EXECUTIVE SUMMARY

PURPOSE
Life has changed significantly since the silent and baby boomer generations were born. Buildings are becoming highly advanced with building controls and automation. These controls can be helpful in some cases, such as energy savings, and even in some instances to increase safety and help seniors. However, often, controls and building interfaces are not well thought out, and some people are losing their ability to control their interior environments, or they are forgetting how to altogether. Due to these advances in controls, people and younger generations use buildings differently; people formerly relied on passive or adaptive comfort strategies to manage interior environments: e.g., opening windows, changing clothing, and using their physical building interfaces to improve their spaces – these simple behaviors to maintain comfort, increase well-being, and save energy are becoming a lost art. To learn from these generations, such as how they lived in buildings, what strategies they used to make themselves more comfortable in the absence of technology, as well as how buildings have changed to automate the occupant out of the equation, we sought to capture stories of their experiences before it is too late. This pilot study implemented qualitative and narrative methods to interview and observe older adults in buildings (homes and senior living facilities) to better understand how the passing of time has changed their relationship with and their interactions within the built environment. This qualitative approach has garnered incredibly meaningful stories, lessons learned, recommendations for lifestyle changes, and more, that will inform future senior living developments in the future.

GOAL(S)
Our team traveled around the Pacific Northwest to meet with seniors and collect stories surrounding their experiences with the built environment. We collected qualitative data from seniors surrounding e.g., occupant well-being, health, socialization, building interfaces, lifestyles across lifetimes, adaptive comfort strategies (and more). Additional topics of investigation included:

- Engage with older adults about their experiences in buildings across their lifetimes to help us better understand and optimize buildings for all types of people, despite age, gender, and location.
- Understand how technology plays a role in older adult daily lives, what they need to know, and how to train them on new systems that have “automated them out” of the equation.
- Understand how building standards (ASHRAE, LEED, WELL, etc.) do not consider senior demographics and needs (e.g., Thermal comfort/preferences, vs senior haptics, and visual comfort – circadian and lighting, lighting sensitivities, lighting code vs senior eyes, etc.)
- Understand how nature (or access to nature) affects the wellbeing of older adults.
- Understand how COVID-19, health concerns, and isolation have affected seniors in buildings – largely isolated for the last year+, how companionship helps them stay sane (pets)?
- Habits/human building interactions: current vs upbringing, Interface interactions,
- Technology and Innovation - building automation, smart home tech.
- Socialization and human interaction - peers, pets, neighbors,
LEADING RESEARCH QUESTIONS

**RQ1.** How do older adults interact with their buildings? Why?
**RQ2.** How do older adults manage their comfort in buildings? Why?
**RQ3.** How have their human-building interactions changed over the course of their lifetimes? Has their ability (physical and or cognitive) to use buildings changed or have buildings changed around them in ways that alter their ability to interact with buildings (i.e., automation)? What are the drivers for those interactions?
**RQ4.** What changes are needed to make these older adults more comfortable, safer, and more satisfied with their building environments or living spaces?
**RQ5:** How does having access to a view to nature, or being in nature, impact older adults...in terms of well-being, comfort and/or building interactions? And why?

DELIVERABLES UPDATES

1. Preliminary Interviews and Focus groups
   a. Completed in August 2021. Shelby Ruiz visited nine senior living communities and one private single-family home, interviewing seniors over the age of 65, to collect stories and perceptions of their building interfaces, living situations, nature, and communities overall.

2. Report of key findings.
   a. A bit longer than promised, but you are reading it! This is outlined with key findings and an abbreviated executive summary page 1-6, and a preliminary draft of a conference paper manuscript with expanded findings and commentary throughout following that.

3. Publication submittal for conference or journal.
   a. Abstract for this project (see purpose statement on page 1) was accepted for the ACEEE Summer Study on Buildings conference proceedings. First draft of this manuscript is due March 21st, 2022, and will be revised until publication in August, 2022.
   b. Appropriate journals are being researched to determine the best fit for a journal publication, ETA journal submission Fall 2022.

4. Two external grant applications.
   a. This has been more difficult to find the right kind of RFP to fit this research and our goals for research than expected. Our current plan is to propose individual work with the companies we collaborated with for this project (upon GCISL’s blessing) to pursue projects related to energy use training, occupant comfort and wellbeing workshops/guides, and overall engagement activities. We additionally see opportunities to train building users on their interfaces (namely thermostats) and other forms of technology.
   b. Potential grant application for indoor air quality in senior living communities with the EPA was not pursued due to application eligibility requirements that we cannot meet through the university.
   c. The ID+CL is also looking into pursuing external grant applications through AARP, Retirement Research Foundation, National Institute for Health, local Native American tribes, and more.

SUMMARIZED KEY FINDINGS

The following key findings are organized into relevant subject matter areas, defined by the data analysis process and filtered to be representative of the company and research institute’s objectives of this study.
COVID IMPACTS
• Many participants expressed fear and uncertainty related to the pandemic, causing several
effects such as loneliness and lack of socialization due to social distancing, anxiety, and a newly
founded responsibility for taking care of others.
• Interactions with others is an aspect of life that deeply affects mental health and wellbeing for
seniors and should not be taken away.

SAFETY
• A story about a fire door closing on a resident during a power outage, resulting in their injury
and decline was shared at a specific community location. While many fire safety codes and
regulations require such features by default, consideration of loitering zones and emergency
support in such situations must be considered by individual communities for these infrequent
but potentially dangerous circumstances.
• Nightly monitored surveillance cameras and security measures would benefit occupant safety,
preventing falls and confused residents from disrupting other residents late in the evening.
• The need to have a stepstool or ladder should be eliminated from apartment designs, even for
petite residents. Accessing a needed storage space, to change a light bulb, or to perform other
simple tasks is a safety liability and can be resolved through the design of accessible and safe to
reach apartment amenities. Additionally, providing support for residents who need help getting
access to their stored belongings free of charge, would eliminate their perception of having to
do it all by themselves.
• Considerations for walker, wheelchair, and cane users in the dining facilities would help reduce
congestion and improve safety in circulation spaces. Walker parking or a mechanism to place
walkers outside of egress paths would improve resident safety and service staff navigation.
• Flexibility in design to accommodate all bodies, abilities, and needs is required, especially when
considering storage, shower and bathing safety, and reach distances.
• Roll in showers with plenty of floor space for an ergonomic seat is a necessity for less able
residents, as are options when it comes to their shower seating, toiletries storage, and
entry/exit path. Shower handles are preferred over fixed shower head for height, reach, and
mobility restrictions.

ACCESSIBILITY OF APARTMENTS, THE COMMUNITIES, AND AMENITIES
• Considerations for ergonomic reach of those in a wheelchair or walker could be designed into
apartments of future senior living communities. Reaching over a hot cooktop or sink to reach
controls and lighting switches is a danger to many, resulting in several participants to stop
cooking or using their kitchens altogether.
• Training occupants of safety features in their kitchen appliances is a safety consideration that
can prevent fires and burns/scalds in many residents.
• Hard flooring materials can be cold and uninviting to many residents more familiar with
carpeted living accommodations. Further, hard surface flooring can pose the opportunity for
residents to lay down rugs or carpets on top of the flooring, increasing chances for trips and
falls. Weighing the benefits provided by hard flooring for cleaning and maintenance must be
balanced with resident comfort and safety.
• Freight and emergency service elevators would be a desirable feature to many participants,
citing public displays of medical emergencies, deceased residents being wheeled through the
lobby, or having concerns about moving in/out of personal belongings in front of all residents.
• For communities with shared laundry facilities, concerns of machine sanitation and accessibility
of laundry services was a concern of many residents interviewed.
OCCUPANT COMFORT: VISUAL, ACOUSTIC, AND AIR QUALITY

- More thoughtful lighting within apartments, in tight spaces specifically, is needed for safe navigation for occupants with low visibility. Lighting under cabinets, in closets, cupboards, and hallways would greatly improve occupant comfort in many participating locations.
- Acoustic comfort was majorly a non-issue in many locations, participants citing incredible amounts of soundproofing from the structure of the building itself. Some concerns in this subject area included not being able to hear alarms or neighboring residents in cases of emergencies. Additionally, sound transfer through ceilings of apartments with hard flooring was the only mentioned issue with sound, although in some cases it has helped identify falls or dangerous situations with neighbors.

TEMPERATURE CONTROLS AND INTERFACES- THE GOOD, THE BAD, AND THE FRUSTRATING

- Thermostat controls must be easy to understand, large enough to see and use, and be reliable to the heating and cooling setpoints established by the resident or community. Explanations and or training for these interfaces would greatly benefit many residents who may be unfamiliar with digital controls.
- Integrated weather predictions and recommendations for clothing, activities, and occupant comfort strategies within a temperature control device would benefit many residents who may not know how to manage their comfort in changing weather conditions.
- Due to the changing climate of the Pacific Northwest and world, air conditioning in the summer is becoming a necessity for the health and safety of older adults in residential communities. Air conditioning as a baseline amenity in future developments is essential.
- Teaching residents how to stay comfortable and safe in wildfire or heatwave conditions would not only make occupants feel safer and taken care of but may result in better health outcomes overall.
- Accessibility of using a window was a documented challenge for many interviewed residents. The placement of window locks or heavy frames were frustrating challenges for many who simply wanted to open a window for fresh air. In newer developments, providing windows placed for cross ventilation would be a great benefit to many residents more familiar with passive comfort strategies than digital comfort controls.

