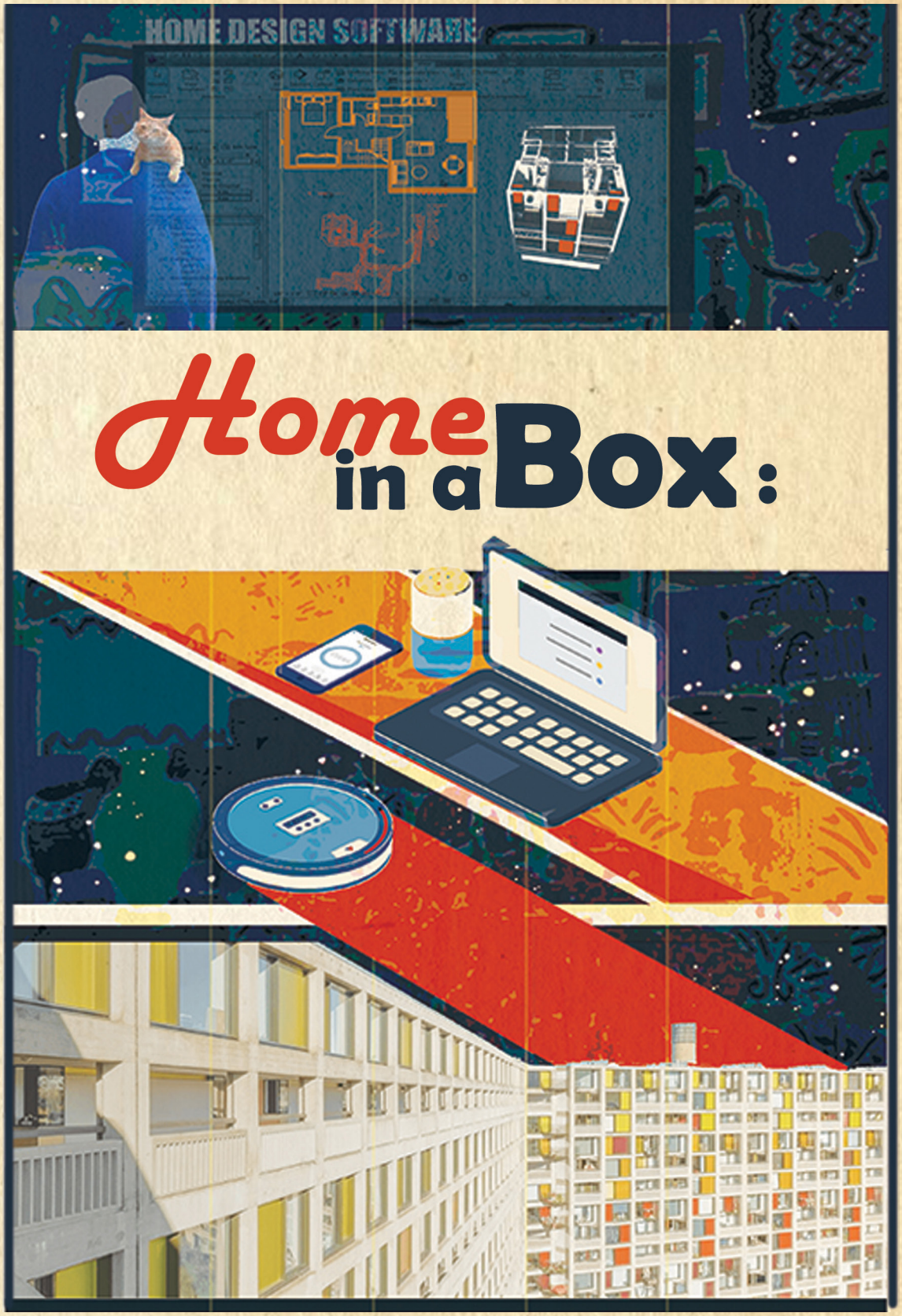

Home in a Box:

A Feminist Critical Spatial Practice to Speculate on a Careful CAAD in The Home.

Niveen Daoud

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A Feminist Critical Spatial Practice to Speculate on a Careful CAAD in The Home.

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A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy

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Abstract

The inevitability of Computer-Aided Architectural Design (CAAD) in architectural practices leads architects to imagine the homes they design as contained in and constrained by the three-dimensional digital models they produce. This process is often highlighted as efficient, rational and certain, yet produces 'empty homes'. Although inhabitants are co-producers and potential users of similar CAAD technologies themselves, architects' empty home representations imagine them (the inhabitants) as invisible. Moreover, these represented homes lack a domestic narrative and reinforce the discourse which locates CAAD as beyond the inhabitants' capability. I critique this lack of embodied narrative as symptomatic of the way CAAD and its practices are configured. The thesis explores an alternative by introducing design as a situated practice where the designer is held accountable for the knowledge they claim and a tool to critique/challenge the status quo design cultures. It offers a methodology that creates and initiates a dialogue about CAAD and domesticity from within home (and beyond architectural practice), especially as experienced through the COVID-19 pandemic. To do so, I propose and develop the idea of *Home in a Box* as a feminist critical spatial practice that rethinks design as a tool for architectural inquiry at home and seeks 'another' creative way of knowing CAAD and domesticity to enable meaningful engagement with inhabitants. Through analysis of several architectural practices, spatial analyses of my own home and participatory research at Park Hill in Sheffield, this thesis critiques the taken-for-granted, technoscientific cultures that shape architecture design practices, configure 'the architect' figure and formulate prescriptive imaginaries of their so-called clients.

Home in a Box highlights the necessity for a feminist approach, attentive to more caring ways for CAAD use and domestic spaces enquiry which also challenges the discourse of the necessity and inevitability of CAAD in architecture. Using Maria Puig de la Bellacasa's *Matters of Care* and Hélène Frichot's concept of *Feminist power tools* as main theoretical accounts, this thesis attends to a feminist ethos through persistent practices that overlap *thinking* and *doing*, reflected in how it is done and written. The thesis is composed of written narratives that weave theory and practice with conversations with architects, autobiographical notes and semi-fictional stories from Park Hill. The structure of this thesis follows my encounters with four main practices, organised into four parts: the **Utilisation/ Exploitation** of Computer-Aided Architectural Design (CAAD), Social housing **design practices**, **Thinking** Home *in a Box*, and **Doing** the box. The first part follows architects' scepticism profounded by the instrumentality of CAAD tools. The second part explores social housing design's digital and cultural intricacies in architectural practices. The third part relates to my encounter with thinking *Home in a Box* and sheds light on the box's theorisation. The final one is written from within sites of the box's engagement, constituted of two-fold practices of doing the box as a means of production and collaboration. This thesis aspires to contribute to ongoing academic debates that aim to engage with how design is rigidly structured and how CAAD and home are approached and defined in the architectural profession. Introducing Home in a Box as a feminist critical spatial practice contributes to architectural knowledge by offering a feminist approach to home that engages inhabitants in the critical debates of techno-domestic practices. The thesis also contributes to strategies to engage with fieldwork 'remotely', providing some tools and experience of conducting research through a pandemic.

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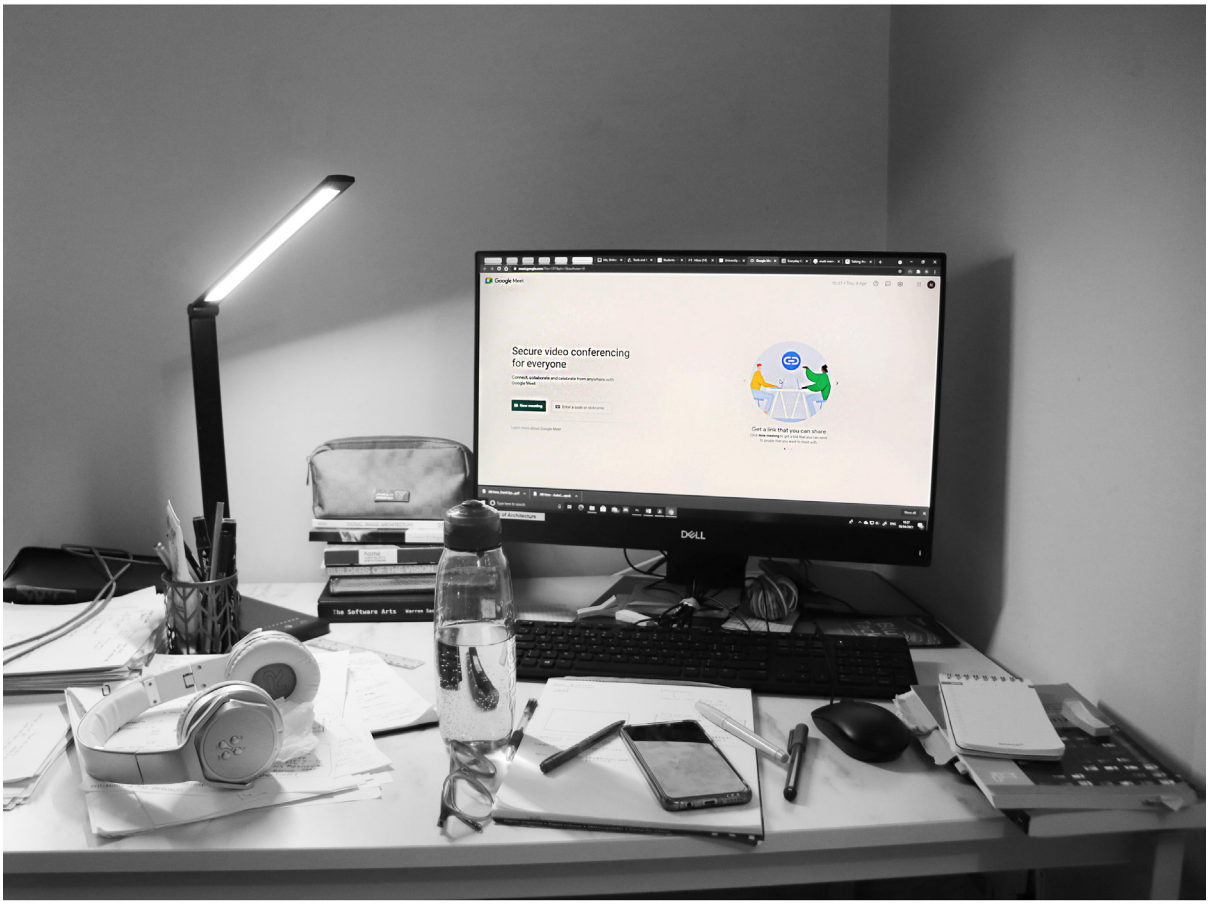
Thesis Introduction



Introduction.1: Image captured in April 2021 by the author that shows at-home workplace in which most of the research activities took place.

This thesis offers 'another' understanding of domesticity and Computer Aided Architectural Design (CAAD) from within inhabitants' homes and beyond architectural practices. It speculates on alternative and collaborative imaginaries of how the encounter/overlap between CAAD and home could be understood. Through the design of *Home in a Box*—a creative inquiry tool I made as part of the research—and the multiplicity of practices, theories, sites and relationalities it cites, the thesis interrupts the ways in which CAAD, home, and design are often depicted and defined by traditional practice-based design cultures in architecture. I critique architectural power structures that formulate 'the architect' figure and mark inhabitants as the 'less knowledgeable other' with a CAAD that produces empty portrayals of their homes, and the design of home as professional-only territory. I explore ways to reclaim inhabitants' agency as co-producers of homes and potential users of counterpart CAAD technologies by engaging in 'another' design practice of *Home in a Box* to enable embodied, relational and situated knowledge production about architectural software. In doing so, I examine design beyond what I have known as an architect myself by engaging feminist thought to challenge taken-for-granted answers produced by the architectural milieu. In the thesis, I argue for more caring CAAD practices by staying close to the entanglements that shape the spatiality and temporalities of inhabitants' domestic ecologies.

The original contribution of this thesis is shifting common CAAD-home imaginaries and bringing CAAD into the proximity of inhabitants' homes from my position as an architect by proposing a *careful* approach necessary to involve inhabitants in the critical and embodied modes of producing CAAD-home knowledge. It seeks 'another' way for design practices to

interpret CAAD and home. Additionally, unexpectedly, it potentially provides some of the required tools and experiences to conduct remote fieldwork throughout pandemic emergent times. This PhD thesis is 'by design' informed by my engagement in designing *Home in a Box* as a mode of creative inquiry that overlapped feminist theory and design material practices. I use Hélène Frichot's concept of the feminist power tool and Maria Puig de la Bellacasa's Matters of Care as the main theoretical accounts.[1] This was accompanied by borrowing cultural probes to shape the box materially into its final shape as a 38 x 28 x 13cm cardboard box enclosed with various multimedia activities for inhabitants to participate in.[2]

As with much research conducted during the COVID-19 pandemic, my research took place inside my home in Sheffield. From within my home, I remotely traced the encounters of CAAD and homes situated in social housing design in several architectural practices and inhabitants' engagement with *Home in a Box* within Sheffield's iconic Park Hill flats. Park Hill was designed by Ivor Smith and Jack Lynn, two architects then working for Sheffield City Council, who were chosen for the job by the council's chief architect Lewis Womersley.[3] Park Hill was completed in 1961. It was originally designed as social housing and is now privately occupied. After its popularity declined, it became Grade 2 listed in 1998 and in the late 2000s, Urban Splash took over its management and commissioned various architects to refurbish different phases.[4] Phase one was renovated by Hawkins/Brown and Studio Egret West in 2008, phase two by Mikhail Riches, and phase three, by Whittam Cox Architects, became a student accommodation known as Béton House in 2020.[5]

As of 2016, Building Information Modelling (BIM) became the mandatory means of designing buildings funded by the government in the United Kingdom, known as the 'BIM Level 2' mandate. Following its compliance with public funding schemes, social housing offers a particular site to follow the ethical and political entanglements informed by the prescribed use of architectural software in its design practices. The inquiry this thesis pursues has particular relevance to social housing design which I encountered in several London-based architectural practices between October and December 2020. Though the initial interest was to follow social housing inhabitation, the research in Park Hill was informed by four inhabitants' engagement in *Home in a Box* between May and October 2021.

Interrupting the overlap: Unloading the 'in-between'

My thesis is an interdisciplinary one. It crosses the predefined boundaries of architecture's discipline and profession. Typically, academic researchers are expected to locate and position their research within the 'field' to which it should belong during the PhD journey, in the sense that it is associated with the process of formulating a 'voice' to weave in a clearly defined spectrum. However, locating my research and my 'voice' within architecture's academic field

1 Hélène Frichot, *How to Make Yourself a Feminist Design Power Tool*, The Practice of Theory and the Theory of Practice (Baunach: AADR – Art Architecture Design Research, 2016); Maria Puig de La Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds*, Vol.41 (Minneapolis: University of Minnesota Press., 2017).

2 Bill Gaver, Tony Dunne, and Elena Pacenti, 'Design: Cultural Probes', *Interactions*, 6.1 (1999),21–29.

3 Keith Collie, David Levitt, and Jeremy Till, *Park Hill–Sheffield: In Black and White* (United Kingdom: Categorical Books, 2012), p. 23.

4 Collie, Levitt, and Till, pp. 7–8.

5 Urban Splash, 'Park Hill- Brochure', *Urban Splash*, 2020 <https://s3-eu-west-1.amazonaws.com/us-website-content/Downloads/park-hill/US_Park_Hill_Brochure_Low_Res.pdf> [accessed 11 January 2023].

was a challenging pursuit. My research is positioned within the vague and neglected site of encounters between CAAD technicity and the everyday ecology of home. The intersection between architectural software and domesticity is often overlooked in academic and practical debates. I remember explaining my research to a colleague at the beginning of my PhD. Her incredulous response dumbfounded me: 'CAAD and home? How? Is there any connection between them?' I frequently met with similar disapproval whenever I answered the 'what is your research about?' question. Usually, CAAD's instrumentality preoccupies academics and architects' imaginaries. Whereas CAAD is highlighted as an innovative technology requiring particular technical proficiency and remarkable capacity to keep pace with its progression and change, homes are considered a straightforward, clichéd landscape in neoliberal architectural design cultures.[6]

CAAD-Home

CAAD is associated with architects' professional use of computerised power for design. Its rationality, efficiency and certainty to make home, as a territory of domestic activities like sleeping, cooking, and cleaning, seem irrelevant. For most, the only way to imagine their intersection is to think of architects' adept employment of CAAD for creating precise floor plans, three-dimensional models and rendered Computer Generated Images (CGI) of sleek empty houses. Similar imaginaries preoccupied how I understood CAAD-home encounters drawn from being an architect who did an undergraduate degree at an engineering faculty before engaging in this research. The intricacies of the CAAD and home contrast were evident in my attempts to locate my research in the digital 'field'. As with any PhD researcher, the endeavours for situating my research were informed by finding related conferences and academic publications. My research did not fit into the conventional division between 'CAAD' and 'domestic architecture' themes. The former was too technical to fit in, and the latter seemed too distant. It offered a theoretical understanding of home without considering its intersection with architectural software. Therefore, to ponder this forgotten intersection seemed to challenge taken-for-granted architectural cultures in academia and practices to which my troubled pre-assumptions about CAAD and home previously belonged.

My interest in CAAD did not explicitly emerge until I began my PhD in 2018. Initially, my research inquiry had grown slowly out of curiosity about architectural design tools throughout my undergraduate education in Jordan, and through my experience of 'slow' engagement in architectural design in the last year at architecture school, informed by my preference for traditional means of drawing over the productivity of CAAD use. Although I had basic digital drafting and modelling skills, I preferred using marker pens, watercolours and technical pens compared to my peers' use of Revit and V-Ray rendering engines. In 2015, Revit started to spread widely among design studio students in Jordan as a new software promising a 'more efficient' way to practise design, and the architectural profession and pedagogy put more stress on architects and architecture students to continue pursuing technical skills in the latest architectural software. The research inquiry that later developed into my PhD research proposal revolved around this subjective experience of mine. I questioned the power structures I challenged by choosing not to use CAAD tools and their ethical implications on understanding design as practice and architecture as a discipline. It was driven by: 'why do I engage differently?'. Yet, although my inquiry emerged from political and ethical concerns of my own practice, I was still bound by reason, symptomatic of the rational urge to find a solution to every problem endorsed by predominant technoscientific cultures in architecture I had been taught. I soon realised, after starting my PhD, that the tension prompted by my

6 See chapter two where I navigate through the technical cultures of informed by neoliberal representations.

mobilisation across my practice and training marked the resistance encountered by shifting beyond architectural practices' pre-definitions. For me, this experience provoked looking for interpretations of why architectural software is inevitable and why it is hard to look 'differently' at architectural design using them.

When I started this research, I tried to understand why and how CAAD became inevitable by exploring its entanglements and genealogies in academic and practical debates. In his book *Digital Fabrications: Designer Stories for a Software-Based Planet*, Galo Canizares emphasises that to understand the influence/agency of architectural software, we need to examine the way it technically operates, recognise the social contexts in which it is produced and used, and explore how its technicalities exert political power that prescribes specific ways of working.[7] In those terms, I engaged with the work of *Houdart*[8]and *Rose, Degen, and Melhuish*[9] on three-dimensional renderings, *Loukissas'* on digital simulations[10] and involvement in BIM means of practices by *Llach*[11] that display various social repercussions of CAAD's different outputs in the thickness of architects' everyday life, following 'pragmatic' ethnographies in several architectural practices.[12]

Home emerged as a concern corresponding to understanding architecture and agency as relational terms. In *The Production of Space*, Henri Lefevre interprets people's inhabitation and everyday practices as a fundamental layer of materialising architectural space. He suggests that space is produced through three different levels: 'spatial practice', space as materially and functionally practised by society, 'representations of space' as conceived and perceived by scientists, planners, urbanists, technocratic subdividers and social engineers, and 'representational space', 'as directly lived through its associated images and symbols, and hence the space of 'inhabitants' and 'users'. [13] Based on that, understanding architecture as a discipline shifts beyond the neoliberal representation of architects as the sole creators of space and extends to the cultural, social and political processes they participate in alongside other contributors, tools, and material and discursive dynamics. This highlights architecture as a collective, social process rather than an instrumentally produced object and embodies

7 Galo Canizares, *Digital Fabrications: Designer Stories for a Software-Based Planet* (ORO Editions/Applied Research & Design, 2019), pp. 9–10.

8 In Sophie Houdart, 'Copying, Cutting and Pasting Social Spheres: Computer Designers' Participation in Architectural Projects', *Science & Technology Studies*, 21.1 (2008), 47–63. An anthropologist, Houdart, uncovers how *Kuma Kengo and associates* designers' engagement in the montage processes to produce "more alive" three-dimensional renderings upholds particular architectural imaginaries.

9 In Gillian Rose, Monica Degen, and Clare Melhuish, 'Networks, Interfaces, and Computer-Generated Images: Learning from Digital Visualisations of Urban Redevelopment Projects', *Environment and Planning D: Society and Space*, 32.3 (2014), 386–403. Rose, Monica Degen, and Clare Melhuish, pay attention to the social and digital complexities of CGI's production for the Msheireb Downtown project in Qatar.

10 In Yanni A (Yanni Alexander) Loukissas, *Co-Designers : Cultures of Computer Simulation in Architecture*, *Cultures of Computer Simulation in Architecture* (Abingdon: Routledge, 2012). Loukissas explores digital simulations' role in transforming the dynamic of relationships between various practitioners in several UK and USA-based practices such as Arup.

11 In Daniel Cardoso Llach, *Builders of the Vision: Software and the Imagination of Design* (Abingdon: Routledge, 2015). Cardoso Llach highlights historical and practical accounts of how the techno-social dynamics informed by using architectural software operate within the tensions between design and construction practices. He does that by referring to CAAD discourses at the Massachusetts Institute of Technology (MIT) and BIM employment within Frank Ghery's firm in Abu-Dhabi.

12 All these studies attend to architectural ethnography by following a pragmatic approach which extends Bruno Latour's work in Science and Technology Studies (STS). For more details see: Albena Yaneva, *The Making of a Building: A Pragmatist Approach to Architecture* (Bern: Peter Lang, 2009); Albena Yaneva, *Made by the Office for Metropolitan Architecture: An Ethnography of Design* (Rotterdam: 010 Publishers, 2009).

13 Henri Lefebvre and Nicholson-Smith Donald, *The Production of Space* (Oxford: Blackwell, 1991), pp. 38–39.

inhabitants as co-producers who continuously engage in its material reconfiguration beyond its construction.[14] With this in mind, people's inhabitation highlights an absent landscape of particular interest for querying the agency of CAAD spanning beyond the architectural design and construction practices that the few studies I present above offer.

For many, the significance of CAAD is found in architects' use of software capabilities that enable them to foresee future possibilities of the buildings they design with less time and effort. In the generic imagination that understands architecture as a professional territory, CAAD is also considered a professional-only tool located beyond ordinary people's capabilities. With the arrival of technologies that allow people to engage with two-dimensional floor plans and three-dimensional models of their homes, CAAD became a concept that people relate to, and home then became a different subject of inquiry. Though there is significant work done on domesticity that provides historical feminist critiques like the work of Dolores Hayden[15], Emma Cheatle[16] and Iulia Stătică[17], and other studies that offer analysis of smart homes and automation at homes like the work of Yolande Strengers in sociology and science and technology studies[18], and Luis Hernan and Carolina Ramirez-Figueroa[19], my interest in home emerges from the concern of how architectural software, or similar software shapes how domesticity is depicted and understood.

Many of the technologies that allow people to interact with digital representations of home happens through an array of devices ranging from robotic vacuum cleaners to personal mobile phones, tablets, and computers. For example, the development of robotic vacuum cleaners introduced 2D floor plans into people's everyday lives as a digital means of enhancing the mundane task of vacuum cleaning.[20] Other market-led applications like the IKEA home planning web-based program,[21] The Dulux Visualizer App,[22] and Jotun's Colour Design App[23]

14 Nishat Awan, Tatjana Schneider, and Jeremy Till, *Spatial Agency: Other Ways of Doing Architecture* (Abingdon: Routledge, 2013), pp. 26–34; Doina Petrescu and Kim Trogal, *The Social (Re) Production of Architecture: Politics, Values and Actions in Contemporary Practice* (Abingdon: Routledge, 2017), pp. 1–15.

15 Dolores Hayden, *The Grand Domestic Revolution: A History of Feminist Designs for American Homes, Neighborhoods, and Cities* (Cambridge, Massachusetts: MIT press, 1982).

16 Emma Cheatle, *Part-Architecture: The Maison de Verre, Duchamp, Domesticity and Desire in 1930s Paris* (Abingdon: Routledge, 2017).

17 Iulia Stătică, 'Socialist Domestic Infrastructures and the Politics of the Body', in *The Oxford Handbook of Communist Visual Cultures*, ed. by Aga Skrodzka, Xiaoning Lu, and Katarzyna Marciniak (New York: Oxford University Press, 2020), pp. 19–43.

18 Yolande Strengers, 'Envisioning the Smart Home: Reimagining a Smart Energy Future 1', in *Digital Materialities: Design and Anthropology*, ed. by Sarah Pink, Elisenda Ardèvol, and Dèbora Lanzeni, 1st edn (Abingdon: Routledge, 2020), pp. 61–76; Yolande Strengers, *Smart Energy Technologies in Everyday Life: Smart Utopia?*, 1st edn (London: Palgrave Macmillan, 2013).

19 Luis Hernan and Carolina Ramirez-Figueroa, 'Domesticity and Digital Eugenics: Design Cultures of Silicon Valley', in *Design Culture (s). Cumulus Conference Proceedings Roma 2021, Volume#2* (Cumulus (the Global Association of Art and Design Education and Research), 2021), II, 4542–50.

20 Robotic vacuum cleaners are loaded with smart mapping capabilities that use scanning technologies to map the interior spaces of home. They create 2D floor plans in which people can engage with cleaning processes these vacuums are designed to do. Companies developing these robotic vacuum cleaners compete to introduce more flexible and accurate mapping capabilities that allow more efficient engagement with these devices' cleaning process.

21 IKEA, 'IKEA Home Planner', *IKEA*, 2022 <https://kitchenplanner.ikea.com/id/UI/Pages/VPUI.htm?Lang=en-ID&_ga=2.106364995.1960816437.1668528710-1665990619.1668528710> [accessed 15 November 2022].

22 Dulux, 'Dulux Visualizer App – Colour Match Your Home | Dulux', *Dulux*, 2022 <https://www.dulux.co.uk/en/articles/dulux-visualizer-app> [accessed 15 November 2022].

23 Jotun, 'Jotun Colour Design App – Now Available for IOS/Android', *Jotun*, 2022 <https://colourtrendsme.jotun.com/en/colour-collection-2019/colour-design-mobile-app/> [accessed 15 November 2022].

are designed to offer inhabitants the ability to envisage their products at home. Inhabitants can try Dulux's and Jouton paints by taking photos of their homes; they can add IKEA furniture, producing renderings-like images through their engagement in drawing and modelling their home's physical elements like walls, windows, and doors.[24] Similar to the IKEA planner, the CAAD industry, represented by Autodesk and Dassault Systèmes, promote their *Homestyler*[25] and *HomeByMe*[26] as tools for inhabitants to model their 'dream' homes in 3D. With the various ready-to-add furniture products, they can create interior CGIs analogous to what architects create using conventional architectural software. Likewise, MagicPlan features scanning technologies that allow non-architects to use their mobile devices to map their homes to create instant 3D models and measured 2D floor plans.[27]

Engaging (with) performative critique

As I think of the CAAD-home encounter, I perceive that the way architects represent and define their authoritarian role as predominant in CAAD use and home design often challenges inhabitants' engagement. Despite inhabitants' involvement as co-producers of domestic interior spaces and as users of at-home technologies, they are often excluded and made invisible. These technoscientific structures reproduce architectural practice to a privileged professional territory in which designing domestic spaces using CAAD is an inevitable reality. Industry efforts to involve inhabitants in CAAD-like technical dynamics replicate the power structures of architectural software development. It prefigures instrumental workflows to represent homes as empty shells. This process is often celebrated as efficient, rational and certain, and restricted to a specific group according to their affordance of the required technical skills and infrastructure for using them.

This takes us back to the same loop from which my interest in CAAD and home emerged in the first place, motivated by my 'other' design experience as an undergraduate student in architecture school, my colleague's disapproval of what I would call the relationality between CAAD and home, and my involvement as a researcher in locating my research in the field. The engagement in the encounter between CAAD and home in design practice often repeats certain power hierarchies that formulate 'the architect' figure as CAAD expert and sole author, and engage in imagining inhabitants as the 'less knowledgeable' others. In this thesis, I aim to challenge these technoscientific design cultures that prescribe particular imaginaries of inhabitants' knowledge of CAAD and home, for whom architects design their homes through engaging in predefined technical and material practices informed by architectural software use. I seek to critique the absence of: a. embodied domestic narratives in the way architects represent these homes through CAAD, and b. meaningful inhabitants' engagement in comprehending CAAD-home encounters. I do so through attending to the following questions:

What social underpinnings, narratives and practices are incited by architects' use of architectural software (CAAD tools) in designing people's homes?

24 See section subtitled: Site of collaboration: 2nd May 2021- 7th October 2021 in chapter four that exhibits the experience of using IKEA home planner of an inhabitant, Hannah.

25 Homestyler, 'Homestyler - Free 3D Home Design Software & Floor Planner Online', *Homestyler*, 2022 <https://www.homestyler.com/> [accessed 15 November 2022].

26 HomeByMe, 'Free 3D Design Software | HomeByMe', *HomeByMe*, 2022 <https://home.by.me/en/> [accessed 15 November 2022].

27 Magicplan, 'Magicplan | Mobile Sketching Solution for Contractors', *Magicplan*, 2022 <https://www.magicplan.app/mobile-sketching-solution> [accessed 15 November 2022]. See section subtitled: Site of collaboration: 2nd May 2021- 7th October 2021 in chapter four that exhibits the experience of using MagicPlan by an inhabitant, Hugh.

How can I shift common CAAD-home imaginaries and bring CAAD into the proximity of inhabitants' homes from my position as an architect/researcher without the risk of repeating the same power structures that I instead aspire to challenge in this thesis?

In what ways can I invoke inhabitants' meaningful engagement in shaping the knowledge of architectural software and domesticity?

Getting through the architectural split (theory-practice/critique-design)

As a multi-strand subject, architecture shapes how architects/researchers know, understand, and operate, due to the range of disciplines (science to humanities and art) it belongs to and the established methodologies they offer.[28] Architecture as built space and as a design practice is always part of an extended web that entangles people's everyday lives, objects, cultures and places. The multiple ways it engages in the world it exists in make it complex to grapple with, raising the questions of criticality (how architecture enacts and operates) and of agency (how it might act differently).[29] Therefore, the knowledge to answer such questions requires different modes, ranging from understanding architecture as a discipline through theory, history and criticism and as a profession through practice.[30] Jane Rendell emphasises that these distinctive modes of approaching architecture often shape its understanding as a multidisciplinary subject. She suggests that this multidisciplinarity attends to several disciplines while maintaining the boundaries that separate them regarding how they are identified and what methods they offer. Rendell suggests the term *interdisciplinarity* to find the meeting points at which these different approaches to architecture are brought together, where architects/researchers' work moves between different disciplines in which they can operate 'in-between', 'across', and 'at the edge' that separate each and in doing so question how they typically work.[31]

I started my PhD understanding architecture mainly as a profession, symptomatic of being trained as an architect. For me, architectural design revolved around material practices that produce buildings able to find practical solutions to problems (often related to the physical configuration of the space). CAAD was merely an irrefutable instrument used in this process. The way I knew what constituted architecture was informed from a practical understanding of it as a form of doing, an action performed by 'the architect, as a figure/ role of authority, authorship and intention over the architectural object. Such a role is enabled by software that promotes the efficiency of this process. In this understanding of architecture as discipline, I understood theory to be objective modes of inquiry in the natural sciences that may prove a hypothesis and often lead to solutions.

