Living Apart, Together: Cohousing as a Site for ICT Design

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ABSTRACT

This paper presents qualitative studies of cohousing, a model where individual homes cluster around common space, share some meals weekly, and make community decisions together via consensus. It analyzes 80 descriptions of cohousing community websites to reveal the values common to cohousing, as well as site visits to three cohousing communities in the United States. These consist of tours, attending multiple common meals, and interviews with residents to gain insight into cohousing practices and experiences. The goal of this work is to understand how cohousing is lived and structured with an eye towards considering this model of living from an HCI perspective. Keeping that in mind, this paper concludes with a discussion of the relevance of cohousing to existing and emerging trends in HCI such as civics, technologies for building community, and how cohousing might unravel the concept of a “smart home.”

Author Keywords

Domesticity; qualitative studies; design research; cohousing; intentional communities; values.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

While HCI has always had an interest in domestic spaces as a site for developing information and communication technologies (ICT), it has so far had a relatively constrained understanding of what counts as “domesticity.” Explorations of ICT design privilege single-family houses, leaving alternative spatial arrangements and configurations outside of the frame. Traditional approaches to the home have been deployment-based, offering novel technologies to families in detached, single family homes. However, shifting patterns of contemporary living—economic, geographic, and demographic—have led to new modes and new models for habitation becoming more prevalent. These

new models of living—in this paper cohousing—offer a different understanding of what “home” means. This can provide a fresh perspective on the boundaries of where and how domesticity happens as well as how to consider the role of ICTs at home.

Cohousing

Cohousing is a style of living that is meant to provide a functional alternative to social disconnectedness that has made contemporary living untenable for many [44]. Cohousing builds strong community among its residents by design, and is a reaction to contemporary single family houses that lack vibrant social connection between and among neighbors. In *Creating Cohousing: Building Sustainable Communities*, McCamant and Durrett describe their own journey that led them to plan, build, and eventually become residents in cohousing [44]: *Over two decades ago, as a young married couple, we began to think about where we were going to raise our children. What kind of setting would allow us to best combine our professional careers with child rearing? Already our lives were hectic. Often, we would come home from work exhausted and hungry, only to find the refrigerator empty. Between working and housekeeping, where would we find time to spend with our kids? Relatives lived in distant cities, and even our friends lived across town.... Most young parents seemed to spend most of their time shuttling their children to and from childcare and playmate’s homes, leaving little opportunity for anything else.*

So many of us seemed to be living in places that did not accommodate our most basic needs...We dreamed of a better solution—an affordable neighborhood where children would have playmates and we would have friends nearby, a place with people of all ages, young and old, where neighbors knew and helped one another [44].

For them, and many others, the solution to issues like these has been cohousing [21]. Cohousing is a kind of collaborative community that aims to replicate a village-like atmosphere. Cohousing comes in all kinds of shapes and sizes. In the most traditional form residents each own their own self-contained house and share ownership of common spaces, like open outside areas, storage facilities and a large “common house” for events, entertaining, and occasional meals. Most cohousing communities have common meals a couple of times a week. Many cohousing communities are committed to social values like resource sharing, involvement, sustainable living, and diversity. Residents are responsible for maintenance and upkeep, and

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are expected to provide a small amount of their time monthly to keep up with the work that helps the community function. This labor can be landscaping, cooking, cleaning, and so on—the functions of a traditional home, writ large.

One resident of cohousing has described his home like this on Facebook: *It's like a village. You know all your neighbors, have shared meals a few times a week, and share the labor of maintaining and growing the community. There are lots of shared resources including a common house with a big commercial-style kitchen, laundry, meeting rooms, TV room, kids play room, and a guest room that any resident can use. Legally it's a condo, so you own your own self-contained townhouse unit, but the design is a little different. The parking is off to one side so the interior of the community is pedestrian only, which really reinforces the "village" feel!*

History of cohousing

Cohousing originated as a specifically ideological practice in Denmark in the late 1960s. In particular, McCamant and Durant offer two articles that helped to inspire and form the foundation of the nascent cohousing movement: journalist Bodil Graae's *Children Should Have One Hundred Parents* (1967); and architect Jan Gudmand-Hoyer's *The Missing Link between Utopia and the Dated Single-Family House* (1968) [44]. Lucy Sargisson describes the tones as “firmly utopian,” and intrinsically offering a feminist, communitarian critique of then-contemporary institutions and practices. Graae and Gudmand-Hoyer claim that the design of the city has created ever-more extreme isolation and alienation, and even further, that urban housing has played a causal role in that shift [49].

This critical perspective provided an ideological foundation for what became cohousing, or in the original Danish, *bofællesskaber* (“living communities”). Here, multiple independent households coalesced into new developments combining the advantages of community with the autonomy of private housing. They sought to restore what they saw as disintegrating community values, to build stronger families, and to create ‘villages’ in an urban context [49].