NATURE: HOW SENIORS PERCEIVE NATURE, ACCESS IT, AND APPRECIATE NATURAL FEATURES

- Outdoor spaces, whether private balconies or public courtyards, decks, or rooftops, must consider residents of all physical abilities, and as such, ensure safe navigation for those on foot or in wheelchairs.
- Gardening spaces and plant life is desirable for many residents, as it helps connect them to hobbies or activities they participated in before moving into a senior living community.
- Protection from the elements, such as sun, rain, snow, wind, and otherwise, is essential to making outdoor areas a safe and equitable environment for all visitors. Further, measures to protect public and private outdoor spaces from noise, pollution, and other distractions that come with city living.
- For many, having a view of natural elements (i.e., water, lawns, trees, flowers, etc.) is essential to their connection to the outdoors. Providing positive and relaxing views of the world surrounding the community can provide a great positive impact on resident outlook and wellbeing. Reducing distractions from city noises and smells is essential to the utilization of these areas.
Privacy from neighboring residents and buildings is an important element to consider when programming a new senior living community to ensure all occupants feel safe in their private residences.

Communities placed in cityscapes without significant access to natural spaces must consider providing external opportunities to access natural spaces outside the community, or rather, provide extensive options for residents to find peaceful areas with a focus on natural experiences on site.

COMMUNITY FEATURES AND NEEDS FOR THE FUTURE

• Availability of engaging and intellectual activities would be highly attended by residents who find games, cards, and other sponsored programming is not interesting to all.
• Inclusion of technology training and equipment would benefit the occupants who find navigating the digital world a challenge. In-person help, and technology-based classes/activities would benefit many.
• Availability of programming spaces such as lecture rooms, gathering halls, and theatres must be large enough for all if not most residents of a community to attend.
• Secular religious or meditative spaces were requested at several communities, showing the need for a designated area of quiet reflection outside of one’s private residence.
• Alternative dining experiences that take less time to attend was a common request. This would land somewhere between the common fine dining experience that takes hours to attend, and the pickup/takeaway option still provided after the COVID-19 lockdown. Many residents want to attend meals and would compromise with a limited menu for faster dining times.
• The location and amenities surrounding a community was noted as a primary reason many residents chose to live where they do. Making access or transportation available to residents to utilize the features of their external community would help seniors feel more integrated to their local community and provide further active living engagement opportunities.
• Busy streets and unwalkable locations (i.e. on a hill) are unfavored features of a senior living location.
  For those still choosing to drive with their own vehicle, the layout of the parking garage facility must be easy to navigate, well lit, and provide adequate accessible parking spaces. Driving can provide a great sense of freedom to residents, and as long as they are safely able to drive, accommodations and accessible rates for senior drivers would be something to consider in future business models. Further, requests for electric vehicle charging stations for residents will be something to consider as EV cars become more common.

To read the drafted manuscript that resulted from this project, please continue to page 6-33.
GENERATIONAL RESILIENCY: Learning from and Designing Better Buildings with and For Older Adults
Manuscript draft prepared by Shelby N. Ruiz, Sierra M. Rothlisberger, Julia K. Day

ABSTRACT
Life has changed significantly since the silent and baby boomer generations were born. Buildings are becoming highly advanced with building controls and automation. These controls can be helpful in some cases, such as energy savings, and even in some instances to increase safety and help seniors. However, often, controls and building interfaces are not well thought out, and some people are losing their ability to control their interior environments, or they are forgetting how to altogether. Due to these advances in controls, people and younger generations use buildings differently; people formerly relied on passive or adaptive comfort strategies to manage interior environments: e.g., opening windows, changing clothing, and using their physical building interfaces to improve their spaces – these simple behaviors to maintain comfort, increase well-being, and save energy are becoming a lost art. To learn from these generations, such as how they lived in buildings, what strategies they used to make themselves more comfortable in the absence of technology, as well as how buildings have changed to automate the occupant out of the equation, we sought to capture stories of their experiences before it is too late. This pilot study implemented qualitative and narrative methods to interview and observe older adults in buildings (homes and senior living facilities) to better understand how the passing of time has changed their relationship with and their interactions within the built environment. This qualitative approach has garnered incredibly meaningful stories, lessons learned, recommendations for lifestyle changes, and more, that will inform future senior living developments in the future.

INTRODUCTION
In 2017, the community over the age of 65 consisted of nearly 15% (47.8 million people) of the United States population, growing 1.6 million in number from the year prior (U.S.Census, 2017). This population of Americans over the age of 65 is expected to nearly double by 2060 to 95 million, increasing their share of the American population from 16% to 23% (Mather et al., 2015). Nearly 40 percent of seniors over the age of 65 have at least one disability or have difficulty in general movements such as walking and seek individualized care options as their conditions progress (He & Larsen, 2014; U.S.Census, 2017). Generally, older adults live in assisted care communities because they report needing assistance with more than one daily activity or Activity of Daily Life (ADL), sometimes as result from injury but more often product of a combination of health-related concerns.

The concept of senior living is relatively new; when Medicare and Medicaid were enacted in 1965, elderly housing was primarily considered institutionalized care. With progress in legislation and industry investment, a shift toward effective and inclusive care options has been steady (Wilson, 2007). The baby boomers are considered to be more active and independent, more educated, and wealthier than previous generations (Medina et al., 2020). As the Baby-Boomer generation ages, the senior care industry faces the challenge of meeting the needs and sheer number of incoming adults in need of care in the future as the oldest of them are beginning to consider senior living as an option for end of life care (Anderzhon, 2012). The residential model that includes social programming, meals, activities, and overall housing requirements seemingly covers the foundational needs of older adults but should be considered with care across multiple disciplines to address the expectations of the future residents (Anderzhon, 2007; Spitzer et al., 2004).
For seniors, as physiological and situational barriers become more prominent in daily life, retraction an active quality of life is observed (Noelker, 2001; Taira & Carlson, 1999). There are well known risks of isolation in the senior population which include higher rates of physical decline (Perissinotto et al., 2012), as well as mental illness and depression (Mehta et al., 2002; Rodakowski et al., 2016). A higher level of situational and perceived isolation is common in older-adults, due to their proximity to relevant activities and lessened physical abilities (Cornwell & Waite, 2009).

Additionally, it is important to recognize that life within the built environment has changed significantly since the silent and baby boomer generations were born. Buildings are becoming highly advanced with new control types and automation which can be helpful in some cases, such as energy savings, and to increase safety and help seniors maintain comfort. However, often, controls and building interfaces do not consider the user experience of those with mobility or cognitive impairments, and some people are losing their ability to control their interior environments, or they are forgetting how to altogether.

Due to these advances in controls, people and younger generations use buildings differently. People formerly relied on passive or adaptive comfort strategies to manage interior environments: e.g., opening windows, changing clothing, and using their physical building interfaces to improve their spaces — these simple behaviors to maintain comfort, increase well-being, and save energy are lost in automation of buildings and advancements in controls, and are often discouraged, as to not disrupt the sensitive building control environment. Older adults may have grown up in an age where these passive strategies were their only mechanism to achieve comfort, as central heating and cooling or modern lighting were not common. Building occupant behaviors play a significant role in the energy use and comfort within a building, especially in multifamily housing situations like senior living communities (Maruejols & Young, 2011; Ritter, 2012; Yu et al., 2011). Conflicts between the passive strategies of managing comfort older adults are familiar with and the highly automated buildings today, may result in wasted energy or resources as seniors are not being trained on how to keep themselves comfortable in an energy efficient manner within the new buildings that they move into for senior care.

This report presents findings of a small-scale study of nine senior living communities in the greater Seattle area to better understand the way that older adults use their buildings, adapt to changing thermal, visual, and environmental stimuli, and their perceptions of building interface usability. This study utilized one-on-one interviews, focus groups, and tours of senior residential facilities and private apartments. This research aims to better understand what is and is not working for older adults in these residential communities, as well as seek opportunities for immediate and long-term improvement for the senior living industry. While senior living is a rapidly growing industry, much has changed in the architecture and design world that may surpass these older-adults’ comforts in using technology, relying on automated interfaces, or hinder their ability to manage occupant comfort in their own home.

Findings point to several opportunities to gracefully help seniors navigate the changing buildings around them (and the technology integrated within them), improve their overall occupant comfort in the places they spend the most time, increase accessible and equitable access to the outdoors, and steer future senior living developments for the next generation of older adults. Additionally, because occupant behaviors play such a significant role in the energy use and occupant comfort within a building, methods of training building users in energy-efficient comfort strategies could lead to cost, satisfaction, and operational benefits to the senior living industry.

BACKGROUND (LIT REVIEW)
The global growth of urbanization affects society in many ways, often prevalent through the appearance of new challenges to human health and well-being. As expected, the most affected are vulnerable populations, such as children and the elderly (Kabisch et al., 2017). For the elderly, a sedentary lifestyle typically heightens both mental and physical health concerns, furthering cognitive decline and feelings of isolation. Many of these concerns, however, can be easily mitigated by certain design practices to increase comfort and social ability in senior living homes.

Although the population of the elderly is increasing, they are often underrepresented (Fatima et al., 2020). Their ability to walk and lead an active lifestyle, also affecting social life, depends on a range of factors in physical and cognitive health. A study in 2020 by Joo Young Kim investigated the association of spatial configuration with social interaction for elderly using syntax and social network analysis, finding that the accessibility of residential spaces for elderly individuals in social housing apartment complex has a strong effect on the strength of the social network with neighbors (Kim & Kim, 2020). It is important for designers to consider accessibility in senior living homes not only for the effect on physical comfort and health, but also for the effect it has on social interactions affecting mental health.

Levels of accessibility also relate back to comfort, and research from Visual Comfort in Elder Care Facilities: Promoting Environmental Gerontology Theory set visual comfort design guidelines for elder care facilities. Because elderly people spend most of their time indoors, indoor lighting design and visual comfort are vital for safety (Edrees et al., 2021). A set of preliminary guidelines were proposed – helping to fulfills physical and psychological needs of the elderly, especially with daylighting aspects, in turn promoting social sustainability. These guidelines for designers included, but were not limited to:

- The designer should consider the following points when applying colors to achieve visual comfort, such as using contrast between dark and light hues and when using pastel colors — not preferable — consider not shifting from one color to another, especially in transitional spaces. In addition, the designer should use saturated and rich colors and provide ambient lighting, task lighting, and dimmable lighting to enhance color renders and perception.