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28 Jane Rendell, 'Critical Architecture: Between Criticism and Design', in *Critical Architecture*, ed. by and Murray Fraser Rendell, Jane, Jonathan Hill, Mark Dorrian (Abingdon: Routledge, 2007), pp. 1–8 (p. 2); Jane Rendell, 'A Way with Words: Feminists Writing Architectural Design Research', *Architectural Design Research*, 2013, 117–36 (p. 117).

29 Isabelle Doucet and Kenny Cupers, 'Agency in Architecture: Reframing Criticality in Theory and Practice', *FOOTPRINT*, Spring.4 (2009), 1–6 (p. 1) <https://doi.org/10.7480/FOOTPRINT.3.1.694>.

30 Isabelle. Doucet and Nel. Janssens, *Transdisciplinary Knowledge Production in Architecture and Urbanism : Towards Hybrid Modes of Inquiry*, Vol.11 (Springer Science & Business Media, 2011), p. 2.

31 Jane Rendell, 'Critical Spatial Practices: Setting out a Feminist Approach to Some Modes and What Matters in Architecture', in *Feminist Practices*, ed. by Lori A. Brown, 1st Edition (Routledge, 2016), pp. 39–77 (p. 22); Rendell, 'Critical Architecture: Between Criticism and Design', p. 2.

The first time I realised other modes of knowing architectural design and CAAD, I was in the first year of my PhD. I was exploring what is written about the history and theory of CAAD, questioning how and when it became inevitable in producing architecture. I drew two parallel timelines. The first tracked architectural theory, spanning from the 1930s to the 2010s, and its intertwining with CAAD use, while the second mapped the genealogy of CAAD software.[32] A third timeline emerged later where I traced how understanding of architectural space changed over time, influenced by Hilde Heynen's work on the relationship between people and space, in the sense that suggests understanding architecture space as a tool, receptor and stage.[33] At this point, my thinking shifted as I began critically problematising how I understood CAAD's inevitability and architectural practice's instrumentality by giving social meaning to their processes of use and design. That is when I understood the modes of knowledge critical theory offers through its procedures and methods, drawing its interests from disciplines like humanities, social sciences, anthropology, geography and cultural studies. These modes do not prescribe[34] the objective solution-problem approach I knew before. Instead, they aim for a change by engaging with self-reflective thought that considers the ethical, political and emotional subjective experience.

It is in the split where I sat, between the practical modes I previously knew and the disciplinary ones I became exposed to, that feminist thinking emerged. Driven by interdisciplinary concerns, the work of feminists in architectural design, like Jane Rendell[35] and Hélène Frichot,[36] shifted towards blurring the lines that separate theory from practice. The feminist research that is useful here attends to understanding the role of theory as a mode of practice rather than a separate tool for analysis. This shift enabled other ways to approach how we understand and know architecture and design, extending the role of theory to critical theory and opening the discipline of architecture to other fields. For example, Jane Rendell widens the role of theory to include work of theorists and philosophers of the Frankfurt School that emerged in the early twentieth century and connects to G.W.F. Hegel, Karl Marx and Sigmund Freud's work.

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32 In mapping architectural theory, I dwelled on Kate Nesbitt, *Theorizing a New Agenda for Architecture : An Anthology of Architectural Theory 1965-1995* (New York: Princeton Architectural Press, 1996); K Michael Hays, *Architectural Theory since 1968* (Cambridge, Massachusetts: The MIT press, 1998); H. F. Mallgrave and D. Goodman, *An Introduction to Architectural Theory, 1968 to the Present* (Wiley-Blackwell, 2011) <https://doi.org/10.1111/j.1531-314X.2011.01185.x>; Krista Sykes, *Constructing a New Agenda for Architecture : Architectural Theory 1993-2009*, 1st ed. (New York: Princeton Architectural Press, 2010). And in tracing CAAD on Branko Kolarevic, *Architecture in the Digital Age: Design and Manufacturing* (London ; New York: Taylor & Francis, 2003); Katie Pierce Meyer, 'Technology in Architectural Practice: Transforming Work with Information, 1960s–1990s', *Information & Culture*, 51.2 (2016), 249–66; Roberto Bottazzi, *Digital Architecture Beyond Computers: Fragments of a Cultural History of Computational Design*, 1st edn (London, New York: Bloomsbury Publishing, 2018); Theodora Vardouli, 'Computer of a Thousand Faces: Anthropomorphizations of the Computer in Design (1965-1975)', *Dosya 29: Computational Design*, 2012, 24–31; David Willey, 'Sketchpad to 2000': From Computer Systems to Digital Environments.', in *ECAADe Conference, Architectural Computing from Turing to 2000*, 1999, pp. 526–32; Alexander Koutamanis, 'A Biased History of CAAD', *Digital Design: The Quest for New Paradigms, 23nd ECAADe Conference Proceedings*, 23.September (2005), 629–37; Andrew Goodhouse, *When Is the Digital in Architecture?* (Canadian Center for Architecture, 2017).

33 Hilde Heynen, 'Space as Receptor, Instrument or Stage: Notes on the Interaction Between Spatial and Social Constellations', *International Planning Studies*, 18.3–4 (2013), 342–57

34 See Jane Rendell, 'Between Two', *The Journal of Architecture*, 8.2 (2003), 221–38 (pp. 223–24).

35 Rendell, 'Critical Spatial Practices: Setting out a Feminist Approach to Some Modes and What Matters in Architecture'; Jane Rendell, 'Only Resist: A Feminist Approach to Critical Spatial Practice', *Architectural Review*, 2018 <https://www.architectural-review.com/essays/only-resist-a-feminist-approach-to-critical-spatial-practice> [accessed 5 January 2023].

36 Hélène Frichot, *Creative Ecologies: Theorizing the Practice of Architecture* (London ; New York: Bloomsbury Publishing, 2018); Hélène Frichot.

[37] In this way, theory does not prescribe how we design but allows us to engage speculatively to generate a critique combined with creation. It provides a comprehensive understanding of architecture beyond its production to embrace its reproduction through representation, consumption, appropriation and occupation. Under the term 'feminist architectural practices', the focus shifted to the design process rather than the end product, highlighting the importance of negotiating the theory-practice exchange.[38]

In this thesis, the research questions challenge the predominantly instrumental use of CAAD to reclaim 'another' way to imagine the CAAD-home intersection situation that might exist inside homes, with a desire to critique and question existing norms and structures that reproduce and represent architects as experts and inhabitants 'less knowledgeable'. In doing so, I follow a relational thinking that allows an understanding of the complexity of CAAD-home encounters in both sites as an assemblage of humans, non-humans, practices, positions and languages. I question not only the modes in which I identify/know architecture design as a discipline and a profession but also the available methods for engaging with CAAD-home as a research inquiry through theory and methodology.

Encountering the multiplicity of techno-domestic sites

Techno-domestic (dislocated) fieldwork

This research was necessarily carried out remotely due to the COVID-19 pandemic. I was, at the outset, interested in social housing after I traced the use of several CAAD tools in architectural practices at the beginning of this research. The development of BIM technologies over the past decade drew attention to new means to produce buildings. BIM introduces digitised workflows centred around creating and sharing three-dimensional models between different practitioners, perceived as more innovative and efficient procedures for practising architecture and managing its data. With the software industry, governments started to mandate the use of BIM technologies, with an aim to materialise the efficiencies it promises.[39] In 2016, under the 'BIM Level 2' mandate, BIM became required in designing projects funded through government schemes in the United Kingdom. As publicly funded projects, the design of social housing is particularly implicated by the shift required from architectural practices to follow BIM workflows in the sense that it makes specific architectural software such as Revit ineluctable in architects' engagement in social housing design and delivery.

Social housing (also known as council, public, or local authority housing) generally describes homes that councils, local authorities, and housing associations develop for vulnerable people who rent them for less than market value. The emergence of social housing as a concern for my inquiry corresponded to CAAD's use in its design necessitated by the UK's BIM Level two mandate. However, it is also considered a critical landscape to pursue CAAD-home encounters in terms of how it is designed and inhabited. This is because of the dominant power structures that highlight architects' design of social housing for poorer inhabitants as a

37 Rendell, 'Critical Spatial Practices: Setting out a Feminist Approach to Some Modes and What Matters in Architecture', pp. 20–21..

38 Jane Rendell, 'Tendencies and Trajectories: Feminist Approaches', in *The SAGE Handbook of Architectural Theory*, ed. by C. Greig Crysler, Hilde Heynen, and Stephen Cairns (SAGE Publications, 2012), pp. 85–96 (pp. 89–91).

39 Ludger Hovestadt, Urs Leonhard Hirschberg, and Oliver Fritz, *Atlas of Digital Architecture: Terminology Concepts Methods Tools Examples Phenomena*, 1st edn (Basel: Birkhäuser Publishers for Architecture, 2020), pp. 509–12.

socially and ethically responsible practice suggesting a privileged social status.[40] Moreover, in the discussions on architectural software and domesticity, social housing inhabitants are often excluded for the 'otherness' they represent.

In this thesis, inhabitants, specifically those who live in social housing, are often described as 'the other' or 'being othered' in architectural practices. In cultural geography, the notion of 'othering' is often used to denote the process in which a social group identifies another group with undesirable characteristics to construct their identity as superiors.[41] In architectural practices, architects' engagement in domestic spaces design processes using CAAD tools leads to a discourse representing inhabitants as inferiors regarding design and technology knowledge. Architects' othering processes in addressing inhabitants as 'less' capable of producing domestic spaces and using technology maintain an implicit judgment that always assumes their lack of knowledge in both aspects. This affects the way inhabitants are generally represented, marking them as 'the others', which entails an objective/neutral interpretation of 'the architect' figure as more knowledgeable and implies cultures, languages and systems of beliefs that politically affect the way inhabitants are addressed in architectural practices and reframe the ethical system from which architects reproduce their values.[42]

Generally, inhabitants of any housing type are observed as 'less knowledgeable' regarding CAAD use and home design, despite being co-producers of domestic spaces and potential users of similar CAAD technologies. Whereas potential inhabitants still need to qualify for social housing according to various criteria, including race, income or gender, their representation as 'more vulnerable' adds another layer of discrimination when discussing CAAD and home because of their limited access to the technical infrastructure. Therefore, in this thesis, I was initially interested in this kind of double marginalisation of social housing inhabitants. I originally sought to challenge the power hierarchies that choose who is 'allowed' to speak on CAAD-home encounters. I wanted to engage in retrieving the ground from which discussions on technology and domesticity emerge and which has been refined from inhabitants' missing voices. However, given the limits of a PhD, I could not navigate through this kind of secondary social marginalisation and the politics around it. And due to the restrictions that the pandemic put in place, accessing social housing inhabitants was impossible. Instead, I follow the first layer of how inhabitants are generally marginalised regarding CAAD use and home design.

In the earlier stages of my research, my plan for the fieldwork was to engage in dialogues with architects and inhabitants on CAAD and domesticity in person. These were intended to (physically) occur in the thickness of everyday life at one or two architectural practices and inside three to five flats within a social housing development. In the first quarter of 2020, just before starting my fieldwork, the world changed with the global spread of the novel coronavirus. This was followed by a national lockdown in the United Kingdom. The fast pace of our days slowed down suddenly; all measures and everyday activities were re-distributed, and face-to-face social interactions reconfigured, fundamentally affecting how this research was planned and conducted. This research addresses digital technology (specifically CAAD) and domestic space, two aspects which also played a crucial role in the pandemic. As our social interactions were restricted, our routine work, study, and shopping shifted to 'online from home', relying on digital technologies to make this new reality work. At the same time, people were expected to make do and mend their homes to fit their work environment inside the physical realm of their

40 I expand the discussion on architects' social responsibility and value in section subtitled: 'Social' housing: who designs for whom? In chapter two.

41 Lajos L Brons, 'Othering, an Analysis', *Transcience, a Journal of Global Studies*, 6.1 (2015), 69-90. (p. 70).

42 For more details see chapter two titled:Social housing design practices: 'social' housing as a product.

domestic spaces. As the pandemic broke out, I had to rethink the sites where my inquiry would take place (which architectural firms and which homes). Moving almost every activity to home during the pandemic put extra pressure on people psychologically and physically. I needed to rethink to what extent I could ask architects and inhabitants to commit themselves throughout their participation in my research. Additionally, I questioned the available methodologies that allow dialogues about CAAD and domesticity to emerge from a distance.

The outcome was that although social housing was still an interest, I needed to shift my research to homes with available and not vulnerable participants. Due to the coronavirus outbreak, many social restrictions limiting face-to-face interaction were put in place, making it challenging to establish direct connections with inhabitants. Social housing inhabitants, specifically, were not available or ethically viable during a pandemic because their vulnerabilities were magnified during this time, for example, due to their work and family responsibilities and lives and lack of technical resources. Therefore, I needed to shift to other types of participants, young single inhabitants who occupied a building previously understood as social housing. However, getting in touch with inhabitants has always happened through arbitrators such as individuals in touch

Introduction.2: A screenshot captured from video recording of an online interview conducted in November 2020 with one of the architects (on the left) from practice t, held through Google Meet.

with people who live there and social organisations directly related to them (architectural practices, residents associations, and councils).

Particular sites of inquiry

(1)
Social housing design

My home (in Sheffield) emerged as an intermediary site, from which I remotely approached CAAD-home encounters in architectural practices and inhabitants' homes. Through email, I pursued several UK-based architectural practices that specialised in housing design and social housing, assuming most would use CAAD. I sought to find one practice or two willing to allow (online) interviews of a 'couple of their architects', as I initially requested. In locating my inquiry, my interest was in exploring CAAD use and social housing design by understanding how architects imagine, represent and relate to their assemblage through everyday engagements and practices in the office. Practice 'c' and practice 't'[43], two London-based architectural

43 Original architectural practices' names have been changed.

offices, agreed to let me virtually meet their directors, who later gave me more access to other practitioners working on social housing projects in the firm. Over the course of two months (October–December 2020), I had a number of conversations with directors, architects, and a BIM manager, engaging in formal (online) interviews and informal conversations.

Interviews with practitioners were central to exploring CAAD-home encounters in architectural practices, answering the question of what social underpinnings, narratives and practices are incited by architects' use of architectural software (CAAD tools) in designing people's homes. The way these conversations happened, the language used, and the setting played a vital role in interpreting the content of the interviews.[44] In both architectural practices, interviews were arranged hierarchically. I first interviewed directors, who later referred me to architects and BIM managers. This hierarchy revealed different aspects of how CAAD and domesticity are perceived and represented. Through the stories practitioners told in the interviews, I was able to unfold how they engage in design processes and CAAD technicalities in everyday life. I understood the way they talk about CAAD and social housing as a part of the social and material dynamics of the design processes, how they represent their practices in imagining their social, ethical and material engagements. I speculate that my representation as an Arab (non-British), Muslim, female researcher and non-practising architect in the UK encouraged architects to depict themselves as the 'more knowledgeable'.

I appeared to be a 'less experienced' architect, and thus, they tended to take the authoritarian and expert position to share different details from their CAAD use and social housing design process.

My engagement in conversations with practitioners from both practices, c and t, can be articulated and described as short-term and remote 'architectural ethnography'. Albena Yenava's term 'architectural new ethnographies' builds on the shift in architectural scholarship in the 1980s that started to attend to architecture as a practice rather than a product. Inspired by the seminal work of sociology in *Architects and Firms* (1984) by Judith Blau and anthropology in *The story of Practice* by Dana Cuff (1992),[45] Yaneva follows a pragmatic approach to redescribing the social and material dynamics entangling design processes, studying architects' and designers' activities, beliefs, and cultures, attentive to their words and non-verbal gestures and engagements with non-humans. In methodological terms, architectural ethnography uses formal and informal interviews, participant observations, site visits, and archival research, drawing on a wide array of sources like reports of architects meeting with clients and inhabitants, site visits, descriptions of the construction of drawings and models, and in-office archives.[46]

In this thesis, my analysis of architectural practices started with exploring how they depict their social housing practices and CAAD through their websites, articles and publications written by their architects about social housing. And through formal and informal interviews and discussions, I follow how they design social housing and use CAAD. I ask questions about ordinary processes in the office to encourage them to describe their daily engagement with architectural software, practitioners, local authorities, clients, and inhabitants.[47] I pay particular

44 For more details see section subtitled: A note on conversations in the office in chapter two.

45 Judith R Blau, *Architects and FIrms: A Sociological Perspective on Architectural Practice.* (Cambridge, Massachusetts: MIT press, 1984); Dana Cuff, *Architecture: The Story of Practice* (Cambridge, Massachusetts: MIT press, 1992).

46 Albena Yaneva, *Five Ways to Make Architecture Political: An Introduction to the Politics of Design Practice* (London ; New York: Bloomsbury Publishing, 2017), pp. 41–46.

47 For more details see section subtitled: A note on conversations in the office in chapter two.

attention to how they represent themselves and their practices, and how they describe their engagements with architectural software and their roles throughout different social and material entanglements of the social housing design process. I tell these as stories of architects narrated from the thickness of architectural practices in everyday life, to understand the design ecology from which social housing and CAAD use knowledge evolve.[48] Although critical, I do not seek to personally criticise the specificity of social housing design practices performed in practice c and practice t. Instead, I aim to create a situated critique of power dynamics incited by neoliberal structures often repeated throughout different practices shaping how CAAD and domesticity are imagined. Through practice c and practice t, I follow the social and material intricacies of CAAD use in designing social housing by understanding the social underpinnings of CAAD-home encounters and exploring architects' related narratives and practices. It is important to note, though, that I recognise that the stories I narrate are specific of each practice and thus cannot be generalised. Yet something can be learned about the approach to CAAD-home in architectural practices. That to 'remotely' explore practitioners' daily interaction with CAAD in the context of housing design, it is important to stay attentive to the subjectivities and performative aspect of the interviews, the way they occurred, the language employed, and the setting were just as important as the content itself. In this context, architectural ethnography

Introduction.3: An image captured by the author in January 2023 that shows four boxes of Home in a Box in which four participants from Park Hill engaged with between May and October 2021.

enables researchers to stay close to intricacies of conversations with architects to interpret the performative aspect of their daily engagements in architectural practices.

48 In chapter one titled: Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD): speaking of the devil in the office I navigate through how architects talk about CAAD use in the architectural practices and in chapter two titled: Social housing design practices: 'social' housing as a product, I follow social housing design practices and architects' engagements with local authorities, inhabitants, and technical dynamics of CAAD use.

(2)
Social (not-social) housing inhabitation

In response to the pandemic, my developing project, and my own situatedness at home during the pandemic, I designed *Home in a Box,* a material box *(*38 x 28 x 13cm rectangular cardboard box that held a variety of multimedia objects (such as booklets, zines, maps, postcards, an instant camera, a voice recorder, and a smelling jar) as a feminist tool to initiate dialogue with inhabitants on CAAD-home assemblages. *Home in a Box* is an object I designed that invokes encounters with CAAD inside home, allowing a meaningful engagement of inhabitants from within their everyday domestic lives. Delivering *Home in a Box* to individual participants' doors, I was able to engage remotely in discussions about CAAD and domesticity with four inhabitants from within their flats in Sheffield. The box shares information on CAAD, specifically Revit, and in return inhabitants tell me about their lives at home and the technologies they use. The box's materials engage inhabitants in various activities like drawing, mapping, photo-taking, annotating, and sound recording. Throughout May-October 2021, each of the four boxes I sent spent four to six weeks with each inhabitant. Their participation was later followed by (an online) interview, where the inhabitants and I discussed their engagement with the box. It allowed further reflection on their participation and the box content and discussions on their interpretation of CAAD and home emerging.

The four participants who agreed to participate and engage in the activities *Home in a Box* encloses all lived at Park Hill, the iconic 1960s social housing flats on the edge of Sheffield. Park Hill was remarkable as my inquiry became situated between it and my home. A housing development sitting on a long hill behind Sheffield train station, Park Hill is a controversial site in architectural history and practice. My initial pursuit was to find social housing with a mix of tenures that reflected diverse socio-economic backgrounds reflecting my interest in those who do not necessarily have access to commercial CAAD created for non-architects or have never heard of it, and whose idea about home can draw on a diversity of meanings, as well as being in line with the architect discussions outlined above. My second interest was in housing developments designed with CAAD. This may look like an obvious prerequisite for any 'recently' designed building. I aimed to have these technologies as an essential part of shaping architects' housing imaginaries, as a vital part of representing domestic life that dwells inside.

Park Hill became an ideal site to explore social housing's troubled history in the UK. The development was initially planned to turn slums into modern social housing following the now iconic 'streets in the sky' typology from Alison and Peter Smithson's Golden Lane competition entry.[49] From a success in the 1960s to turn it 'from place of social and physical despair to a place of social hope', the development deteriorated into a so-called 'sink estate' which, according to Jeremy Till, it had all the failure traits that Alice Coleman describes in her popular work *Utopia on Trial* that blames architects and planners for the failure of social housing.[50] This precipitated its conservation listing in 1998 and, later, regeneration through Urban Splash, which managed Park Hill since the late 2000s into exclusive private homes with only third of the total homes to become shared ownership and affordable housing, with different architectural practices in the UK taking part in its production like Hawkins/Brown and Studio Egret West in 2008 who worked on phase one of the regeneration, phase two by Mikhail Riches, and phase

49 For more details see: Alison Margaret Smithson, *Urban Structuring: Studies of Alison & Peter Smithson* (London: Studio Vista; New York: Reinhold, 1967); Alison Smithson and Peter Smithson, *The Charged Void: Urbanism* (New York: Monacelli Press, 2005).

50 Collie, Levitt, and Till, pp. 23–24.

three, by Whittam Cox Architects.[51] The regeneration of Park Hill has become a prime symbol of how architectural practice has the power to alter domestic spaces. From a brutalist icon which once was a 'home' for the working-class people, which replaced 'slums' in a Northern industrial city, the development has now been transformed into an attractive 'product' for the middle-class to buy. Park Hill, although no longer, or because it is no longer, social housing, became an ideal site for my research – not only for the potential it has to meet people from different backgrounds to collaborate with, nor for being redeveloped and regenerated since 2008 by several architectural practices with the aid of CAAD, but as a site that has become iconic in architectural history. This, in addition to the impossibility of accessing different social housing inhabitants due to the pandemic restrictions and stress it put on vulnerable people, Park Hill provided an alternative by being able to access several single young occupants who rent privately in what was previously known as social housing. By choosing it, I was interested in challenging prevailing discourses in technology and domesticity, finding out how architects imagine home through CAAD and how the technology could be imagined and speculated by young single occupancy inhabitants.

Park Hill is an excellent example of commodifying architecture, where home is reproduced into an iconic attractive product, raising the question of what daily life takes place behind the icon. What would its inhabitants say about it from within the messiness of everyday domestic life, beyond the elegance of architectural representations, CAAD rendered, and utopian textual descriptions? I collaborated with four people, Hugh, Catherine, Hannah and June, who live in different parts of Park Hill. I reached them through both the Park Hill Residents Association (PHRA) and personal acquaintances who helped hook me up with some inhabitants who were interested in engaging with *Home in a Box*.

In producing *Home in a Box*, my home also emerged as an intermediate critical inquiry site. From home, I self-reflect on the cultural dynamics I confront as an architect, revealed through my engagement in designing the box.[52] Autoethnography, 'an autobiographical genre of writing and research that displays multiple layers of consciousness, connecting the personal to the cultural',[53] describes my writing practices at home, reflecting on my personal engagement in the box design while understanding the architectural design cultures I sought to critique in this thesis. Elizabeth Ettorre suggests autoethnography as a feminist method of embodied practice that occupies and demonstrates personal experiences and emotions as political engagements. Through feminist autoethnography, critical writing practices are performed to bring to light new meanings and subjectivities.[54] I engaged in feminist autoethnographic writing to reflect on the box's design; understanding my home was defined as an intermediate site from which I reflected on my understanding of architectural design, CAAD and home while claiming an architect position. Through spatial analyses of my own home, incited by mapping different activities inside my home, I also reflect on the temporalities of my everyday life inside my own home. This played a vital role in understanding the box's design from an inhabitant's perspective.

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51 Collie, Levitt, and Till, pp. 7–8; Urban Splash.

52 See section subtitled: Site of production: 23rd November 2020-1st May 2021 in chapter four that navigates through my engagement in designing Home in a Box.

53 Carolyn Ellis and Art Bochner, 'Autoethnography, Personal Narrative, Reflexivity: Researcher as Subject', in *Handbook of Qualitative Research.*, ed. by Norman K. Denzin and Yvonna S. Lincoln (Thousand Oaks: Sage Publications, 2000), pp. 733–68 (p. 739).

54 Elizabeth Ettorre, *Autoethnography as Feminist Method: Sensitising the Feminist'I'* (Abingdon: Routledge, 2016), p. 4.

Home in a Box as a feminist critical spatial practice

My thesis is 'by design'. My engagement in this research is informed by designing *Home in a Box,* supported by a written text through which I ground my theoretical positions. Design and theory interplayed and overlapped in a way that each informed the development of the other. As a part of the same practice, both allowed engagement in generating an embodied critique of predominant design cultures enacted by producing knowledge on CAAD and domesticity from within inhabitants' homes.

Through this thesis, I described the approach to CAAD-home inquiry through Home in a Box's production and collaboration as 'another' way of reproducing knowledge of CAAD and home and speculating domestic and technological configurations. 'Another' is an adjective that means something different and/or additional to what is existed. In using 'another' as a notion, I specifically refer to the creative practices I attended in this research to approach CAAD-home inquiry as design-based research, introducing a different/additional way to design material practice in architecture coupled with theory/ writing practices. Through my engagement in designing and theorising Home in a Box, I challenge how design is often defined and practised in the architectural profession. I introduce Home in a Box as 'another' locally engaged creative design practice that enables new ways of thinking about CAAD and home by following feminist ethos to challenge taken-for-granted power structures, reflecting on how my position as designer/researcher is challenged and provided with 'other' ways to exist as central in this research.[55]

In *Creative practice inquiry in Architecture*, Ashley Mason and Adam Sharr define Research by design as the one that 'seeks new knowledge through the conduct of design'.[56] They reconceptualise design-led research in architecture as creative practice inquiry by presenting a myriad of projects that attend to 'other' ways to approach architectural knowledge using methods from different disciplines and practices. Their book also presents a list of recent literature about creative architecture practice.[57] They emphasise that creative architectural research requires architects' engagement in interdisciplinary research methods that emerge outside architecture and recombine with other academic landscapes. Such creative practices rely on the researcher's positionality as central in formulating and sustaining how research is creatively conducted.[58]

Through engagement in *Home in a Box* design and writing practices, this thesis challenges architecture's disciplinary division between criticism and design practices that stems from the persistent division between theory and practice and attends to distant and objective modes of inquiry. In architecture, the theory and practice relationship is often understood as oppositional exchange, where both are standalone modes of knowledge that cannot be as part of the same practice. Theory is usually understood as the engagement in writing about architecture by architects, theorists or historians. Practice, such as design, is engagement in materially producing architecture. In this case, theory is usually used as a scientific instrument that sets general objective rules on how architecture is produced, or to describe the method architects used to design.[59] This mode can be seen in the rift between how architects understand design

55 See Hélène Frichot, pp. 5–7.

56 Ashley Mason and Adam Sharr,*Creative Practice Inquiry in Architecture* (London ; New York: Routledge, 2022), p. 5.

57 See Mason and Sharr, p. 11.

58 Mason and Sharr, pp. 3–6.

59 Awan, Schneider, and Till, p. 29.

as a practice and articulate it through speech or writing through theory.[60]

Instead, this thesis follows a feminist approach, dwelling on Jane Rendell's emphasis on 'interdisciplinarity' as a necessary term for generating a 'political' critique. She suggests that interdisciplinary research questions the ideological systems that structure the way specific disciplinary practices produce particular definitions and methods of inquiry.[61] To understand the complexity of CAAD-home encounters and bring them closer to inhabitants' homes, Rendell's notion of 'interdisciplinary' serves as a valuable approach with which to challenge the dominant processes that aim to control the way knowledge, architectural software and domesticity are produced. Instead, it allows new modes of knowledge and understanding to emerge from within inhabitants' homes. Rendell's notion offers a way to rethink the possibility of an embodied critique of the architectural design cultures in which homes are designed, using CAAD by questioning the norms of architecture as a profession and discipline that constrain what methods and modes of knowledge are available to know and engage with it and define how I, as a researcher, am situated in relation to CAAD-home encounter as a research inquiry.

Jane Rendell argues for an interdisciplinary approach by introducing the notion of 'feminist critical spatial practices'. Her notion describes the resistance to the dominant social order of global corporate capitalism through everyday activities and creative practices. It is grounded in a feminist thought that perceives interdisciplinarity as a landscape where theory and practices interplay and critical, political and ethical engagements are taken into account.[62] However, such an approach is also crucial for feminism because it strives to work through transformative activities that generate resistant forms and modes of knowledge by questioning the processes and norms that tend to control intellectual and creative production.[63]

I suggest the entanglement of practices, theories, and positions in this thesis, including *Home in a Box*, as feminist critical spatial practices. Three aspects in Rendell's term are essential to formulate the understanding of my inquiry in this thesis; first, she attends to feminist methodologies that suggest theory as a form of practice driven by interdisciplinary concerns that dissipate the opposition between theory and design (methodology). Through this, she pays attention to the interrelations between location, identity and knowledge (location/position). She stays attentive to the performative qualities of writing a critique that attends to situatedness and the relation between criticism and practice (writing/doing).[64]

Home in a Box as a feminist methodology

In this thesis, *Home in a Box* is a feminist theory-methodology for CAAD-home inquiry within inhabitants' homes. Here, I introduce 'feminist theory-methodology' as a concept that understands the creative practices that tackle a multiplicity of voices often made invisible following the feminist traditions that juxtapose theory and practice. It offers a way to reflect on the multiplicity of thinking and doing modes while maintaining the necessary situatedness

60 For more details on the gap between design practice and theory see chapter one titled: Utilisation/Exploitation of Computer-Aided Architectural Design (CAAD).

61 Rendell, 'Critical Architecture: Between Criticism and Design', p. 1.

62 Also see: Lori A Brown, *Feminist Practices: Interdisciplinary Approaches to Women in Architecture* (Abingdon: Routledge, 2011), p. 6.

63 Rendell, 'Critical Spatial Practices: Setting out a Feminist Approach to Some Modes and What Matters in Architecture', pp. 21–24.

64 Rendell, 'Tendencies and Trajectories: Feminist Approaches', pp. 90–95.

that takes into consideration the troubled positions practitioners take while engaging in such creative practices.

In *Home in a Box*, I use Hélène Frichot's concept of the *feminist power tool* and Maria Puig de la Bellacasa's *Matters of Care* as the main theoretical accounts to design *Home in a Box* and to understand my engagement in various practices that overlap thinking and doing the box throughout its production as a feminist practice.[65]Through the box, I challenge architectural practices' dominant imagination that undervalues inhabitants' CAAD and domestic experiences and marks them as 'less knowledgeable others', seeking to create an embodied dialogue on CAAD and home from within homes to create a different practical landscape. My thesis is concerned with disclosing inhabitants' domestic practices performed through the materialities and temporalities of their homes and collectively speculating 'another' configurations of CAAD. Through *Home in a Box* the relationships were incited between the box and spatiality and temporality of inhabitants' domestic practices that constitute the materiality of home. In *Home in a Box*, I apply design as a situated tool that dismantles the relationalities and politics of architectural design through my engagement as an architect and the designer of the box, and inhabitants' engagement performed through interaction with different activities it enclosed. The design of the box incited a shift in my positions as an architect, CAAD user and inhabitant. This shift uncovered a web interpretations, powers, emotions, languages and ethics related to how I, as an architect, understand notions of design, CAAD, and home. [66] Inhabitants' engagement in the box also revealed how architects perceive their homes.[67] However, these interpretations are understood as situated and cannot be generalised beyond my and Park Hill participants' experiences.