Intentional, not ideological

In *Cohousing, A Utopian Property Alternative*, Sargisson notes a possible distinction between cohousing communities in Europe and North America. To her, European cohousing communities are based more on an ideological critique of late capitalism, While North American communities cast cohousing as a pragmatic response to fundamental everyday problems. This is exemplified by the Creating Cohousing quote above, that positions cohousing as a way of helping solve problems around caring for children.

Cohousing as a venue for design

As an intentional project that involves architectural, legal, and planning consideration, cohousing communities are certainly designed. While communities certainly vary in

Figure 1: Cohousing in Ann Arbor, Michigan, USA.

terms of size and physical structure, there are some commonalities that are shared among communities. For example, many design decisions serve to facilitate a sense of shared kinship and safety. Cars stay on the periphery of the property, leaving space between the homes to become play spaces for children. Common houses are in the center or near commonly-accessed parts of the property. Homes are oriented towards pathways and front windows in residences are large enough to let passers-by see inside. In *The Cohousing Handbook*, Hanson describes these as specific goals of cohousing design: *purposeful separation of the car, pedestrian pathways, kitchens facing pedestrian pathways, a centrally located common house, and affordability* [34].

The role of site planning and design is essential in considering how and why cohousing communities look and act the way that they do. As Williams has written, cohousing communities are neighborhoods that are expressly designed for social interaction [57]. Beyond this, though, cohousing communities become homes beyond a single house. The common house, for example, is both common space as well as a continuation of an individual residents' home. Cohousing stretches the definition of home in ways that can provide provocative and interesting inspiration for ICT design.

HOW HCI INTERPRETS THE HOME

The home and domestic life has long been a topic of interest to HCI. Understanding how domestic contexts might shape technology design is a theme common in CHI literature. Recently, Desjardins et al. have published a literature review and analysis of approximately the last twenty-five years of domestic-oriented design research in HCI [12]. They classify this research into genres (after [15]) that describe how research into domestic technology has operated. These genres provide categories of HCI research into domestic life that can be expanded by taking cohousing into account. With cohousing in mind, the most relevant genres are *social routines in the home, ongoing domestic*

practices, the home as a site for interpretation, and contested values of a home.

Social routines in the home describe how routines affect everyday home life and social structures. This genre is influenced by ethnomethodology [22], and asks questions about how social life is created and organized in the home. Inside of an individual family home, much of this social organization remains unchanged in cohousing, while a large set of community social routines become grafted on. Research into cohousing from this genre's perspective could reveal how domestic routines are reconstituted as being broader than a house and, indeed, become spread across a community at large.

Ongoing domestic practices emphasize the personal experience of living in the domestic sphere as linked to particular practices [12]. Questions from this genre include: how do practices configure the home experience? How do people describe and reflect on the various domestic practices they perform? What is the role of artifacts and technologies in the practice of domestic experience? "Domestic practices" here includes gardening [29,36] pottering [52,62], religious practice [58,60,61], health monitoring [1,32], interpersonal communication [2,3,19], domestic network management [30], resource consumption [51] and simple living [33]. At the very least, cohousing is a practice like these that carries with it its own set of material- and object-borne obligations. But as a style and arrangement of living, cohousing also inflects the practices and experiences that take place within its borders.

The home as a site for interpretation seeks to understand the "unique, nuanced, private, messy, and creative" nature of domestic life [12]. This work concerns itself with ideas like playfulness [23,24], exploration [26], discovery [42], reflection [45], interpretation [25], speculation [35], and provocation [18]. This genre asks, how can we include reflection and interpretation in the home? Can we create technology that reflects the intimate, complex, and nuanced character of domestic experience? How do people react to, use, and explore with new technologies designed to support interpretation in the home? These questions are especially interesting in a cohousing context as they mesh well with how cohousing life operates already. As intentional communities governed via consensus, cohousing is reflective in its practice to begin with, and respectfully engaging among and between cohousing residents is a core part of understanding its brand of domesticity.

One genre that seems particularly relevant to an expanded definition of domestic life is *Contested values of a home*. This genre brings attention to different constructions of what comprises "home." What have we overlooked when we've talked about the home? How can we go beyond common assumptions about what the home is in a way that can tell us more about how to design interactive domestic technologies? Research in this category examines alternative family structures [46], non-Western perspectives

[5,7], mobile ways of living [11,63], time-based understandings of home [17], and gender-based understandings of domestic spaces [6,9]. Cohousing provides a new venue to help understand how particular values operate in domestic spaces in novel ways.

Proponents and residents of cohousing take pains to emphasize that living in cohousing is not so very different than standard condominium or neighborhood life. There are clearly some differences that can call attention to values and practices that are currently excluded from domestic ICT design in HCI research, however. Taking the themes above as modes of domestic HCI research, there are certainly ways to understand cohousing domesticity as being substantially different from existing domestic practices in ways that can generate inspiration for ICT design. Cohousing is one way to think about how more usual understandings of technology in the home might become *defamiliarized*, a technique of inversion that takes standard, unexamined practices around everyday life that are culturally dominant and casts them in an unfamiliar light to reveal what kinds of assumptions exist. In doing so, defamiliarization can generate alternative stories of use that technology trends might otherwise leave out [5]. For example, Bell et al. "suggest that identifying and resisting these trends can suggest new portions of the design space to explore, resulting in a range of products that will more fully address the range of possible lifestyles in the home" [5:156].