Recognition and consideration of visual and acoustic comfort is crucial in providing healthy environments for the elderly, especially since residents in long-term care often suffer from symptoms of circadian disruption including depression, difficulty sleeping, frequent daytime napping, and loss of cognitive ability (White et al., 2013). Regular patterns of light can help to mitigate these symptoms, although it has been found that nearly half of the senior population often keeps blinds closed to avoid glare, yet they often remain closed due to the inconvenience to reopen them (Kim et al., 2021).

Window opening and clothing adjustment proved to be the first strategies they adopt, before they resort to an energy consuming strategy (Giamalaki & Kolokotsa, 2019). This seems to often be because of the difficulty of interface operability, whether that be windows, temperature controls, or even kitchen appliances. According to a study by Bill Bordass that focused on finding the balance between improving comfort and reducing energy consumption, interfaces need to be fully understood to be functional, especially for the senior population:

Designers must desist from swamping people with over-complicated or unnecessary features and think more about making systems easier to manage and use and providing suitable feedback on system performance. The trick is to think of the building’s passive, active and human interface features as one complete system, not as unconnected entities... Better-
configured controls offer great opportunities to improve health and comfort and save energy in both existing and new buildings. (Bordass et al., 1993).

This concept from senior citizens manually altering their environment may also be a result of aiming to keep energy costs low in their childhood, but these habits have become more technologically motivated as generations age. A holistic review on residential comfort reveals that habitual actions play a main role in residential expenditure and that environmental and technological cues shape levels of comfort (Ortiz et al., 2017). Due to the absence of comparable technologies and little technology experience in the target group, the article describes development of an innovated lighting system aimed at increasing independence and well-being of senior adults, especially while examining the rising of global temperatures. Ortiz’s review stated the following:

> It has been estimated that in less than one generation, expectations of comfort via central heating and air conditioning have become a norm. However, it has been proposed that energy savings can be achieved while still maintaining a high quality of life and wellbeing provided by the energy consuming services. Recent findings show that most of everyday behaviors are guided by habits, especially when interacting with technology since technology acts as a contextual cue that triggers the habit. (Ortiz, 2017. p. 5)

If operable interfaces for older adults became widely available, mitigating these habits of manual alterations, institutions may be more desirable for seniors instead of preferring to age in place as they do now (Portet et al., 2011), allowing seniors to keep control of their environment and activities to improve their autonomy, health, well-being, and their feeling of dignity. Control management systems can create high levels of comfort, but they are often too complex for the average person – especially in consideration of the elderly (Bordass et al., 1993; Bordass et al., 2007). A well-designed environment, with considerations of all levels of comfort, has a strong ability to have a positive impact on improved resident wellness (DeGroff, 2016).

As mentioned before, it is crucial for senior residences to support social interaction between residents, but arguably an even greater factor is the support and presence of green spaces. Perkins Eastman, a global design firm dedicated to the human experience, defines biophilic design as the recognition of our connection with nature through water, earth, air, and plant elements – with highlights of both near and distant views (Chmielewski & Dickey, 2016; Perkins & Hoglund, 2013). Valuing differing types of these natural interventions, such as including garden and outdoor spaces, nature inspired patterns and sensory strategies, as well as circadian-managing lighting tactics, can help attribute to an increase in overall occupant wellbeing (Noelker, 2001; Pardasani & Thompson, 2012; Wright & Wadsworth, 2014; Wright & Lund, 2000). Thoughtfully created green spaces have potential to build community connections and can become a conduit that feeds the process of healthy aging in elderly people (Wright & Wadsworth, 2014; Wright & Lund, 2000). Depending on the person and circumstances, safely experiencing the outdoors can be any physical activity from walking a trail, to deeply contemplative time alone, such as sitting in a garden, watching the clouds go by, or observing animals scurry outside. Gardening, and the act of experience nature through green spaces specifically allocated for seniors creates “multi-dimensional phenomena” to occur within the minds and bodies of aging seniors and should be respectfully considered as healing spaces with a design program (Wright & Wadsworth, 2014).

It is already recognized that spending time in nature is beneficial to the stress recovery and restoration process (Detweiler & Warf, 2005; Ulrich, 1984; Ulrich et al., 1991), but for seniors this need is magnified and often underprovided. For the elderly, having a relationship to the built environment can determine
their health (Takano et al., 2002; Wright & Lund, 2000), emotional wellbeing (Beute, 2014; Velarde et al., 2007), and longevity, despite other inequalities, where green space is provided (Bratman et al., 2019; Hartig, 2008; Mitchell & Popham, 2008; Noelker, 2001). Amongst elderly people, walking and gardening tend to be the most popular at-home leisure activities and provides needed stimulation, as many older adults rarely meet the recommended amounts of exercise and activity (Ashe et al., 2009; Wang & Macmillan, 2013). The role as a designer is to evaluate possibilities of integrating the natural environment with the built environment to create meaningful interactions for people throughout the aging process.

Social isolation and decreased levels of activity are noted both in observations and in the literature, all in some capacity noting the lack of access to once enjoyed outdoor activities and the benefits it provides (Ottosson & Grahn, 2005). In several ways, the human need to interact with nature can be met by taking frequent walks outdoors or keeping a houseplant. Studies attributing views of nature and daylight (Beute, 2014), horticulture programs (Ho et al., 2017), wander gardens (Detweiler & Warf, 2005; Ottosson & Grahn, 2005; Weatherby & Moriarty, 2006), and other biophilic spaces to senior health and wellbeing are becoming more common, relating the health benefits of nature to accessible opportunities for an at-risk demographic (Bossen, 2010).

While access to nature is an important aspect of senior living homes, it is also one of the factors affected most by the COVID-19 pandemic. Originating in China, COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 and has led to nearly 450 million cases and six million deaths worldwide (World, 2020). To slow the spread of the virus, governments have implemented the practice of physical distancing, which includes isolation within the home with limited time spent outdoors (Soga et al., 2021). According to a study on the importance of nearby nature and the impacts of the pandemic by Masashi Soga:

> The COVID-19 epidemic has created a stressful environment for most people around the globe (Maani & Galea, 2020). We have demonstrated that the experiences of nearby nature (both less and more immediate) can help prevent poor mental health during such a stressful time, or at least, not make it worse. We found that the degree of self-esteem, life satisfaction, and subjective happiness was all positively related to the frequency of green-space use around the home and green views through windows at home. We also showed reduced levels of loneliness and depression and anxiety in people who use greenspace frequently and live at a home with a green view.

Looking at these situations put in place to control the pandemic, as well as certain sections of the population, some groups are clearly more vulnerable to the effects. The elderly already have predisposed risk factors for health, but they also have different psycho-social vulnerabilities (Banerjee, 2020a). Social connections are vital during a public health crisis, even more so when “ageism” becomes a tactic of greater marginalization of the senior population. Representation and positioning of older people in social media began in COVID-19, with hashtags such as #BoomerRemover – contribute to feeling of worthlessness in older people. Lower mental health levels make them particularly vulnerable to a range of negative health and social outcomes, so acknowledgement of this social isolation and loneliness is essential to combat the negative impacts of the pandemic (Jackson & Brooke, 2020). There is an urgent need to support older people during this crisis, even with existing restrictions. Ensuring basic needs will help them to stay free of loneliness, grief, anxiety, and abuse, as increased suicidal ideations and attempts consequent to stress have increased greatly (Banerjee, 2020b).
Supporting our senior population is an individual choice, but it is pivotal in sustaining the rest of the population as well. A quote from Sinead Donnelly in his article titled “The elderly and COVID-19: cocooning or culling — the choice is ours”, states:

> Discrimination of care based on age is immoral and unethical, even when unintentionally not providing environments to help a group flourish. Ethics requires that moral agents act to prevent preventable harms, that we recognize the equal worth of all members of society and that we take special care of the most vulnerable among us (Donnelly, 2020).

It is with this background on relevant topics to this study, that a picture can be painted of the unique challenges and changes to be made to the senior living industry to improve future community developments. The next sections of this report describe the methodology, analysis, and preliminary findings of this interview study.

**METHODOLOGY**

**PARTICIPANTS**

Several types and sizes of senior living communities were visited to investigate a wide array of living communities for older adults, and the ways that their built environments may shape their building interactions. Communities were recruited from existing relationships and contacted via email or phone to confirm availability and ability to support this research activity.

Participants in this study were residents of living communities for older adults, were over the age of 65, and were cognitively able to answer questions and understand the consent process. The researchers directly communicated with and sought participants from the recommendation or suggestion of living community staff and members and used a selective recruitment method, to ensure that participants are cognitively sound and willing to sit for the duration of the interview. The researchers considered the effects of cognitive decline in older adults in participation of this study, and as such, excluded participants who may not be able to recall stories as accurately as they occurred or became upset, agitated, or confused through the interviewing or focus group procedure.

Based on the information provided, oral and/or written consent was collected from participants at the point of interview and had the opportunity to ask any questions regarding their involvement in the study at the beginning of the discussion. Participants were notified at the beginning of each interview that they had the liberty of answering or not answering the questions as they were asked, at any time.

In general, participants of this study have experienced living in many types of buildings and eagerly shared stories of how their buildings (and human-building interactions) have shaped lifestyle choices, personal comfort, and overall wellness.

**DATA COLLECTION**

Research data was collected through interviews and focus groups of older adults in their communities. We utilized a semi-structured interview approach since each participant would be interviewed one time (Bernard, 1988). This approach allowed us to collect specific data but also provided flexibility to explore issues about themes as the participant raised them, and these conversations were pursued in a person-by-person basis. The semi-structured interview prompts further allowed structured follow-up of discussion points when needed. Depending on the community and their in-person interactions policies due to the COVID-19 pandemic, interviews were held in person in either a private area of the participants community center or within the participants private residence. Interviews were audio recorded for transcription, and information was collected physically on interview companion documents and transcribed for use in data analysis. This companion document collected information on participant
demographics, notes from the interview conversation, as well as researcher observations regarding participant physical and cognitive wellbeing at the point of interview.