The critical theory that supports *Home in a Box* as a feminist theory-methodology dwells on ideas developed by Hélène Frichot, mainly the concepts borrowed from *Feminist Power Tools* (2016). These concepts, including how to formulate a feminist power tool using conceptual/thinking tools and what role these power tools take in a situation, are crucial because they allow pursuing a feminist ethos to grasp the role theory takes as a form of practice. They place my situated experiences of designing the box as an architect within more prominent power structures that shape architectural design cultures by being attentive to how the box's production encourages questioning my relationship as an architect/designer to the architecture milieu. Furthermore, they explore other potential ways for design practice, and how it is entangled in a broader web of relations, powers, emotions, positions, and practices in the situation I explore, and support how my subjectivity is constructed, where the uncomfortable feelings its design incited are related to how I understood the notion of design as an architect. They create alternatives to these design structures by allow understanding how to use a conceptual tool/theory and make it actionable to challenge these taken-for-granted cultures. These concepts also shape my understanding of the materiality of the box, not only as an object but as a conceptual tool that makes us think about the CAAD-home encounter situation by problematising, perceiving the box as a materially-seized object that exists autonomously, but is part of a broader structure of relations in which ideas and interpretations the box incites are part of what the box is.

In designing *Home in a Box* I attend to Maria Puig de la Bellacasa's *thinking with care* as a further theoretical account. De la Bellacasa states that to think with care we need to allow a relational making of a *careful* language and care time.This allows me to design the box in a

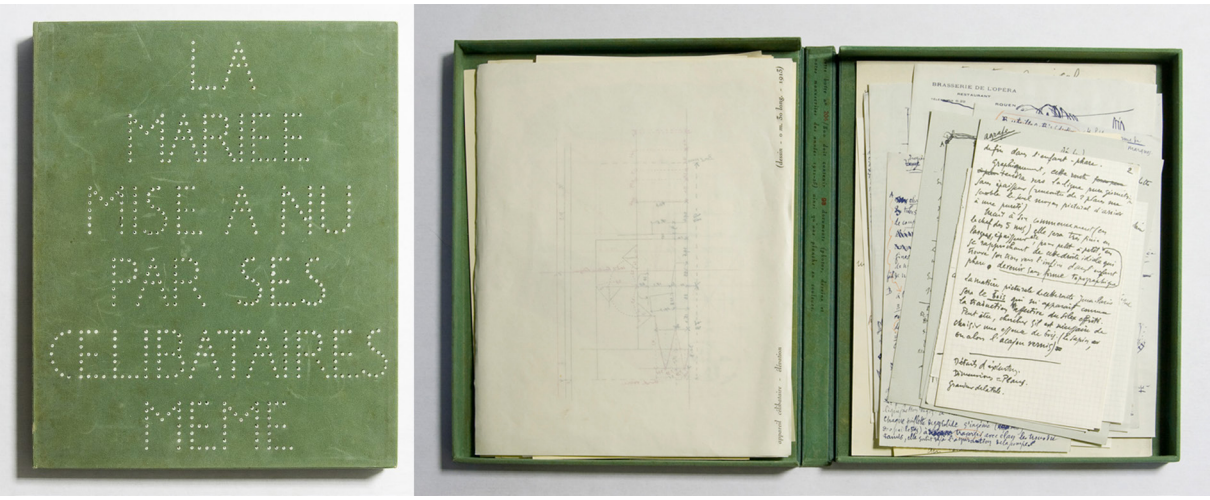
65 Hélène Frichot; de La Bellacasa.

66 See section subtitled: Site of production: 23rd November 2020-1st May 2021 in chapter four.

67 See section subtitled: Site of collaboration: 2nd May 2021- 7th October 2021 in chapter four.

way that shares CAAD architectural discourses with inhabitants and incite an understanding of CAAD-home from within inhabitants' homes, and to temporally engage slowly with people's domestic practices and imaginations that inhabit a diverse range of timelines inside homes.[68] From outside architecture, I also borrow the term and method of *cultural probes,* which I interpret here to allow me to delve into people's mundane lives inside homes by letting them take part in intriguing activities in which they draw, collage, take photos, and fill in diaries about everyday domestic practices without being disturbed by my presence.[69]

The elements of *thinking with care* as theory and *cultural probes* have mutually informed the development of *Home in a Box.* Through different activities it encloses, the box does three things: first, it re-enacts CAAD at home by bringing CAAD practices and discourses to people's



Introduction.4:Marcel Duchamp, La Boîte verte, 1934, 93 documents (photos, drawings, notes from years 1911 to 1915) and one plate. Courtesy of Bill Vazan.'Marcel Duchamp's Green Box - VOX' <http://centrevox.ca/en/exposition/la-boite-verte-marcel-duchamp/> [accessed 2 July 2023].

Introduction.5: Box in a Valise (From or by Marcel Duchamp or Rrose Sélavy) 1935-41.'Marcel Duchamp Box in a Valise-MoMA' <https://www.moma.org/collection/works/80890> [accessed 2 July 2023].

68 de La Bellacasa, pp. 69-72,171-173.

69 Gaver, Dunne, and Pacenti; Sarah Pink and others, *Making Homes: Ethnography and Design* (Abingdon: Routledge, 2017), p. 121.

domestic life; second, it juxtaposes CAAD technics shared in with domestic activities and materialities, producing new relations between CAAD and home; and third, across different activities, the box incites questions about how much CAAD is part of people's lives, what is missing from CAAD tools used by architects, and what CAAD they want and do not want.[70]

As an activities kit, I designed Home in a Box into its final physical shape as a set of visual and discursive activities kit contained in a 'box' through engagement with precedents from the broader context of creative practices like the work of Marcel Duchamp's; 'The Green Box' and Boîte-en-valise, known as 'box in a suitcase'. In the former, Duchamp included several documents related to his famous artwork, the 'Large Glass' consisting of photographs of the work itself and other related artworks, in addition to a collection of manuscripts notes that explain his thinking enclosed in a green cardboard box.[71] In the latter, he reproduced miniatures and replicas of his artwork into around 300 boxes between 1941 and 1968 to create 'portable museums' or a museum into a suitcase.[72] In designing Home in a Box, I used similar creative techniques by enclosing different multimedia objects, including drawing, mapping, photography, recording and annotating activities inside a box. This enabled me and Park Hill inhabitants who interacted with the box to engage with critical questions about CAAD and home, producing the box as an object that allows for a critique of taken-for-granted architectural practices.

Through the box's production, I wanted to stay attentive to the ethical, political and material practices that allow for *careful* relations with inhabitants, acknowledging the troubling and vulnerable positions created by such relations, such as questioning my position as an architect, designer, CAAD user and as inhabitant.[73] I developed modes of knowledge that let them actively engage as co-producers of CAAD-home knowledge throughout answering different questions about their perception of several elements of CAAD and about their everyday domestic practices they engage in at home. The theoretical account of *thinking with care* plays a vital role in engaging in the production of *Home in a Box* through the political commitment and ethical involvement in producing an activity kit that considers *careful* language that aims to share and co-produce knowledge on CAAD and domesticity and allows making more caring time through 'slow' engagement with different temporalities and dynamics of their everyday domestic life occupying home.[74] This enables inhabitants to engage meaningfully in producing 'another' imaginaries of CAAD and home. For example, inhabitants engaged with the box over around three weeks, which gave them enough time to share about different practices like cooking, cleaning, doing the laundry and other everyday activities they take part in at home; this made it possible to stay close to the web of the relation, emotions, objects, and different materialities that tie inhabitants to their homes spatially and temporally. Care is often understood as an emotion and a practice. In the 1980s, feminist scholars considered care a specific kind of ethics.[75] Ethics of care stays attentive to the relational aspects of the encounter between carer and cared-for to maintain their relationship in terms of how these relations are configured and

70 See chapter three titled *Home in a Box*: thinking the box.

71 See Susi Bloch, 'Marcel Duchamp's Green Box', *Art Journal*, 34.1 (1974), 25–29.

72 See Brenna Campbell, Élodie Lévèque, and Erin Jue, 'Marcel Duchamp's Boîtes-En-Valise: Collaboration and Conservation', *Studies in Conservation*, 57.sup1 (2012), S52–60.

73 See section subtitled: Site of production: 23rd November 2020-1st May 2021 in chapter four.

74 I extend discussions on care in section subtitled: CAAD speculation with care in chapter three.

75 See Carol Gilligan, *In a Different Voice: Psychological Theory and Women's Development.* (Harvard University Press, 1982); Nel Noddings, *Caring: A Feminine Approach to Ethics and Moral Education* (California: University of California Press, 1984).

reconfigured within each situation beyond how they are typically represented.[76] Maria Puig de la Bellacasa emphasises the role care takes in practices of knowledge production. She poses 'how to care' as a vital question that grounds care ethics in the specificity of a situation. The relational aspects of care affect how knowledge is shaped and how we care through staying close to the affective, ethical and political significance of our material practices.[77]

In this thesis, I introduce Home in a Box as a feminist theory-methodology. This concept helps to understand the box through the assemblage of different thinking and doing modes that happened through a web of humans, non-humans, positions, emotions, and practices in different sites in which it was produced (my home) and with which inhabitants collaborated (Park Hill).[78]

I use this term to unfold the multiplicity of ways the box is articulated as a 'theory/conceptual tool'[79] that makes us think about the CAAD-home situation, a physical 'object'[80] incorporating multimedia objects with visual and discursive activities, and 'feminist inquiry' that pays attention to the ethical and political capacity that considers inhabitants hidden voices when producing knowledge on CAAD and home.

Through this thesis, I suggest *Home in a Box* itself as a feminist power tool that makes us think about CAAD-home encounters by relating to the spatial and temporal materialities of everyday life inside people's homes as the leading site in which the box is put to work, resisting taken-for-granted representations informed by architects' CAAD use in design practices to produce empty homes. This articulation allows for generating a critique enacted by understanding *Home in a Box* through the assemblage that relates the box to different humans, things and processes formulated in the sites where I produced it and inhabitants collaborated with it. Additionally, it stays attentive to my position while designing the box and related to technoscientific design cultures that incited questions about who I am as an architect and designer.[81] The key findings developed in the thesis include, first, the troubles I encountered, evident in discomfort, anxiety and fear enacted by *Home in a Box's* design, reveal how architectural practices operate within larger structures that define and produce 'the architect' figure, which troubled me while designing the box. And the engagement with *Home in a Box* allowed an embodied perspective of the CAAD-home situation from within the inhabitants' homes, instead of authoritative ones in architectural design cultures, offering speculation on more caring forms of CAAD. This does not suggest eliminating the current practices in architecture but calls for affective, ethical and political engagement in the form of '*moments of exchange'*, as one of the inhabitants described, in which inhabitants reclaim their agency as co-producers of home.

Reclaiming positions/locations that matter

Architects/ inhabitants/care

76 Nel Noddings, "THE LANGUAGE OF CARE ETHICS," *Knowledge Quest* 40, no. 5 (2012): 53.
77 de La Bellacasa, p. 204.
78 See chapter four titled: Home in a Box: Doing the box.
79 See chapter three titled: Home in a Box: Thinking the box. .
80 See section subtitled: Home in a Box as an ethnographic design object in chapter three.
81 I navigate through the positionalities I claim while designing Home in a Box, in section subtitled : Site of production: 23rd November 2020-1st May 2021 in chapter four.

What is CAAD? What is home? The answers to these two questions are often imagined as specific to architects' engagement in CAAD technicalities to draw and model people's homes. Through this thesis, I follow the specificity of the CAAD-home situation. I do that by claiming agency from the inhabitants' voices, who are marked as 'the other' in architectural practices—allowing diverse embodied narratives from people's homes to emerge in the discussion of architectural software and domesticity. However, how to engage with those 'othered', while claiming 'an architect' position, presents its own ethical challenges.

In architectural practices, the dominant power structures shape how design is performed using architectural software. They represent architects as the 'more knowledgeable' who engage in more efficient ways to produce people's homes. Though architectural practices that design social housing care to engage future inhabitants in its development, their methods seem instrumental. Throughout the project's timeline, architects meet prospective inhabitants several times, seeking specific design preferences (for example, how the living room and kitchen are related) through different methods like questionnaires and informal discussions.

However, this temporal experience of inhabitants' care is still focused on the efficiency of the design as a productive process that plots architects' design activities along a linear trajectory to meet technoscientific expectations, where the future is configured towards a technically defined goal of designing a 'good' social housing for the vulnerable 'other'.[82] Through this thesis, I critique the power structures that formulate more instrumental ways to care for inhabitants' knowledge throughout social housing design and shape the answers to the questions What is CAAD? What is home? as a professional-only territory excluding inhabitants' understanding of both. The question of how to ethically care for inhabitants' knowledge emerged as I started to think of *Home in a Box* design. My concern was how to engage with more caring practices other than what I knew as an architect, without repeating the power structures I aimed to critique in the first place.

I designed *Home in a Box* to understand how much CAAD is part of inhabitants' lives, how they represent their domestic lives and to speculate what CAAD they want and do not want to represent their homes. And in doing so, I attain political and ethical capacities that consider how I relate to inhabitants' experiences of architectural software and domesticity to shift CAAD-home imaginaries to the proximity of their homes. Care became a fundamental part of this through questioning the ways to engage in activating inhabitants agency to speculate another form of CAAD, representing them as co-producers of CAAD and home knowledges. As an architect, engaging in designing the box through thinking with care influenced how I relate to and define CAAD, home, and design, putting what I know and understand as an architect at risk. I asked, who am I as an architect? I exposed the vulnerable positions that I claim: as a designer, a CAAD user, and an inhabitant.[83]

Critic/designer

Through this thesis, I shift between three sites: architectural practices, my home, and inhabitants' homes, to seek to critique architectural design cultures that mark inhabitants as invisible and architects as main CAAD user and home producer. In each site I experience being a critic of architectural practices from three locations through approaching architects' design cultures in practice c and t and my engagement in designing *Home in a Box*, and by attending to a feminist ethos to approach inhabitants' 'other' experiences of CAAD-home encounters through the

82 I extend the discussion on architects' technical and ethical engagements in social housing design in section subtitled as: CAAD -social housing 'technical' superimposition in chapter two.

83 I extend the discussion on my positionalities throughout *Home in a Box* design and production in section subtitled : Site of production: 23rd November 2020-1st May 2021 in chapter four.

box design to create a form of, to borrow from Donna Haraway, 'situated knowledge' that generates a critique of dominant architectural representations.[84] To do so, I stay attentive to the situatedness of their locations and identities from which their knowledge of CAAD and home is formulated and the positions I claim and locations I occupy to produce this critique.

In architecture, criticism tends to denote the written essays produced by specialist critics to judge design projects and objects (such as buildings) they did not design.[85] John Macarthur and Naomi Stead point out that such criticism is located as a central 'interface' between theory and practice. It operates and links between a series of oppositions, architectural cultures/practices, academies/industries and discipline/operations in which a critic is situated at a necessary distance from the design work. Temporally, criticism locates the design work in relation to its historical precedents, present inflexion and future projections. Moreover, they consider judgement essential for the criticism to work through architectural practices.[86] In the introduction to *Critical Architecture*, Jane Rendell problematises the distant position critics claim and the distanced location criticism takes in relation to architectural design work. She argues that in a discipline such as architecture, criticism and design are often debated and located as two distinct poles, and their intersection is often contested. Their division is drawn from the thought that criticism does not produce buildings, and design is never performed in writing. In a typical scenario, architectural criticism takes an in-between position where an external judge-produced commentary, or judgement comes after a design work takes place. It is usually abstract, objective and distant. Rather, Rendell suggests rethinking the relationship between architectural criticism and design by questioning predefined ways of performing both modes of practice and their underpinned assumptions. Through the introduction of 'critical architecture' as a term, she invites 'critique'/'criticality' that keeps 'the other' in mind to emerge (instead of criticism) as a self-reflective and embodied activity that comes closer to design practices. [87]

Critics are often represented as external judges who are not involved in designing the object on which they comment (a building, as in the case of architectural design). As an architect/ researcher, engaging in the 'criticism' of CAAD-home encounters elicited by people's home design practices exposes an externality and distant position. Such positionality assumes unequal power dynamics, where the researcher/architect looks at inhabitants' otherness from 'above', which threatens to repeat the same loop from which this research initially emerged. In those terms, Rendell's critical practices bring the critic and criticism closer to design practices, allowing the critic to entangle with design attentively. In resisting architecture's disciplinary divisions, the way critic, criticism and design work are temporally related and spatially positioned also matters. In *Site Writing: the architecture of art criticism*, Rendell emphasises that criticism is often described through the conceptualisation of the relation between critic and artwork, using spatial terms depicting distance, frame, externality and outside.[88] Whereas conventional architectural criticism/ critical theory operates in before-and-after relations with design work, in which critics perform necessarily externally, many theorists encourage shifting such positions to remain 'critical'[89] while challenging taken-for-granted knowledge

84 Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies*, 14.3 (1988), 575–99.

85 Rendell, 'Critical Architecture: Between Criticism and Design', p. 1.

86 John Macarthur and Naomi Stead, 'The Judge Is Not an Operator: Historiography, Criticality, and Architectural Criticism', *OASE Architectural Journal*, 2006, 116–37 (p. 118).

87 Rendell, 'Critical Architecture: Between Criticism and Design', pp. 2–4.

88 Jane Rendell, *Site-Writing: The Architecture of Art Criticism* (London ; New York: Bloomsbury Publishing, 2011), p. 6.

89 A criticality that attains self-reflectivity and desire for social change qualities of critical theory, and al-

modes. Gavin Butt offers an 'against and/or beside' proposition that allows criticism to find ways that free it from predefinitions of institutionalised thinking while persisting in acquiring the necessary criticality.[90] Rendell suggests shifting the power dynamics of writing criticism that cite the critic's relation to the object of study. She proposes relating 'to' and writing 'with', propositions that indicate power equivalence between the critic and the object, instead of modes of the dominance assumed by using 'over' and 'under'. [91] Similarly, Irit Rogoff attains a practice of 'writing with' the artist's work instead of 'about' it, in a way that allows the de-hierarchisation of its interpretations.[92]

In this thesis, I follow the specificity of the CAAD-home situation by dwelling on Rendell's critical writing practices. Her understanding allows me to be attentive to my position and location in relation to the theories and practices involved in *Home in a Box.* Throughout the box design, I stayed close to articulating how thinking with care to design the box interrupted the rationality and certainty of how I defined design, CAAD, and home as an architect. This is by engaging in reflecting on the discomfort, anxiety and fear enacted by Home in a Box's design. In addition, it enables a connection between my relationality and positionality as a critic to the site of writing the box itself, allowing the construction of an embodied critique of design cultures, where I write *with* the box rather than *about* it. This happened by engaging in writing autobiographical notes, accompanied by annotations I wrote during and after designing the box. I remark on the vulnerable positionalities as an architect who is defined as between a designer, a user, and an inhabitant, which troubled me while engaging in the box's production.

Embracing stories that matter: Feminist writing practices

In this thesis, by grounding my research in critical feminist practice, I stay attentive to different practices, positions, sites and relations that inform generating critiques of architectural design cultures to provide an embodied interpretation and understanding of CAAD and domesticity from within inhabitants' homes. The production of this critique is enacted by different positions as critic, architect, designer, CAAD user and inhabitant in several sites of architectural practices, my home and inhabitants' homes I mobilised and occupied materially, conceptually and emotionally. Rendell's form of 'site-writing' and Emma Cheatle, Katja Grillner, Mieke Bal's forms of creative- critical writings are general writing practices of this thesis to stay close to the specificity of sites I moved between to generate this critique.[93] Rendell emphasises that '"site-writing" is what happens when discussions concerning site-specificity extend to involve art criticism, and the spatial qualities of the writing become as important in conveying meaning as the content of the criticism.'[94] Emma Cheatle introduces walking-writing as a situated practice

ways adheres to considering 'the other'. Rendell, 'Critical Architecture: Between Criticism and Design', p. 4.

90 Gavin. Butt, *After Criticism : New Responses to Art and Performance* (Oxford: Blackwell, 2005), p. 5.

91 Rendell, *Site-Writing: The Architecture of Art Criticism*, p. 7.

92 Irit Rogoff, 'What Is a Theorist', in *The State of Art Criticism*, ed. by Michael Newman and James Elkins (Abingdon: Routledge, 2008), pp. 97–109 (p. 104).

93 Rendell, *Site-Writing: The Architecture of Art Criticism*; Emma Cheatle, 'Writing Walking: Ficto-Critical Routes through Eighteenth-Century London', in *Writing Architectures: Ficto-Critical Approaches*, ed. by Hélène Frichot and Naomi Stead (Bloomsbury Publishing, 2020), p. 112; Cheatle, *Part-Architecture: The Maison de Verre, Duchamp, Domesticity and Desire in 1930s Paris*; Katja Grillner, 'Writing and Landscape-Setting Scenes for Critical Reflection', *The Journal of Architecture*, 8.2 (2003), 239–49; Mieke Bal, *Louise Bourgeois' Spider: The Architecture of Art-Writing* (Chicago: University of Chicago Press, 2001).

94 Jane Rendell, 'Site-Writing: Enigma and Embellishment', in *Critical Architecture*, ed. by Jane Rendell and others (Abingdon: Routledge, 2007), pp. 170–82 (p. 151).

to unpack multiple temporal accounts, positions and sources as she unpacks the history of eighteenth-century London through walking, following the footsteps of Mary Wollstonecraft.[95] Katja Grillner also presents writing architecture as a mode of practice by situating herself as a subject in a landscape amid others she writes about.[96] Mieke Bal offers a critical writing approach by attending to narratives that approach the 'architecturality' of Louise Bourgeoise's work, *Spider*, which places it at the centre of her writing.[97] The use of these forms of situated reflective life writing emerged through considering the particularity of the CAAD-home situation in architectural practices and inhabitants' homes, informed by my experience in designing *Home in a Box* as an architect inside my home. They allow the exploration of my situatedness not only as the designer of the box but also as its critic, navigating through different positions I claim and understanding the relations between critique and design.

Through this thesis, I mobilise architectural practices and inhabitants' homes, theory and practices in doing and writing the box. This is reflected in how it is written, enabling me, as a researcher, to relate to different sites while reflecting on the vulnerable positionalities, people and practices in which I was involved. The texts that constitute this thesis are written in relation to various voices, including architects and practitioners in practice c and practice t, my voice as an architect and designer of *Home in a Box,* and Park Hill's inhabitants who collaborated in doing the box. My practice of site writing follows Rendell, Cheatle, Grillner, Bal and others' approaches by combining images and text to create spatial relations. It blends creative, personal and academic writing styles to reflect different positionalities, explores the interactions between material and emotional states and outlines the relation between writing and designing the box.[98] This thesis follows the multiplicity of practices, materialities and concepts that upholds the understanding of CAAD-home encounters in three sites: architectural practices, my home, and inhabitants' homes. This is reflected in my practice of writing, formulated in different formats that enable telling embodied narratives from each site. The writing on practice c and practice t was shaped into stories, conversations, and statements with citations from my interviews with practitioners from both practices.[99] From my home, I reflect on my positionalities as an architect, CAAD user and inhabitant, enacted by the practices, emotions, and ideas I encountered while designing *Home in a Box.* This is written as an autoethnographic diary from November 2020 to May 2021, spanning the creation of the box within my home during COVID-19.[100]

With the four Park Hill inhabitants, each inhabitant acts as a key. Their real identities are hidden under four fictional characters: Hugh, Catherine, Hannah, and June, whose engagements with the box and subsequent interviews provided the events and information in the box. This multi-narrative unveil their embodied experiences of using CAAD tools and the spatiality and temporality of their domestic practices at home. I write from their homes using their voices as a biographical multi-narrative formulated as roman à clef (meaning 'novel with a key').[101]

95 Cheatle, 'Writing Walking: Ficto-Critical Routes through Eighteenth-Century London'.

96 Grillner, 'Writing and Landscape-Setting Scenes for Critical Reflection'; Katja Grillner, *Ramble, Linger and Gaze* (Stockholm: KTH, 2000).

97 Bal, *Louise Bourgeois' Spider: The Architecture of Art-Writing*.

98 Jane Rendell, 'The Siting of Writing and the Writing of Sites', in *Explorations in Urban Design* (Abingdon: Routledge, 2017), pp. 245–56 (p. 219).

99 See chapter one titled as Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD): speaking of the devil in the office, and chapter two titled Social housing design practices: 'social' housing as a product.

100 See section subtitled as site of production: 23rd November 2020- 1st May 2021 in chapter four.

101 Ian Ousby, *Cambridge Paperback Guide to Literature in English* (Cambridge University Press, 1996), 332; Melissa Boyde, 'The Modernist Roman à Clef and Cultural Secrets, or, i Know That You Know That i Know That You Know,' *Australian Literary Studies* 24, no. 3–4 (January 1, 2009): 156.

Using *roman à clef,* I recite inhabitants' engagement in doing the box by following the box from its arrival till its departure from each home. The *roman à clef* form is intended here to be a feminist practice of writing the box that maintains the ethical capacities of writing 'the other'. It allows a critique of architectural practices through writing with inhabitants' voices, often represented as 'the other', reclaiming an authoritative position to tell their own stories about home and CAAD.[102]

Thesis structure

The thesis is structured into chapters associated with my experiences in different sites: architectural practices, my home, and inhabitants' homes. The structure follows my fieldwork experiences, beginning with interpreting CAAD use and social housing design in architectural practices, then thinking of *Home in a Box* design and materialising it as an object, and ending with inhabitants' collaboration in doing the box. Four main chapters relate to the practices I encounter throughout my experiences in different sites: 1. Utilisation/ exploitation of Computer-Aided Architectural Design (CAAD); 2. Designing social housing; 3. *Home in a Box*: thinking Home in a Box; 4. *Home in a Box*: doing the box.

The first chapter, Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD), follows CAAD's discourse and practices performed by architects and practitioners in practice c and practice t. I navigate the gap between how architects talk about CAAD and how they use it daily, reflecting on their scepticism and its relationship to the instrumentality of CAAD tools. The chapter unpacks the roots of architects' uncertainty when speaking about CAAD by deconstructing how it was developed as a tool and the actors behind the process. This is in the context of understanding architects' anxiety over a loss of control and how digital architecture is perceived as an excess and indulgence in wider architectural practices and discourse.

The second chapter, Social housing design practices, follows the digital, material and cultural intricacies of using CAAD to design social housing in practice c and practice t. In this chapter, I extend the discussion on architects' discourse and practices I started in the first chapter by expanding on how architects talk about their design practices. I begin by briefly tracing the social underpinnings of social housing design to understand architects' ethical and technical engagements in both practices. This is followed by an in-depth analysis of how the digital dynamics of CAAD usage shape how architects imagine and relate to social housing as a design process and as an object.

In chapter three, *Home in a Box:* thinking Home in a Box, I develop *Home in a Box* as a feminist theory-methodology that enables an inquiry into CAAD-home encounters within inhabitants' homes by allowing a meaningful engagement of inhabitants to produce embodied knowledge on architectural software and domesticity. This chapter articulates *Home in a Box* as a twofold feminist practice that overlaps theory and design. I introduce Maria Puig de la Bellacasa's thinking with care and Hélène Frichot's Feminist power tools as the main theoretical accounts of designing the box, followed by borrowing the 'cultural probes' method from anthropology design to materialise the box into its final shape. Through this chapter, I ask how I can care for inhabitants' embodied experiences, collectively speculate on more caring configurations of CAAD with them, and understand the box both as an object and a conceptual tool.

Chapter four, *Home in a Box*: doing the box, offers a critique of the design structures that shape how CAAD, home and design are defined in architectural practices. The critique is articulated

102 See section subtitled: Site of collaboration: 2nd May 2021- 7th October 2021 in chapter four.

in the design of the box and the way inhabitants collaborate with the contents of the box. Through this chapter, I focus on 'other' understandings of CAAD and home by tracing the box's movements from my home to the inhabitants' homes. In the sense that I stay attentive to the box's entanglements with a web of practices, positions and ideas with its different sites of production and collaboration. I provide alternative practice by presenting the interruptions caused by producing the box as an 'other' design practice by reciting and reflecting on autobiographical notes accompanied by design annotations I wrote while designing *Home in a Box*. In addition to presenting fictionalised narratives as an invitation to reconnect with inhabitants' CAAD-home imaginaries through exploring divergent spatial, temporal and digital domestic engagements incited by inhabitants' interactions with *Home in a Box*.

Chapter One

Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD): Speaking of The Devil in The Office.

Introduction

Architectural practices are tricky places, trapped between understanding how buildings are made as a *practice* and written or spoken of as a theory. This tension is embodied in the distance between what happens inside architectural firms as matters of the reality of buildings' design production and how architects and theorists represent it. Understanding CAAD use in architectural firms is subject to the same division between how architects performatively engage with computer programs every day in their offices and how different theories emerged from its use under the 'digital architecture' theory. In architectural offices, 'CAAD', as an acronym for Computer Aided Architectural Design, usually looks less trendy. It is mistaken as Computer-Aided Design (*CAD)*[1], which is referred to as the traditional computerised drafting tools that mimic how designers drew and modelled their designs before digital software. CAD is often considered a conventional, old practice when compared to Building Information Modelling (BIM), a more 'sophisticated' way of practising architecture and managing its data.[2] In this research, I consider all acronyms are the same. My use of 'CAAD'[3] refers to the everyday engagement of architects with computer software in producing people's homes, regardless of typology or the software company that develops it.

Comprehending this daily interaction and its social implications will allow a better understanding of how architectural design informed by CAAD use is performed. My aim in this research is to critique design cultures that shape the representations of architects' and inhabitants' knowledge of CAAD and home. My interest in grasping CAAD's presence in housing architectural practices and the ways that lead to an intimate understanding of CAAD-related architectural practice from within the practice itself. The relevance of this is that an interpretation of the way the software is performed allows me to challenge/question the idea of design itself later. In this chapter, I highlight the gap between what is performed as *practice* and spoken/ written as a *theory,* given its importance in revealing how architects practise CAAD. The contrast between how architects talk about CAAD and how they use it signals crucial aspects to consider when approaching the use of architectural software by non-professionals. Especially with the pandemic barriers and the inaccessibility it caused to architects' offices and people's homes. The ethnographic input from spending time on these sites was impossible, which transformed my discussion into understanding the discourse's role in revealing different facets of practice in the office. Hence, how do architects write, speak and practise CAAD inside architectural practices? How is CAAD as a discourse entangled with how architects do and design housing buildings?

There is a difference between speaking CAAD and speaking/writing about its use in architectural practice. Starting with the latter, talking/writing about CAAD is associated with how architects represent their use of CAAD in their design processes. Usually, this representation is discrete from their performative actions that happen through everyday social frictions with the software's space, with all its pulldown menus, commands and errors. Denaturing from CAAD's embodied daily interaction occurs due to treating this interaction as a social engagement

1 For more details on the history of the debate on CAAD or CAD acronym see G Celani and P Veloso, 'CAAD Conferences: A Brief History', in *The next City-New Technologies and the Future of the Built Environment [16th International Conference CAAD Futures 2015. Sao Paulo* (Sao Paulo, 2015), pp. 47–58 (pp. 47–48).

2 Marco Frascari, Jonathan Hale, and Bradley Starkey, *From Models to Drawings: Imagination and Representation in Architecture* (Abingdon: Routledge, 2013), p. 3.