Defamiliarization offers a means of understanding well-known contexts in new ways. Cohousing provides an opportunity to defamiliarize domestic practices by upending existing assumptions about what homes must be. In cohousing, the role of the community is expanded, more and different kinds of shared space exists, and who counts as a member of "home" might be broader than usual.

METHODS

The previous section discusses how HCI understands domesticity via genres, corresponding roughly to social routines, domestic practices, how "home" is interpreted, and finally how domestic values might be contested among different kinds of users, particularly as a strategy to do design work via defamiliarization. In addition, this project takes as its methodological inspiration the work of John Law, a British sociologist and co-founder of actor-network theory, or ANT [40]. In *Aircraft Stories*, Law tries to both unpack and understand a sociotechnical artifact—the ill-fated British TSR2 fighter-bomber—through multiple methods presented as vignettes of material inquiry. The linkages between blueprints, interviews, requisitioning documents, personal memories of the plane, and so on cumulatively serve to "decenter the object in technoscience" [41]. In its place, he builds a new understanding of the object from multiple contingent contexts. Together, these fractional, partial understandings of the TSR2 offer a way to know the specific aircraft and its multiple contexts

and roles somewhat differently than other sociological or ethnographic methods. To Law, the TSR2 is an airplane, but also an agenda; it is a plan for construction, but also a manifestation of a waning power's geopolitical anxiety; it is born of military requisitioning, but also of advertising; it is the archive, but also the anecdotes. To understand the multivalent nature of the TSR2, Law draws all these aspects together and interprets them in ways that are simultaneously independent and intertwined. This rich multiplicity of perspectives is what Law calls *the mess*.

This style of research is especially compelling to design researchers as it foregrounds material things like blueprints, patents, sketches, schematics, stories, and models in ways that other kinds of inquiry do not specifically attend to. These objects are the substance of the design process, and as such can serve to inform design in ways that interviews alone cannot. In keeping with Law, the author also wanted to try to get a broad, messy understanding of how cohousing operates as a model of domestic lifestyle in practice. To that end, the author used multiple ways of engaging with cohousing communities. The balance of this paper describes cohousing from a variety of perspectives and from a mixed-methods approach [54]. These methods include evaluation of primary texts extracted from cohousing web sites as well as on-site ethnographic methods. These are described in detail below. As a design research project, this combination of methods is intended to inform the development of new prototype systems based on insights from cohousing communities [10]. This work is not motivated by a goal to discover concrete facts regarding how cohousing communities operate generally, but instead is meant to extract broader themes and ideas to inform later design process.

The first way to interpret cohousing was through analyzing USA-based cohousing community web pages. These sites were approached systematically to learn how communities across the country describe themselves, and contained descriptions, mission statements, and sometimes lists of values for each community. The author performed simple content analysis on the contents of these pages in order to generate a list of the values of cohousing via grounded theory [48,50]. This loose set of codes that emerged from this analysis describe values that are important to cohousing communities. These cohousing values became a starting point to understand how these communities see themselves, as well as what kinds of goals their practices support.

For more specific, personal engagement with cohousing, the author visited three cohousing communities using a strategy of “diverse engagement” inspired by Law's *mess*. A combination of different approaches over a period of 8 months provided a unique perspective on what cohousing is and how it operates at these three communities across two U.S. states. Over that time, the author conducted interviews

with residents, took tours of the communities, and was a guest at common meals. These engagements each provided a different way to understand cohousing. Semi-structured interviews, for example, provided a way to get cohousing residents' experiences in their own words, while still retaining flexibility to respond to unexpected aspects of conversations with residents [8]. Attending common meals and going on tours of cohousing sites offer a means of doing what Wright and McCarthy describe as *knowing the user*: “knowing the user in their lived and felt life involves understanding what it feels like to be that person, what their situation is like from their own perspective” [59].

Together, these methods offer a means of approaching cohousing and considering two questions about it: what is common to cohousing communities? What is distinctive to cohousing? This messy, contingent process of engaging with communities in multiple ways offers advantages in terms of thinking through cohousing as a space for ICT design. By focusing on a wealth of different kinds of materials, design concepts and insights can be generated via a process of “abductive sensemaking” [39]. In this process, design research materials can be synthesized into concrete design ideas through multiple iterations of prioritization, judging, and forging connections based on the stuff gathered through design research coupled with a researcher's own experience and insight.