DATA CLEANING
Upon return from Seattle, companion documents were scanned, transcribed, and data was transcribed, removing participant identities from the transcripts, and then coded to unique identifiers. After transcription, data was be cleaned to remove incomplete or unclear responses, and stored securely for analysis, as the data collection period took place over the series of several months and locations. Once all data was collected, transcribed, and cleaned researchers analyzed the interview responses to identify themes, lifestyle behaviors, stories, and attitudes using several analysis methods.

ANALYSIS
AFFINITY DIAGRAMMING AND CODING
Using the Kawakita (1982) and Haskins Lisle et al. (2020) models of establishing relevant themes and codes through the process of affinity diagramming or the KJ method, key topics were derived from the cleaned interview transcripts by using three sample interviews (Haskins Lisle et al., 2020; Kawakita, 1982). Three researchers used the three transcript documents, manually marking up each document with potential codes that emerged from the conversation. These outcomes were modelled in an online concept board using digital sticky notes and sectioned subject areas, resulting in a diagrammatic model to base the following steps of coding. From this process, researchers were able to determine relevant codes and subjects to identify in following rounds of coding, and started the process of coding all interviews, companion documents, and other collected materials from the list of codes provided by the affinity diagramming process.

| Sort Interview Documents | Keeping in mind geographical differences, interview notes and transcripts were sorted by community. |
| Sort Pictures | Noting trends of interfaces such as temperature controls, pictures were sorted by community and theme. |
| Evaluate Interview 1 | Individual interview analyzed by team, making note of ideas and feelings from participants. |
| Affinity Diagramming | Notes from previous step created into affinity diagramming – i.e., grouping themes related to questions. Pulls from affinity diagram, codes and subcodes were input into NVIVO software. |
| Creation of Codes | Each interview read thoroughly and sorted manually into codes as read. |
| Coding: Round 1 | Keeping in mind the main research questions, participant quotes were directly sorted into these “nodes”. Focused directly on likes and dislikes of communities, safety, effects of COVID-19, and temperature controls. |
| Coding: Round 2 | Cross referencing of our own findings with existing studies and conclusions. |
| Coding: Round 3 | |
| Literature Review |

Figure 1. Step by step of the data analysis process

RESULTS
This study found that key concerns that emerged from this research include impacts of the COVID-19 pandemic, safety and accessibility, occupant comfort, availability of nature access, technology, and community features. These topics are further abbreviated in the following section titled key findings and are expanded here below with topic synopsis and direct participant quotes included.

COVID-19 PANDEMIC IMPACTS

MENTAL HEALTH/SOCIALIZATION: Certain sections of our population are more vulnerable to the effects and situations put in place to control the pandemic, especially the elderly – considering they already have predisposed risk factors for health, as well as different psycho-social vulnerabilities. Many expressed fear and uncertainty related to the pandemic, causing several effects such as loneliness and lack of socialization due to social distancing, anxiety, etc. Though stated it was recognized staffing from the communities were trying everything they could during lockdowns, residents showed great sorrow about COVID affecting daily life. Interactions with others is an aspect of life that changes mental health and wellbeing greatly for seniors and should not be taken away.

Quotes regarding COVID-19 concerns:

“I am paranoid about the variants and seeing how things are developing, and it’s just yeah, so the lockdown was very difficult for everybody, but I had my book so that I had something I could do in the apartment. I, I felt so sorry for those who didn’t have something they could do in the apartment.” - ALIMI_01

“I think that the isolation was not very good. They tried they did everything they could here, had all sorts of programs on television. But I don’t know, there’s just something about having contact with face-to-face interactions. All right. A lot has changed in the last 18 months.” - UH1_01

“Oh well of course we couldn’t do anything. We were locked down. We were in our rooms for months. Not the only people we saw were the servers. And so that was all just so happy when we could start playing games again and interact. And I think I think all people, not just all people, we need interaction, and we need physical contact with other people.” - MGK_05

“I think everything is all different now. They’re much more separated. I don’t see children anymore or even much outside of this pandemic has changed things. So it’s very hard on us being kept away from so many things. People don’t live close to the families anymore, and younger ones don’t really have much relationship with older people. They deserve all kinds of praise and kudos for the care they gave us when they were all quarantined in our rooms, supplying meals and bringing popsicles to little bags of popcorn.” - GTS_01

“I felt constrained, I guess, you know, because I lived in we lived without responsibility, you know, just our responsibility for a long time. And I and it wasn’t and we had to sign up for meals and all those kind of things and the. And the and then, of course, when the pandemic came, they closed this off and put us in a room and said, stay here.” - MGK_01

SAFETY

SURVEILLANCE: A handful of participants requested for cameras in public areas and hallways to be monitored for falls and wandering residents. Specifically at nighttime to prevent neighbors from handling confused residents in the middle of the night or catching a fall. There were stories told of
residents being woken up at night to a neighbor or fellow resident in distress, confused, or scared for their safety, which should not fall upon other residents' responsibilities.

Quotes regarding security concerns:

“I know they don’t want cameras, but I believe we need cameras in the hallways. You never know, no matter how secure your building is, people can get it if they want to.” -MGTRU_07

STORAGE: Needing a stepstool to reach the limited amount of storage in an apartment creates a dangerous opportunity for someone to injure themselves. The study collected numerous stories of residents themselves or a friend needing to use a step stool or ladder to perform simple tasks like replacing lightbulbs, reaching essential storage spaces, or to even put away laundry in closets. In spaces where storage is a necessary commodity, making said storage accessible and safe to use must be considered.

Quotes regarding storage concerns:

“My neighbor will only use her lower cupboard’s because some of the cupboards are too high and you can’t get up there without a stepstool.” -MGK_06

“I don’t know why they did it. There’s a shelf area and there should be for why there should be three wide, three or four wide shelves. Instead, they have narrow shelves like this with this much space above. What on earth are you thinking? We’re going to store there where if they made them this high and wider, we could use it to store towels and things on. And I don’t understand what the purpose of design is, so I’m too lazy, I’m too lazy, and to cheap, to pay them to come and put larger shelves in which they would do. But some people have kind of built it up themselves.” -MGU_01

WALKERS: Described by participants as the “walker congestion issue,” specifically in dining rooms and public spaces, walker parking/valet suggestions were offered by members of the community to get the mobility devices out of egress paths and reduce congestion for circulation/service staff in dining areas. As more residents rely on mobility devices such as walkers, an allocated area for them to be placed or better planning in tight circulation areas to avoid trips and falls from residents and staff. Additionally, concerns for walker mobility in carpeted areas and doorways was a significant safety issue.

Quotes regarding walkers:

“And for and for example, on the second floor by the elevators is the type of carpet that should never be used in a facility like this because it’s got a pile. All right. And that’s difficult for people with walkers and wheelchairs to go over. It should always be it should always be a tight, low, low pile like this right here. -ICB_01

“There’s no place for a walker in the dining room, you know. Yeah, and I think dining room should be designed for and to accommodate people who come in. And what we do is put it over on the side area or next to a table and. The problem with what they do here, I’m afraid, if they had a fire and people had to get out, you know, there’d be these walkers all over the place.” -MGK_06

“I think there’s something like more than half the residents, you know, have walkers and parking walkers during the dining area. It’s it’s just not designed right.” -MGU_01
ERGONOMICS: Showers, shelving, drawers, and cabinets need to be more accessible to those who are extraordinarily petite or tall, lesser or higher mobility, able to or unable to bend, and for those with vision impairment. Flexibility in design to accommodate all bodies, abilities, and needs is required, as many residents have downsized from full-sized single-family homes and have significant need for storage of personal belongings and heirlooms.

Quotes regarding ergonomics concerns:

“I think they’ve done some very stupid things for people who are seniors, and the high cabinets are one of them. I realized they got it up there and so I bought a two-stool step thing. But it’s really dangerous. They really shouldn’t have them because if they didn’t have these high cabinets and I don’t even use the ones over the refrigerator because even with my stepstool, I couldn’t reach it. It’s just stupid. It’s just asking for falls. And we have somebody who was climbing up on a chair or something to do something on top of the fridge and fell and was still, I don’t know, recovering.” -MGU_01

“I open the door because the windows are a little harder for me to open the balcony on the balcony.” -ICB_03

SHOWERS: It was noted several times that a variety of accessibility options available across communities and across rooms is required for safe and easy bathing for residents. While some people want bathtubs, others cannot step over the tub wall to use the shower. Roll in showers with plenty of floor space for an ergonomic seat is a necessity for less able residents, as are options when it comes to their shower seating, toiletries storage, and entry/exit path. Shower handles are preferred over fixed shower head for height, reach, and mobility restrictions.

Quotes regarding bathing concerns:

“The shower is not well done. The shower has a great big little place to sit on in from. But I need to sit in the chair, and so that means that there really is a room, very much room for my feet, because that square thing, it gets in the way and I sit in the back of the shower or the showers here in the square thing, you were supposed to sit on it. And I tried that for a while. But it really, I needed really a chair with arms and all that kind of stuff. I think a really intelligent designer needs to work out a safe shower that people can use well and people with some difficulties can use well, I think that would really be a big help and. I’m trying to think if I want more handholds in my apartment, I don’t know if I do necessarily, but with balance issues, I think you need to think about people who have balance issues, finding help for them to make their lives safe and comfortable…” -ICB_03

“There’s absolutely no shelf for anything in the bathroom, so there’s a seat because it’s a big shower, it’s a seat, I just keep the seat down person personally. That’s where I put my stuff. Because there’s a tiny little shelf about this wide. And the only thing you could put on it would be a bottle of shampoo that you get in a hotel. Oh, so it’s just little things like that that they didn’t think of when they designed that they thought of the big stuff, but not the little little things.” -MGU_01

ACCESSIBILITY

REACH: The range of reach for those in a wheelchair or using a walker (only able to use one hand at a time) is limited and considerations to place necessities within their reach at a reasonable height is important. Comments included the ability to reach across the stovetop to control the burners, and fear
of hurting themselves. Others commented that digital interfaces on the front of a stove can be accidentally bumped and cause fear of fires.