3 The use of the CAAD term was not introduced till the 1980s. Ludger Hovestadt, Urs Leonhard Hirschberg, and Oliver Fritz, *Atlas of Digital Architecture: Terminology Concepts Methods Tools Examples Phenomena*, 1st edn (Basel: Birkhäuser Publishers for Architecture, 2020), p. 134.

with the software. In architectural profession culture, the relationship with CAAD is often depicted as technoscientific abstract. In an imaginative setting, a presentation performed by an architect on how they used CAAD in a specific design process in front of a professional committee will not be the same as when they casually talk about what they like and do not like in this process to a colleague. The social interactions that occur while using the architectural software, possibly revealed in architects' daily conversations, are considered non-professional and exhibited more as a personal encounter with the software informed by their subjective use. This puts these tools in a distant position, highlighted as very professional and objective, isolating them from the messiness of their everyday use. The illusion of objectivity dominates architectural technology discourses. And CAAD technologies exist as autonomous and neutral tools, detached from their social, material, and technical configurations.[4] This gap between CAAD practice and theory is problematic because it reduces the actions it represents, diminishing what CAAD practices may mean and how practitioners define them.

Nishat Awan, Tatjana Schneider, and Jeremy Till suggest a rift between architectural practice, with the habitual, repetitive and unreflective processes that architects engage in to react to clients and market demands, and the way the practice is theorised, using 'traditional' forms of theory that follow a natural sciences' frame. In this case, theory is only a scientific instrument that sets general objective rules on how architecture is produced, eliminating the subjectivity and particularity of each architectural creation. The result is distinguishing styles, and technical standards (usually associated with a star architect's signature) applied to buildings regardless of local realities.[5] Such an approach influences how digital tools are conceptualised as scientific instruments that set rules and justify how buildings are created and designed (Parametricism, for example).[6] This means that CAAD and other digital tools are deployed to create 'cool, disembodied, rational, logical' buildings, in Stead's words, smoothing over the ordinary, bland and dull practices that emerge out of the everyday use of CAAD.[7]

As I set out on this research, I contacted practices in the United Kingdom, asking for a conversation on their use of CAAD in housing design. I selected practices with documented records of using CAAD (and what architectural practices do not nowadays?). However, my request was met with suspicion and rejected. This is not because they do not use it but because they do not consider their practice as one of those big, specialised 'CAD-expert' offices that have used the technology to build a whole narrative of their design process. Architects tend to put CAAD practices in two distant positions: in one, they treat it as an inevitable everyday routine that is inescapable, imminent, mundane, and thus less substantial. But they also understand it as a professional speciality, associated with privileged and advanced computer and technological software capabilities beyond most practices, which can be thus sold as an added value to potential clients. This distinction is evident in how CAAD practices are represented by practitioners who strip out their professional speech and text from their everyday actions and interactions with CAAD.

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4 Daniel Cardoso Llach, *Builders of the Vision: Software and the Imagination of Design* (Abingdon: Routledge, 2015), p. 2.

5 Nishat Awan, Tatjana Schneider, and Jeremy Till, *Spatial Agency: Other Ways of Doing Architecture* (Abingdon: Routledge, 2013), p. 29.

6 More about Parametricism and Parametrics see chapter 4 of Roberto Bottazzi, *Digital Architecture Beyond Computers: Fragments of a Cultural History of Computational Design*, 1st Edition (London, New York: Bloomsbury Publishing, 2018), p. 83.

7 Naomi Stead, 'Architectural Affections On Some Modes of Conversation in Architecture, Towards a Disciplinary Theorisation of Oral History' *Fabrications:The Journal of the Society of Architectural Historians, Australia and New Zealand* 24, no. 2 (2014): 157.

However, why do architects ignore their everyday interaction with CAAD and assign notions of 'digital' to sophisticated, 'cool', and tech-nerdy practices? The answer to such questions can be traced to the history of the software, its introduction to an architectural market, and how the emergence brought forth the adjective 'digital' to adjoin architecture in contemporary discourse. This history also follows the dynamics of the relationship between computers and architects. In this research, my focus is on the complex juxtaposition between social housing and CAAD in architectural practices, where I explore the relationship architects build with both terms and the way they refer to them when they describe their practices and, in return, how that shapes the imaginaries of CAAD and social housing. In this chapter, I delve into CAAD based on my ethnographic fieldwork with two London-based architectural firms. I follow how architects talk about CAAD in terms of what stories they tell from their daily interaction with it to approach its use from the depth of everyday life in the architectural office, which will help to know what CAAD is and what it does within architectural practices.

Searching for architectural offices to situate my inquiry was challenging. My main focus was the practices that specialised in housing and social housing specifically—assuming that most would use CAAD. My initial request was to have conversations with a couple of their architects about CAAD technologies, to gain more access gradually. Emailing/sending my inquiry to all possible architectural firms in the United Kingdom who used CAAD and worked on social housing resulted in replies from two London-based architectural firms: practice c and practice t[8]. After their response, I sat in front of my computer screen, browsing their websites, looking for any information on the kind of CAAD they used, their housing projects, and how these two firms present their architectural practices in general. I found no mention of CAAD or any software or digital technology, just a couple of stock photos of architects at their desks sitting in a field of monitors. One of the firms used one in which the monitor was hidden from the scene, and physical models were shown instead. Each of these firms narrated their character and personality in these images. One takes social housing as a feature of their practice, and the other highlights their interest in materials, construction detail and sustainable approaches. Both, however, do so without referencing CAAD.

In this thesis, I explore practitioners' daily interaction with CAAD in the context of housing design. I am interested in the performative aspect of these daily engagements, which I probe in five interviews with practice c and practice t. The performative aspect of the interviews, the way they occurred, the language employed, and the setting were just as important as the content itself. It took me around two months to speak to two directors, two architects and one BIM manager. Unbeknownst to me, the interviews were arranged hierarchically, beginning with the directors, whom I contacted first, and putting me in touch with the architects and BIM managers. This hierarchy revealed different facets of CAAD utilisation within the process. From different positions and viewpoints amidst the design process, practitioners perceived and represented CAAD differently. Thus, the gap between how they speak about it and how they engage performatively with it takes different forms and shapes.[9]

8 Original architectural practices' names have been changed.

9 I expand the discussion on my conversations with practitioners in practice c and practice t in section subtitled as: 'A note on conversations in the office', in chapter two.

Roots of doubt: the emergence of architects' relationship with software (a brief history)

In the 2000s, architects became reconciled with using CAAD within their design practices after decades of widespread hesitance and suspicion. CAAD technologies had been seen, to that point, as an ambiguous presence threatening the architect's role. The turn of the millennium saw a flourishing use of CAAD, becoming an inevitable part of architectural practices and accompanied by the emergence of the CAAD technician role. The pragmatics of its utilisation reconfigured architectural practice and led to new relationships with these tools. The gap between how architects use CAAD as a practice and how these tools are represented in discourse becomes uncertain, contradictory and ambiguous. 'It is just a tool', 'we use CAAD… but it is low tech', 'Revit is very efficient… it's complex and slows the process.'[10] This is how some practitioners from both practice c and practice t described CAAD in my conversations with them. The contradictions in architects' speech suggest an oscillating position between fascination with CAAD's efficiency and precision and frustration with how flawed they are perceived.

Hence, why do architects tend to be uncertain about CAAD and what are the roots of this stance? You may ask why detachment is so fundamental in the discussion on CAAD in architectural practices. I would say that attitude is key to understanding the essence of the technology's existence and its entanglement with practices within the office. Most of the time, these tools are stripped from all the social dynamics surrounding them, leading to an abstract definition of CAAD and what it does to architectural practices. Doubt and scepticism remind us of the superimposed social configurations by their existence in architects' daily practices. This reveals a profound apprehension of the architect's role in architectural practices and the artefact's role (mainly the digital productions of CAAD such as digital drawings, 3D models, and renderings) in the way architects represent and refer to these roles.

In the 1960s, academic departments witnessed the emergence of Computer-Aided Design (CAD) technology, with researchers starting to explore the potential of digital computers to computerise architectural drawing and drafting processes. *Sketchpad,* the outcome of Ivan Sutherland's research at MIT, showed the potential of adapting fruitful experiments in computerised engineering drawing developed by the US Air Force to architectural drafting.[11] This paralleled with growing interest in CAD development in Britain, where research groups emerged around the country—in Liverpool led by Arthur Britch, Edinburgh by Aart Bijl, and Strathclyde by Tom Maver, followed by research in Cambridge, Leeds, and Bristol.[12] By then, personal computers were not widespread. Architects formulated their first relationship with CAAD from a distance through 'screenshots': the photographs taken of computer screens by academic institutions in their technical reports and which came to illustrate a possible future of computers embedded in architectural practices.[13]

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10 Interview with H.C., architect at practice t, 27th November 2020, Interview with F.C., director at practice t, 13th October 2020, and interview with M.S, architect at practice c, 25th November 2020.

11 Bottazzi, p. 10.

12 David Willey, 'Sketchpad to 2000': From Computer Systems to Digital Environments,' in *ECAADe Conference, Architectural Computing from Turing to 2000* (CUMINCAD, 1999), 526–527.

13 Matthew Allen, 'Representing Computer-Aided Design: Screenshots and the Interactive Computer circa 1960', *Perspectives on Science*, 24.6 (2016), 637–68 (p. 663).

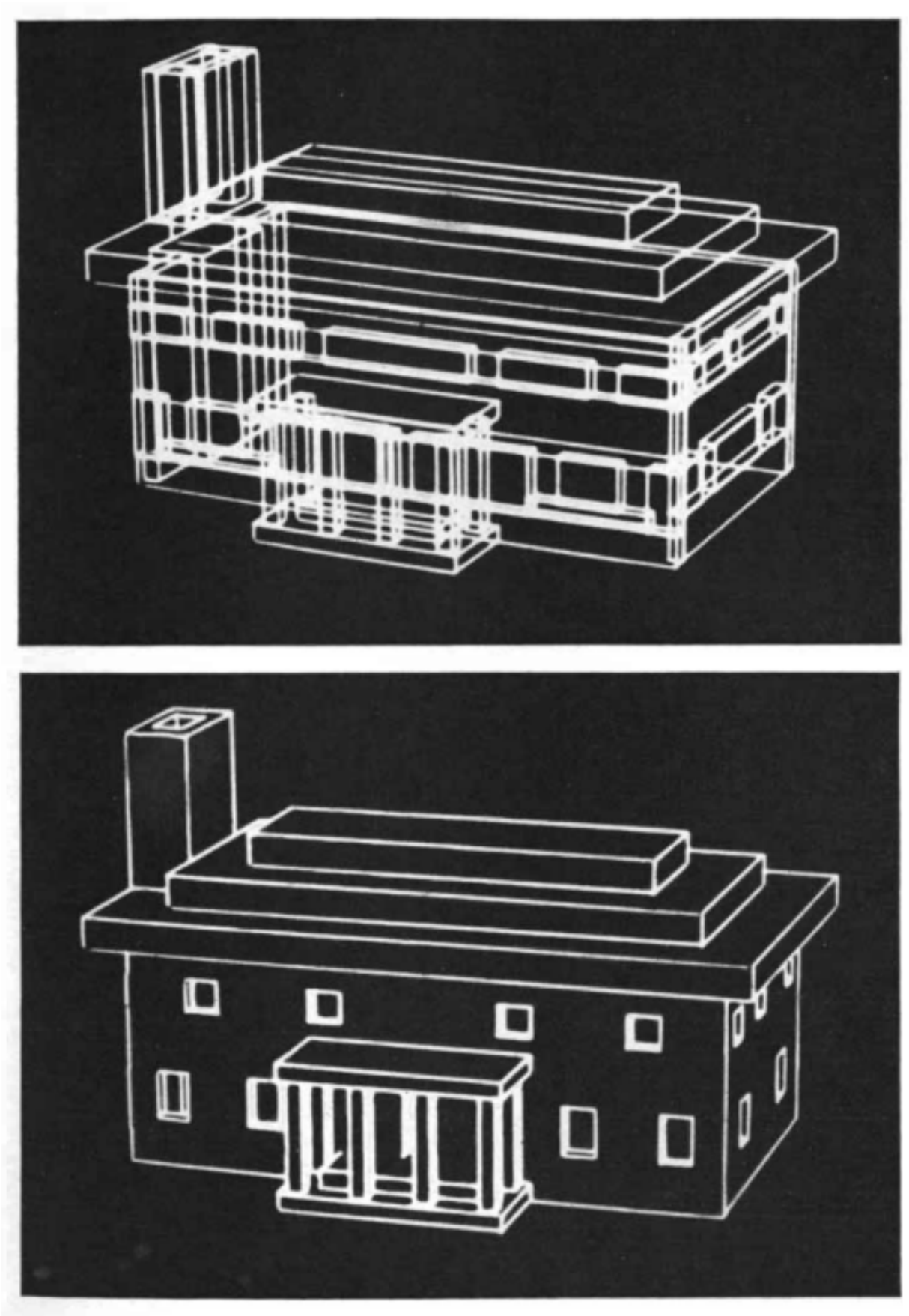

Figure 1.1:Screenshot that shows a perspective produced in a computer program was written by Lawrence G. Roberts of the Lincoln Laboratory. Sutherland, Ivan E. "COMPUTER INPUTS AND OUTPUTS." Scientific American, vol. 215, no. 3, 1966, 86–99 (pp.96).

Architects' relationship with computers was shaped not only through their very first basic encounters with representations of what CAAD could do but also primarily formed through other mediators from specialised media, academics and researchers. Notable cases are Ivan Sutherland, Steven Coons[14], and Douglas Ross, who built on the imaginaries of computers accompanying architects throughout design practices.[15] Through the combination of its affordances to automate the design process and imaginaries of the technology as a slave to deal with mundane and time-consuming tasks, CAAD soon stirred feelings of doubt and fear in architectural practice. By the 1970s, parallel with the development of personal computers and monitors, architects and researchers such as Christopher Alexander[16], Nicholas Negroponte[17], and William J. Mitchell[18] took a vital role in defining the arrival of CAAD into practice and its future possibilities. The adjectives and metaphors used to explain the new technology are revealing. CAAD as 'Clerk', 'Partner', 'Wizard', 'Surrogate', and 'Accountant' inform a discourse polarised by the optimism of its possibilities and the anxiety about the technology diminishing authorship.[19]

While sceptic architects in the 1980s were still uneasy about adopting CAAD recruitment in their practices, the technology gradually became an established research strand within academic institutions, as illustrated by the emergence of international organisations such as *ACADIA*, *eCAADe*, and *CAAD Futures*.[20] The idea of CAAD became more appealing, with computers becoming more affordable, portable, and powerful. Meanwhile, established players, such as Autodesk, developed software to overcome reluctance in the profession, creating tools to aid two-dimensional drawing and three-dimensional modelling. These companies used all their commercial leverage to disseminate these tools. *Autodesk*, which commercialised the early version of AutoCAD, previously known as MicroStation, promoted it by targeting magazine articles that reached practitioners in their offices. It tried encouraging them to use CAAD by highlighting its drawing capabilities and compatibility with different software packages.[21]

CAAD started to be a recognisable digital presence in architectural offices, and proficiency in its use became a vital skill for practitioners in the 1990s.[22] The efforts paid by academia and the software industry played a crucial role in convincing architects of computers' capabilities in different aspects of architectural design. With CAAD's arrival to the office's everyday life, the competition between companies like *Autodesk*, *Intergraph*, *Bentley Systems*, *Palette Systems*, and *Dassault Systems* increased by the mid-1990s to meet the growing demand. As a result, architectural software took different shapes to become tools for drafting, modelling and rendering engines; not all these were exclusively made for architects' use, as some were initially

14 For more details on Coons' role in CAD creation and imagination in architectural practices see Llach.

15 Llach, pp. 53–54.

16 See Matthew Allen, p. 638; Theodora Vardouli, 'Computer of a Thousand Faces: Anthropomorphizations of the Computer in Design (1965-1975)', *Dosya 29: Computational Design*, 2012, 24–31 (p. 26).

17 Vardouli, pp. 26–29.

18 Katie Pierce Meyer, 'Technology in Architectural Practice: Transforming Work with Information, 1960s–1990s', *Information & Culture*, 51.2 (2016), 249–66 (pp. 253–56).

19 Vardouli, pp. 25–29.

20 The Association for CAD in Architecture (ACADIA) was found in 1981 and Education and Research in Computer Aided Architectural Design in Europe (eCAADe in 1983 was followed by establishment of CAAD Futures in 1985 in the Netherlands, for further details on CAAD conferences history see Celani and Veloso.

21 Pierce Meyer, p. 258.

22 Alexander Koutamanis, 'A Biased History of CAAD', *Digital Design: The Quest for New Paradigms, 23nd ECAADe Conference Proceedings*, 23.September (2005), 629–37 (p. 634).

meant for the animation industry. Some architects, such as Frank Gehry, Peter Eisenman, Bernard Cache and Zaha Hadid, strived to develop their own CAAD tools by partnering with software creators. This process led to a paradigm shift in contemporary architectural discourse and theory.[23]

The development of CAAD went through different phases. These tools started as two-dimensional (2D) drawing tools that architects used to draft plans and elevations with lines and planes as their building elements. After that, CAAD became three-dimensional (3D), gaining the capability of creating volume models. This possibility became a core element in architectural practice as virtual models derived 2D drawings of plans, elevations, and sections in addition to perspective and orthographic images. Using such tools afforded a sort of consistency; once a change had been made to the virtual model, all the drawings would be adjusted accordingly. Building Information Modelling (BIM) furthered this logic when it was launched in the 2000s, using 'objects' as the basis of 3D modelling. To create a model, architects would need to use predefined constructs, such as walls, ceilings, floors, doors, windows, and staircases, provided in a set of libraries which would be used to assemble buildings. Improvements in accuracy and precision were not the only qualities sought in the development of CAAD tools, but increasingly the possibility of organising and storing building information. In architectural practices, architects moved from dealing with lines and planes' abstractions which needed to be interpreted by an expert eye, into 'smart' models embedded with information about the building's physical, material, and functional qualities.[24]

In the United Kingdom, a government policy informed by BIM Level 2 mandate obliges BIM use in architectural practices when designing public-funded buildings, and social housing is one of them. This means that firms need to shift their practices into using BIM software such as Revit, which Autodesk develops. Such governmental policies are the leading reason for pushing architectural offices such as practice c and practice t into moving to BIM in their practices. After spending time talking to practitioners from practice c and practice t, I found that architectural firms and offices often create their own strategies to follow the obliged use of BIM tools when designing social housing projects employing different types of CAAD tools, a majority of which are still getting supported by their developers. For example, in practice c, architects adhere to workflows that rely on implementing Revit from the beginning of the design process. This helps create different sketches at the early stages of the housing project that are developed in detail back in Revit. Practice t often uses AutoCAD and Sketchup at the initial stages of any housing project to test different design options. Later, when one alternative is agreed on, practitioners develop the design in more detail in Revit.

In her article: *Technology in Architectural Practice: Transforming work with information 1960s-1990s,* Katie Peirce Meyer argues that introducing software to take over tasks in architectural offices caused a shift in the way architects' various responsibilities are shaped. However, the architectural practice itself remained an interrelation of diverse actions that aim to document and share information on building design and construction, striving to bring together the work of various practitioners and disciplines. CAAD was designed to help store, share, and manage this complex flow of building information from its early beginnings. Even after the introduction of CAAD, the architect's role remained as the manager or coordinator of verbal and visual design information embodied in drawings, models, and spreadsheets. There

23 Bottazzi, p. 11. And for more details on architectural theory in the 1990s see Harry Francis. Mallgrave and David. Goodman, *An Introduction to Architectural Theory : 1968 to the Present.* (Wiley-Blackwell, 2011), pp. 161–76.

24 Hovestadt, Hirschberg, and Fritz, p. 513.

is then little change, with a few variations on the knowledge architects are expected to have to practise architecture. [25]

Meyer suggests that architects face the uncertainty of continuous change and challenges to their authority and knowledge, in addition to the traditional contingencies of the project timeline. Due to the constant change in clients, practitioners, and a wide range of the project's requirements in their work, architects develop strategies to assert their authority and control. This authority is accompanied by the requirement to negotiate decisions with people in different social settings, such as clients, users, and other practitioners in the building sector. Architects justify this urge to take control by representing themselves as the 'experts', which stems from their accumulated knowledge and experiences in spatial, technological, financial, and practical aspects of building design. Artefacts, such as drawings, sketches, and spreadsheets, are tools to signify, share and communicate this knowledge and expertise.[26] CAAD facilitates the creation of these artefacts, and expertise becomes an asset to practitioners. The increased relevance of CAAD in practice makes the infrastructure of producing mediating artefacts more evident, especially in the recent implementation of BIM in architectural offices. Early development in CAAD was intended to support practitioners in reducing uncertainty, a goal articulated by researchers in the early days of software development. Meyer suggests that increased implementation of CAAD allows architects to gain control, but what if reliance on these technologies contributes to a sense of change and uncertainty?[27]

Change is a prominent feature of CAAD; current tools are always subject to updates, and there is always the possibility of a better tool displacing their primacy in practice. I had the chance to talk with G.E.,[28] a BIM manager in practice t. H.C., an architect in the same office, described him as the 'firepower' who deals with all technical issues designers face in the office.[29] We talked about CAAD use in practice t in general. One of the topics we discussed was software updates and how practice t deals with updates from Autodesk. Updates are an inevitable feature of CAAD work. For example, Autodesk executes these updates by introducing a new version each year. Each version 'upgrades' work files, a process often not significant but often 'locks' files by making it impossible for older versions to be open. This is a 'very aggressive' policy from the company, as G.E. described. In Revit's case, Autodesk tends to drop support for one version back, making it hard to, for example, open a file produced in the 2018th version using a 2021 copy without facing different errors.

Galo Canizares suggests the change in CAAD is fast-paced. He emphasises: 'But how can we grasp a thing so slippery and elusive? Software is always changing. Automatic updates, mandatory patches, proprietary algorithms, machine learning, these are but some of the ways in which the software that we use is constantly morphing and therefore difficult to fully apprehend.'[30] The challenge of keeping up to date with these tools is usually relegated to the 'firepower men' (the BIM technical team in the office), who keep an eye on the most recent developments and versions. For practitioners, dealing with software updates is just another

25 Pierce Meyer, pp. 262–63.

26 Pierce Meyer, p. 263.

27 More details on CAAD tools that have 'died' see Autodesk graveyard webpage created by Steve Johnson who was an AutoCAD specialist in the 1980s. Steve Johnson, 'Autodesk Graveyard', *CAD Nauseam*, 2018 <https://www.cadnauseam.com/autodesk-graveyard/> [accessed 10 February 2022].

28 Original initials of all name have been changed.

29 Interview with H.C, architect at practice t, 27th November 2020.

30 Galo Canizares, *Digital Fabrications: Designer Stories for a Software-Based Planet* (ORO Editions/Applied Research & Design, 2019), p. 9.

burden best dealt with by the technical staff.[31] Ethnographic work in both firms suggests that updates and the changes they introduce to project files contribute to a sense of precariousness. Practitioners are sceptical of CAAD as they need to be prepared to leave behind and give up any digital procedures/processes that become outdated.

In her seminal work *Architecture: The story of practice*, Dana Cuff attributed uncertainty in architectural practices to the constant transformations that practitioners face over the lifetime of a project. Change is often tied to a heightened sense of unpredictability: not knowing what issues might arise, what results they are likely to achieve, and the knowledge required to deal with it.[32] With each project in the office, architects are put in a position of questioning the knowledge or expertise they need to deal with different aspects of design and construction (like lighting, landscaping, and fire) and who the experts are to consult. These questions lead to uncertainty about what allegiances are needed to get the work done throughout a set of procedural actions of how ideas are developed, sequenced and agreed on with various social associations with the client, contractors, users and other practitioners.[33]

With the widespread use of software in the architectural office, architects still deal with these aspects of practice; the difference is in how artefacts are exchanged and produced throughout, making digital infrastructure more visible.[34] Requiring architects to keep up to date with the new practice means using CAAD technologies. Constantly improving their expertise and proficiency in its use to meet the practices' emerging technical standards and reshaping their responsibilities, with the software taking over various tasks and transforming the way work procedures are executed. Although CAAD is meant to support architects' practices, assisting them in coordinating several duties in buildings' production processes, the additional labour required to keep updated on the latest version and workflows contributes to uncertainty. It leads to contradicting attitudes toward these technologies.

The way that uncertainty has shaped architects' relationship to CAAD is influenced by the actors who have mediated its introduction to practice. Early in its development, academia and the software industry were the primary intermediaries, especially through efforts to convince architects of the practicality of architectural software. Although architects are now active users, academic and commercial bodies still negotiate the architect-machine liaison. With the introduction of BIM, governments have gained primacy in promoting the use of software in their practices, often through policy.[35]

> 'I am not a practising architect, my idea on Revit is very general, and I am interested to know your point of view as BIM manager', I told G.E., a tactic I learned through other discussions I had with practitioners, giving them a chance to lead on the conversation. Somehow this paved the way for me to proceed and ask him to describe the social context of CAAD use in the office, specifically Revit, so I persistently asked him: 'Can you tell me how many practitioners work on the project when it comes to the design process? Do all of them use Revit?'
>
> G.E.: 'Not all of them use Revit, but recently we were pushed to use it

31 Interview with G.E., BIM manager at practice t, 9th December 2020.
32 Dana Cuff, *Architecture: The Story of Practice* (Cambridge, Massachusetts: MIT press, 1992), p. 84.
33 Cuff, pp. 84–87.
34 Pierce Meyer, p. 264.
35 For more details on BIM and government policy see Hovestadt, Hirschberg, and Fritz, p. 511.

> throughout different projects we work on, like masterplans, theatres and housing design. Actually, I think the market is getting more mature and requires more projects to be fully done on BIM level two, which is definitely pushing more people to use Revit.'[36]

Government policy has widened the range of agents who influence architect-software relations. Practitioners are expected to use software to guarantee precision and efficiency, a requirement that erodes their authority over a project and contributes to uncertainty. The discourse of precision stands in contradiction to that of precarity. ' Revit forces you to be accurate in exactly what you're doing, and [it] doesn't lie. It probably gives you less risk in terms of [avoiding] producing errors in a project.' This was H.C.'s answer, an architect who has worked with practice t for more than ten years. In discussing accuracy, H.C. describes how, throughout the years working in practice t, he has witnessed the office transition from MicroStation to Revit. The transition was primarily motivated by official requirements to use BIM Level 2 in social housing developments.[37] Notions of accuracy and efficiency dominated my conversations with all the practitioners in both firms. So, is precision contributing to the practitioner's perceived loss of control? What mechanisms lead them to trust these tools when they, contradictorily, erode their authority?

Since the arrival of *Sketchpad* in the 1960s, CAAD has been presented as a novel tool that allows architects to produce more precise drawings. Early pointing devices, a light pen similar to a modern computer mouse, made the use of the tool 'quite sloppy', as Sutherland described. The sense of precision is embodied in the software's capability to 'correct' architects' drawing flaws by anticipating intent and calculating the position of lines. The ability to anticipate and correct errors serves to prescribe architectural practice further, reconfiguring it towards precision and accuracy.[38]

The way in which CAAD has reconfigured and oriented architectural practice towards precision is evidenced in how practitioners at practice c and practice t describe CAAD's potential to enhance design processes. As M.S., an architect in practice c, explains: 'again, the efficiency that we find from using that software we use to improve the design of the layout.'[39] Software satisfies a need to minimise imprecision and uncertainty, especially with the capabilities of

36 Interview with G.E., BIM manager at practice t, 9th December 2020.

37 Interview with H.C., architect at practice t, 27th November 2020.

38 Francesca Hughes, 'Facilities for Correction', in *Superhumanity Design of the Self* (University of Minnesota Press., 2018), pp. 283–91 (pp. 285–86).

39 Interview with M.S, architect at practice c, 25th November 2020.

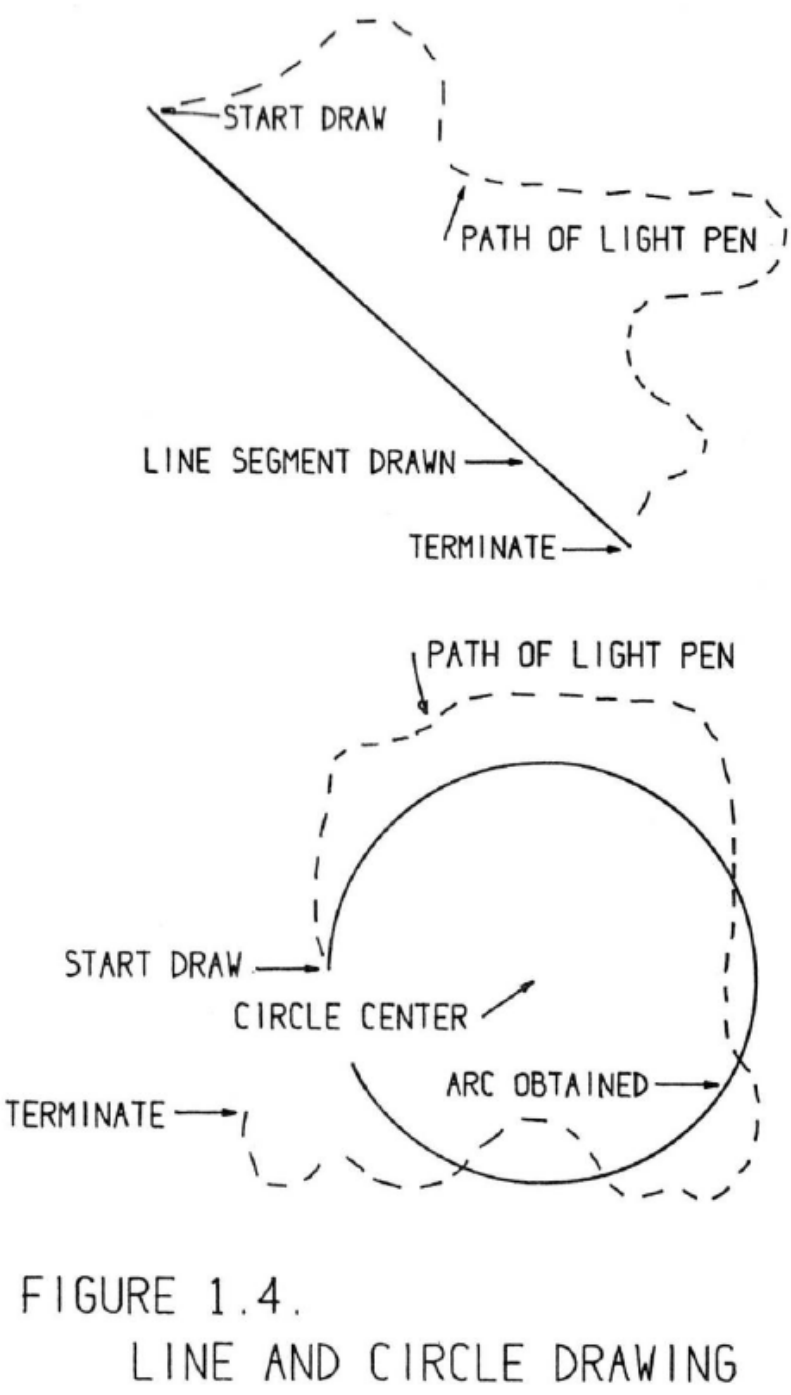

Figure 1.2:Illustration of drawing a line and circle in Sketchpad. Ivan Edward Sutherland, 'Sketchpad: A Man-Machine Graphical Communication System', 2003, p. 22.

modern CAAD software compared to previous generations (AutoCAD, for example). Given how BIM predefines building elements in libraries, architects no longer 'draw' but assemble three-dimensional components to extract drawings later. M.S. described how producing sections using CAD was a 'struggle' because of all the things that may go wrong, especially the head and sill heights. For him, Revit 'saved architects the trouble'. Since BIM creates a 3D model of the building, architects can inspect the way different building elements come together. More importantly, it makes the need to draw sections from scratch redundant, reducing the likelihood of error. Unlike early CAAD, the software does not correct drafting but shapes the way architects imagine buildings. If today's architectural software better meets a requirement for accuracy, how do we explain persistent scepticism?