CONSTRUCTING COHOUSING

In the United States, the primary web presence of cohousing on the internet is the Cohousing Association of America (<http://cohousing.org>). The association coordinates information between residents of various cohousing communities via a wiki-style master list of sites at various degrees of planning and execution, from long-term, well-established communities, to those in the building process, to those in the very early stages of designing or interest-gathering for prospective communities.

Cohousing websites frequently include a “Vision and Values” section that emphasizes what a community believes is important in a general sense, as well as the ways that these beliefs are materialized as practices in the community. Often, these pages include how the communities intend to achieve these goals as residents via a mission statement. A survey of 80 established cohousing community web sites provide a way to reveal the goals and intentions of US-based cohousing communities. Using grounded theory to generate a list of codes, 20 distinct values emerged as described below and listed in Figure 2:

- *affordability*, controlling costs through smaller housing sizes or even direct subsidy;
- *caring* or *connection*, broadly meaning the quality and depth of relationships between cohousing residents;

- *community*, perhaps the value most underlying cohousing as a practice, and understood as a sense of general fellowship;
- *consensus*, managing the community and making decisions in a group through deliberation and unanimity
- *cooperation* or *collaboration*, a common sense of working with one another;
- *diversity*, open-mindedness towards and acceptance of differences in race, age, gender, sexuality, and ability and other aspects of identity and experience;
- *family*, a commitment to growing and supporting children youth, and various family configurations;
- *generosity*, here meaning a generosity of spirit in interacting with community members;
- *intentionality*, living thoughtfully and deliberately, especially with respect to cohousing values;
- *joy*, taking pleasure in the community itself;
- *outreach* or *education*, serving as an example of lifestyle for the greater community outside of the walls of the community;
- *participation*, taking an active role as a resident in shaping the community that you want to have;
- *privacy*, in this case meaning valuing individual space as well as participation in the community at large;
- *respect*, treating residents with kindness and care;
- *responsibility*, understanding your part and commitment to the community at large;
- *security*, meaning that every member should feel comfortable and safe in the community;
- *sharing*, or willingness to contribute goods or services to another resident in need;
- *simplicity*, reflecting a minimalist lifestyle that supports richer personal experiences;
- *sustainability*, ecologically sensitivity and energy-efficiency; and
- *work*, helping to maintain the community by taking part in the labor that makes it run.

In short, cohousing produces a community that is both sensitive to and driven by values. These values offer a way of considering how technology design can support or extend existing cohousing practices in ways that feel normal or natural to residents. It's especially interesting to see the most common values across cohousing groups. Caring, community, diversity, and sustainability, for example, each appear in over 70% of the community descriptions. The ubiquity of these values emphasize what intentionality means in practice for cohousing communities. They are designed and constructed from the ground up to support mutualism among their members.

Cohousing on the ground

The second component of this research took place in two cohousing communities in Atlanta, Georgia. Atlanta is an especially interesting site for cohousing research in that it is home to both the largest community in the United States as well as the smallest.

Figure 2: Percentage of cohousing community websites using these terms in vision or mission statements.

East Lake Commons Cohousing

East Lake Commons (ELC) is the largest cohousing community in the USA. It is built on 20 partially-wooded acres located 4 miles east of downtown Atlanta (Figure 3, left). There are 67 townhouses in that space, a large common house, and “Gaia Gardens,” a 3-acre organic garden and orchard, greenhouse, apiary, blueberry patch and pond. The garden and orchard together supply a CSA, or community-supported agriculture, and provide fruit and vegetables to the surrounding neighborhoods.

In the Spring of 2015, the author took a tour of the grounds of ELC, followed by an informal interview with his host and sharing in that evening’s common meal. What became ELC was originally intended to be Section 8 housing (government-sponsored housing for low-income residents), but a community of Quakers looking for a site to create a faith-based intentional community entered a discussion with the property developer and established a cohousing community. The community no longer has any formal religious affiliation. In its place is a burgeoning cohousing community of approximately two hundred residents. This is many more than it was originally designed to accommodate. Originally, ELC was intended to be two

Figure 3: Cohousing communities in Atlanta, Georgia, USA. On the left is East Lake Commons, and on the right is Lake Claire Cohousing (images from Google Maps).

separate cohousing communities, but development costs meant that the second common house was never built.

In practice, this community can be a bit unwieldy: the large number of residents make it too difficult to operate by what might be considered as “true” cohousing principles. Consensus, for example, is extremely difficult to achieve with over two-hundred residents. Instead, residents use a super-majority of 80% of the community to make resolutions that cannot be blocked by dissent. ELC makes it clear that cohousing can be too large to work well. The “village in a city” atmosphere that lends itself to values like community or cooperation evaporates when the scale gets too large. As with other neighborhoods, there are tensions, but with twists that reflect a community containing common interests and intentional deliberative structures.