**HARD FLOORING:** There are pros and cons of hard vinyl flooring; they are easier to clean and maintain as well as less opportunities for allergens or dander buildup, however, sound transfer and reverberation increases, hard surfaces are prone to increased feelings of coldness, increasing resident desire to lay down rugs (tripping hazards) and may increase the risk of spills and slips if wet.

Quote regarding flooring concerns:

“I walked in and it was like with this carpeting when I saw it. I just want to live here. If the whole thing had been this dark, cheap looking flooring, I’m not sure I would have felt that. And the other thing about it is that people are going to put rugs in and then you put rugs in and you trip. So I am not thrilled about this move to hard flooring right now.” -MGU_01

**ELEVATORS:** Private access for medical professionals and freight needed in some locations. New residents moving in and having their belongings carried through the lobby is not only unsightly for others, but to some, an invasion of privacy as their life possessions are paraded through the building. Additionally, several participants commented on the worry and discomfort that happens when a fellow resident is carried out of the building on a gurney through the main lobby for everyone to see.

Quotes regarding elevators:

“I would I wish they had a freight elevator here because I hate to see people taken out on the gurney from the lobby.” -MGK_05

**LAUNDRY:** While at times unreasonable or lack of utility connections exist, there were concerns in some of the communities for convenience and sanitation reasons that in-unit laundry services would be appreciated. Sharing dryers specifically was a concern if previous users had not completely cleaned their laundry there could be fecal matter residue in the machines. This may also be an issue of high-efficiency machines that use less water or older inefficient equipment that do not properly rinse and clean laundry to the standard of resident expectations.

Quotes regarding laundry:

“I would have loved the washer dryer, my unit actually I told Justin the other day because I have a closet, which is my linen closet, and it looked as though this would be perfect for stackable washer and dryer.” -MGTRU_07

**OCCUPANT COMFORT**

**LIGHTING:** More lighting is needed in general, but specifically in closets, cupboards, and smaller spaces. Under cabinet lighting and in-drawer/cupboard lighting would help those with low visibility, as would safety lighting or nightlights in some areas. Color tuned lighting options could benefit circadian function, as several participants commented on the intensity of the fluorescent bathroom lighting and going to the restroom at night in the dark as to not awaken themselves suddenly. Other instances cite poor placement of overhead lighting in unnecessary areas. Overall, the consensus that thoughtful placement of light, and more of it, would benefit most cases.

Quotes regarding lighting:
“You need bright light at times to see things and navigate safely.” - ALJMI_01

“...but I can’t see it in the dishwasher because it’s so dark and it’s black inside. And I need to light something lighter and the contrast... I think that would be and the countertops and that dishwasher thing that I mentioned is really that one has really become suddenly here. That is a big problem.” - ALJMI_03

“Yeah. I’m not thrilled with the lighting in my living room, quite frankly. Yeah. It’s sometimes especially in the winter, I turn the light on in the kitchen and then the light on, which is an overhead light camera around in the living room. But it’s hard to get to. I’ve you know, I have a lot of light because I need good lighting to read. And just to see, in general, I don’t like it to be dark. In the kitchen, it’s fluorescent, which I’ve never. Yeah, I’ve always found that hard, you know, even in an office or what have you. Harder on the eye.” - MGK_02

**ACOUSTICS:** Acoustic comfort was majorly a non-issue in many locations, participants citing incredible amounts of soundproofing from the structure of the building itself. Some concerns in this subject area included not being able to hear alarms or neighboring residents in cases of emergencies. Additionally, sound transfer through ceilings of apartments with hard flooring was the only mentioned issue with sound, although in some cases it has helped identify falls or dangerous situations with neighbors.

Quotes regarding acoustics concerns:

“But I am just astounded that this this building is amazing because we do not hear anything. And I have questioned I’m extremely sound asleep and have slept through things that I absolutely should not have. And but I have questioned if I would actually even hear announcements and alarms kind of thing if we needed to escape.” - ALJMI_03

**INDOOR AIR QUALITY/ENVIRONMENTAL QUALITY:** Potentially affected by the difficulty of operating windows, rooms become very stuffy for residents, especially during summer months as temperatures rise in western Washington. Many choose to crack windows when accessible, or even leave their door connected to the main hallway open, despite requests from staff to leave shut for safety precautions. Assistance or easier to open windows would be of great benefit to residents to increase indoor air quality, which in turn may affect physical health.

Quotes regarding IAQ concerns:

“I take the temperature down to sixty-eight at night and I open the window because I love the fresh air. And then in the morning I take it up to 70 and it stays there all day. Sometimes I put it up a little if I’m feeling chilly. OK, but you know, it’s not a perfect system. It’s a little slow to respond but it’s better than not having it.” - ALJMI_01

**TEMPERATURE CONTROLS AND COMFORT**

**THERMOSTATS:** Many participants of this study commented on the unreliable and inconsistent thermostat controls in their private residences. Many were not sure if they work, never understanding why or when it would start heating or cooling based on their temperature setpoints. Many participants also lamented about the small screens, buttons, and otherwise challenging interface controls. Additionally, with lack of instructions or a manual on using and programming their temperature control interfaces, many were left to their own devices of asking neighbors or family on how to simply use their
control stations. Further, non-backlit displays are difficult for this demographic to use, especially those with poor vision or appropriately lit apartments.

Quotes regarding thermostat concerns:

“I take the temperature down to sixty-eight at night and I open the window because I love the fresh air. And then in the morning I take it up to 70 and it stays there all day. Sometimes I put it up a little if I’m feeling chilly. OK, but you know, it’s not a perfect system. It’s a little slow to respond but it’s better than not having it.” - ALJMI_01

“There’s something to be said for large buttons in a senior living facility for large controls, and it seems like that’s pretty pervasive throughout a lot of that complaints.” - ALJMI_01

“I guess one area I’m not sure how it works, and that’s the cooling system or the air conditioning. And I’m not sure just how that does work. And I’m not sure if we have any control over it.” - ALJMI_03

“…either my body has changed or something. It keeps it at seventy-four, which feels comfortable to me. But that used to be too warm. I mean seventy to seventy-two was kind of where I wanted to be, but I was fine between 68 and 72. But now it’s 74 is as cool as it gets, but I feel quite comfortable there…” - GTS_04

“…it has the regular old Honeywell type thermostat. And they are terrible because, for example, in the heating season that I can if I turn the temperature to 70, it’ll typically go to seventy-five or seventy-six before it turns off. So I rarely use my base board heater because I can get far better control with a portable heater…” - ICB_01

“One of the most challenging to it in this this is not only in my apartment is our thermostat, but you also know, control of the thermostat. The thermostat is designed so that people can’t read it or understand it. Why new residents just get so frustrated. It took me a year, a year to finally meet to me to finally figure out what is what. I live with what is the most comfortable and we’ve had previous engineers or maintenance men here who agreed that it was a poor design and to see the temperature, it’s this microscopic dot and I must hold it down with the correct so I can see really. Right. But I have to use a magnifying glass and a flashlight to see this little green dot going up and down.” - MGU_02

AIR CONDITIONING: The 2021 heat wave was a scary time for many residents without air conditioning or knowledge on how to keep themselves cool. Many resorted to installing small air conditioning units, loitering in public conditioned areas in the community, or leaving the premises all together to escape the discomfort at family residences of cooling centers. Retrofitting central air-conditioning is not possible in many instances but providing residents the ability to stay comfortable in such circumstances, as a basic amenity, is a health and safety necessity. Every individual having a window unit air conditioner may result in higher electricity and maintenance costs than would floor by floor retrofits or high efficiency split systems in each apartment. Further, providing resources and guidance for residents on how to stay cool without such systems is an opportunity for occupant training in the future.

Quotes regarding air conditioning:

“So they’re going to need air conditioning. So I know retrofitting is expensive, right. But everybody buying their own individual air conditioners and running them all day is more expensive. Long term, it’s not sustainable. So I think they have to start looking into, you know, places like this that have been fine, that aren’t going to be fine anymore.” - MGTRU_03
“...what I like about my apartment and talking about heat is that the heating and cooling unit is toward the front. And so [MGU02] gets it in her apartment and then I get it goes on the other side. It goes into the front bedroom. The back bedroom doesn’t have any. So it’s got a little electric heater thing, which I can which I can control. And it’s real easy to control. It doesn’t do air conditioning but does heat.” -MGU_01

“I guess one area I’m not sure how it works, and that’s the cooling system or the air conditioning. And I’m not sure just how that does work. And I’m not sure if we have any control over it.” -ALJMI_03

ADAPTIVE COMFORT STRATEGIES: Overall, it seemed that people were much more comfortable adapting to their environment using clothing or opening a window, than they were tinkering with a thermostat that is unreliable. Some attributed this ability to the way they were raised, some for concerns about energy use, and others for simplicity’s sake.

Quotes regarding adaptive comfort strategies:

“And we’re also believers and putting on sweaters and taking our sweaters off. We’re going to be able to be a little bit chilly, a little bit too more. We can adapt.” -ALJMI_01

“Oh, yeah, if I get cold, I put on a sweater. If I get warm, I take it off. I usually dress in multiple layers, but this is warm today, so I don’t have a shirt on over my. That’s the easiest way to control your environment.” -LKS_04

“I’ve heard it said that there is no bad weather, it’s just inappropriate clothing.” -MGBAL_01

WINDOWS: The ability to open a window in some of the targeted communities is less than accessible, restricting residents from fresh air, due to either heavy frames or inconvenient placement of window interfaces/locks. Some don’t bother trying to open a window with concern of not being able to get it closed again when the air is no longer wanted. Many use windows for fresh air, for refreshing stuffy air, or to get cooler air when temperatures rise above comfortable levels indoors. This is especially a concern during the recent heatwave, when hot stuffy apartments pose a health risk to residents. Easier to open windows or windows specifically placed for ventilation (and training of when and when not to open windows) is a necessity. Easier to open windows or mechanical assistance for those with limited reach/strength.