> 'But what of our drawings? How the architectural drawing forgets (or not), or how we install the act of forgetting in the production and amendment or revision of the architectural drawing is very instructive of what architecture would prefer to forget, but despite itself, persists in remembering.'[40]

Architects' tendency to be sceptical of software is haunted by a paradox of fear. CAAD is a constant reminder of architects' proclivity to mistakes. Francesca Hughes suggests that the fear of making mistakes has a long history in architecture, represented by the urge to create self-correcting tools up to the recent development of artificial intelligence.[41] I suggest that CAAD was initially produced and developed to prevent architects from making mistakes while engaging in the design process. However, architects' use of CAAD is still driven by doubt. Hesitancy to adopt CAAD might be misplaced. Practitioners are not sceptical of software's accuracy or technical advantages but of a deep-seated fear that these abstract tools erode their agency as sole authors. CAAD allows architects to err, aiding them in improving their accuracy through its features that enable persistent corrections of errors. By doing so, CAAD can expose architects' vulnerability by uncovering their thoughts' slipperiness and erred decisions.

Despite how crucial it has been in orienting architectural practice towards precision, the production of CAAD remains obscure. Architects' scepticism in their descriptions of CAAD suggests a complex composite of social and political dynamics. CAAD software is a product of the collective efforts of different groups and corporations that design, produce and execute these tools. Behind its constant change and ever-improved correction system lie academia, the technology market, and government collaborations. Llach emphasises that CAAD technology is neither neutral nor autonomous but a cultural infrastructure. In architectural practices, CAAD software is often depicted as autonomous tools situated independently with built-in logic and unaffected by the social actors and institutions that produce and use them. This is accompanied by the thought that CAAD is just a neutral 'tool' that has no impact either on the design practice it is employed in or on the practitioners who use it. However, this understanding is inadequate because it eliminates the social and material entanglements that CAAD is always part of throughout its development and use. Thus, it shuts down its politics, the way it formulates and reformulates social, material and technical realities.[42] Instead, Llach offers an understanding that sees CAAD software systems as infrastructure. This way of approaching CAAD 'situates them as cultural artefacts within economic, institutional, and political frames, and as embodiments of their makers' worldviews, ambitions, and desires.'[43]

40 Francesca Hughes, 'Deleted: How the Drawing That Can't Forget Forgot', *A/R/P/A Journal*, 2016, para. 2 <https://arpajournal.net/deleted/>.

41 See Hughes, 'Facilities for Correction'.

42 On politics of software see Canizares, pp. 46–61.

43 Llach, pp. 2–4.

This understanding indicates that CAAD's use makes the architect's authority dissolve and weave into a more extensive web of social structures of power and material arrangements, where 'the architect' is no more in control.

> 'I'm trying to think, we use BIM, and quite I guess it's a bit of a large component of how we deal with projects. But I wouldn't say it's the backbone of how we do projects, either. I think we see it as a tool. And we use it just like any other software or previous software or drawing board back in the day to create drawings we need to do.' M.S., an architect in practice c.[44]

This is how M.S. began his description of the use of CAAD at practice c. He joined the firm's team two years after graduation and has stayed there for the last seven years. Highlighting the instrumentality of CAAD is a common strategy for architects to explain away the ambiguity of their position towards CAAD. A similar narrative emerged in my conversation with H.C. from the practice t: ' *You know, the whole idea of the tools, say CAAD and Revit, have come about from; I suppose an extremely long lineage of how you express a building as a drawing … CAAD programs are just a tool, at the end of it, I suppose.'*[45] Llach attributes this highlighting of instrumentality to how western cultures seeded the idea of the mind's privilege over the matter, where Leon Battista Alberti first shaped the figure of 'the architect' as having a privileged status and whose role belonged to the activities of the mind. Design then became an elite mental activity incompatible with matter, and the tools used to manipulate it are associated with craftsmen.[46]

The notion of CAAD being 'just a tool' is reminiscent of a long-established strategy historically used by advocates to convince practitioners to shift their practices into its use. CAAD was initially described as providing practitioners with a powerful tool to organise information about a building, and the computer as an archive of details and valuable data that would be otherwise prone to be lost to architects' memory and drawn artefacts.[47] This idea was compelling to practitioners as they saw an advantage in producing precise drawings while having additional analytical tools.[48] Moreover, information management also enabled architects to hold more information about a building's construction, which would usually be builders' and artisans' territory.[49] Following these historical traces resulted in building the image of CAAD as neutral tools, disassociated from the social context that produced them, and contributed to a lack of discussion on their role in shaping architectural practice.[50] 'It is just a tool' is a device to reassert the authority and control of practitioners and assuage fears of its loss. In this chapter, I traced the roots of the uncertainty architects manifest in their speech regarding CAAD use, but how can I locate/situate the role of this scepticism within the gap between CAAD theory and practice? How does it weave into architects' tendency to split between the way they talk about CAAD and how they performatively engage in the actions of its use in their everyday architectural practices that I started with this chapter? A contributing factor to this split is the emergence of a digital avant-garde in architectural discourse, especially in the 1990s and 2000s. The primacy that 'digital architecture' gave to software, exploring new forms of architectural

44 Interview with M.S., architect at practice c, 25th November 2020.
45 Interview with H.C., architect at practice t, 27th November 2020.
46 Llach, p. 3.
47 Willey, p. 527.
48 Hovestadt, Hirschberg, and Fritz, p. 133.
49 Llach, p. 23.
50 Llach, p. 3.

practice that emerged of its possibilities, prevented other practitioners from engaging with software as a design tool and resulted in everyday CAAD architectural practices' hostility to the emerging digital theory.

The emergence of 'digital architecture' as a distinct practice was evident in the way it is defined and represented. In *The Digital Turn in Architecture 1992 - 2012*, Mario Carpo suggests that considering a building 'digitally designed' is not about generally using digital tools in its design. However, according to Carpo, it necessarily needs to refer to a building that cannot be designed and built without digital technologies. Defining digital architectural design as a particular practice caused an early rift between it and everyday CAAD use, which was disseminated later as an inevitable tool in every architectural practice. As a term, digital architectural design appeared after the massive development of different electronic technologies in various aspects of everyday life at that time. This innovation was believed to revolutionise society, economy and culture.[51]

Though CAAD was already an established area in the academic research and software industry, its everyday use by architects (other than digital star architects) across different practices was at its early beginnings. The 'digital architecture' discourse emerged through architects' (who later became the Avant-Garde of digital design) interest and fascination with the capabilities of new digital tools developed in the 1990s. The advent of the 'digital age' in architecture was inspired by computer processing and graphic capabilities informed by the development of different software packages that allowed drawing and modelling curvilinear compositions. Spline modellers with controlled and easily manipulated parametric curves and animation software were early examples of software typologies that allowed some architects to explore and test new ideas by producing complex architectural forms. The theorisation of curving folds as a debate of the time in architecture parallelled this through architectural theory informed by the thoughts of Greg Lynn's theory of folding, Stan Allen's 'field condition', and Foreign Office Architects' writings which emerged without any mentions of splines and animation software. Architects like Frank Gehry, Peter Eisenman, Greg Lynn and Zaha Hadid engaged in different practices of designing and writing digital architecture, relied on practices and theorisation of producing non-standard architectural form-making. Carpo sees their digital practices as a prolongation of post-modern thought informed by variations, differentiation, and choice that act against the standardisation of modernism.[52]

In *Archaeology of the Digital*, Greg Lynn presents the work of architects: Frank Gehry's Lewis Residence (1989-95), Peter Eisenman's Frankfurt Biozentrum (1987), Chuck Hoberman's Expanding Sphere and Iris Dome (1988-94), and Shoei Yoh's Odawara Gymnasium and Galaxy Toyama Hall (1990-92), as examples of early engagement with the digital tools as a 'creative practice'. Some used existing digital software, and others collaborated with developers to produce their own types of software. He suggests that such architects' use of digital tools was driven by their creative and intelligent capabilities in envisioning their ideas within the virtual environments of software. He emphasises that they knew what they wanted from such digital tools, which act as an extension of their design thinking process and creative medium to put them to work.[53]

The emergence of 'digital architecture' discourse in the 1990s by the Avant-Garde as a medium for shaping non-standard architecture continued as an established field where 'innovative'

51 Mario Carpo, *The Digital Turn in Architecture 1992-2012* (Chichester: John Wiley & Sons, 2012), p. 8.

52 Carpo, pp. 9–12.

53 Greg Lynn, *Archaeology of the Digital: Peter Eisenman, Frank Gehry, Chuck Hoberman, Shoei Yoh* (Canadian Centre for Architecture, 2013), pp. 11–12.

applications of digital software are explored in architectural research and practice.[54] However, this discourse was distant from everyday CAAD use in drafting and modelling different ordinary buildings' typologies (housing, for example) in architectural practices, representing 'digital' as a term associated with a particular practice that produces unusual, creative and innovative architectural productions. The emergence of star architects' digital architecture theory resulted in other architects collectively imagining digital technologies as exclusive to certain architects' figures and distinct practices. This eliminates architects' everyday engagement in CAAD drawing and modelling from being considered as significant as such.

Conclusion

In the introduction of his book *Practice: Architecture, Technique and Representation*, Stan Allen followed a pragmatic approach to understanding architectural practices. Where grasping architecture is subject to the logic that necessarily envisions *theory* and *practice* as two distinct types of practices: discursive and material. For him, architecture fails to be defined other than being a form of material practice; architecture is distinctive as it has a set of rules that differs from other discursive practices such as 'writing, film, and new media, and communications like critique, commentary, and explanation'.[55]

Practising architecture involves architects' daily engagement with material practices that transform their ideas into different forms of media and materialities via the artefacts they produce.[56] Architectural software did not necessarily change that but added new digital materiality to architectural practice. It has allowed buildings' drawing/assembling processes to be organised into several digital layers, groups, block libraries, parametric objects, and file formats.[57] These new organisations of digital matter shorten the way to theory and discourse; they do not hold onto any theoretical approach that does not take their instrumentality into account.

For architects, CAAD technologies are instrumental and perceived as performative instruments rather than discursive practices. Nowadays, practitioners have overcome questioning CAAD's role: what is CAAD? A pretty common question in the 70s and 80s (as mentioned earlier) became outdated; instead, their focus shifted to exploring what these technologies practically can do.[58] After following CAAD's historical traces, we can see architects' engagement in its practices in the present is stubbornly hanging onto these tools (authority-threatening) past and clinging to its persistent capacity to change in the future. This makes these tools deeply embedded with uncertainty and faith, where architects hold onto the CAAD rules and procedures accumulated throughout time and are open to their new technical potentials, ceasing any outdated working means. 'I can't even go back to that kind of software to do simple tasks; I find it frustrating.' This is how M.S., who witnessed both before-Revit and after-Revit architectural practices in practice c in the last seven years, added on his experience of previous CAAD slowness comparing to Revit's current use. I found this interplay between abandonment and acquisition apparent when practitioners in both firms told stories about their experiences with different CAAD tools

54 For examples see Jane Burry and Mark Burry, *The New Mathematics of Architecture* (London: Thames & Hudson Londres, 2010).

55 Stan Allen, *Practice Architecture, Technique + Representation*, 2nd edn (Abingdon: Routledge, 2009), p. XIII.

56 Stan Allen, p. XIV.

57 Hovestadt, Hirschberg, and Fritz, pp. 136–37.

58 Following Stan Allen's pragmatic analysis for architectural practices: 'Today, the most interesting practitioners no longer ask what architecture is, or what it means, but rather what it can do'. Stan Allen, p. XIII.

over time. Their conversations were usually embedded and subjected to a timeline of their own, which is used as their universal reference when talking about the way they handled CAAD through time; M.S. commented, 'We've been working in the industry now for ten years, and I started working in CAD, and it was so slow, and I was fast on it, but it's so much slower than Revit'. [59]

'Digital architecture' theories emerged by a particular class of architects away from the prevalent CAAD tedious everyday practices, which essentially caused architects to distance the way they talk about CAAD from their intimate daily interactions to appear more professional, safe, and a less risky position/place. And uncertainty is their way out to mitigate this interstice. Doubt can take back their distant articulated thoughts on CAAD to the liability of its everyday use to various possibilities, where they are more vulnerable and less in control. It is, as Allen says: 'a tactic for dealing with an imperfect reality with a catalogue of tools that is itself always incomplete, imperfect, and inadequate'.[60]

59 Interview with M.S., architect at practice c, 25th November 2020.

60 Stan Allen, p. XV.

Chapter Two
Social Housing Design Practices:
‘Social’ Housing as a Product.

Introduction

> 'He's going to be talking graphically, he's going to be drawing, and the computer is going to understand his drawings, and the man will be using a graphical language that we call Sketchpad…. You will see a designer effectively solving a problem step by step by step, and he will not at the outset know precisely what his problem is, nor will he know exactly how to solve it. But little by little, he will begin to investigate ideas and the computer, and he will be in cooperation, in the fullest cooperation, in this work.' From MIT science reporter: Computer Sketchpad, 1964.[1]

'He is going to be talking graphically': in such a way, Steven Coons, a pioneer academic in and an early advocate of the Computer-Aided Architectural Design (CAAD) project, described the man-computer communication while using the unconventional *Sketchpad* back in the early 1960s. In a special episode on Sutherland's Sketchpad, Coons and Ivan Sutherland were hosted in T*he MIT Science reporter*, a series of televised interviews presented by John Fitch, who introduced the scientists' work to the non-specialist general public. Interacting with CAAD software has become firmly rooted in the heart of the everyday dynamics of architectural practice offices. Today's CAAD discourse in these offices, for example, practice 'c' and practice 't'[2], has emerged far from the subjectivities of architects' daily use of these tools in housing design and away from the intricacies of the frictions between different practitioners, artefacts, clients and inhabitants, social and material configurations that regularly take place in the office. As discussed in the previous chapter, architects and practitioners tend to be uncertain and contradict their blind faith in architecture software when talking about it; their dialogue is embedded with fear, essentially stemming from their dread of losing their authority as the creators of buildings. Being sceptical is how they work out this gap between their practice and discourse. Yet, on the contrary, where architects generally talk about CAAD sceptically in the office, they use it to actively talk about housing in general and social housing specifically.

Verbs like 'photoshopped' and 'pixilated' have become more prevalent in today's general conversations, especially in design discourses emanating from the general and widespread use of Adobe's Photoshop software. Software interfaces introduce a set of vocabulary architectural practitioners now use to describe things; such verbs did not even exist before the presence of software. Derived from Autodesk Revit software aesthetics, 'Lofted' and 'booleaned' are two other descriptive verbs added to architects' list of professional vocabularies to define three-dimensional (3D) modelled forms.[3] In Canizares' analysis of such software embeddedness, understanding the emergence of such verbs is one way to know how software and the social and material structure behind its interfaces are shaped and have the power to transform its users' (such as designers and architects) actions and discourses. In other words, these computer programmers have a potent effect, an agency. In this chapter the way I look into how software is situated/embedded in architects' speech is quite different and less directly articulated; although Coons' 'Talking graphically' expression at the beginning of this chapter was meant

1 See Francesca Hughes, '"Deleted: How the Drawing That Can't Forget Forgot"', *A/R/P/A Journal*, 2016, para. 6 <https://arpajournal.net/deleted/>.

2 Original architectural practices names have been changed.

3 Galo Canizares, *Digital Fabrications: Designer Stories for a Software-Based Planet* (ORO Editions/Applied Research & Design, 2019), p. 56.

for the man-computer communication mechanism, I argue that his vision was migrated from the internal 'talking with the machine' into architects' external speech on buildings they design. Here my focus is specifically on CAAD's embeddedness in architects' discussions on social housing. CAAD's graphical presence in architects' discourse has developed beyond the existence of the 'visual speech' that enables them to use this architectural software to become more of an integral part of how architects express/talk and represent their relations to the housing developments they design and people to whom they deliver. From this perspective, I look in depth into hidden traces of CAAD in the speech of architects and practitioners from practice c and practices t, particularly when talking about the housing/social housing they design, to continue to explore answers to 'what does CAAD do' to the idea of home.

Rather than just looking at CAAD or social housing design my research focusses on the complexity that ties both into architectural practices—in the architectural office the creation of social housing processes is inherently inseparable from using architectural software. CAAD cannot exist alone inside any architectural office but is consistently untangled and re-tangled within the iterative design processes, moving among social organisations of architects, practitioners, clients, and inhabitants, where ideas and materials are created and transformed through (physical/digital) artefacts. Exploring the practices of practice c and practice t, I evaluate how CAAD has become more grounded in their architects' social housing design discourse and practice. The discussion on social housing itself is complex and cannot be detached from the predominant social, economic and political dynamics behind the scene of creating these homes for socially vulnerable people. In this chapter, I will tell the story of how social housing and CAAD intersect in practice c and practice t offices based on how practitioners speak and talk about it, weaving it into more comprehensive discussions on authority, social responsibility and CAAD agency as leading threads to understand why these matter.

A note on conversations in the office

As you saw in the previous chapter and will see in this proceeding one, conversations with practitioners are one core element upon which I ground this research. My analysis builds on interpreting what architects say, how they navigate their practices in their speech and why they possibly present themselves and their practices that way—situating their dialogues in the broader set of social and material dynamics. I turned to talking to architects after the novel coronavirus outbreak in 2020 made it impossible to conduct my planned fieldwork of spending periods of time within architectural office/firms. Though I missed the chance to witness the very mundane passing moments that happen every day in the busy life that occupies architectural offices, (online) conversations with architects still enabled a window onto the social processes that occur while they design buildings.

Both practice c and practice t have rich websites that snapshot different events in their studios, telling stories through photos and written texts of physical model making, building construction, choices of material, ideas behind buildings, and coordination between practitioners on specific projects. As Naomi Stead claims, though, architects would still prefer to talk rather than to write, for them to tell real stories from within the architectural profession culture is more straightforward than writing them down, yet the 'gossips and the anecdotes' seem less professional.[4]

4 Naomi Stead, 'Architectural Affections On Some Modes of Conversation in Architecture, Towards a Disciplinary Theorisation of Oral History', *Fabrications:The Journal of the Society of Architectural Historians, Australia and New Zealand*, 24.2 (2014), 156–77 (p. 159).

All the interviews I had with both firms were online and happened in very pre-organised settings; most of them were arranged by the studio coordinator/manager (who channelled my initial communications with practitioners), who set the interview's date, time, and sometimes was even responsible for choosing the online platform. From my home (in Sheffield), I spoke to practitioners from the firm's offices in London and sometimes even from their homes. Overall, this would seem a very comfortable/flexible environment for me as an interviewer for its convenience as I did not need to travel to meet the practitioners. However, my conversations with practitioners were still held in a very pre-conditioned interview setting, acting accordingly to fit in practitioners' busy schedules (even after all of these arrangements, some interviews did not work and were rescheduled on the same meeting day). Such interviews are 'fragile', as Stead describes, due to all these contextual pre-conditions surrounding them that become an inseparable part of the way these dialogues formulate particular meanings, which definitely could be differently shaped if it was conducted on another day or another setting (face to face for example).[5]

I came to each interview with a shortlist (five to six) of well-prepared questions. Generally, I asked about two main themes: how housing project design happens in the office and how CAAD is used, with all of the troubles it may have. They were tailored to the specificity of meeting with each practitioner and their role in the office, in recognition that speaking to a director is not the same as talking to an associate architect, and definitely, it is not the same with a BIM manager: each can reveal the office's dynamics from a different point of view. Conversations with practitioners are generally characterised by being professional and authoritative as in public, creating disembodied events separated from the personal and the emotional, where architects tend to show their authority over these practices within their professional culture.[6] Due to the several rejections I got from architectural firms before practice c and practice t, I intended to ask them humbler requests, 'one interview, this is all I need' was what I started with, yearning for a chance that would allow me to ask for a bit more. All the practitioners I met (who were all men) could see my satisfaction with this exclusive interview I got. I was attentive and adequately equipped with all my carefully designed questions to get the most out of these non-recurring conversations, which showed my respect for the professional persona that interviewing an architect must have, reflecting how valuable they are to this research and what a well-informed and reliable researcher I am. I was aware of my positionalities and the acts I was putting on to take advantage of these interviews because of the challenges the pandemic has created in terms of being able to access architects in architectural practices, especially with the absence of any face-to-face communication.

At the beginning of each interview the interviewee perceived I was no competitor nor a 'threat', in Stead's words, evident in my non-British (specifically Jordanian-Palestinian/Arab) English accent and from my headscarf (hijab), as a Muslim non-British woman. I also introduced myself as a non-practising architect (in the United Kingdom). All these aspects fed into the practitioners' tendencies to be in the position of taking the authoritative and more knowledgeable role, which is positively reflected in their generosity in describing several details of housing design practices and their use of architectural software in the office. From the intersectionality theory perspective being different, intersecting several categories (gender,race) sometimes could have better effects in specific situations. The differences incited from being a woman, Muslim, non-British, and non-practising architect intersect to represent my identity within a power dynamic that did not pose a risk to the authority of architects who saw me less as a rival, which

5 Stead, p. 158.
6 Stead, p. 157.

thus led them to share more about their practices. [7]

Conversations with architects are critical, yet it is essential to ask who was enabled to speak and whose voice got heard. Talking only to architects could marginalise what others (practitioners, builders, clients, and inhabitants) would comment on the same situations and how they would tell the same stories. This keeps architectural discourse exclusively circuited around what architects did and what they intended the building to be, excluding the other voices and effects.[8] However, in my work, talking to architects is still crucial; through conversations, architects unintentionally may shift away from their professional talk on architecture more into the subjectivities of its practice, revealing more of the everyday processes that they perhaps try to conceal as unprofessional.[9] All the practitioners I interviewed were architects, except practice c's director and the BIM manager at practice t, who both had an engineering background. I did not choose who to interview and had to seize the chances the process offered to me. Once I had gained practice c's and practice t's acceptance to talk to one of their office directors first, I was able later to ask them to speak to an architect and a BIM manager. These different disciplinary roles in the office provided various positional views to the encounter between CAAD and housing. Directors took a spokesman role, giving me more of an overview of housing design processes in the office, how it starts and ends and how CAAD is utilised over the span of the projects, viewing the process more from an above position. Job architects spoke from the heart of the messiness of the practice, and were able to open up more on the interstices in the process. The BIM manager gave an alternative narrative from outside architecture's lens, away from the 'the architect' as authority. However, they all were 'loyal' in reflecting the office's significance in working in social housing, stressing this throughout the conversation in varying degrees.

Indeed, articulating the subjectivities of my conversations with practice c and practice t practitioners will situate a more profound understanding of the social context from which the discussion on CAAD's embeddedness in architectural discourse on social housing emerges. Here I carefully explore how CAAD merges and affects the complex structure of social dynamics in both offices, where software ideals interplay forth and behind architects' speech, actions and reactions to the particularity of social housing production.

'Social' housing: who designs for whom

Social housing (also known as council, public, or local authority housing) generally describes homes that councils, local authorities, and housing associations develop for vulnerable people who rent them for less than market value.

'Social' is mainly an adjective that describes anything related to society and the way it is organised. Its direct link to people's lives makes this word an indication of how the actions it describes are ethically integrated and turning around on something that matters more; which is 'people'. Using it can establish a connection between the speaker, practices it represents and for whom it is done. 'Social' can display the speaker's value, it could make what is done prominently valuable and probably highly appreciated. And even sometimes, it may reflect on a higher status of who did it more as a privilege or admiration.

'Not luxurious', 'large scale' and 'social' are the adjectives that both practice c and practice t's

7 Stead, p. 160.
8 Stead, p. 163.
9 Stead, p. 164.

directors used to describe their firms' typical housing projects. Though they work on several housing types,[10] their shared focus was on how they work with councils, local authorities, and resident housing associations to deliver mixed tenure and public housing. Both firms treat this type of housing with special attention. I approached other firms for interviews also but not using 'social' in my correspondence with them probably contributed to their rejection of my request. With these other practices I asked to speak about CAAD (whose use is sceptical to architects as I argued above) first, disturbing the way its role in creating these 'social' buildings should be perceived. Drawing on Stead's work on interviews with architects, having a conversation with them about their professional practices is strongly tied with their willingness to reflect on their authority over not only the designs they create but also the profession's cultural context where these designs are created.[11] Putting 'social housing' in the foreground was a tactic I used to approach practice c and practice t; shifting the focus to their role in designing social housing as the main interest of the conversations, with CAAD's use as a subsidiary topic, which led to success in gaining both practices' engagement. The failed earlier attempts, accompanied by my actual successful conversations with practitioners in both practice c and practice t, brought on the questions of how architects' roles became intrinsically tied to social housing, why this housing specifically became 'socially' valuable in architectural practice, and how CAAD is threatening this connection.-

> 'What does it mean to design a home for people who will live in this social or mixed tenure housing?' Halfway through the interview I quickly rushed my question to M.S.[12] after I failed to remember what I wanted to ask earlier—glancing at the array of physical models of buildings with mono oak-coloured wooden materials, standing visible on shelves behind him. M.S., an architect in practice c, started to dwell on what 'good' housing qualities should be and how Revit is used to deliver them efficiently, just before the conversation was interrupted by the smoke alarm going off from his side. He said after the alarm stopped: 'I know that working for public and councils and local authorities is different; the priorities are different because they've got a direct responsibility to their role to the people in their Borough, for instance.'[13]

The architects in practice c and practice t are not the sole creators but are essentially co-producers of social housing with councils, residents' housing associations and other local authorities to develop homes for potentially vulnerable people. Somehow, they feel 'more' responsible for designing and delivering better homes for vulnerable people, despite their lack of absolute power or full authority over them. The way architects articulate this direct accountability toward this type of housing is quite conspicuous, which I think is necessarily tied to several motives associated with their authoritative tendency over architectural production in general and such housing units specifically, though this propensity was shaken back in the eighties and negatively affected architects' reputations. Other than that, who they design these homes for is understood as an ethical and moral issue—indeed, it can give a more humane impression of what this architectural practice does. However, manifesting their ethical obligation toward poor people in social housing design feeds into a portrayal of their architectural practice's higher 'social' value and reciprocally can signify their architectural work

10 According to practice c and practice t's websites.
11 Stead, p. 157.
12 Original initials of all names have been changed.
13 Interview with M.S., architect at practice c, 25th November 2020.

with particular prominence. Tracing how architects' roles in producing social housing came to be shaped this way is firmly correlated with its genealogy by the history of social, economic, and political dynamics, particularly from nineteenth century philanthropy and CIAM in European modernism leading to this type of housing being labelled as 'social' today.[14] So, by whom, for whom, and how did it become 'social'?

Long before CAAD existed, the beginning of social housing is traced to the nineteenth century when industrial philanthropists first drew attention to working class conditions and provided support to ease their access to more affordable homes. Supporting building homes for financially vulnerable people stemmed from the charitable activity of enterprisers in the UK who planted initial seeds of what are known today as housing associations. [15] To aid the philanthropists' efforts to redevelop 'slum' areas, the government endorsed the Artisans' and Labourers' Dwellings Act in 1875, giving local authorities the privilege to buy and sell lands to support building up homes for poor people who were in need at these areas.[16] As of 1885, housing conditions in London—among other cities—were seen as most inferior, requiring the demolition of 50 per cent of them, and through the 1885 Housing Act, the councils were given the authority to rebuild new homes.[17] London County Council (LCC) was founded in 1889 with these new privileges to become a new decision-maker for housing in London. The council consisted of many special committees and professional departments, of which the architects' department was part, employing architects to provide needed skills to design and supervise housing schemes and create typical plans of flats and cottages as a guide for future design works.[18]

'Homes fit for heroes' is how local authorities framed their campaign to bring on improved housing development schemes for the 'heroes' who won the first world war.[19] As a response from the government, which paid attention to houses' dire conditions people lived in and feared soldiers uprising to demand better housing, similar to the causes of the Russian revolution in 1917.[20] This is when council housing terminology was initially founded: the 1919 Housing and Planning Act pledged governmental funds to build half a million homes for working-class people, allowing local authorities whose primary responsibility was to develop these housing buildings to rent them.[21] In this interwar period, the social structure shifted, disposing of predefined social classes and establishing a new order: some on the right, according to Deborah Ryan, thought that this 'elevating' of the working class and lower-middle-class to the 'new rich' caused people from the established middle classes to suffer from economic losses due to the war and become the 'new poor'.[22] And that's when homeownership became quintessential for

14 For more details on CIAM role in to find new basis for a socially engaged architecture see Eric Paul Mumford, *The CIAM Discourse on Urbanism, 1928-1960* (Cambridge, Massachusetts: MIT press, 2002).

15 Paul Karakusevic and Abigail Batchelor, *Social Housing: Definitions & Design Exemplars*, 1st edn (Milton: Milton: RIBA Publishing, 2017), p. 18.

16 Paul Karakusevic, 'A New Era of Social Housing: Architecture as the Basis for Change', *Architectural Design*, 88.4 (2018), 48–55 (p. 50).

17 John Boughton, *Municipal Dreams: The Rise and Fall of Council Housing* (London ; New York: Verso books, 2018), p. 17.

18 Nicholas Merthyr Day, 'The Role of the Architect in Post-War State Housing: A Case Study of the Housing Work of the London County Council, 1919-1956' (University of Warwick, 1988), p. 99.

19 Mark Swenarton, *Homes Fit for Heroes: The Politics and Architecture of Early State Housing in Britain* (Abingdon: Routledge, 2018), p. 1.

20 Deborah Sugg Ryan, *Ideal Homes, 1918–39: Domestic Design and Suburban Modernism* (Manchester University Press, 2018), p. 36.

21 UK Parliament, 'Council Housing', *UK Parliament*, 2022 <https://www.parliament.uk/about/living-heritage/transformingsociety/towncountry/towns/overview/councilhousing/> [accessed 1 March 2022].