Like many cohousing communities, there is a limit to how many of the units can be rented. Design constraints on limited resources like the number of available parking spaces make it difficult to have many independent roommates in a single unit. During a common meal at ELC, my host mentioned that there was some concern that the new owner of a unit wanted to create a live-in/incubator space for founders of technology companies. This was a possible problem in two ways. First was a concern that any large group of renters might not be very interested in playing an active role in the community at large, making the community less functional as cohousing. Second, and building from the first, these residents would use community resources in a way that was disproportionate. If you divide the number of residential units on the property by the number of parking spaces available, the average number of spaces per unit is ~ 1.2 . These are in a small parking lot just past the gated entrance to the property. If a home has four or five residents that each intend to park, they could occupy parking spaces that could otherwise be used by three or four households.

The issue of parking was one way that this very large community has recently had troubles regarding commitment to cohousing principles. After two visits, my

host decided that she would prefer to stop participating in the research project, fearing that an outside presence might become another point of contention at a moment that to her, felt like it might be a particularly harrowing inflection point for the community in general.

Lake Claire Cohousing

Lake Claire Cohousing (LCC) is among the smallest cohousing community in the USA. In contrast to ELC, it sits on a half-acre plot in a densely-populated residential part of East Atlanta. Surrounded by detached, craftsman-style homes, the 12 townhouses at LCC cluster tightly around open space in the center, with a common house and garden plot at the west end of the property (Figure 3, right).

LCC was built in 1997, and the first residents moved in the following year. Unlike ELC, LCC was self-funded by a group of people inspired by McCamant and Durrett to create a cohousing space. These residents followed the guide of books like *Creating Cohousing* [44] and *The Cohousing Handbook* [34] in finding land, architects, planners, and so on to build a community that fit their needs and resources. One way it’s possible to understand the difference between ELC and LCC is through their approaches to development. While developer-driven cohousing might mean that larger-scale funding is possible at the outset, it may also mean making certain kinds of concessions in the design and construction that make cohousing values harder to maintain over the long term. The inability to build a second common house for ELC and the resultant need to create one large community from what was intended to be two neighboring ones has made it difficult to forge a single cohousing community that works together well. While the genesis of cohousing plays a large part in establishing common values, it’s also important to see how the community functions after it has been built.

LIVING IN COHOUSING

To obtain a richer understanding of the lived experience of cohousing, as well as the opportunities for ICT to play a role in that setting, the author interviewed 5 residents of LCC in the fall of 2015. While this may seem like a small

number of participants, in a smaller community like LCC it represents half of the households in the community. These residents varied as to their age, gender, occupations, and how long they have been living in cohousing. Three of the interviewees had been involved with the community since its inception, either as a founding member during the development process (R2, R3), or as an interested party during that time who moved in a year after the project was completed (R4). Two of the participants were men (R2 and R3) and three were women (R1, R4, R5). All interviewees had families, although at different life stages. Some residents' children were adult and out of the home (R2, R3, R4). Other residents had small children currently in the home (R1, R5). This "next generation" of cohousing was often mentioned in interviews.

Each home visit lasted for about an hour. The visits consisted of a semi-structured interview asking about alternative styles of living, how and why participants chose to live in cohousing, and the role of ICTs in their living arrangement. This semi-structured interview was followed with a "home inventory" [31] to discover what ICTs were used in the home. Interacting with and discussing these home technologies helped to generate more questions. All interviews were audio recorded in addition to taking written field notes. During the visits, photographs were taken of objects or quirks that arose during interviews. Each interview was transcribed and open-coded to identify common concepts and recurring themes in the data, while the photos served as visual aids for analysis.

One goal of this interview was to understand how these participants used technology at home. Each of these families owns at least one computer, and all use them for both work through Internet and e-mail, as well as entertainment via streaming media services like Netflix or Hulu. Each participant interviewed owned and used a smartphone. Indeed, conversations around technology design that could benefit cohousing frequently revolved around potential smartphone apps. Only one participant had cable TV in their own home (R3), although there is cable TV in the common house, as well as shared Wi-Fi.

Life in cohousing

For the residents of LCC, community is at the core of cohousing. Like McCamish and Durrett's example earlier, cohousing is appealing as a means of making community and living in a way that connects to others: *"I describe [cohousing] as being an intentional community. We are living together and we want to make community with each other, we want to interact with each other, so we do things purposefully to do that. Now, after this many years, it's kind of like automatic. We don't even think about it."* – R4

"Intentional community, consensus, some commitment to sustainability. I've often described when people ask me, 'What is co-housing?' I say it's like a college dorm where everyone has a mortgage, with less sex (laughter). It's

extended family without the baggage. It's a cross between a commune and a condo." – R3

This nearly-familial connection is important to residents of cohousing. The village feel that comes from the spatial arrangement and practices of cohousing—what together could be described as designed intentionality—is very much the goal. Here R3 talks about why cohousing is so appealing to them: *"It's not infrequent that I just stop and go, 'I can just walk over to John and Sara's house and walk in the house and say this and ask that.' That ability to know that the boundaries are a lot more porous and that I can get the help when I need it. We get the help with the kids. We get someone picked up or dropped off. Can we borrow ... That's that extended family, the familiarity, the ease."* – R3

At its most basic level, cohousing is about this kind of ease, a comfort with others and a joyfulness in having a community around to share experiences with. Designed and built as antidote to urban neighborhoods where residents are anonymous and homes are independent, cohousing creates a community through both intention and practice.