Quotes regarding window accessibility:

“I open the door because the windows are a little harder for me to open than the balcony door.” -ICB_03

“And I talk to other people. They said I don’t I don’t even try to open my windows anymore. I think that’s not right. Yeah. You know, you should be able to open your windows.” -MGTRU_03

“...the nice feature of our unit is that we have big windows, which we don’t cover because we’re on the fifth floor. So we figured nobody can see us. So we have these windows uncovered with lots of daylight streaming in, which is nice.” -ALJMI_01
“...But I like about it is in the winter I can shut the door, I can leave the without cooling down the whole apartment and then I can open my window at night. So I really like that. I really like that system.” -MGU_01

NATURE
ACCESSIBILITY: For those with access to the outdoors directly from their apartments, the option to roll out to the balcony or having comfortable outdoor furniture to be able to stay outside for longer periods of time would benefit many residents. Availability of rooms with balconies for private outdoor areas is a challenge with an existing building, but alternatively, providing safe and accessible public outdoor areas is needed. Availability of public outdoor spaces within a safe distance, diverse walking paths and courtyards, concerns of safety when outside including sun exposure, ability to navigate the outdoor space, or disorientation while outside are concerns in this area.

Quotes regarding outdoor accessibility:

“Having access to having access to outside is very important. I wouldn’t want to live someplace without that.” -LKS_04

“We have a nice walking path around the building, which is nice” -LKS_01

“Well its extremely important to me, and that’s one of the problems with this neighborhood. I mean, it’s just it’s not good walking neighborhood.” -MGTRU_01

“I would have a balcony, OK, so that I could get outside while I’m in my apartment. I go outside every day, but that would be nice just to open the door and go out onto a balcony. Personal outdoors. And it’s great in the spring because the birds just sing so loudly in the morning. It’s just very nice to open a window too.” -UHI_01

VIEW OF NATURE: Having access to a view of lawns, trees, flowers, birds, bugs, mountains, and more remind residents of the natural life outside of their building’s walls. These elements of nature can be connected to artistic appreciation or nostalgia and be a sense of peace to many. Others may deeply want this connection with nature but feel restricted from enjoying it due to concerns of sun exposure, safety while navigating the outdoors, or privacy in their residences. This emphasizes the value of having a private view of the outdoors, where they can appreciate and see the natural world outside, without worries of a resident across the courtyard watching them. In instances where personal views of nature are limited, it is necessary to provide areas outside where residents can enjoy the elements of nature, explore the environment, and learn about their surroundings.

Quotes regarding views of nature:

“It makes me happy. Yeah, it would be very difficult to live in an environment where I couldn’t couldn’t see the clouds or the trees or the birds...” -ALJMI_01

“...the nice feature of our unit is that we have big windows, which we don’t cover because we’re on the fifth floor. So we figured nobody can see us. So we have these windows uncovered with lots of daylight streaming in, which is nice.” -ALJMI_01

“I just love the outdoors here, I mean, wherever you look, there’s either trees or flowers or and I think that’s probably why I’m not at all depressed in any way I can. When I get that way, I just look outside and enjoy seeing what there is.” -ICB_05
“Well, in that regard, having a dining room with a panoramic view is a great draw because we spend, I think, three meals a day. And I sit by the window and I enjoy all of the things that they were talking about, the planes, the birds, the changing season at home, all of it. I think we all enjoy that.” -LKS_02

**PROXIMITY OF NATURE**: Many expressed that in their community, some being fairly urban, there is a lack of nature overall. Finding peace and comfort in outdoor spaces is difficult when sounds, smells, and materials from the urban climate infiltrate the “natural” spaces. Protecting these areas from external distractions is important to creating a safe environment for relaxation. These spaces must be accessible, safe to navigate, and provide varying degrees of protection from the elements. In western Washington, this means protection from the rain, low sun angles, and wind.

Quotes regarding the closeness or proximity of nature:

> “To me, that’s really important. That’s really important to have something where you can get out physically out of your room.” -ICB_04

> “So we just fell in love with nature. And we had the view to the mountains the same as I. And when I must leave the house, I thought we’d stay there forever. And then my husband changed it up and I didn’t want to leave The View because it was so beautiful and it wasn’t that large, but it was the Olympic Mountains. And I said, someday, before I die, I’d like to live somewhere with that view again. And here I am.” -ICB_05

> “I don’t spend any time on the balcony. Oh, because it is so noisy. Right. It just isn’t possible to sit there with any kind of comfort. And I’m tried to have noise blockers. I have headphones that with noise cancellation. And I don’t I’m not very comfortable outside. I have ear plugs that deaden it, but the noise is so continual and so intense that I think it’s really at the level that’s harmful to the ear.” -ICB_03

> “I would prefer a bit more trees. It’s a beautiful building, but there’s no nature, you know.” -MGTRU_07

**COMMUNITY FEATURES**

**ACTIVITIES**: More engaging mental and intellectual activities such as lectures, writing and reading groups, and song/dance/theatre performances that engage residents beyond playing games or mealtimes were requested. Computer and technology spaces and training were also requested as many residents found navigating in the digital world as confusing and overwhelming. Some are forced to pay bills online, and without prior experience using a computer or cellphone, this seemingly simple task can be an emotional burden on them.

Quotes regarding activities:

> “I’ve really gotten less active than I was, and I’ve seen people here just deteriorate so much in this one year. You. Yeah. Mentally and physically and I have physically because I’m not very good at doing exercise so.” -MGTRU_06

> “There’s plenty activities for others. Not so much for me, as I am not interested in playing cards all day.” -GTS_02
DESIGN FEATURES: Several community participants commented on specific features of their apartments, such as the sinks, showers, colors of the community, or other dislikes of their specific apartment that are worth mentioning.

Quotes regarding design features of apartments:

“Color that's so minor, except it's not like beige or anything with beige. Especially for older people, it’s like we're in our units a lot. I mean, you get old and you are just... you're home a lot. So dull. And, you know, people say, well, color is arbitrary. It's like, you know, green is kind of a neutral.” -MGTRU_03

“But, you know, there's enough going on in your poor, elderly brain. You don't need to be distracted with all this orange stuff all over the place on the counter surfaces. How do you ever find that, if you like, drop something on the counter? Difficult, actually.” -ALJMI_01

“...the kitchen is teeny. But I think that's so that you can get, you know, get around. It's like I know these units, they're little. The sink is just like it's like a bowl. I can't even like I mean, it sounds silly, but there's no bathtub and the sinks in the bathrooms are small. So what if you want to wash a sweater by hand? So the sinks are ridiculously small.” -MGTRU_03

PROGRAM SPACE: Several community participants noted a need for a community gathering space large enough for all residents to congregate together at once, safely. Many of the participating communities have anywhere from 150-400 residents in the complex, without an indoor space for all members to attend an event together at once, safely. Additionally, a location or activity room secularly designed as a religious or meditative space was requested at almost every community visited. Lastly, in relation to dining spaces, many residents expressed interest in alternative dining experiences, where grab and go or express meals are available. For some, the luxurious experience of fine dining takes too much time out of their day and would much rather have a limited menu and faster service times.

Quotes regarding community program spaces:

“But the dinner time can be very long... but it's in part because it's viewed as a, um, a restaurant experience. And so they're trying to make a nice, comfortable restaurant experience. And for many people, it's their main social event. And so that needs to be accepted and it's very fine. But if you're in a little bit of a hurry, you it's it's like dining out every night.” -ICB_03

“This building has no space for like 70 people to meet, there are 130 or more residents and we're using the dining room right now for our residents meetings. We must completely reconfigure it. And it's just I understand that other residential homes have larger meeting spaces. And our general manager, when he has his monthly chats, we must put chairs out sort of in the bistro. It's just they need a bigger meeting space.” -MGU_01

“I never eat breakfast on here because I just can’t you know, the service is slow and so it's nice if you want to have a nice long meal. But I figured out if I ate all meals down here, it would be at least five hours a day. Something close to that. Yeah, that's true.” -MGU_01

“I'm working on it now is getting signs for the activity room game room on the other side of the hallway there so people know what the rooms are. Yeah. So, if you move in here and you knew you don't know what's what wayfinding” -MGU_04
COMMUNITY LOCATION: Several residents expressed desire to be placed within an active area with typical amenities like libraries, shopping, and parks, rather than being located outside of busy centers increasing segregation between older adults and younger populations. Additionally, the landscape of the neighborhood is important, including walkability of the area (relatively flat and level sidewalks), neighborhood safety, and noise levels from the outside are important factors to why a resident chooses a location to live. Busy streets (noise and pedestrian danger) and lack of safe walkable areas (steep or hilled streets, uneven sidewalks, dark corridors, etc) are undesirable traits of a future site for senior living.

Quotes regarding community location factors:

“...the location is great. We can go to the library. There is a senior center, which I haven’t been to the grocery store, which I don’t particularly like. But they’re finishing up a drug store out on the main street and that’ll be a big help. It looks like this is a shopping area, but it really is great.” -MGK_03

“Well its extremely important to me, and that’s one of the problems with this neighborhood. I mean, it’s just it’s not good walking neighborhood.” -MGTRU_01

SENIOR DRIVERS: Parking garages that are dark, difficult to navigate or park in, and lack of wheelchair accessible spaces for parking were primary parking and driving concerns. Neighborhoods with low street visibility or incredibly steep driving conditions are additional worries from those who have either already given up or plan to soon give up driving. For many, having a car and license is a sense of freedom and essential for their lifestyles outside of the community walls. For those who do not, providing flexibility in community-provided transportation is a must. This service should be on a sliding scale financially as well, for many may not be financially able to leave on their own, restricting their ability to leave and enjoy life outside the community walls.