22 Ryan, p. 18.

people in the UK, synchronised with building houses for private sale growth.[23]

From 'homes fit for heroes' to the 'housing for all' slogan, local authorities after the second world war concentrated on their role in planning to provide homes to a wider variety of people whose income was not necessarily low, leading to significant prosperity in building public housing from 1945 to 1951, which resulted in the construction of one million dwellings in the UK.[24] This was accompanied by a substantial increase in architects' recruitment in councils.[25] These architects worked behind the scenes to produce designs of these housings at that time; in a local authority like the LCC, architects were chosen from the top students in the UK universities to work under secure regular income from the council. Though they worked within bureaucratic structures, working under the council's name liberated them from many limitations that individual architects faced, which guaranteed them more freedom in their architectural practices, resulting in them being highly aspirational in the housing they designed.[26] All of that reflected the architects' growing belief in the vitality of their role in bringing about social and political change.[27] Influenced by Le Corbusier's 'machines for living', leaning toward more 'modernised' housing developments, council architects ambitiously created more contemporary-style towers instead of terraced housing blocks.[28] This incline toward modernised housing tower designs was architects in the public sector's work signature, which was opposed by architects in the private sector, responsible for speculative housing as the leading home designs supplier for the middle-class homebuyers whose dream-home aspirations were alike.[29] With superiority, councils' architects viewed their capability as excelling the latter's, considering their work as supreme in front of speculative housing builders.[30]

Things deteriorated toward the 1980s, with governments and local authorities keeping on questioning what roles public and private sectors should take to solve housing crises in the country, for whom local authorities should provide homes, if it is for everyone or only for the vulnerable, and how rents and development schemes should be moderated.[31] The beginning of this period was marked by the reintroduction of the 'Right to buy' legislation in 1979 by prime minister Margaret Thatcher, whereby council housing tenants now had the right to buy houses they had rented for years, with discounts that reached up to 60 per cent of the market value.[32] This led to an increase in residents being invested 'emotionally and financially' in their rented homes, who sought to improve their status to become more respectable in their local neighbourhoods.[33] The situation was complicated on the councils' side, with an imbalance in maintaining their ability to develop new housing for those in need, especially with the rise in legalised discounts on buying the existing ones.[34] The councils' authority was repositioned/redirected with the 1988 Housing Act, which gave housing associations, as independent non-profitable organisations, more finance and power to lead their own version of social housing

23 Ryan, p. 17.
24 Karakusevic and Batchelor, p. 2; Ryan, p. 174.
25 Day, p. 294.
26 Ruth Lang, 'In-House: The Council Architect', *Architects' Journal*, 2017, 22–24 (p. 23).
27 Day, p. 295.
28 Ryan, p. 174.
29 Paul Jenkins and Fiona McLachlan, 'Is There a Role for Architects in Mainstream Private Sector House Building?', *The Journal of Architecture*, 15.2 (2010), 153–80 (p. 156).
30 Boughton, p. 122.
31 John Burnett and Christopher G Powell, *A Social History of Housing, 1815-1985*, 2nd edn (London: Methuen, 1986), p. 291.
32 Boughton, p. 134.
33 Boughton, p. 137.
34 For more details see Boughton, pp. 134–39.

projects that varied from constructing new buildings or redeveloping existing ones.[35]

With the 1990s economic downturn and societal fracture in the communities for whom these houses were meant to be built, the complexities of the conflicts and defects in local authorities' management of public housing issues caused a marked decline in these housing developments' quality.[36] This resulted in private housing blocks slowly taking over the housing sector instead, which were designed mainly by architects in the private sector whose capabilities were merely invested in the development of speculative housing.[37] Though this opposition interplayed architects in public and private sectors, neither survived the effects of public housing estates' failures as they were the ones blamed for it, which was highly damaging to the reputation of the architects involved in their design, leading to architects' unwillingness to engage in council housing and their reversion to other types of building design.[38]

By the beginning of the twenty-first century, the housing situation in the UK had been transformed, with the market's inclination toward the creation of privately owned houses instead of those produced by local authorities, which its reality in itself shifted and reshaped. From 1968's record high of 190,670, in 2004 local authorities produced only 130 homes.[39] Following the economic crisis in 2008, the housing sector regressed, resulting in private ownership stepping into and dominating housing types in the market.[40] Despite the national degradation of the housing sector overall, housing associations grew more robust as a potential provider of social housing, taking over the power local authorities had in the previous decades. By 2010, a million council homes had been transferred to housing association management since 1997, due to their better ability to design and manage housing projects, detached from the bureaucracy and service requirements in which local authorities' schemes were immersed and without denying their easy access to housing funding.[41] By the government's Localism Act of 2011,more privileges were restored to local authorities which once again gained more independence over financially and administratively managing public housing developments,[42] enabling them to have some freedom on how they handled money and planned housing programmes.[43] These shifts in dynamics behind social housing development paralleled subtle private architects' engagement in local authorities and housing associations' schemes to develop social housing. I speculate that the private sector's domination in the housing market was one crucial factor that led private architectural firms to become more engaged in public housing design and planning and even turn into the primary engagement by architectural practices nowadays.

'I think you've chosen well; almost all of our clients are local authorities,

35 Garry Blight and Pamela Duncan Lydia McMullan, Hilary Osborne, 'UK Housing Crisis: How Did Owning a Home Become Unaffordable?', *The Guardian*, 2022 <https://www.theguardian.com/business/ng-interactive/2021/mar/31/uk-housing-crisis-how-did-owning-a-home-become-unaffordable> [accessed 14 March 2022].

36 Karakusevic and Batchelor, p. 2.

37 Jenkins and McLachlan, p. 157.

38 Karakusevic and Batchelor, p. 2.

39 Office for national statistics, 'House Building, UK: Permanent Dwellings Started and Completed', *Office for National Statistics*, 2022 <https://www.ons.gov.uk/peoplepopulationandcommunity/housing/datasets/ukhousebuildingpermanentdwellingsstartedandcompleted> [accessed 14 March 2022].

40 Karakusevic and Batchelor, p. 3.

41 P Karakusevic, M Althorpe, and A Batchelor, *Public Housing Works: Karakusevic Carson Architects*, G - Reference,Information and Interdisciplinary Subjects Series (Lund Humphries Publishers, 2021), p. 12.

42 For more details see the GOV.UK, 'Localism Act 2011: Overview', *GOV.UK*, 2023 <https://www.gov.uk/government/publications/localism-act-2011-overview> [accessed 10 January 2023].

43 Karakusevic, Althorpe, and Batchelor, p. 13.

and almost all of our projects are about delivering social housing for those local authority clients.'[44] M.J., director in practice c

This way, my choice of researching practice c's architectural practice was complimented by M.J., a middle-aged director in practice c who was not an architect himself and was the first practitioner I managed to meet after a three-month correspondence with the office. I speculate this acclaim was actually for my successful venture to meet his expectations on why I should approach their practice for my research in the first place, simply based on their massive work on social housing. For practice c, social housing is central to the practice's identity, evident in their extensive efforts to promote it through written essays, video interviews, and other media shared on their website. They have succeeded in making social housing not only the practice's unique signature but also more of an essential source from which its value is drawn. On the one hand, this representation is articulated by having local authorities and housing associations, rather than inhabitants, as their main clients, yet it emerges from their work 'side-by-side' with inhabitants to create higher-quality homes for them after decades in the UK of relinquishing such housing.[45] Putting all of this within the historical context of social housing, how does this 'social' aspect in architectural practice represent the office's superior position and value?

Semantically, depicting this type of housing as 'social' is historically related to the shifts in who creates social housing and for whom. These homes were a right in the nineteenth and twentieth centuries, initially built for a specific category of people who mainly suffered from dire housing conditions. Throughout time this gradually shifted to becoming a universal right for all people after the second world war period, back again today to be treated as acquired homes where people still have to qualify for social housing based on race, income or gender.[46] This fluctuation in the basis of who is eligible to live in such homes was paralleled with a dramatic change in local authorities' privileges under neoliberal governments to produce market-led homes. 'Council housing' was the dominant form until the rise of housing associations a couple of decades ago as a strong provider for such houses, reintroducing 'social housing' to include their involvement in developing and delivering homes for the poor for discounted rents. With the diminishment in councils' roles, their architectural departments were affected too, 'council architects' being steadily substituted with private-sector architects who succeeded in showing how much they cared about designing homes for such people. Defining such housing as 'social' is a superimposed whole picture, where the architectural practice role cannot be separated from the political, social and economic dynamics that have identified who is eligible for such homes and who has the authority to set up and develop them.

Nowadays, in architectural offices such as practice c and practice t, 'social' is a sign of their architectural practices' prominent status, drawn directly from their responsibility for designing and delivering better homes for potentially vulnerable people with local authorities and housing associations as an ethical cause. However, architects suffered from undesired degradation of their professional reputation due to taking up such social responsibility in the eighties, which negatively affected their willingness to engage in the creation of such housing projects for decades at that time. Alice Coleman published her book *Utopia on trial* in 1985, pointing the finger directly at architects as the ones to blame for social housing failure in London—denying the complexity of the city's urban situation caused by 'poverty, social division, and collapse of

44 Interview with M.J., director at practice c, 10th November 2020.

45 This is how practice c introduced their practice on their website; stressing the importance of working with local authorities as clients and with local communities as the inhabitants of social housing developments they design as a gesture for their attentive care for such projects which suffered neglect for 40 years in the UK.

46 Karakusevic and Batchelor, p. 12.

the public infrastructure'. This led to the government's exploitation to justify the collapse of the social housing system by putting the architects in the face of such accusations, outlying any other political reasons that stripped all of the responsibility but the architects.[47] Being exposed to such critique was partially a consequence of architects' discourse itself at that time when they articulated architectural space as a 'tool'—interrelating the role of buildings' spatiality as a fundamental aspect that leads to a change in society's behaviour.[48] In contrast, architects' ethical responsibility, as Jeremy Till called it, revolves around their part in enabling spatial attributes that empower the people as dwellers and co-creators of the architectural space.[49] Thus, why do architects today engage in such 'risky' practices of designing these housing developments, and how do they still find it socially appealing (especially after their profession went through a traumatic experience in the past)?

I would say that designing social housing does make architectural practices look good. Yet what would social housing mean for architects if it was not designed mainly for poorer people? Architectural practices exemplify themselves as valuable due to the architects' relation to the 'other' people for whom they create these homes and with whom they (some of the time) interact within the design process. Architects' engagement in social housing development can reflect how much 'good' their practices do in the moral sense, which can articulate their architectural offices' special significance elevating their social and ethical status. At practice c, this connectedness with local 'other' people, who eventually will be the future inhabitants of homes they produce, partially becomes a way that directs their eager methods to reflect their architectural practice's significance through different forms of media. This relationship between housing inhabitants and architects themselves is not established straightforwardly. However, it happens thoroughly through the mediation of local authorities and housing associations who plan these schemes and act as the clients in architectural practice who choose these well-known architectural firms to create these homes on behalf of their inhabitants.

Drawing on the political economist Massimo De Angeli's definition of value practices as 'those actions and processes, as well as correspondent webs of relations, that are both predicated on a given value system and in turn (re)produce it. These are, in other words, social practices and correspondent relations that articulate individual bodies and the wholes of social bodies in particular ways.'[50] We need to understand how architectural offices engaging with the production of 'social' housing is a value practice, that works to create such housing associates architects' design practices with a 'moral' meaning, that in turn acts as a guiding pivot, defining the ethics on which their actions are based. Their architectural practices essentially build their use of 'social' as a value on being part of a whole: in social housing developments, architectural practices cannot exist in isolation without participating in housing schemes primarily designed by local authorities and housing associations as the social organisations that plan these projects. This relationship is an essential part of shaping the architectural practice's high value and prompting the meaning of architects' actions that uphold such value, stemming from considering inhabitants who will live in these homes as the marginalised other—that effectively help in presenting such firms as unusually supreme in terms of morality. Doina Petrescu and Kim Trogal, in the introduction of their seminal book: *The Social (Re)Production of Architecture: Politics, Values and Actions in Contemporary Practice,* stressed 'other values' that

47 Jeremy Till, *Architecture Depends* (Massachusetts; London: MIT press, 2009), pp. 177–78.

48 Hilde Heynen, 'Space as Receptor, Instrument or Stage: Notes on the Interaction Between Spatial and Social Constellations', *International Planning Studies*, 18.3–4 (2013), 342–57 (p. 347).

49 Till, p. 178.

50 Massimo De Angelis, *The Beginning of History: Value Struggles and Global Capital*, 1st edn (Pluto Press, 2007), p. 24.

architecture potentially can produce, provoking more empowering alternative values to those that dominate the market and neoliberalism.[51] But here, practice t and specifically practice c (and many mainstream practices) cannot be included under such a category: both practices are fundamentally immersed in a market-based ethical system from which their values are reproduced. This takes us back to the basis on which these ethics predicate in architectural practice in the first place, the core from which what is 'good' and what is 'bad' is differentiated.

Here, I will begin with defining what these architectural practices' ethics are not, following the way Zygmunt Bauman formulates how any ethical/moral stance is shaped by simply saying it is: 'to assume responsibility for the Other; to act on the assumption that the well-being of the Other is a precious thing calling for my effort to preserve and enhance it, that whatever I do or do not do affects it, that if I have not done it, it might not have been done at all, and that even if others do or can do it, this does not cancel my responsibility for doing it myself'.[52] The 'other' in social housing can range from the builders to those who live in these homes, or as Till stresses, any person who is politically affected by creating these buildings.[53] My focus here is exclusively on inhabitants, the people who urgently need such homes and to whom architects should primarily be responsible. To understand a practice's ethical system, we need to explore from where social responsibility arises.

The creation of public housing in both firms happens through collaborative work between local councils or housing associations and architectural firms, where the latter operates as an interface with the local communities and future residents, enabling all these actors to become agents in the production of these home spaces. Nishat Awan, Tatjana Schneider and Till discuss how the notion of agency in architectural practices necessarily exposes how power is exerted and social responsibility is shared.[54] In the case of practice c and practice t, this social responsibility is strictly shared with the councils, resident associations and other local organisations, which also distributes the power and authority over creating these housing units.

> 'Architects tend not to be involved in these big discussions; we come into that debate too late. So, when we come and a client says (you know, might even be the council and they might be people who have got like good intentions) but they say here's a site and build some homes, and I said, Okay, well how about some workspace. Or how about, a school or nursery. As well, that's not part of your brief; your brief is up, so we were quite limited. To create these ideal neighbourhoods, often these decisions have been made, you know what goes on there so before we start, but then there's quite a lot of regulations and design guides out there. For example, especially when you work for the councils for a housing association.'[55] F.C., a director in practice t

The exercise of power and agency is apparent in the discussion I had with F.C., one of practice t's directors, around how they navigate work with councils. My conversation with F.C., who was also the first I met from practice t, was marked by his unintended vacillation over how different relationships in practice t's practice are politically shaped in the broader sense

51 Doina Petrescu and Kim Trogal, *The Social (Re) Production of Architecture: Politics, Values and Actions in Contemporary Practice* (Abingdon: Routledge, 2017), p. 8.

52 Zygmunt Bauman, *Alone Again: Ethics after Certainty* (London: Demos, 1994), p. 15.

53 Till, p. 173.

54 Nishat Awan, Tatjana Schneider, and Jeremy Till, *Spatial Agency: Other Ways of Doing Architecture* (Abingdon: Routledge, 2013), p. 32.

55 Interview with F.C., director at practice t, 13th October 2020.

between practitioners, housing developers and inhabitants. F.C. built the conversation on his extensive career in practice t as an architect for eleven years and director for two years at the time of the interview, and being from Germany adding more more insights into UK social housing's reality as he consistently compared it to Germans' housing experiences. From above, he describes the way that architects' authority over housing design often follows an institutional hierarchy, bound by the council's power over different spatial origins. Design in this case usually begins with the brief set out by the local authorities or a housing association, which orchestrates various details of the housing project, whether it is social or mixed tenure, the number of apartments/flats and their typology. All of that draws on the boundaries within which architects can work, accompanied by different design guides and regulations, such as the London Design Standard or what is also known as National Described Space Standards.[56]

Initially, the whole discussion with F.C. on the limits for architects in fully taking on a social role and responsibility commenced with discussing how the limitations set by councils inevitably transform homes into a commodity or 'product', which is frowned upon in architects' professional culture. To adhere to a commitment to creating quality social housing is seen as articulating a higher professional status for the practice:

> 'You see a lot of these developers talking about their homes as a product, you know, so they know what that product is, and then they try to, you know, really fine-tune their product, and then build really efficiently, lots of homes, you know that fit this product.'[57] F.C., a director in practice t

Consequently, this eliminates the presence of the inhabitants toward whom this responsibility should be attained. 'I wish there were more trust towards the occupiers', F.C. commented, as disapproval of the commodification of social housing strips inhabitants of being empowered substantial co-producers of these homes. Somehow, this makes architects' ethical attitude toward these homes' inhabitants relatively bounded with all these aspects that play a vital role in formulating the base from which their 'morality' emerges. This disposesses them of their responsibility from any means of genuine care for the 'other' and spurs their ethics towards a more market-oriented value system into which architects' actions are integrated as a larger structure, unconsciously defining what is good and bad, considering all of the conditions that allow this good and this bad to happen.[58] For example, in the case of social housing, when councils (as local authorities providers) or housing associations (as private providers) decide to plan for a housing scheme in a specific borough, it becomes about managing their funds to build a housing building development according to the land it has.[59] What is 'good' for these providers is simply producing the maximum number of homes within the minimum spatial requirements that the land size allows, which operates within the broader financial system that will enable them to plan other future social housing buildings. Thus, any architectural practice that helps in this endeavour will be as well identified as 'good', seeing architects' knowledge

56 National Space Standards were introduced in 2015 after the government's Housing Standards Review, setting out the new national standards to improve housing planning that includes accessibility, water, internal space, security and energy. See GOV.UK, 'Housing Standards Review Consultation', *GOV.UK*, 2022 <https://www.gov.uk/government/consultations/housing-standards-review-consultation> [accessed 27 December 2022]; the Royal Institute of British Architects (RIBA), 'Space Standards for Homes', *RIBA: Architecture.Com*, 2022 <https://www.architecture.com/knowledge-and-resources/resources-landing-page/space-standards-for-homes> [accessed 27 December 2022].

57 Interview with F.C., director at practice t, 13th October 2020.

58 Drawing on the definition of *value systems* by De Angelis, pp. 26–27.

59 Alastair Parvin and others, 'A Right to Build: The next Masshousebuilding Industry', *Architecture 00:/ And University of Sheffield, Sheffield and London, UK*, 2011, pp. 28–29.

and skills as 'human capital' and their relational trust as 'social capital'.[60] Considering these houses as market discounted homes that are sustainably developed based on housing market status is from which the meanings of architectural practices are signified and given value. It is here that architects' processes of designing social homes emerge from, dependent on the web of relations they establish with the local authorities and other providers that simultaneously contribute to its reproduction.

Architects think of this social housing as a 'status symbol', signifying their practice's social credentials. And their direct responsibility and authority over the resulting scheme clash with the narrow boundaries that councils draw for them. The conflict is partly explained by the way the social role of architects has been historically configured, which reverberates in the way notions of authority and responsibility articulate firms' identity and their design cultures to create 'good' social housing. The value of the 'social' housing in practice t and practice c architectural practices stems essentially from local councils and other housing providers they work with and operates within market-oriented systems. This feeds into drawing this image as a 'valuable' practice that sustains and reproduces it as a value system based on 'making the "other" invisible'.[61] Though their relationship with inhabitants as the 'other' in social housing is the origin whereby such value is derived, their involvement in these homes' design remains provisional and reciprocally traded between these house providers and architects. The former allows access to such communities while the latter echoes requisite spatial qualities, and both act as arbiters who predominantly speak on behalf of the 'other'. Architects' responsibility toward residents remains shallow as a superficial signification of their significance embedded into the market system run through a wider web of relations that politically and economically produce these homes.

As discussed in the previous chapter, CAAD makes architects' authoritative character dissipate into the broader political and social dynamics, mirrored in the way they talk about these digital tools which are formed by and immersed into doubt. Talking about social housing similarly reveals traces of a dispersed power over its production that ultimately is the source from which the value of their practices is assigned away from the actual contribution of its inhabitants. However, what does CAAD do to architects' discussions on 'social' housing, and how does it operate within these dynamics?

CAAD -social housing 'technical' superimposition

I return now to the excerpt I started this chapter with. After more than five decades of Coons' 'talking graphically' on early versions of the first architectural software, CAAD technologies have become an inevitable part of practice t and practice c social housing design. CAAD became inherently immersed in social housing practices after the Digital Built Britain (DDB) programme was launched in 2011. That aimed for the construction sector to become nested into more 'digitisation' of the built environment, prompting firms to involve different digital analytical tools in their practices as part of Building Information Modelling (BIM) which became the new mandate requirement for all buildings constructed with governmental funds. BIM is defined by four levels[62] and disseminated to aid clients, providers, and suppliers to describe

60 Drawing on the discussion on what does *capital* mean by De Angelis, pp. 37–38.

61 De Angelis, p. 25.

62 The four BIM levels represents the improvement in using tools that allow digital sharing and collaboration of buildings information throughout projects timespan, Level 0: projects are produced using 2D CAD with little collaboration where exchange is done through print or paper. Level 1: projects are produced using 2D and 3D CAD and project's data exchange is done electronically that is managed by main contractor. Level 2: projects

how digital tools should be used and how building information should be shared throughout the building's production process.[63] After the government's construction strategy in 2016–2020, BIM level two became mandatory for all publicly financed constructions, encouraging the use of object-based three-dimensional (3D) software (for example, Revit and ArchiCAD) that allows different practitioners to share information embedded in the modelled building (see the previous chapter). And since social housing is fundamentally developed within public funding schemes, practice c and practice t shifted their practices toward employing BIM using Autodesk's developed software, Revit, as their primary BIM tool besides other conventional CAAD tools.

Revit was the 'chosen' tool to execute BIM in practice t and practice c offices, imposed as part of the collaboration between the UK's government and Autodesk,[64] which is a leading investor to help provide the needed technologies to support the UK's move toward more digital design and delivery. Its involvement mainly was throughout the strategy assistance and communication of how such transition would be implemented in buildings' construction processes.[65] This narrows the space of choice that architects have for the technologies they use throughout the social housing production, dissipating their authority over a wider web of institutional and commercial relations that lies behind the reality of BIM Level 2 requirement.

Introducing BIM in practice c and practice t's practices led to all social and material operations occurring between distinct cultural mediums, such as the providers of these homes, designers and inhabitants becoming further encapsulated by CAAD technical processes and workflows along the whole spectrum of housing space production. At the beginning of any public housing project, the housing scheme provider, the local authorities or a housing association, usually comes to the commissioned architectural practice with a project brief which specifies all required details that allow them to start the design process, such as the site, how many houses are to be built, bedrooms ranges (one, two or three bedrooms), and of course, its tenure type (social housing or mixed private-public tenure). With the BIM Level 2 mandate, it became essential to have specialists in architectural practices that deal with all the technical and procedural details of BIM implementation throughout the project's timeline: that is a BIM manager and coordinators. I had the chance to talk with G.E., practice t's BIM manager, who had a civil engineering background with a vast experience in 3D modelling and CGI creation using different CAAD tools. He had worked at practice t for six years at the time of the interview. Talking from his own home, he took me through various aspects of BIM within the office.

Moving both firms' work into BIM was not an easy task, being itself a time-consuming effort complicated by the difficulties of training practitioners to use new digital tools that were not used before; for them, it was like going through 'a steep learning curve' as H.C., an architect at practice t described.[66] For example, within practice t, G.E. was responsible for running such

are produced and managed through using intelligent, data-rich objects in a managed 3D BIM environment, where all parties combine and exchange their work. Level 3: projects are fully collaborative, where all collaborators work and exchange data on one shared project view, where everyone who have access are able to modify throughout the project. See NBS, 'BIM Levels Explained', *NBS*, 2023 <https://www.thenbs.com/knowledge/bim-levels-explained> [accessed 10 January 2023].

63 GOV.UK, 'Guidance: Creating a Digital Built Britain: What You Need to Know', *GOV.UK*, 2022 <https://www.gov.uk/guidance/creating-a-digital-built-britain-what-you-need-to-know> [accessed 31 March 2022].

64 For more details see: Autodesk, *Autodesk and the UK BIM Level 2 Mandate*, 2016 <https://thebuildingcoder.typepad.com/files/autodesk_and_uk_bim_level_2_mandate.pdf>.

65 HM Government, *Building Information Modelling: Industrial Strategy: Government and Industry in Partnership*, 2012, p. 10 <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/34710/12-1327-building-information-modelling.pdf>.

66 Interview with H.C., architect at practice t, 27th November 2020.

training in the office. Practitioners are prepared to be proficient in Revit, following specific ways of working with 3D models to keep the consistency in modelling workflows to minimise common simple errors that can hinder the process requiring BIM technicians' interventions to be solved.

In both firms' architectural practices, social housing developments happen through iterative transactions between the office's team and the local authorities or housing associations, and E.G.'s role as the BIM manager entails him taking an active part in the office, manoeuvring between social organisations of councils and practitioners, and being part of crucial discussions through all project stages. For example, in the early phases, under the BIM Level 2 mandate and alongside the project's brief, local councils must provide Employer Information Requirements (EIR), a document usually prepared by relying on consultants from the office. Local authorities' expectations from BIM used in architectural practice, considering what information they are supposed to get from these 3D models, are articulated as 'a guidance on what we're going to do, how are you going to respond to this and how', G.E. explained.[67] This is followed by setting up another document known as BIM Execution Plan (BEP) by the BIM manager and the project lead architect from the office, which details how the council's requirements in the EIR will be administratively and technically accomplished throughout the design and delivery process: so 'that they know what to expect for every stage for each type of category of objects you have in the model. So, again, it would be more useful for you if I showed you an execution plan, and then you could see everything that is done',[68] he added, stressing the importance of having all these sorts of documents to show to me as he talked to me from his home, which would make it easier for both of us to have further discussions on them. 'What about BIM audits?' I asked, drawing on one of the BIM manager's roles, which is to roll out a series of checks along the whole process to make sure everything is done as agreed on in BEP. He replied 'so when you have been consulted, doing all the checks, they will refer to the execution plan to see if what has been delivered for the end of the stage corresponds to what was set up on the BIM execution plan.'

In the previous chapter, I related how a vast web of cultural mediums usually intermediates architects' relationship with CAAD, including governments, by assigning mandatory BIM requirements to firms working on public housing projects. Reciprocally, CAAD acts as a medium to distribute power between the council and the architectural practice. However as above, housing providers usually limit to what extent architects are socially involved when it comes to specific design decisions. Implementing CAAD-led workflows can interrupt this configuration of control temporarily, exemplified in preparing and processing the needed BIM documents —architectural practices appear as more knowledgeable than the council in preparing such documents. Architectural offices which agree to produce these houses are given more agency, yet this mediation reformulates the shape of the transaction between architectural practices and councils embodied into digital materiality, reducing social housing domestic spaces to a set of information sheets extracted from a shared 3D model.

I came to the interviews with architects at practice c and practice t more confidently, especially after overcoming my first encounter with the directors of both firms. I was keen to explore the social and material organisations through which social housing is produced. 'How many people or practitioners usually work on one project?' I asked H.C., a practice t architect, glancing at my written notes that I kept open on one-third of my laptop screen. H.C. spoke to me from a small room which may have been one of the office's archive spaces, with a single tall black

67 Interview with G.E., BIM manager at practice t, 9th December 2020.
68 Interview with G.E., BIM manager at practice t, 9th December 2020.

cabinet standing behind, with a large wooden building model with many windows on the top of it, and a couple of potted plants placed on a cluttered desk on the opposite side. H.C. took me for a tour of how the architects' team designs social housing. Typically, the housing design team consists of five architects: a project lead architect; an associate architect; and two or three assistants. Design starts with the general outlines, creating the base plan that defines the outer wall lines of the housing, such as how the units are arranged and the principles of the rooms follow, done by the project lead and associate architect. Assistants follow up on this by working on more details, usually going along with the project lead's instructions, producing different facades and different floor level plans according to flat types (especially if mixed tenure), then building physical models, creating Sketchup, Revit models, and other photoshop montaged images, and working on materials and case studies. Having a BIM team (a manager, coordinators, or technicians) is vital, as they are not only the ones who prepare Revit files before they start the design process, by uploading types of walls, doors, windows typically used in the software's library (families) and preparing the project's templates, but also, they are relied on when it comes to technical support throughout the process. [69]

In practice c, the beginning of the design process adheres to this dynamic regarding how many architects work in the team, how it is hierarchically constituted and how the work is distributed between them. In my conversation with M.S., the architect I interviewed from the office, he emphasised the importance of sketches in practice c's office. 'Sketching is a big part of the company', he said. Architects reciprocally interplay between hand-drawn sketches and Revit-generated models throughout the design process. At the beginning of each housing project, architects create a basic 3D model that becomes the arithmetic reference of the sketches' scales and measurements which they keep drawn layered on top of it. These sketches are the primary basis for architects' discussions, and where comments are communicated through red pen markups, which feed into the Revit model that keeps updating simultaneously. [70]

Drawings and images (plans, elevations, sections, orthographic and perspective drawings) have always been architects' graphic representations of the buildings they design. With the way CAAD software is designed and organised, technology increasingly limits architects' tendency to use graphic representations even in their discourse. Specifically, in practice c and practice t, using their superior knowledge and the language of CAAD (or at least how they see it) as a technique to speak their practices' stature became more entrenched in how they express their social obligation toward the 'other'. Thus, how does CAAD become graphically embedded as a technical structure from which they represent these homes' inhabitants?

> 'We think it's critical to work with residents from a very early stage in the process. Because although they may not ultimately always have a decision, they don't always make the final decision, their input is really important. And if you're going to work on people's homes, then you know it's a very traumatic, potentially traumatic thing…and we use our BIM tools to enhance that communication.' M.J., one of practice c's directors, stood up in front of his camera, asking me to wait till he looked around from a nearby table for a copy of an A3 size printout booklet, which was prepared for tenants of one of the estates they met. I heard the rustling through its pages; he raised it to show me a page with some printed hand-drawn sketches (which I could barely see clearly from my screen), flipping it over to where CGIs

69 Interview with H.C., architect at practice t, 27th November 2020, interview with G.E, BIM manager at practice t, 9th December 2020.

70 Interview with M.S., architect at practice c, 25th November 2020.

> rendered photos of apartments interiors were organised in a group of four or six images filling the whole page: 'This is a really good example of where we are actually, although we're still at stage two, we produced kind of like photorealistic images of the interior of the apartments', he commented. [71]

My conversation with M.J. took place on the day after practitioners in the office (including him) met residents of one of the estates of London (whom they had worked with for more than ten years) accompanied by the relevant residents association to discuss their work on one of the housing developments in its early stages. Such meetings are regularly held every month where architects come with rendered images and physical models of the proposed design ideas for people's homes. In practice c, local people's interventions are usually deliberately channelled through restrictive scientific inquiry methods such as tick-box questionnaires, email correspondence, or websites. 'Non-technical' and 'very technical' is how F.C., practice t's director, emphasised the distinction between working with local inhabitants versus professionals in the office—commenting on the 'un-technicality' of their approach when it comes to involving inhabitants in the discussion on the office's housing design. Inhabitants are usually perceived as less privileged when it comes to their transaction with CAAD-produced representations, placing them into a 'non-professional' position—typically located opposite their 'very technical' approach where their designs are dynamically exchanged exclusively between architects and other practitioners, consultants, and clients as superior knowledgeable agents.

With the inevitability of CAAD use in social housing design, architects are constantly exposed to technical operations that daily software use encompasses. Coming across 'technical' as a depiction of architectural practices across 'professional' practitioners in F.C.'s discourse opens the discussion on understanding the different facets. Drawing on Zeynep Çelik Alexander's introduction of a co-edited book: *Design Technics Archaeologies of Architectural Practice*, *technic* 'is used to denote a constellation of interrelated practical, artifactual, and procedural material conditions.'[72]Historically, t*echnic* refers to the duality combining both the artefacts and procedures, better known as *technology* and *technique* and comprehending this term is usually subject to the oscillation between technology's autonomy and ability to make a change on its own and its user authority to control these technical procedures of its use to achieve their aspiration.[73] This vacillation can be traced back to how the relationship between humans and instruments was historically presented under the master-slave dichotomy— if the former were to be the master of the latter, tools would be neutral and autonomous; if the opposite, tools would obtain superpowers. Alexander's understanding of the dynamics that arise from architects today's use of digital tools in architectural practices takes the 'in-between' position, which mediates this relationship that ties architects as the user (subject) with CAAD as a tool (object)—overcoming this historical presentation which flattens the agency of all the cultural, social, and material organisations that surrounds its use.[74]

Relying on this definition to understand architects' practices in F.C.'s discourse would open this assemblage to broader 'mutable' possibilities' in Alexander's words, where these materialistic processes cannot be split from the social medium with all of its cultural dynamics but also from dealing with the knowledge that these procedures incorporate. Especially within this uncontrollable setting, where neither the architectural production (the social housing

71 Interview with M.J., director at practice c, 10th November 2020.

72 Zeynep Çelik Alexander and John May, *Design Technics: Archaeologies of Architectural Practice* (Minneapolis: University of Minnesota Press, 2020), p. ix.