Sharing space and place

Sharing is something that takes place inside of cohousing without much concern. Other than time, probably no part of cohousing is shared as much as the common house. The common house is the heart of the community, a social hub for entertaining as well as a venue for events that are open to the broader community at large, outside of cohousing residents: *[Partner] has private students, occasionally. I host lots of meetings at the common house. A lot of the people I work with, whether it's the theater I work with, or the non-profit I work with, I say, 'Should we do the meeting at the common house?' A lot of people know the common house. It really is a great resource in that way."* – R3

As the largest enclosed space in LCC, the common house is the main site of social activity in the community. Because individual homes are relatively small compared to contemporary houses, the common house takes care of the overflow. The common house, for example has an industrial kitchen, laundry facilities, deep freezer, cable TV, and Wi-Fi that is used and shared by residents. It offers a way for residents who do not have devices and systems like these—whether for personal or practical reasons—to use them as they please: *"There were times before we got our own Wi-Fi signal, because there was a time when we were feeding off others and trying to share... We would more regularly go down there to tap the signal. There are other people who do that... Recently, I've seen two sets of our neighbors spend a lot of time down there. I think it tends to be when your signal goes out."* – R3

"We share the common house, which I see people have these big houses and they have theaters where they watch movies and stuff, and it's like, 'Well, we have a space that's big that we all take turns. We're not going to have a big dinner every night, but when we do have a big dinner two

times a year, three times a year, we can go over there and use it and share it.” – R4

That said, the common home is still shared. For at least one resident, shared space and the home are not exactly one and the same: *“It feels like a shared space. I can't say it's an extension of my home. We say that to people, ‘That's an extension of my home, so don't I don't want you to do that there’ We'll use that line, but yeah I don't ... I don't know. It's hard to say that. I feel very comfortable when I'm there. I'm very relaxed. I don't feel like I'm not ... I'm in somebody else's house”* – R4

This tension—between shared and private space—might be the defining character of the work of maintaining cohousing. Shared space is never quite as comfortable for this resident as their own home is. However, they are clearly willing and able to participate in events that take place there and use the common house when they want or need to without discomfort. Here we see a seamfulness emerge. Taking advantage of social seams (like ambiguity regarding the boundaries of home) or technical seams (like infra-structure breakdown) offer a compelling way to consider designing ICT in cohousing contexts [4].

Keeping up with upkeep

Shared infrastructure means that there are shared obligations to maintain and repair it. The design of LCC involves a parking lot that has security lights over it that are not very accessible, and repairing even something so simple involves more than might otherwise be expected: *“What was the latest thing? We had to get all the outside lights fixed. They're so high, it's three stories over the cement; the parking lot there, and you know, you don't want to get a ladder up there. You have to hire somebody. It's expensive, but just getting that all worked out... There's always something going on.”* – R4

During these interviews, various residents were installing solar panels, taking advantage of tax incentives from the state. Shared residential infrastructure is not always very simple for licensing or permitting agencies to understand. *“We want to do one for the common house, but we... They're having a hard time because we want to do third party payer, and they're having a hard time giving us a quote on that, which I don't know why. I think it has to do with the ownership of that common house, they're having a hard time.”* – R4

Because the construction of LCC was completed in 1998, the roof was nearing the end of its natural lifespan. Different approaches between different residents become clear when facing looming financial obligations, especially when the issue may affect multiple people at the same time: *“Here's where you learn living with other people how different people term ... or, feel about their maintenance. My husband is always proactive with like a roof, replace it after fifteen years if it's a fifteen-year roof because the leakage then, oh, my gosh, by the time you notice, there's a*

lot of damage and it's a pain in the butt. When we went and it was time to change the roofs, we got a guy out here and he gave us quotes. I think eight out of the twelve did it, but not everybody was convinced. Some people said, ‘No, we're going to wait for it to break.’ I was like, ‘That's fine. That's your choice. We're getting a great deal now.’

Twice a year we get the guy to come out and clean our gutters. Same thing, not everybody participates in that. Thank goodness for emails, it's much easier than going down and writing things up and having people ...” – R4

Here maintenance activity that is normal and mundane in individual housing contexts becomes much more complicated. Just clearing the gutters requires coordination and organizing residents, and makes it clear how decision-making processes might sometimes become contentious.