SUMMARIZED KEY FINDINGS
The following key findings are organized into relevant subject matter areas, defined by the data analysis process and filtered to be representative of the company and research institute’s objectives of this study.

COVID IMPACTS
- Many participants expressed fear and uncertainty related to the pandemic, causing several effects such as loneliness and lack of socialization due to social distancing, anxiety, and a newly founded responsibility for taking care of others.
- Interactions with others is an aspect of life that deeply affects mental health and wellbeing for seniors and should not be taken away.

SAFETY
- A story about a fire door closing on a resident during a power outage, resulting in their injury and decline was shared at a specific community location. While many fire safety codes and regulations require such features by default, consideration of loitering zones and emergency support in such situations must be considered by individual communities for these infrequent but potentially dangerous circumstances.
- Nightly monitored surveillance cameras and security measures would benefit occupant safety, preventing falls and confused residents from disrupting other residents late in the evening.
The need to have a stepstool or ladder should be eliminated from apartment designs, even for petite residents. Accessing a needed storage space, to change a light bulb, or to perform other simple tasks is a safety liability and can be resolved through the design of accessible and safe to reach apartment amenities. Additionally, providing support for residents who need help getting access to their stored belongings free of charge, would eliminate their perception of having to do it all by themselves.

Considerations for walker, wheelchair, and cane users in the dining facilities would help reduce congestion and improve safety in circulation spaces. Walker parking or a mechanism to place walkers outside of egress paths would improve resident safety and service staff navigation.

Flexibility in design to accommodate all bodies, abilities, and needs is required, especially when considering storage, shower and bathing safety, and reach distances.

Roll in showers with plenty of floor space for an ergonomic seat is a necessity for less able residents, as are options when it comes to their shower seating, toiletries storage, and entry/exit path. Shower handles are preferred over fixed shower head for height, reach, and mobility restrictions.

ACCESSIBILITY OF APARTMENTS, THE COMMUNITIES, AND AMENITIES

Considerations for ergonomic reach of those in a wheelchair or walker could be designed into apartments of future senior living communities. Reaching over a hot cooktop or sink to reach controls and lighting switches is a danger to many, resulting in several participants to stop cooking or using their kitchens altogether.

Training occupants of safety features in their kitchen appliances is a safety consideration that can prevent fires and burns/scalds in many residents.

Hard flooring materials can be cold and uninviting to many residents more familiar with carpeted living accommodations. Further, hard surface flooring can pose the opportunity for residents to lay down rugs or carpets on top of the flooring, increasing chances for trips and falls. Weighing the benefits provided by hard flooring for cleaning and maintenance must be balanced with resident comfort and safety.

Freight and emergency service elevators would be a desirable feature to many participants, citing public displays of medical emergencies, deceased residents being wheeled through the lobby, or having concerns about moving in/out of personal belongings in front of all residents.

For communities with shared laundry facilities, concerns of machine sanitation and accessibility of laundry services was a concern of many residents interviewed.

OCCUPANT COMFORT: VISUAL, ACOUSTIC, AND AIR QUALITY

More thoughtful lighting within apartments, in tight spaces specifically, is needed for safe navigation for occupants with low visibility. Lighting under cabinets, in closets, cupboards, and hallways would greatly improve occupant comfort in many participating locations.

Acoustic comfort was majorly a non-issue in many locations, participants citing incredible amounts of soundproofing from the structure of the building itself. Some concerns in this subject area included not being able to hear alarms or neighboring residents in cases of emergencies. Additionally, sound transfer through ceilings of apartments with hard flooring was the only mentioned issue with sound, although in some cases it has helped identify falls or dangerous situations with neighbors.
TEMPERATURE CONTROLS AND INTERFACES - THE GOOD, THE BAD, AND THE FRUSTRATING

- Thermostat controls must be easy to understand, large enough to see and use, and be reliable to the heating and cooling setpoints established by the resident or community. Explanations and or training for these interfaces would greatly benefit many residents who may be unfamiliar with digital controls.
- Integrated weather predictions and recommendations for clothing, activities, and occupant comfort strategies within a temperature control device would benefit many residents who may not know how to manage their comfort in changing weather conditions.
- Due to the changing climate of the Pacific Northwest and world, air conditioning in the summer is becoming a necessity for the health and safety of older adults in residential communities. Air conditioning as a baseline amenity in future developments is essential.
- Teaching residents how to stay comfortable and safe in wildfire or heatwave conditions would not only make occupants feel safer and taken care of but may result in better health outcomes overall.
- Accessibility of using a window was a documented challenge for many interviewed residents. The placement of window locks or heavy frames were frustrating challenges for many who simply wanted to open a window for fresh air. In newer developments, providing windows placed for cross ventilation would be a great benefit to many residents more familiar with passive comfort strategies than digital comfort controls.

NATURE: HOW SENIORS PERCEIVE NATURE, ACCESS IT, AND APPRECIATE NATURAL FEATURES

- Outdoor spaces, whether private balconies or public courtyards, decks, or rooftops, must consider residents of all physical abilities, and as such, ensure safe navigation for those on foot or in wheelchairs.
- Gardening spaces and plant life is desirable for many residents, as it helps connect them to hobbies or activities they participated in before moving into a senior living community.
- Protection from the elements, such as sun, rain, snow, wind, and otherwise, is essential to making outdoor areas a safe and equitable environment for all visitors. Further, measures to protect public and private outdoor spaces from noise, pollution, and other distractions that come with city living.
- For many, having a view of natural elements (i.e., water, lawns, trees, flowers, etc.) is essential to their connection to the outdoors. Providing positive and relaxing views of the world surrounding the community can provide a great positive impact on resident outlook and wellbeing. Reducing distractions from city noises and smells is essential to the utilization of these areas.
- Privacy from neighboring residents and buildings is an important element to consider when programming a new senior living community to ensure all occupants feel safe in their private residences.
- Communities placed in cityscapes without significant access to natural spaces must consider providing external opportunities to access natural spaces outside the community, or rather, provide extensive options for residents to find peaceful areas with a focus on natural experiences on site.

COMMUNITY FEATURES AND NEEDS FOR THE FUTURE

- Availability of engaging and intellectual activities would be highly attended by residents who find games, cards, and other sponsored programming is not interesting to all.
• Inclusion of technology training and equipment would benefit the occupants who find navigating the digital world a challenge. In-person help, and technology-based classes/activities would benefit many.
• Availability of programming spaces such as lecture rooms, gathering halls, and theatres must be large enough for all if not most residents of a community to attend.
• Secular religious or meditative spaces were requested at several communities, showing the need for a designated area of quiet reflection outside of one’s private residence.
• Alternative dining experiences that take less time to attend was a common request. This would land somewhere between the common fine dining experience that takes hours to attend, and the pickup/takeaway option still provided after the COVID-19 lockdown. Many residents want to attend meals and would compromise with a limited menu for faster dining times.
• The location and amenities surrounding a community was noted as a primary reason many residents chose to live where they do. Making access or transportation available to residents to utilize the features of their external community would help seniors feel more integrated to their local community and provide further active living engagement opportunities.
• Busy streets and unwalkable locations (i.e., on a hill) are unfavored features of a senior living location.

For those still choosing to drive with their own vehicle, the layout of the parking garage facility must be easy to navigate, well lit, and provide adequate accessible parking spaces. Driving can provide a great sense of freedom to residents, and if they are safely able to drive, accommodations and accessible rates for senior drivers would be something to consider in future business models. Further, requests for electric vehicle charging stations for residents will be something to consider as EV cars become more common.

DISCUSSION AND CONCLUSIONS
We learned so much from this research about the ways that older adults take care of themselves, their environments, and live in a typical modern senior living community. Of the many possible outcomes of this research, which will be expanded upon in the section titled “next steps”, answering the objectives of this research is critical to understanding where to go from here. This section discusses and ties together the work that was completed as a part of this project and welcomes further conversations on how to address the topics approached.

Please note, that while many of the conversations held were generally positive or filled with outstanding compliments to the communities and staff, it is important to call out the points where improvements can be made to improve senior living communities in the future. Below are some concluding thoughts to the research questions that drove this research.

ANSWERING THE RESEARCH QUESTIONS
RQ1. How do older adults interact with their buildings? Why?
Older adults tend to use their private residences as a respite from the busy common areas of their senior living communities. They frequently use their living spaces for rest, productivity, relaxation, entertainment, and for socialization, the latter particularly before the COVID-19 pandemic. They interact with their kitchens, bathrooms, and living quarters throughout the day, for various reasons. For those that cook, interacting with the microwave, oven, sink, and cabinets are necessary to execute in-home meal prep. Occupants will open their windows and doors for ventilation, use their thermostat controls frequently to change internal temperature, adjust blinds or curtains for privacy and/or lighting control, as well as interact with their lighting wall stations to control the ambient lighting of their private spaces. In less private areas, residents visit public spaces to interact with their neighbors, peers, and community...
staff for dining, socialization, and leisure type activities. Many participants noted their attendance to community programmed activities such as playing cards, attending movies or lectures, and community meetings. These social and public activities typically are held in prearranged areas of the building(s), where residents or staff will alter seating, temperature, or lighting for occupant comfort. Outside, residents can enjoy sitting on a bench or at an outdoor table to chat with friends, use the community gardening spaces, or take advantage of local walking paths that may surround the senior living campus. All these human-building interactions (HBIs) include multiple facets of activities of daily life and should be carefully considered when designing senior living facilities of the future. This topic will be expanded upon in the following research questions.

RQ2. How do older adults manage their comfort in buildings? Why?
An interesting outcome of this study was that there are several ways that older adults manage their comfort in their residences, and several reasonings behind those actions. Some residents grew up in an age where central heating and cooling were not common and are trained to use adaptive comfort (adding/removing clothing, changing activities) and passive strategies (opening a window, shutting the blinds) to keep themselves comfortable in their residences. Many participants cited that it was far easier to change their clothing than bother with their temperamental thermostats, which was not surprising. In other instances, there were participants that relied solely on their comfort interfaces like a thermostat or heater to make their environment as comfortable as they needed, refusing to change behaviors or clothing levels, as they were used to climate control systems and expected them to work as programmed. Both mentioned strategies are not perfect, nor work well for everyone based on health, comfort, or cultural expectations.