73 For more details see Alexander and May, p. xii.

74 Alexander and May, p. x.

developments) nor the tools they use act under their authority, architects count on this professional knowledge as the primary users of these mandatory-to-use digital tools to signify their higher expertise/status.

I came across similar to F.C.'s 'technical' discourse with some of the practitioners I talked to, who tended to flatten the production of these homes and the knowledge it upholds into digitally produced two-dimensional and three-dimensional representations, especially when inhabitants became part of their discussions. Most of the time, inhabitants' understanding of these homes' designs was reduced to the specificity of 3D representational images and models:

> F.C., practice t director: 'you know architects and planners and even our clients, they can read plans and understand plans; non-professionals really struggle with 2D drawings, so we try to only present 3D information. So, and that can be a physical model, or it can be like a photo montage.'[75] F.C.'s statement haunted me. Since this discussion was part of the first interview I had in my fieldwork, I was pretty nervous and overwhelmed with how unexpectedly willing F.C. seemed to share; it did not occur to me to further probe this area immediately. One month later, I deliberately planned to ask H.C., an architect from the same architectural practice, about it: 'how do you communicate design proposals with social housing residents? Do you use, for example, CGI renderings or plans produced using CAAD, or do you go with physical models and sketches?' I asked.
>
> H.C.: '3D models are really good, for that renders are important as well because you know that's the sort of next step I think in achieving this sort of realistic visual of what a final design might be or, you know, a future building might be, as people are familiar with things like photographs, right, and things they see on the screen, so they are already seeing things in 2D of 3D objects so are able to interpret that information in terms of picturing this physical building in the future.'[76]

Similarly, M.S. drew on M.J.'s controversy on the role of the 3D visualisations they produce to liaise their imagination of the future domestic spaces with its inhabitants. Stressing that this inclination toward these three-dimensional images stems basically from inhabitants' growing knowledge of software, 'people's interaction with software and phones, particularly gaming, has made people familiar with the power of three-dimensional tools,' he said. He further explained that these CGI of home interiors became what inhabitants would 'expect' nowadays as a practice to provide. However, how does the way architects flattening of inhabitants' knowledge of domestic spaces work within the broader web of social and political dynamics of architectural practice?

Talking about images and models was a prevailing part of the discussions I had with practice t and practice c practitioners. These representations became a constitutive part of their imagination of social housing and their communications with its inhabitants. Rendering and

75 Interview with F.C., director at practice t, 13th October 2020.
76 Interview with H.C., architect at practice t, 27th November 2020.

modelling are an essential part of a broader set of technical processes architects in both offices engage with through their practices while continuously being involved with CAAD tools. These technicalities become an inseparable part of the broader web of how relationships between different cultural organisations (councils, practitioners and inhabitants) are politically formulated, reformulated and represented.

Understanding these technical procedures that exist due to digital technologies' emergence into architectural practices is deeply associated with discerning the basic technical definitions of drawing, photography and image. Drawing on John May's afterword in *Design Technics Archaeologies of Architectural Practice*, different techniques of architectural representation, in their essence, culturally operate through processes of recording, storing, and retrieving thoughts and knowledge systems and always work beyond a single individual's action and are stored through collective memory. Architectural CAAD drawing, photography, and image are three different forms of visual depictions that differ in how they are technically stored. Drawings are mainly mathematically prescribed and mechanically produced; they are a set of gestures always aided by a mechanical tool, resulting in geometrical inscriptions or deposition on a stable surface. On the other hand, photography cannot be calculable but is chemically generated through a chemical-mechanical process when a surface is chemically exposed to light and produces detailed portrayals of visual scenes. With advancements in different representation technologies in the twentieth century, images became the dominant format that eliminated other previous ones, introducing a new 'entire mode of storage and its attendant forms of thought, imagination, and consciousness'. [77]So, what do image and model technically mean?

Images are formed differently from photography. Rather than chemical exposure, they are electrically created and stored. Images are visual depictions resulting from detecting the environment's energy and transforming it into electrical signals to be processed, calculated, managed, manipulated and stored statistically. When these signals are accumulated, they become known as 'data': these images are data-driven, and thus, they are quantified entities and profoundly mathematical.[78] But what happens when architects interact with different 'textual' commands within CAAD software to create a 3D model? They simply make images continually refreshed at a fast pace that precedes architects' perception, based on numerical operations that happen through electrical signals embedded in what appeared in software as textual 'commands'. These high refreshing rate images, temporally, seem in a continuous, up-to-date, automatic state, creating a 'real-time model of the world'.[79] Returning to social housing, how do architects' daily entanglements with such technicalities affect their imagination of these homes and the definition of knowledge the inhabitants acquire?

Architects' involvement in different technical procedures in their practices is not only materially composed but essentially is also temporally related. And here, I look at this technicality as a constitutive part of a broader material, cultural, and practical constellation. The process of depicting the world is fundamentally related to the techniques and tools that allow practitioners to create such representation within the practice culture, compliant with its inherent rules through time. Traditional architectural orthographic drawing has always been linear, its technical process relies on thought structured on lines based on specific rules that have beginnings and ends. The world (as a speculated future) is depicted by drawing, following a set of geometrical rules and gestures developed through practitioners' devotion to its long

77 Alexander and May, p. 227.
78 Alexander and May, pp. 222–24.
79 Alexander and May, p. 231.

historical traditions, holding its present and future back into its past.[80]

In contrast, 'postorthographic' techniques (like modelling and rendering) that emerged out of digital tools' involvement in architectural practices produce processed images entangled in 'real-time' through unperceivable electrical signals. Here, architects' engagement in producing a building's design using digital tools is not linear. As they model the building's different elements, architectural software enables architects to test different varieties of materials, spatial and structural configurations within an instantaneous timeframe. Throughout this process, the depicted world's present is continually related to endless future possibilities depending on the computer's vast capacity to calculate and compute alternative realms, presenting and legitimising architectural production through a set of data formulated into different precise and highly controlled images that represent different aspects such as buildings' spatial, structural and energy performance and efficiency.[81]

> 'There's a lot less knowledge about design in a non-professional world.'[82]
> F.C., practice t director

This is how F.C. expressed his dissatisfaction with how potential inhabitants reacted to a prize-winning housing scheme designed by the practice t team, who seemed not to care about the 'awarded' housing development design but rather about how many beds the flat has, whether its bathrooms are ensuite or if it has 'certain Siemens cookers or a Bosch kind of fridge'. From his point of view, their design was not appreciated enough, especially after the client advertised it without mentioning them as the 'awarded' designers, but with 'the flat comes with sky TV and has a Siemens fridge' presented instead.[83] In both practices, architects do not only feel they have the design-related expertise to create housing designs, but also the technical knowledge to produce 'real-time' models of people's homes. Most of the time, they are the only ones who are considered 'professional' amongst a group of housing providers and future dwellers. In these processes, architects are able to project an uncountable number of possible future realities of these homes which CAAD tools allow. They are marked as privileged with access to all future (calculable) possibilities of these homes, favoured by the CAAD technical knowledge that enables them to foresee numerous different domestic realities. This gives them a state of power. The inhabitant, who produces these homes' reality after being built, is labelled as the 'less knowledgeable' other, considered less exposed to CAAD's technical processes such as modelling and rendering, yet more or less deals with its produced images in the reality of the home daily. From the architects' perspective, this dynamic makes them feel they should be superficially 'non-technical' in all of their transactions with future inhabitants of the homes they design.

Architects from both firms articulated the definition of home as 'not as a super finished product', 'something that people feel they can still customise', 'where people enjoy living' and featuring 'changeability'. Predicating on their social responsibility toward socially vulnerable 'others' and emphasising the importance of their social role obliges architects to provide 'good' housing in which their power over its design is intrinsically bounded by housing providers, local authorities, and housing associations controlling briefs. Using a 'graphic language' which is triumphed with CAAD image-model technicalities discourse, embeds inhabitants' otherness

80 Alexander and May, pp. 228–30. Also see: Robin Evans, *The Projective Cast: Architecture and Its Three Geometries*, 1st edn (MIT press, 2000); Robin Evans, *Translations from Drawing to Building*, 1st edn (MIT Press, 1997).

81 Alexander and May, pp. 230–31.

82 Interview with F.C., director at practice t, 13th October 2020.

83 Interview with F.C., director at practice t, 13th October 2020.

further as the less privileged with such knowledge. This is symptomatic of architects' use of this language as a 'coping' strategy to signify their elite social value based on their knowledge of CAAD, which confirms their 'marginalised' authoritative status. However, what do these technicalities do to the idea of home, and what are their further implications, their agency?

> 'we usually start on stage three for residential projects, and I think they are ideal for Revit because they don't have many complicated wall junctions or variations in floor levels…; it automates the process; everything is parametric, so you spend much less time redoing and checking things, it is a lot quicker.' [84] G.E., BIM manager in practice t

When I met E.G., practice t's BIM manager, I was keen to look into the material complexities that unfolded when dealing with Revit files while designing social housing, and this was part of how he started to elaborate on how Revit is usually prepared. In the early stages, architects roughly model general building masses used to calculate preliminary housing development feasibility automatically. In later stages, models are developed in more detail by assembling different building elements, where flats take shape, rooms are specified, and wall and ceiling finishes are chosen, and that's when different apartments are labelled through in-Revit tags, as private rent, social rent or shared ownership. However, what happens beyond all these automated processes that G.E. mentioned? For practitioners in practice t and practice c, social housing is coupled with more extensive responsibilities than any other project, obliged as it is by housing providers to comply with particular design requirements in the brief and with a specific time scale. This affects how they navigate CAAD's technical processes to meet the expected spatial and temporal aspects of housing design delivery.

Practitioners discuss CAAD's use in social housing design with a blind faith in its efficiency: 'I guess there is, sort of, because of the programme inherently allowing you a degree of efficiency and sort of repetition. There's a tendency to want to use that to make the process of creation of drawings, you know, efficient.' This is how H.C. commented when I asked him to tell me more about the CAAD downsides.[85] In Revit, architects do not draw people's homes, but architects are constantly part of an assembling process. Different elements like walls, floors, windows and doors are picked up from pre-loaded libraries and compiled so they join together automatically. Architects do not need to think about their conjunction, test different elements and materials, extract any related information, and instantly create all technical drawings (like plans, sections, and elevations). Nowadays, CAAD software allows practitioners to transmit, duplicate, repeat, and immediately modify images they create of people's homes by entirely relying on computational capabilities to automate such processes with less effort and time. Within software such as Revit, the world is essentially experienced through unseeable discrete, measurable, and calculable electrical signals, which are unperceived by practitioners due to their size and speed; such automation does not necessarily replace architects' thinking with a computational one but allows such processes to dwell in both realms, concealing the boundaries that separate them.[86]

In this complex entanglement, architects are constantly dealing with the materialities and technicalities of CAAD while they design people's homes, wherein the process they are engaged through monotonous, routine computerised activities as 'labourers', which throughout history

84 Interview with G.E., BIM manager at practice t, 9th December 2020.

85 Interview with H.C, architect at practice t, 27th November 2020.

86 John May, 'Life, Autocompleted', *Harvard Design Magazine No. 46 / No Sweat*, 2018, para. 4 <http://www.harvarddesignmagazine.org/issues/46/life-autocompleted> [accessed 19 April 2022].

became known as 'CAD Monkeys'. Initially, this terminology emerged to describe a novice person who has undergone a degree in engineering or architecture and whose job in the office (usually after his/her graduation) is to do mundane, repetitive drafting labour using computer software.

With the introduction of BIM practices, these labourers became known as 'BIMpanzees',[87] as a new terminology of a similar definition but given more sophisticated and higher professional status, immersing all practitioners (not only novice ones) into more CAAD-driven technicalities despite how the importance of their role is perceived and represented in the design process. Mechanising manual labour was the central aim of industrial automation at the beginning of the twentieth century, setting up different mechanised tools and systems to maximise efficiency and minimise industrial production time (known as Taylorism scientific management systems).[88] For May, involvement in CAAD technical activities today to produce images and models that rely on electrical signalisation allows architects to engage through different means of automation while designing buildings, which is seen as 'signalising mental labour'.[89]

For G.E., practice t's BIM manager, home is considered a simple composition; you deal with walls, floors, windows, and doors whose junctions and overlapping are easily created within the software with the minimum errors, which meets architects' expectations from Revit modelling technicalities. Housing is 'ideal' for the software, mainly dealing with recurring flats on duplicated floors that fit the relatively quick and repetitive process of producing those images and models. M.S., practice c's architect, stressed that using Revit allows architects to 'efficiently' speed up the mundane tasks that enable them to spend more time instead on making these homes 'perform' better under the same project's timeline specified by local authorities and housing associations to design and deliver these housing developments.

In the previous chapter, I discussed how blind faith in CAAD dominates architects' speech despite all other difficulties they face while in daily frictions with such technology. However, my focus here is on what that does to the way architects imagine, define and represent the idea of home and the process of social housing creation. For architects, producing social housing using CAAD tools such as Revit can seem instantaneous, especially with 'real-time' modelling that gives them quick representations of people's homes, with unlimited visual and textual accessibility to the information of every tiny detail of their design. All of it can be automatically composed, reformulated and retested through the continuous engagement of their conscious and gestural habits into processes that immediately eliminate time. For example, if architects technically drew these homes using traditional orthographic techniques, as May discussed, their labour time would be delayed between their created record's past and the present they experience; 'a delay between lived life and its representation'. While in CAAD real-time modelling, such 'temporal separation', as May called it, is removed, eliminated and essentially displaced with an intense compacted time through electrified signals, where the gap between past and present intensively happens beyond architects' perception.[90]

This makes different activities appear more 'automated' using computational capabilities, and design work seem more efficient and take less time, which is further implicated not only

87 This terminology has been mentioned in a talk provided on one of Autodesk's platforms titled '*From CAD Monkey to BIMpanzee: The Evolution of Design Technology at BDP'* and describes CAAD practices in one of the UK's firms after the BIM level two mandate.

88 For more details see Siegfried Giedion's The Assembly Line and Scientific Management, in William W Braham and Jonathan A Hale, *Rethinking Technology: A Reader in Architectural Theory* (Abingdon: Routledge, 2006), p. 198.

89 May, para. 2.

90 May, para. 7..

in how architects make and think of these housing designs, but also identifies housing as a broader cultural pursuit where designing 'good' homes for the vulnerable 'other' is an ethical cause. Based on May's interpretation of the implications of removing labour-time in real-time modelling, this temporal elimination that happens while working on these homes' 'real-time' models in Revit and other tools means removing all established domestic life possibilities that will occur in this space and how those affect its residents.[91] This removes the political and ethical questions from architects' interpretations of a domestic space stripped of its possible temporal and spatial future existence. Additionally, when it comes to CAAD, architects are in a position, as the professionals, with knowledge supported by all the technical capabilities and architectural software on behalf of their inhabitants. This reemphasises the invisibility of the 'other' for whom the social housing is physically and ethically developed in the first place. This takes us back to the point I started with: social housing practices operate within market-based systems that restructure the main definitions of 'good' and 'bad' social practices inseparable from technical procedures. Though these practices predicate their social value based on working for the 'other', they tend to channel the 'other's' voice through determined scientific means (such as questionnaires) that lack enough space for inhabitants' empowerment, and through the hosuing associations that mediate and commission the processes.

Conclusion

Despite architects' denial of 'home as a product', CAAD technicalities seem to embed social housing practices as exactly that. My conversations with architects and practitioners included discussions on how social housing is financially developed and managed as a core aspect in architectural practices. Depending on a restrictive budget specified by housing providers (local authorities and housing associations), these homes are planned and integrated more into questions of what they can provide with this money, for whom, and how they can get some finance back as a part of the social housing long term development plan. With the recent BIM mandate, architects can use Revit parametric qualities to test different design proposals instantly and provide housing providers with discrete calculable feasibility and cost analysis predictions at a very early stage of the housing project. Though architects need to deal with commercial and financial constraints on their design practices that these transactions incorporate, they still play a vital role as primary arbiters who possess the particularity of professional knowledge of these homes' design and delivery and essential CAAD technical skills when it comes to the technical procedures it consolidates. Revit's involvement in social housing production happens to be far from neutral instrument that solely aids technical processes and instead operates within a broader range of relations. As a commercially developed tool itself subjected to the software industry market systems, it immerses architects through the legacy of its technical 'efficiency' into practices that give the 'market' the legitimacy to define the ethics of social housing production.

Real-time modelling became not only a way to calculate how much these homes will cost, and to test different variations/possibilities of its design, but also an 'obsessive' tool, as M.S. described, that strips the specificity of space of any ethical and political considerations. CAAD's massive profusion of easily extracted quantifiable information on social housing in architectural practices obscures the 'other's' domestic existence that is doubled with their actual agency being eliminated from the early practice's transactions at the beginning of each housing project, which further embeds the imaginaries of these homes as an abstract and commercial product. In his seminal text *For a Critique of the Political Economy of the Sign*,

91 Alexander and May, pp. 235–36.

Jean Baudrillard presents 'living accommodations or houses' as an example of how an object moves beyond being a commodity that is produced, traded and distributed but necessarily as a reproduced sign of status, power or cultural identity, which operates in the broader structure where it is produced and consumed through its interrelation to other signs.[92]

Talking with architects and practitioners about social housing usually expands beyond its objective relation to designing a space where 'vulnerable' people's domesticity resides. In their discussions, housing as an object is detached from its functionality, experience and use and loaded with distinct significations of higher social status and prestige. But how does social housing become a produced/consumed sign?

Baudrillard points out that: 'The question of residence is still very closely associated with patrimonial goods in general and its symbolic scheme remains largely that of the body. In other words, domestic practice is still largely a function of determinations, namely: symbolic (profound emotional investment, etc.) and economic (scarcity)'.[93] In architectural practices, social housing is deeply rooted in the symbolic meanings tied to its creation that essentially stems from social responsibility toward the 'other', as a moral and noble aim toward vulnerable people who are in need of these houses, coupled with economic investments prompted by housing providers to sustain its production. The critical turning point happens when CAAD technical procedures and the materiality of its creation that architects become engaged with as a momentary authoritative power that prevails in their discourse and practice — where all you can perceive is the reality of the labour as means of its production and the opacity of their social relations with its inhabitants. That's when social housing becomes a sign; when a concrete caring social relationship with the 'other' no longer formulates the core of its meaning. Instead, the housing draws its essence from its relations to a privileged social status it provokes, that practitioners persistently engage in its consumption and reproduction. This means that the 'other' becomes absent, inhabitants as the main subjects become isolated from the production and the home becomes an object —nothing more than an assembly of relations and significations, where architects' authority, their social responsibility and CAAD's agency are trapped, contradicted and distorted.

92 Jean Baudrillard, *For a Critique of the Political Economy of the Sign* (St. Louis, MO.: Telos Press, 1981), p. 65.

93 Baudrillard, p. 64.

Chapter Three
Home in a Box: Thinking The Box.

Introduction

On Exactitude of Science

"It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well."

Lewis Carroll, Sylvie and Bruno Concluded, (1895)

In O*n Exactitude of Science*, Jorge Luis Borges wrote a short story, based on Carroll's fictional 1:1 map, of an imaginary empire where people were remarkable at drawing maps. Their cartographic skills improved day by day as they mapped their world, further pushing their capacities to draw better details of their empire. The more details they represent on the map, the larger the scale map becomes. The map expanded until they drew maps of provinces in a scale of a city and the map of empires in a scale of a province. But this level of detail was not enough. They decided to depict every part of the empire, point by point: the buildings, hills and mountains. As it became exhaustive, the map turned into the empire. For the younger generation, who did not like what their ancestors had done, these maps were perceived as 'useless', objecting to the obsession in depicting every detail to an extent where it became the empire itself. This map was abandoned, as they realised there was no point to it.[1]

I find architects' fascination with creating precisely drawn representations of the buildings they design quite similar to the cartographer's allure to draw maps that are 'more satisfying' in Borges' terms.[2] Part of the fascination goes back to the effortless fluidity afforded by Computer-Aided Architectural Design (CAAD) tools, which enable them to zoom in and out and draw buildings to the precise detail of a door hinge and tiny screw. The expansion in architectural software capabilities has led to defining new means of how architecture is practised and produced, such as the emergence of Building Information Modelling (BIM) and, with it, the notion of Level of Detail (LOD), reminiscent of the obsession of the cartographer's guild in Borges story. LOD describes the precision to which a building's 3D model is drawn, using a predefined value representing the degree to which the model is detailed. As practitioners work on a specific project, they agree on the extent they want to add elements; the more they add, the more it becomes detailed and embedded with more information. In architectural practice, the higher the level of detail, the more the model will look 'as-built'.

In 2016, BIM became mandatory in architectural practices when designing social housing, leading to the embrace of Revit, a software intended as a highly automated platform for 'assembling' buildings from preloaded and adjustable libraries containing building elements that architects need to assemble 'digital twins' of their projects. Revit facilitates a detailed representation by offering an intuitive drag &drop interface and using the resulting models to 'extract' drawings like plans, sections and elevations. This makes these homes as a particular area to explore how architects tend to represent them precisely using CAAD tools like Revit, in terms of how they depict inhabitants' domestic practices (like eating, cleaning, sleeping and other activities) that spatially and temporally take place inside homes using technologies.

1 Jorge Luis Borges, 'Of Exactitude in Science', *QUADERNS-BARCELONA-COLLEGI D ARQUITECTES DE CATALUNYA-*, 2002, 12 (p. 12).

2 See more on precision in architectural representations in Francesca Hughes, *The Architecture of Error: Matter, Measure, and the Misadventures of Precision* (Cambridge, Massachusetts: MIT Press, 2014).

Borges' story speculates on what would happen to abstraction and reality if one crossed the arbitrary line separating them. In his story, cartographers thought their maps would become more realistic if they represented extensive details. However, a total map is problematic due to its ethical and political implications. It raises the question of who shapes reality, how it is imagined, and what happens to people who dwell in this reality. This story necessarily questions the nature of both abstraction and reality, uncovering not only the social qualities of their existence as juxtaposition, but also the role in representing and shaping one another. Both the cartographers in Borges' story and the architects who design social housing are obsessed with representing reality accurately. This parallel raises questions on the validity of the architectural representation, particularly in people's homes. It also invites an examination of the intersection of CAAD and home; how are homes shaped? What is the role of architects, digital tools and the people who inhabit them? Moreover, who shapes the knowledge that emerges around it?

CAAD and Home

'My friend is a part one architect; her dad has recently gotten into scale models of trains and cars. He got the scale model of John F Kennedy's Lincoln Continental. I am not sure what the scale was. The model was about 15cm long, so I guess about 1:200. He decided he also wanted a scale model of Dealey Plaza, where JFK was assassinated, to go with the car. So, he googled a bit and found a CAAD version that he could download and send to a model maker who could make it and send it to his house. A few days later, the model maker said they had started making the Dealey Plaza model. but just thought they should check what he wanted because he had sent them a 1:1 scale CAAD model. He nearly ended up with a 1:1 replica of this huge plaza delivered to his house. Much less philosophical than the Borges story, but it made me laugh. I guess it shows another way that non-architects understand/misunderstand CAAD.' June, an inhabitant of Park Hill

This research started with two questions: what is CAAD? What is home? Usually, CAAD and home seem to be two standalone realms. CAAD stands for computer software used to design architectural spaces, and home is where people live. The former occupies the territory of architectural practice, while the latter is where people's everyday domestic life occurs. They are two distinct spheres, and the only way they intersect is through architectural practices. Answers to such questions are generally taken for granted in the professional realm of architecture. Suppose you ask these questions in an architectural office. In that case, you will find that CAAD is exclusively associated with the profession, an inevitable evil of practice. Architectural practices often understand it as a specialised piece of software to create two-dimensional (2D) drawings and three-dimensional (3D) models of developments, they hope, their future occupiers will call home. Generally, the conceptualisation of the encounter between these two realms can seem a task particular to professionals, architects, designers and other CAAD users, marginalising inhabitants. However, this representation is reductive, eliminating not only the banal and everyday from home imaginaries, but also the possibility of finding intersections between technology and domesticity. However, the two questions are vital to understanding the nature of CAAD and home and how they intersect, looking beyond these answers to deconstruct who shapes them.

Why do inhabitants' imagination of CAAD and home matter? I surmise that it is less common to

talk about these two concepts from a non-architect perspective. Architects use different pieces of CAAD software while designing domestic spaces, but looking for intersections of software and domesticity within homes themselves is less common. Though similar technologies increasingly become accessible to people, CAAD at home is still an overlooked encounter which tends to be ignored. Different applications are now being promoted for non-architects, such as *Ikea Home Planner*, *HomeByMe*, and *HomeStyler,* which allow the creation of three-dimensional models of home interiors, including photo-realistic CGI. These apps and services are in addition to a growing ecology of devices for everyday, mundane domestic chores, such as robotic vacuum cleaners, which allows people to interface their homes through 2D floor plans similar to drawings produced by architects when designing the space. This makes understanding the occupation of people's homes more critical—ignoring the possibility of such encounters becomes reductive to how CAAD digital technologies and homes are produced and perceived.

Further, it is not only because of the probability of inhabitants being prospective users of CAAD technologies but the inevitability of them being creators of homes. In *Spatial Agency: Other Ways of Doing Architecture,* Nishat Awan, Tatjana Schneider, and Jeremy Till provided a spatial understanding of how architecture is produced based on Henri Lefebvre's *production of space.* They argue that buildings are contributive, dynamic and political in terms of how they are socially produced through continuous processes of exchange and transformation by non-professionals, which makes paying attention to the effects this space entails on everyday life necessary.[3] Following this understanding of the space, typically, a housing building begins as an idea in the architectural practice that is constantly reformulated until built, but it does not stop after that; it is recreated and reproduced by its dwellers after they inhabit it. Throughout this spectrum, home is formulated not only as a physical object but also as a meaning, creating different imaginaries of what home could mean.[4] Home is made through architects' and inhabitants' collective imaginaries and practices. However, architects' definition of CAAD and home is still essential; they take an active role in determining how digital technology and domesticity are interpreted and understood, and focusing here on the inhabitants' part of the story does not eliminate the architects' part but builds a comprehensive understanding of the dynamics of how it is presented.

In this chapter, I argue that in approaching the CAAD-home entanglement, we need to turn to its specificity from outside the privileged architectural profession, calling for embodied perspective from within the banal and everyday at home. To do so, I invite a feminist approach to rethink taken-for-granted knowledge about CAAD and home. I call to resist architects' ready-made answers to what is CAAD and what is home and engage with the ethical and political question of who does shape their answers and whose voice is allowed to speak. Hence, I reconfigure these questions more speculatively to become: what will happen when CAAD meets domesticity outside architectural offices and inside people's homes? What will be the shape of home, and what shape would CAAD take?

One possible way to answer these questions is to inquire into peoples' use of CAAD tools as a site to delve into CAAD-home encounters inside home by exploring non-professional CAD tools, designed by big software companies such as *Autodesk* and *Dassault Systèmes,* for use inside homes. However, I perceive this option as problematic, as it falls into the

3 Nishat Awan, Tatjana Schneider, and Jeremy Till, *Spatial Agency: Other Ways of Doing Architecture* (Abingdon: Routledge, 2013), p. 29.

4 Alison Blunt and Robyn Dowling, *Setting up Home: An Introduction*, *Home (Key Ideas in Geography)*, 1st edn (London: Routledge, 2006), p. 22.

same spinning wheel that initiated this critique from the beginning. It weighs the discussion on CAAD-home encounters to people who have access to these technologies, overlooking inequalities in digital literacy and access. This paradoxically leads to the same narrow angle from where the architects look, especially since these non-architect CAAD versions stem from the same software-industrial roots. All of that eliminates 'others' who do not have access to such technologies and still have something to say about this matter; a social critique of these specific tools is beyond this research's scope. Instead, I draw attention to these 'other' voices by creating 'another' CAAD-home encounter inside peoples' homes that I call *Home in a Box*. In this research, I strive for a CAAD encounter that liberates from imbalanced consumerist exchange and reclaims inhabitants' agency in producing more inclusive knowledge from within their homes. *Home in a box* creates an encounter and a critique simultaneously.

What is Home in a Box?

Home in a box is how I named a 'designed' encounter between CAAD architectural and domestic practices. It is a box and an 'encounter'– situated as both and understood as a designed object and a conceptual tool. This box shifted between its site of creation/production, where I experimented with different ideas and materials to design and create its materialities, and people's home as a site of collaboration where inhabitants engaged/interacted with different processes within the box to produce an inclusive knowledge about both CAAD and home. While reclaiming an architect position, I moved between the box's site of creation and the site of inquiry. In doing so, my voice transformed, shifting between being its designer and its critic. 'Writing the box' happened along with this movement as a continuous process of reflecting on a series of encounters between CAAD architectural practices, domestic practices, inhabitants, the box and me.

Figure 3.1: Image captured by the author in the autumn of 2021, Taken after Home in a Box was returned from Park Hill inhabitant, shows the box with her cat's scratching marks on it.

In this thesis, Home in a Box is a box designed with several activities; and a piece of writing/ text where the box is critically and descriptively written. I am situated as its designer and writer. Both voices are formulated through an entanglement of practices, where discursive and performative practices of 'doing' and 'writing the box' overlap and intersect. This box came about as I was involved in the overlapping design and writing practices that temporally and spatially took place within different sites of creation and reflection: firstly, in my home before the box as an object existed,[5] and secondly, in people's homes afterwards. In these two sites, the conceptualisation of *Home in a Box* occurred in a non-linear way, travelling forward and backwards between the spaces of knowledge accumulation and spaces of imagination and speculation. Inhabitants and I collaborated to explore how CAAD is part of their lives. Together we co-produced knowledge about both home and CAAD.

The box is two things. A conceptual tool that allows engagement with feminist theory as a *careful* practice to speculate another configurations of CAAD, using Maria Puig de la Bellacasa's *Matters of Care* and Hélène Frichot's concept of *Feminist power tools* as main theoretical accounts. A designed object constructed and physically made of a 38 x 28 x 13cm cardboard box that held a variety of multimedia objects (such as booklets, zines, maps, postcards, an instant camera, a voice recorder, and a smelling jar). Chronologically, this box moved from my own home, where I designed it, to the homes of four participants in Park Hill, Sheffield, each interacted with one box over the course of around three weeks. After receiving it back from them, I actively reflected on its materiality through *Writing the Box*.[6] In this chapter, I explore how *Home in a Box* is developed as a feminist theory and methodology that enables an inquiry into CAAD-home encounters within inhabitants' homes by allowing a meaningful engagement of inhabitants to produce embodied knowledge on architectural software and domesticity—articulating the box as a twofold feminist practice that overlaps theory and design.

5 The design of the box happened in March-April 2021; when the COVID-19 pandemic was circulating and doing everything from home was the inevitable norm.

6 See chapter four titled: Home in a Box: doing the box.

Figure 3.2:Snapshots of opening Home in a Box, taken from a video of unboxing the box created by the author in July 2021.

Materialising Home in a box with care: the box as a concept tool and an object

It is like getting a Christmas present![7]

I worked with four inhabitants from Park Hill between May and October 2021. Given that COVID-19 restrictions in the United Kingdom were continuously changing, most of my meetings with inhabitants happened virtually; however, handing over the box and getting it back was a hard-to-miss chance to meet them face to face. I first met Catherine at a café, a lady living in Park Hill, who agreed to meet before deciding whether she would take the box or not. I put the box inside a bag and brought it with me anyway. 'How long have you lived in Park Hill?' I asked from behind my face mask while waiting in the queue for our coffees. 'My partner and I moved to Park Hill when I started my PhD, so it is less than one year,' she said. The fact of being two women of the same age doing their PhD helped me rein in my anxiety.