Consensus, conflict, and decision-making

Consensus is a way to be sure that everybody is happy with the outcome of a group decision. By making sure that all participants agree before an issue is considered as resolved, everybody can buy into the process while feeling respected. This does not mean that it is an efficient process, though: *“I like co-housing, [but] the blessings are also the curse. The house is small; the house is small. You live next to your neighbors; you live next to your neighbors. You have to make decisions together; you make decisions together. Almost every single thing that's a good thing about co-housing is a bad thing about co-housing. I'd say the main thing is it takes longer to make decisions. Even though we have it down to a science, [and even though] it's very seldom we get into a cankerous debate about things. Especially early on, once you realize that you're making decisions together, it's just amazing how many things you have opinions about.”* – R2

The frustration that can come from this kind of work is immense. Every person interviewed had a story of how the process can be annoying. Questions as trivial as “what colors should we paint the exterior of our houses?” become protracted conversations that can be resolved in ad hoc ways: *“[One] contentious situation we had was painting... Before, I think we had a lot of terracotta color, that was our original color. Then we went through this whole thing of ‘multi-color, but then if we do too many everything is a little different color of the same palette then it starts to look like these things over there, and we don't want it to just look like something that a developer put up. We don't want it monochromatic.’ We came up with, ‘These three would be this tone. There'd be a tone of blue, and a tone of green, and a tone of off white.*

Then it turns out that we came home and looked at our house and went, ‘It's not quite what we thought.’ It turns out, the person who went to get the paint had forgotten, had lost one of the chips. She just called it on the spot (laughs).” – R3

One of the values common to many cohousing communities is a desire for outreach, to either serve as an example for other kinds of intentional communities or simply to provide space for cultural events from broader Atlanta. With shared resources like the common house, this is not always smooth sailing: *“Then there’s been a little tension in terms of community life in people who bring in outside things. For example, I make myself available to host, to sponsor things. At this point, there is someone who comes in and does a yoga class once a week. There’s someone else who comes in. There’s a group the comes in and does drumming there and I’m their sponsor. There have been times when it’s come up, ‘Someone wants to do this on a weekly basis.’ In the community, there’s a discussion about, ‘It starts to feel like it’s not our common house anymore.’”* – R3

Coordination

As one might expect, coordinating among cohousing residents sometimes proves a challenge. Here is the most obvious use of existing information and communication technologies, providing a means of connecting residents to each other. In LCC, at least, this changeover is partial and ongoing: *“We have a Google Doc for our phone numbers; our contacts. We haven’t done the meals that way yet. There’s still a sign up down there, though we have, and this is just recently, like the last eight months, we start sending an email out like two days before the meal just to remind everybody.”* – R5

Organizing events among the community is an ongoing challenge. While in such a small group the work of making sure that every resident knows what is happening might seem simple, the task is still difficult—especially in a group where there is intentionally no leader that can make some sort of *de facto* decision. The move to internet or electronic mail systems coexist awkwardly with existing organizing tools like whiteboards or paper: *“We need something, even if it’s a dry erase board with a big calendar spread. I just think, when it started, it seems like scheduling the common house meals; it was, you walk down to the house and you wrote it up on the wall, and you wrote what day you can clean or what day you can cook, and then people would write down whether they could come that day. They would RSVP on the paper. Some people ... [another family] are still using that kind of paper thing and they always forget to send an email but, most of us seem to be operating on emails these days. I won’t even know that you’re cooking unless you send out an email saying, ‘Hey I’m cooking. Email me if you’re coming.’ ... Sometimes I miss things because there’s a few people that don’t operate on email exclusively they just use paper but nobody does paper anymore.”* – R5

While email has advantages in terms of immediacy, convenience, and fit into existing technological workflow, it can sometimes become overwhelming on its own: *“We have these email chains going about several different things. Right now, we have emails chains that we’re going*

to do a Saturday clean-out of the garage and not only have that and, ‘Oh the business meeting is coming up. What are we going to bring to have a potluck for the clean-out?’ All these different things are going at the same time and sometimes the chains get too long. Sometimes depending on what email platform people are using, how the emails are showing up, they miss out on something that said before, and Tom’s like, ‘I thought I was bringing cookies, I thought I was ...’ I’m like, ‘No, Tom, you’re bringing the cornbread.’ It’s just silly things like that that there’s too much. I wish it was simpler...” – R5

Among residents, ICTs revolve around coordinating meals, costs, bills, upkeep, work, and so on. Better legibility and simplicity would be helpful, especially for subjects like these. These examples show how asynchronous, text-based communication can lead to misunderstandings or confusion.

Community, by design

One worry that original residents had in creating LCC was whether the goals and practices of cohousing would die off as the founding generation moved out, that the effort spent designing and constructing the community might be lost: *“Everyone thought one of the big concerns with co-housing [was] that it was the camaraderie or the hassle of building it together that drew people together and you get a founder’s syndrome. As soon as the first generation moved away, it would just become any old townhouse community. That has definitely not happened.”* – R3

The values and practices unique to cohousing are maintained over time because it is committed to by residents and reinforced by design. It is performed as a practice and supported by the design of physical surroundings and social covenants that underlies it: *“I think there is something about the fact that the place is place, there’s a certain amount of forced interaction legally and voluntarily does create this. For me it has actually created a lot of friendships. I have two or three really strong friendships here now. Whereas I didn’t for most of the time I lived here. I don’t know what that is.”* – R2

IMPLICATIONS FOR HCI

Cohousing is a social structure that bonds a standard condominium association or homeowner’s group into a community that lives in an intentional way by design. Social compacts are agreed to that play out—to varying degrees—every day of the resident’s time living in that community. As such, this arrangement can provide richer insights into many emerging aspects of HCI research.