RQ3. How have their human-building interactions changed over the course of their lifetimes? Has their ability (physical and or cognitive) to use buildings changed or have buildings changed around them in ways that alter their ability to interact with buildings (i.e., automation)? What are the drivers for those interactions?
Situationally, many participants told stories of growing up in farmhouses or older homes that lacked the modern comforts we enjoy today; dishwashing and laundry machines, central heating and cooling, electric heating, air conditioning, improved insulation, and the size of windows are all relatively new amenities to the older adults residing in senior living communities in the area. Many mentioned that the changes in architecture and city planning have deeply affected their abilities to navigate buildings today, as well as find comfort within them. Stairs, smaller lot sizes, and multi-level homes were all cited as a physical barrier to staying in their homes, as was maintaining properties that they lived in with their families. Cognitively, modern digital interfaces may operate in ways that are technologically unfamiliar to current senior living residents, as are the “invisible” controls that just happen without direct input such as building automated temperature control. Many of the participants of this study expected a cause>effect building interface, such as opening a window for cooling, or turning a knob on the radiator to release more heat and were unfamiliar with how to interact with their controls to manage their comfort. Significant training on managing comfort in a modern building would benefit many of the older population currently residing in modern living communities.

RQ4. What changes are needed to make these older adults more comfortable, safer, and more satisfied with their building environments or living spaces?
Listed among the collected complaints and challenges of the senior living residents interviewed occupant comfort, safety, and amenity preferences were the most prevalent. For many, the spacing of public areas within the community and sound transfer in gathering spaces (seating and noise complaints in dining halls, theatres, and community activity rooms), design choices that limit their ability to use their private residences as they would like (shelving, storage, AC vs. no AC, access to a balcony,
placement of controls and switches), lighting placements (typically not enough or in the right spaces), bathroom safety (shower access, seating, and toiletry space), and inclusion of in-unit amenities like laundry were the most notable complaints regarding design. Many of these design choices, such as building new gathering spaces or adding utility connections to each room for a washing machine, are more likely to be implemented in new construction, however, simple adjustments to interior finishes (acoustic baffles, adding easily accessible storage shelving, etc.) could help improve dissatisfaction in existing buildings. When it comes to occupant comfort, flexibility in shading and window opening mechanisms would be appreciated to help occupants manage their visual and thermal comfort without additional HVAC systems. Air conditioners were mentioned as a need by nearly every occupant in communities without central cooling, as the portable devices loaned or rented out over the summer “don’t quite cut it” to keep their apartments comfortable. Other wish list items include better views from their living spaces, access to a private outdoor area adjacent to their apartments, and safer to navigate outdoor areas. In terms of safety, decreasing risks of falls and trips by eliminating the need to get on a stool to reach stored items, discontinuing the need for area rugs, and centrally managing overall building comfort (in case of another drastic heatwave), could greatly improve the safety of residents within their own apartments.

Further, digital controls were an area that many commented on facing challenges with. This could be addressed in a number of ways; training occupants how to properly use, interact with, and program their existing digital thermostat controls such that they can properly self manage their comfort, or the design and testing of a “senior friendly” thermostat interface that is large enough, intuitive, and easy to control may lead to positive outcomes for future developments.

RQ5: How does having access to a view to nature, or being in nature, impact older adults...in terms of well-being, comfort and/or building interactions? And why?

Many of the participants of this study reflected on positive experiences in nature, viewing natural environments, and sharing memories of when they were able to go outside to hike, garden, or play with their children that they may not have the mobility to do anymore. Feelings of admiration, comfort, wellbeing, life, and peace were described during the interviews to describe the impact that having natural surroundings has on older adults in this type of setting. Views were seemingly the most accessible and important method of increasing one’s proximity to nature; those who reported having a nice view of water, the mountains, nearby parks or trees, flowers, and the sky were seemingly the happiest with their current living situation and/or choice of apartments. For some, getting outside to explore the grounds of their community campus or take walks to have a dose of nature claimed that they were fearful of being exposed to the elements or being alone in case of an emergency, emphasizing the need for safe and easily accessible areas for outdoor recreation and relaxation. Cover from rain, the sun, and wind is important to protect these hesitant members who desperately want fresh air and a safe place to be outside for themselves. Finding ways to allow seniors to get their hands in soil or bring the outdoors in through houseplants and flowers could additionally be an activity program to consider for communities deeper in urban settings. In instances where folks had access to a private balcony or outdoor space adjacent to their apartment, providing adequate comfortable seating, gardening amenities like a hose hookup, and shading from the sun is important. The doorway transition between balconies and private residences was brought up several times, as a sliding door may not accommodate those in a wheelchair or walker use. Community grounds with greenery can be elevated by allowing residents walking paths with distance markers, identifying plants and local animals on large-print educational signs, and providing small seating areas throughout the outdoor spaces for resting along the paths. Wayfinding when on larger campuses can be a challenge for those who experience orientation issues, so considering signage, distance markers, or even on-pavement signage to instruct residents the right ways to go. Overall, nature was a topic which nearly everyone identified with as a significant part
of the lives before moving to a residential care setting and commented that they felt more and more disconnected from natural environments as they aged.

The following section is an abbreviated list of potential design options for senior living developers, businesses, and designers to consider, taken from the major results of this study. This list is not in any way comprehensive but is open to discussion and additions as each community location is different.

**Design consideration points for future communities**

- Resident safety, accessibility, and navigation – wayfinding, reach, surveillance, ergonomic design, universal design and voice-controls
- Flexibility based comfort – thermal ranges, sufficient lighting in the right places, acoustic level maintenance, air quality monitoring, central heating and cooling, air filtration, ability to use adaptive strategies (easy open/close windows, cross ventilation, guidance for clothing) for thermal comfort
- Better thermal controls for senior interface needs – redesign a senior living thermostat with large control buttons and display, backlit, no clicking or noises, and ACCURATELY displays setpoint and ambient temperature. Could double as local weather station with guidance on dressing recommendations
- In-Unit amenities – Laundry, air conditioning, communication technology and in home assistance, utility sinks, bathing options
- Considerate access to natural spaces – built in to the community, safe and accessible outdoor spaces, private outdoor areas per-apartment, equitable views, and generally accessible neighborhoods
- Location – proximity to public amenities like parks, libraries, transportation, community centers, and shopping,
- Integrated to society – not set away from general population or children, ability to interact with local culture,
- Dining and social spaces in the building – large enough for growth and attendance of all residents in one location at a time... varying preferences for dining experience – bar top and café for quick meals, fine dining for longer meals
- Walker parking and valet for safe navigation in social spaces

To reiterate, from the hundreds of wonderful seniors met from this research, and the 60 interviews conducted, much has been taken and pondered from the opportunity to do this research. The approach taken to design senior living facilities is always changing; new generations, new demographics, new locations, and new business models are rapidly shifting the aged care industry for the better. The findings and recommendations made from this study are just that, our perspective from the limited amount of interviews collected and incredible stories told. Designing buildings and the interfaces that control them can be a challenging thing, especially for a population that does not have the eyesight, mobility, or abilities that they once did. What may work for one group of people may not work at all for the next, and what may work well for the younger technologically comfortable population may not be working for the silent and baby boomer generations.

As designers and researchers, it is our responsibility to investigate and serve those within buildings to protect their life safety, wellbeing, and comfort. The ID+CL looks forward to developing upon this research by conducting further interviews annually at these communities and beyond, capturing their desires, feelings, and more about how building interfaces can be improved for their very specific needs, how populations can be reintegrated to include older generations into the technological world, and to
improve the satisfaction that older adults have with the changes that come with moving into a senior living facility.

NEXT STEPS

The ID+CL would like to follow through with proposing to the participating senior living communities and other aged care businesses the following concepts:

- Considering the design of a senior-friendly thermostat interface – This project would include a multi-disciplinary effort of interior and user experience (UX) designers, mechanical engineers, and building operators to determine the interface and connectivity of a senior living friendly digital thermostat interface. It was observed from this research that many residents struggled with their thermostats, digital or analog, to properly maintain a level of comfort in their private residences. Larger buttons and indicators, backlit screens, capabilities to program for time of day and efficiency, as well as additional features like weather, date, and time, would allow this new design to become the hub of a senior living apartment and give comfort flexibility. This project would research the interface expectations of seniors, existing building control systems (control languages/brands, wall station types, building HVAC systems and more), how they interact specifically with their thermal regulation interfaces daily, and the information that would be most helpful to know as a resident about their environment. From that information, the interdisciplinary team would create a proof-of-concept design that could be integrated into existing building control systems in existing senior living communities.

- Indoor comfort guidebook and tenant engagement – On a community-by-community basis, this project would create a guidebook and manual for residents on how to stay cool when it is hot, how to handle air quality during wildfire season and other IAQ concerns, passively staying warm during cold weather, managing drafts and unwanted air speeds, how to use digital thermostats, and more related to thermal comfort building interfaces. This guidebook would be available at front desks of communities and printed for new and existing residents to have on hand. It would require research on the existing building interfaces, community resources, and product manuals of integrated systems, ideally providing a one-stop resource for residents.

- Technology basics guidebook – Through a more general training approach, this project would be more focused on developing a guidebook for using your typical smartphone and computer for essential functions. These would include paying bills, taking pictures, facetime, and video calls, setting reminders and notifications, avoiding scammers and phishing conspiracies, using a search engine to answer questions, finding your friends and family online, protecting your privacy and data online, and more for senior technological literacy and safety. The list goes on for skills in general technological literacy that are valuable today, but it has been observed in this study and in personal experiences that many seniors struggle with using their mobile devices to their highest capabilities for convenience.

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