In *Making by Making Strange*, Bell et al. offer heuristics for defamiliarizing domestic life that dovetail with cohousing [5]. The first is *no home is an island*, meaning that contemporary technology design portrays the home as a sanctuary from a hostile outside world. Rather than as a site to be defended, actual home relationships are complex, and require one to negotiate privacy and personal relationships within the home. Second, *homes are in communities/homes*

resist communities. The relationship between homes and communities is portrayed in two competing ways. At one end of the spectrum, a home is implicitly seen as decontextualized, ignoring the conditions in which the home is embedded. At the other, communities and connectivity are understood as intrinsically good. Both framings are too simplistic for ICT design. Communities can support households, but they can also interfere with them. Design must take communities into account, but it cannot assume that greater integration is necessarily positive. Finally, cohousing exemplifies how *the user is plural*. The unit of design should not always be an individual but can also include other members of the household or even larger, extended family units. One clear limitation of existing smart home technologies, for example, is accessing multiple users' calendars or Spotify accounts through a single voice-activated agent. Whose information is needed when? Households do not always or even often contain just a single resident. Taking these three considerations into account offers two directions for cohousing-inspired domestic HCI research.

Alternative models for communities and civics

The first way we can understand cohousing in HCI is as offering an alternative model of housing. As a means of reframing economic consumption, cohousing can exist as an exemplar of what might be possible for other kinds of communities at different scales. This work fits in with emerging work in design studies and sociology regarding *commoning* as a means of producing local economies that operate on a level distinct from macroeconomic forces and the structural injustices that sometimes come alongside them [20,47]. Gibson-Graham examines how alternative, bottom-up, local economies operate in a social context that they call "post-capitalist" [27,28]. Cohousing might provide a model and template to provide economic safety nets in countries like the USA where no strong welfare state exists.

This perspective on organizing local communities pushes on what could count (and what might not count) as civic participation. Cohousing communities operate as a distributed home across a neighborhood of houses that don't simply stand on their own. It provides a model of how local groups might operate to support new kinds of infrastructure for civic resilience [13] or generate civic imaginaries that break down boundaries between and among individual homes. Here, the idea of commoning could inform a way of understanding and designing for community-building that considers social service provisioning within future smart villages, towns, or cities.

Smart homes and the Internet of Things

The second way to consider the impact of cohousing in HCI design is how it might problematize the idea of the "smart" home. Most visions of the domestic IoT extend from Weiser's vision of the computer for the 21st Century [56] or Tolmie's notion of "unremarkable computing" [53]. To this point, descriptions of what future life might be like in

Internet of Things-enabled smart homes frequently portray standalone residences with garages and pools as being representative of typical domestic life. Cohousing offers a different understanding of what a smart home might be. Here, there are three different kinds of life in the community: public life in a broader city, public/private life within the cohousing community, and the private life of the individual family home. Cohousing features like the common house exemplify this variety of contested space. Considering how these three layers interact could serve as a model for how alternative IoT might support different styles of communities [16,43].

Another way to design Internet of Things technologies for cohousing communities is to consider the role that the things themselves are taking on. What might it mean to create objects that actively participate in constructing and perpetuating intentional community? Cohousing consists of a public that is driven by certain values, and is invested in particular issues and matters of concern [14,55]. Designing for and supporting these matters of concern could mean that the objects themselves participate in new ways [38].

The final way that cohousing perspectives serve to complicate smart homes is by thinking of the connection among and between residences, rather than simply taking houses as simply having an "inside" and an "outside." What kinds of services and platforms operate through the fringes of the home? What devices make the home permeable? Contemporary smart home technologies like Amazon's Alexa or Dash buttons provide access to massive industrial infrastructures for purchasing and shipping. Cohousing provides a venue for alternative social models for this infrastructure-based approach [37]. The home's relationship to water, electricity, internet, gas, mail, and so on might be productively reframed by considering social infrastructure and how services could be designed to support broader community life. Here, designers might think of "smart homes" not as providing access to product or service infrastructure, but instead social or civic infrastructure.

CONCLUSION

As simultaneously a site, a practice, and an arrangement of things that requires care and coordination, cohousing offers perspectives on ICT design for domestic life that might otherwise be missed. Considering cohousing as a lifestyle that is both a value-laden practice as well as a designed situation combining people and things provides a direction to consider future HCI research, particularly with respect to visions of smart homes, connected communities, and new modes of civic participation.

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