I placed the box's bag on the wooden rectangular outdoor picnic table, where she and I sat to have our coffees. We talked about different details of my research and her potential collaboration. 'This is the activity kit I told you about that you would collaborate in if you decide to take part,' I said while opening the box for her so we could come across its content together. I gave her the introductory card titled "What is in the box?" She looked at it and said, 'hmm, I am interested to see what's in the envelope

7 The parts that are written in *red italic* text are my reflective voice.

that says "open when you do laundry"'. I looked for it between the other envelopes piled inside the box and took a printed brown-paper brochure, a 105 x 148 mm booklet titled "Moving around Home", and a couple of pieces of tracing paper for maps-drawing activity out of it. 'Here, I'll share with you something about Revit,' I said while pointing to the brochure, 'and these other activities where you tell me more about laundry in your home, when you usually do it, and how it moves around the home.' I continued while curiously shifting my gaze between the envelope's content and her facial reaction. 'It is an easy task then!' she said. 'I liked the way the box is designed. It feels like getting a Christmas present! I am happy to take it—it seems like something fun to do!' she added. Happily, I put back the envelopes, close the box and hand it to her. 'It is all yours! I hope you will enjoy it!' I replied with a relieved smile.

This was not the first time *Home in a Box* was described as a 'present'. Generally, giving/taking a present or a gift is closely tied to how power is distributed. Within this setting, the gift usually operates as a reciprocal relational exchange between the gift giver and its taker, where no one acts from above over the other. Through an object (the gift), individuals or groups' social relationships are perceived where 'the object is not an object: it is inseparable from the concrete relation in which it is exchanged, the transferential pact that it seals between two persons: it is thus not independent as such.'[8] Describing *Home in a Box* as a 'gift' object invites the discussion of how it operates in a web of exchange relations while it moves between different sites, materialities and practices, continually transforming within each situation. Hence, how can *Home in a Box* be articulated and theorised?

I designed *Home in a Box* as a tool for inhabitants, understood by architectural practices as 'the other', to encounter and reproduce 'another' knowledge of CAAD and home, challenging the status quo of how both terms are typically presented in architectural practices. As an inquiry tool, this box helps grasp home and CAAD notions amid domestic practices, allowing anyone involved to confront both realms simultaneously. In *How to Make Yourself a Feminist Design Power Tool*, Frichot challenges how design is rigidly structured in architectural pedagogy and the profession by proposing a series of do-it-yourself experiments to introduce how 'other' locally engaged creative practices enabled new modes of thinking to emerge. She leans on the feminist ethos not only to contest normative power structures but also to consider the designer's ethical and aesthetic role as central, where the designer is challenged and provided with 'other' ways to exist.[9] She introduces her guide as a 'playful invitation' to see what happens when her instructions become situated in a specific local environment-world prior to creating their feminist-power tool. [10]

Frichot explains the role of feminist power tools to dismantle how power is formed and reformed within a specific situation. She writes, 'A "power tool" not only alludes to hand-held motorised power tools, but to the equally real question of power relations and how they are redistributed across the existential territories where everyday life is lived out always in relation.'[11] She emphasises the active role these tools undertake by suggesting that any design tool should consider an existing situation or problem where it can be applied and

8 Jean Baudrillard, *For a Critique of the Political Economy of the Sign* (St. Louis, MO.: Telos Press, 1981), p. 64.

9 Hélène Frichot, *How to Make Yourself a Feminist Design Power Tool*, The Practice of Theory and the Theory of Practice (Baunach: AADR – Art Architecture Design Research, 2016), pp. 5–7.

10 Hélène Frichot, p. 5.

11 Hélène Frichot, p. 9.

support the construction of its holder's subjectivity. These tools do not exist solely but as a part of a broad set of actors, relations, and sites.[12] She suggests that to formulate a feminist power tool, it is crucial to be attentive to 'how theory is applied to practice and practice to theory'. For her, theory or concepts are influential as motorised construction tools drawing on Gilles Deleuze's emphasis that concept tools need to be useful.[13] They can significantly affect a situation related to a specific site and an associated problem. Frichot's guide helps me understand the role theory/concepts taken as tools for thinking of *Home in a Box* design and how I think with these tools to produce the box. She leans to Isabelle Stenger's understanding of thinking with concept tools as a way to recognise and address the power structure of the related situation we work in by challenging what we already 'normally' know, aiding us to think in relation to emerging concerns to create a different practical landscape. Tools for thinking should question the dominant status quo, and it exposes the one who thinks and put them at risk. [14] To understand *Home in a Box* as a feminist power tool, it is essential to grasp theoretical accounts of its design and how theory is made actionable. Before exploring *Home in a Box* as a power tool, I will first introduce how the box was designed to become a feminist power tool. In the following sections, I will navigate through Maria Puig de la Bellacasa's thinking with care as the primary thinking tool of the box's design, accompanied by design material practices that configured the box into its final shape.

12 Hélène Frichot, p. 7.

13 See Gilles Deleuze and Michel Foucault, 'Intellectuals and Power', in *Language, Counter-Memory, Practice* (Ithaca, New York: Cornell University Press, 1977), pp. 205–17.

14 See Isabelle Stengers, 'Introductory Notes on an Ecology of Practices', *Cultural Studies Review*, 11.1 (2005), 183–96 (pp. 185–87).

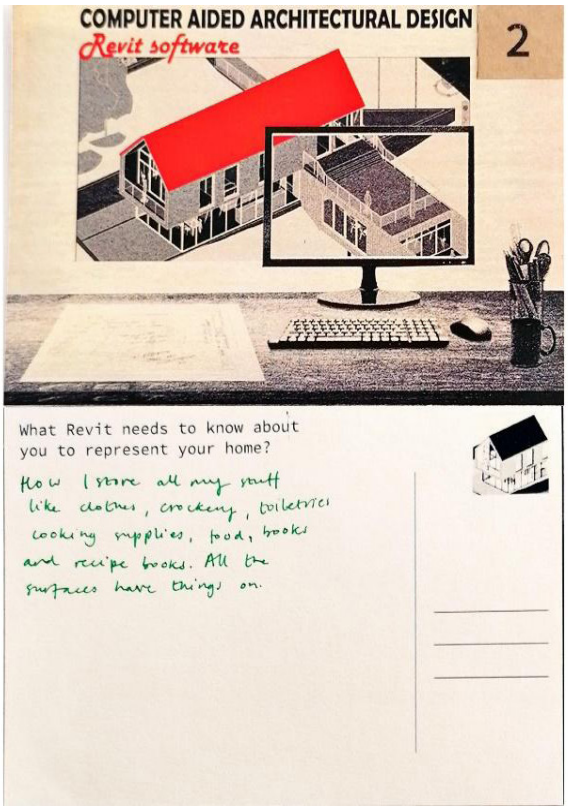

Figure 3.3:Postcard from Home in a Box, written by June, an inhabitant of Park Hill, captured by the author in October 2021.

CAAD Speculation with *care*

"Add clutter" Press this button to fill up the home

On a cloudy autumn day, I met June at the Arts Tower café on the lower ground floor. I was nervously excited to have the chance to wrap up my fieldwork in Park Hill with a face-to-face meeting instead of an online one. The box is laid between her and me, with barely enough room left on a small circular table to discuss different envelopes we picked up while we talked. From an 'Open me Last' envelope, I pulled out an A3-sized model of Park Hill flats with 'What is missing?' written at the top. 'My Kitchen doesn't look like that', June commented while pointing to the empty kitchen the rendering illustrates. 'There's stuff on the surfaces all the way along, not even in an untidy way. I just have things I need to store on those surfaces, like oil and vinegar, spices and ingredients on these shelves', she added.

'Do you think that Revit helps represent it as empty?' I asked.

Her eyebrows rose, and she said, 'It is not Revit's fault! Every surface is obviously going to be completely clear. There will not be an option on Revit like 'add clutter', press this button to fill up the home. But those are all quite personal things you add to your home!'

What if inhabitants created Revit technology used to design homes? What could and would it be?[15]

With 'the other' in mind, the design of *Home in a Box* started. The box did not take a material shape at this point. Instead, it was formulated as an emerging quest to speculate 'another' configurations of CAAD with inhabitants, who are usually thought of as the non-professional other in architectural practices. I approached care as a persistent question to answer along the way of *Home in a Box* design. The inquiry for ways to speculate '*with*' inhabitants led to an exploration of how to care for them, *How can I speculate Revit 'with' inhabitants? What if they created CAAD, what shape would it take?* These are fundamental questions I dwell on, articulating the care I encountered for inhabitants while thinking of the box's design to explore its political and ethical implications. María Puig de la Bellacasa's *Matters of Care* acts as the main theoretical account for my understanding of 'care thinking'. In its beginnings, 'the box' was a speculative project, not only because it aimed to rethink CAAD and home by encouraging collective imaginations of another shapes CAAD could take, but also because I had not decided that I would work with Park Hill's inhabitants. However, to question how to care about what inhabitants know about CAAD and home was a central interest that drives the creation of the box's materiality to become a space for co-produced speculation of CAAD.

In their widely cited work, *Speculative Everything: Design, Fiction, and Social Dreaming,* Anthony Dunne and Fiona Raby describe *speculative design* as an act that produces 'ideas of possible futures and using them as tools to better understand the present and to discuss the kind of future people want, and, of course, ones people do not want'.[16] As a starting point, *What if*..? is a critical question they address to challenge the status quo. It plays a vital role in calling for 'othered' spaces to provoke discussions that produce ideas of how things could be in the future, more as an imaginative means of design.[17] In designing *Home in a Box*, the *what-if* question prompted an open-ended discussion with inhabitants to explore knowledge of CAAD, representation of their domestic life and the sort of CAAD software they hoped for and the one they did not. In this box, the co-production of a non-professional alternative to CAAD aims to invite discussions on the ethical and political implications of the CAAD-home intersection. By putting questions on 'ethical, cultural, social and political implications' first, the use of 'Home in a Box' challenges taken-for-granted representation of domesticity, rather than providing an instrumental alternative to CAAD software.[18] In addition, an alternative 'CAAD' speculation, rather than shaping it into a commercial product, aims to situate CAAD within everyday material culture, focusing on temporal and spatial relationships and powers between inhabitants and their domestic worlds. Here, design is recruited to tackle ethics and values in the present by initiating a space for future imagination. Its role is embodied in being 'inspirational, infectious, and catalytic', overcoming its task to fix reality through problem-solving.[19]

15 I use my voice as 'a designer' in parts written in grey text by borrowing annotations I wrote in Miro-board, an online app, during the box's design.

16 Anthony Dunne and Fiona Raby, *Speculative Everything: Design, Fiction, and Social Dreaming* (Cambridge, Massachusetts: MIT press, 2013), p. 2.

17 Dunne and Raby, p. 3.

18 Dunne and Raby, p. 47.

19 Dunne and Raby, p. 160.

CAAD speculation raises the question of caring for 'other' knowledges of CAAD and home. Puig de la Bellacasa engages in a particular discussion on care with which speculation is always interrelated. She helps us understand care beyond traditional conceptions that exclusively link care to moral commitment; instead, she presents care as a political position that consolidates work/labour with affectivity and operates through ethical and political obligations within a 'more than human' *interdependent* world and agencies. [20] She invites a speculative account of the notion of care that emerges from speculation's strong ties to ethics, elicited from its role in producing current ethical and political imaginations. This aligns with her understanding of care as a 'political commitment' and ethical 'thick involvement' in the world beyond obligated morality, where questioning the ways we involve in care to make the world 'as well as possible' is always present. However, how can '*well*' be understood and '*possible*' be approached in creating such a world?

De la Bellacasa offers care as an open-ended territory consisting of everything we do, where ethics and speculation always intersect and are put to work. Ethics shapes how different relations are formed and reformed in each situation beyond generalised normative terms that establish what 'well' could mean. At the same time, speculation provides openness to the '*possible'* worlds such ethical involvement requires and thus allows an engagement into the specificity of the situation as a situated appeal.[21] *Home in a Box* was designed to explore how much CAAD is part of inhabitants' lives, how they represent their domestic lives, and what CAAD they do and do not want to create their homes. The speculative inquiry of Home in a Box puts care matters to the fore, exposing the role of thinking with care in understanding the 'other' knowledge of home and technology by paying attention to what inhabitants know, want and do not want as a fundamental ethical and political question the box raises on home and CAAD. Grasping *Home in a Box* through matters of care allows a relational epistemic and ontological understanding of the box's involvement as a non-human actor interacting and operating within a broader set of human and non-human actors, relations, positions and ecologies.

Care is difficult to define given its traditional associations with female labour and domesticity. Tronto suggests that 'care includes *everything that we do* to maintain, continue and repair "our world" so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment, all of which we seek to *interweave in a complex, life-sustaining web*.' De la Bellacasa builds on Tronto's definition to propose heterogeneity to ground our understanding of care, where the world composed of diverse humans' 'selves, bodies, and environment' to which they relate through myriad doings is created, held together, sustained, and constantly diversified through an abundant array of care doings. Here, de la Bellacasa moves the focus from the centrality of human agency in caring and immerses it into understanding the world as an *interdependent* configuration of life and matter where caring can establish and abolish relations. She leans on *interdependency* as a critical theme in feminist ethics, understanding it as a fundamental *condition* for reliant and vulnerable beings' existence rather than a *contract* or *moral ideal*, where care is associated with how life is continued for living beings in more than human entanglement. She introduces her three-dimensional vision of care to engage with the inevitable troubles interdependency provokes, as doings-practice, affectivity, ethics-politics to understand caring beyond being an everyday ethico-affective doing.[22]

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20 Maria Puig de La Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds*, Vol.41 (Minneapolis: University of Minnesota Press., 2017), pp. 217–18.

21 de La Bellacasa, pp. 6–7.

22 de La Bellacasa, p. 70.

De la Bellacasa's approach to care necessitates 'ethically and politically charged' material practices. She writes: 'to care joins together an affective state, a material vital doing, and an ethico-political obligation'.[23] For her, it is essentially associated with the 'trouble' our involvement comprises, referring to Donna Haraway's 'staying with the trouble' feminist ethical premise.[24] Understanding care through Bellacasa's definition suggests *Home in a Box* as a tool to follow the entanglement of material, affective and ethico-political *troubles* of caring for inhabitants' knowledge. The question of how to care evoked a feeling of discomfort as a central affection that accompanied my engagement in shaping *Home in a Box* materially as an ethico-political-loaded practice. Care thinking troubled my positionalities as an architect and designer in the box's different production sites, challenging the existing power structures and the taken-for-granted notions of the domestic environment.[25] However, to ask how caring for inhabitants operates within CAAD-home entanglement while designing *Home in a Box* and what it does to shape its materiality requires exploring the possibilities care allows for design practices by referring to my involvement in the box production through de la Bellacasa's vision of care.

I shaped my first encounter with care by asking what *Home in a Box* is. Caring to hear inhabitants' voices to acquire what they know about domesticity and technology through the box was the departure point for thinking of how it can be materially shaped. I engage with the box's design as a matter of care, where relations of care and the box's design are entangled; what the box is presumed to be influences the ways we care, and inversely, modes of care affect what the box becomes. To understand how thinking with care can contribute to how *Home in a Box* is perceived, I lean on how de la Bellacasa approaches care through knowledge politics that refuse knowledge's idealised versions.[26] She locates thinking and knowing in more-than-human technoscientific worlds, where objects and things are included, and knowledge is entangled with the material world in a way that our involvement matters and our thoughts have material effects.[27]

Haraway suggests 'beings do not pre-exist their relatings' as an ontological understanding of the world as a 'knot of motion'.[28] And knowing and thinking processes are located/positioned within a multiplicity of relations that make and unmake this world with which we think.[29] Based on a speculative reading of Haraway's relational ontology and particular take on the situatedness of knowledge, de la Bellacasa builds her understanding of the contribution of thinking to caring relations in an *interdependent* moving world. Her approach to thinking with care necessitates understanding its relationality, where *interdependency* is inevitable for beings' existence, the necessity of maintaining relations with others in more than the human world is acknowledged, and the vulnerability of one's position is recognised.[30]

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23 de La Bellacasa, p. 42.

24 Donna J Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Duke University Press, 2016); de La Bellacasa, p. 204.

25 See section subtitled Site of production: 23rd November 2020- 1st May 2021 in chapter four.

26 de La Bellacasa, p. 19.

27 de La Bellacasa, p. 17.

28 Donna Jeanne Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003), I, p. 6.

29 Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies*, 14.3 (1988), 575–99 (p. 589).

30 de La Bellacasa, pp. 69–71.

Inspired by Tronto's *web of care,* de la Bellacasa suggests that *to think* or *to know* happens through relational processes which demand care. She unfolds *thinking with care* as a 'thick, noninnocent requisite of collective thinking in interdependent worlds', which occurs through three modes: *thinking-with*, *dissenting-within*, and *thinking-for.*[31] Understanding *thinking with care* through these modes is grounded on her specific reading of Haraway's relational ontology that acknowledges who thinks, with whom and for whom in ever moving world of interrelations. To *think-with* means caring for the multiplicity of people, beings, and things inhabiting the world while thinking, which is necessary to allow for new layers of meanings to emerge through forming new configurations of kinship and alliances to resist ready-made answers.[32] Engagement in *careful* relations to create knowledge can be complex and requires paying attention to the closeness of our involvement in some relations, even to the ones we choose not to involve in, as a way to be attentive to the consequences of the knowledge we create, exposing the vulnerability of the positions we take. De la Bellacasa, like Haraway, highlights that 'nothing comes without its world.'[33] And articulating *dissenting-within* as a way of thinking with care means acknowledging not only the relations of care (or its absence) but also the ones involved in caring, which requires recognising the vulnerable positions they take ethically.[34] Meanwhile, she introduces *thinking-for* to argue for an attentive understanding of the responsibility we feel when producing knowledge from the marginalised 'others' perspective as a caring practice. Articulating how we approach experiences of an 'other' to create a situated knowledge is embodied and embedded as a 'practical everyday commitment' where being responsible for the marginalised means being involved in *carefully* situated relations rather than being in charge of others.[35]

Home in a Box started as a feminist inquiry and was '*done*' by engaging in design as a *careful* practice, embodied in the ethico-political commitment to exploring the significance of neglected inhabitants' domestic and technic engagements with banal and mundane things, experiences and practices inside homes which are usually made invisible, and marginalised by the dominant architectural design practices, inevitably involving CAAD software as a vital non-human actor. But what does it mean to think of the box's design *carefully*? Following de la Bellacasa's approach, care thinking means thinking of the box as a way of staying close to the more than human web of relations that constitutes the CAAD-home situation, to relations in which inhabitants are involved with beings and things in their mundane domestic doings, in which the box can become part. *Thinking with* care requires being attentive to the heterogeneous web of relations in inhabitants' everyday domestic lives and the box's engagement in this ever-moving world. Nevertheless, this task was not easy to pursue. As an architect and a designer, designing the box placed me in a vulnerable position and a dominant power hierarchy at the same time. Through *Home in a Box,* I examine care by being involved in its design as a *careful* practice that allows establishing relations with inhabitants' marginalised knowledge of domesticity and technology rather than being in charge of them. As a result, thinking of *Home in a Box* with care is a way to evoke concepts and practices that have the potential to disturb architectural design practices, where CAAD-home can be transformed, uncovering the possibility of alternative practical, ethical and affective ecologies. However, how was the box materially shaped? Specifically, how does caring *thinking* contribute to its

31 de La Bellacasa, p. 19.

32 de La Bellacasa, p. 72.

33 Donna Jeanne Haraway, *Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse : Femin Ism and Technoscience* (New York: Routledge, 1997), p. 37; María Puig de la Bellacasa, '"Nothing Comes Without Its World": Thinking with Care', *The Sociological Review*, 60.2 (2012), 197–216 (p. 198).

34 de La Bellacasa, p. 83.

35 de La Bellacasa, pp. 84–87.

materiality production as *careful doing*?

Figure 3.4: Home in a Box content after getting it back from Hugh, an inhabitant from Park Hill, captured by the author in Summer 2021.

Home in a Box as an ethnographic design object

In *How to Make Yourself a Feminist Design Power Tool*, Frichot addresses the importance of questioning the role of *methods* and *methodology* not as meaning but as ways of use and application in creative practices: 'To apply a tool, you need a working method, and once you reflect on this method, what you have is a burgeoning methodology, that is, a logic of how you are doing what you are doing.'[36] A tool allows the transition between theory and practice where overlapping thinking with doing is implied under 'feminist practices' ethos.[37] She stresses the strong ties associating a tool with a method, especially in creative practices where celebrating ways of *doing* in which practitioners involvement is necessary. Considering the particularity of a method to a specific discipline, for Frichot, architectural methods require special attention and must be portrayed as distinct.[38] If there is anything to invite the definition of *Home in a Box* as a creative practice, it is to ask what form the box should take to embody *care thinking*. And this highlights the question of methods and methodology as central in designing the box.

In *Home in a Box,* I explored ways of involvement in its production as a designer and researcher to shape it as a physical object and as an inquiry tool, a research methodology that allows practices of documentation, critique and theorisation of the domesticity and technology entanglements producing a written description from within the mundane domestic life of home. The work of ethnography involves direct contact with people's daily lives to observe

36 Hélène Frichot, p. 8.
37 Hélène Frichot, p. 15.
38 Hélène Frichot, p. 8.

what happens, listen to what is said, and ask questions formally or informally to collect data.[39] *Home in a Box* should be understood as a tool to perform an ethnography of domestic spaces.

The advent of 'the ethnographic turn in architecture' provided architecture's discipline with a set of ethnographic methods after scholars' shift toward processes of design thinking rather than architectural products/buildings. Architectural ethnographies pay special attention to the designers' involvement in ordinary everyday dynamics in the office and other participants from within design practices, including non-human things such as software, renderings, physical materials and models to produce a 'thick description' of the architectural practices' knowledge.[40] However, the methods of architectural ethnography fail to provide adequate tools to design *Home in a Box* because the CAAD-home situation the box pursues necessitates *careful* attention to the particularity of the texture of the dynamics of mundane life inside people's homes as the main site in which it will be involved. In addition, the design role in architectural ethnography is limited and lacks its enactment as an inquiry method.[41] However, in *Making Homes: Ethnography and Design,* Sarah Pink et al. offer an interdisciplinary approach in design and anthropology that allows 'understanding, researching and designing for change in and through home' by combining the in-depth ethnographic research informed by a past-present understanding of home temporalities, environments and people's activities with the future-oriented design practices to produce knowledge on everyday domestic life at home.[42] Their approach is based on understanding domestic life at home as a dynamic configuration of people, things (including technologies), and processes that continually keep changing.[43] Through three main themes: temporality, environment, and activity, with movement and its relation with time being the central anchor of each theme, they help understand how ethnography and design overlap and introduce methods for exploring how home environments are formed through the continuous movement of things and processes and how people's activities such as using digital technologies, cooking, doing laundry, cleaning, and showering and bathing enclose movement of humans and their things through time and space. [44]

I borrowed 'cultural probes' as a self-reporting method that Pink et al. introduced for researching home as a creative method to shape *Home in a Box*. Also known as 'probe' kits, cultural probes connote packages or kits deliberately prepared with activities designed to be sent to participants to engage in and complete in their own time.[45] Bill Gaver and his colleagues introduced it as a method in 1999 by approaching research as art/design-based inquiry. They designed packages loaded with postcards, maps, booklets, a camera and other materials to engage the elderly of the local communities of three cities to get insights into their daily lives as part of a research project known as the Presence Project.[46] Pink et al. highlight the potential of cultural probes to delve into people's mundane lives inside homes by letting them take part in intriguing activities in which they draw, collage, take photos, and fill in diaries about everyday domestic practices without being disturbed by the researcher's presence.[47]

39 Paul Atkinson and Martyn Hammersley, *Ethnography: Principles in Practice* (Abingdon: Routledge, 2007), p. 3; Karen O'Reilly, *Ethnographic Methods*, 2nd edn (Abingdon: Routledge, 2012), p. 3.

40 Albena Yaneva, *Five Ways to Make Architecture Political: An Introduction to the Politics of Design Practice* (London ; New York: Bloomsbury Publishing, 2017), pp. 43–48; Albena Yaneva, 'New Voices in Architectural Ethnography', *Ardeth. A Magazine on the Power of the Project*, 2018, 17–24 (pp. 17–19).

41 See section subtitled: Site of production: 23rd November 2020- 1st May 2021 in chapter four.

42 Sarah Pink and others, *Making Homes: Ethnography and Design* (Abingdon: Routledge, 2017), pp. 4–5.

43 Pink and others, p. 15.

44 Pink and others, p. 94.

45 Pink and others, pp. 121–22.

46 Bill Gaver, Tony Dunne, and Elena Pacenti, 'Design: Cultural Probes', *Interactions*, 6.1 (1999), 21–29 (pp. 22–24).

47 Pink and others, p. 121. For more details on designing cultural probes see: Tuuli Mattelmäki, *Design*

Figure 3.5: Snapshots shows Home in a Box content, taken from a video of unboxing the box created by the author in July 2021.

The implementation of the practical tools cultural probes provide enabled me to materialise the box into its final shape. *Home in a Box* took the shape of a 38 x 28 x 13cm rectangular cardboard box containing eight envelopes for inhabitants to open on different days or events (on weekday mornings/evenings, on weekends, when doing laundry, etc.), an instant camera, dictaphone, smelling jar, a stationery set, and a small thank you gift.

The choice to include these different objects inside the box was initially based on the tools the cultural probes method often provided in different contexts, such as adding maps, booklets, postcards, and a camera inside the kits given to participants in the Presence Project in which Bill Gaver and his colleagues engaged with elderly participants.[48] However, approaching home through such kits requires being attentive to its dynamic ecology of people, environments, things, practices, emotions, and temporalities and to the ways and tools that enable capturing it.[49] In Home in a Box, including various discursive and visual activities and objects, such as an instant camera, Dictaphone, and smelling jar, meant to add the needed diversity of self-reporting ways for inhabitants to represent their situated domestic everyday lives according to how they prefer to tell their stories and capture different sensory dynamics inside their homes, some prefer to engage in written narratives. In contrast, others preferred to engage in creating visual representations of their homes, like capturing photos or drawing maps. Home in a Box's variety of objects helps challenge architectural practices' dominant abstract and rational representations of homes that lack domestic narratives.

The box was constructed as a space for collaboration between inhabitants and me, where I

Probes (Aalto University, 2006). And for some examples on using cultural probes in home research see: Doenja Oogjes, William Odom, and Pete Fung, 'Designing for an Other Home: Expanding and Speculating on Different Forms of Domestic Life', in *Proceedings of the 2018 Designing Interactive Systems Conference*, 2018, pp. 313–26; Nayoung Koh, Uta Brandes, and Philipp Heidkamp, 'The Morphology of Home: A Qualitative Research Study into the Interrelation of Space, Objectsand Women', *Archives of Design Research*, 26.3 (2013), 9–22.

48 See Gaver, Dunne, and Pacenti.

49 See Pink and others, pp. 93–126.

share information on CAAD, specifically Revit, and they tell me about their lives at home and the technologies they use. Each envelope included two main parts, a booklet that explains a concept, a tool, or a feature in Revit, and other materials such as postcards, diary booklets, and maps that act as a medium for asking questions about domestic life at home, engaging them in a variety of activities like drawing, mapping, photo-taking, annotating, and sound-recording. [50]Questions varied from straightforward, such as: what do you have for breakfast? When do you usually do laundry? What happens to different technologies when you sleep? etc., to more open-ended questions, for example, how was breakfast designed? What does Revit need to know about you to represent your home? How does Revit represent your home, and how do you actually live at home?

Figure 3.6: A snapshot from Home in a Box-making process, taken from a video of unboxing the box created by the author in July 2021.

I experience the overlap between *thinking with care* and the actual *doing* of designing the box as a kit of activities through an entanglement of practices, theories and positions. For *Home in a Box* to arrive at inhabitants' homes at Park Hill and provoke an encounter with CAAD within home. In *Home in a Box* design, I mobilise between Maria de la Bellacasa's *matters of care* as the main theoretical account and the material practices performed by using tools the cultural probes method offers. Based on Pink et al. understanding of home as changing 'material, digital and sensory and affective atmospheric environment'.[51] Where moving entanglement of people, things and processes takes place, and people's creative capacities create a dynamic site for collaboration and intervention.[52] However, how do I enact this overlap and entanglement to elicit an encounter between CAAD and home? And what role does care take?

Revit became a revolutionary leap in the history of CAAD use. Two decades after its first release, it has become an essential tool in architectural practices for designing people's homes as a part of larger social housing developments. In architectural practices, CAAD and home are

50 For a detailed presentation of the box's contents see Appendix A.
51 Pink and others, p. 46.
52 Pink and others, p. 4.

usually perceived as two distant territories, where inhabitants are generally labelled as 'less knowledgeable' others, and their technological and domestic experiences and imaginations are marginalised.[53] In creating the box, I care for inhabitants' CAAD-home marginalised knowledge as an 'ethical and political charged' design practice.[54] I approach this marginalisation as a constitutive part of the totality of CAAD-home ecology. Architects-software dynamics (practices, discourses, processes and materialities of architectural design using CAAD tools) are situated but detached from inhabitants' techno-domestic experiences and imagination. Following de la Bellacasa thinking of the box with care means thinking in a populated world where architectural and domestic practices (such as creating a 3D model in Revit and doing the laundry) are part of one total constellation. Therefore, to allow new understandings of CAAD and domesticity, *careful* engagement in making a new configuration of relations with CAAD, inhabitants and home through *Home in a Box* is necessary.

I designed *Home in a Box* to invoke encounters with CAAD inside home that allow meaningful participation of inhabitants from within their everyday domestic lives. The box does three things: first, it re-enacts CAAD at home by bringing CAAD practices and discourses to people's domestic life. Each envelope in the box comprises a booklet that presents general knowledge of CAAD, such as why architects use CAAD in home design, in what shape it can be found at home, and how architects use specific tools like Revit to represent people's homes—introducing the key concepts, tools and functions architects daily deal with when using Revit.

Second, it juxtaposes CAAD technics shared in with domestic activities and materialities, producing new relations between CAAD and home that suggest new meanings and imaginations of CAAD and home and encourage inhabitants to share the material, sensory, and digital domestic environments which are entangled with their domestic lives in homes.

For example, if 'family' in Revit means: 'a collection of elements with identical use, common parameters, and similar geometry', [55] what does 'family' at home mean, and what happens at home when they are around? In the 'open on the weekend' envelope, I introduced 'family' as one of the main concepts in Revit in a separate booklet with a couple of postcards that hold questions on the familial dynamics at home. Third, across different envelopes, the box incites questions about how much CAAD is part of people's lives, what is missing from CAAD tools used by architects, and what CAAD they want and do not want.

Despite being an architect myself, I have never been proficient in using Revit, which made me reluctant to share knowledge on CAAD (Revit specifically) with inhabitants. How would I share with inhabitants something I barely knew, and in what ways can the box be *carefully* created to cause an intersection/encounter to happen at home? An ethical and political question articulated the vulnerability and the risk I have been exposed to while designing Home in a Box within the architectural milieu. Allowing CAAD to encounter home through the box requires being attentive to how both are irrevocably transformed through the reconfiguration of relations the box creates between inhabitants, CAAD practices and discourse, and home with all its material, sensory and digital dynamics. And also, to how I care for inhabitants' meaningful participation in creating CAAD-home knowledge through the box.

De la Belllacasa accentuates care involvement in knowing and thinking practices which reciprocally affect how knowledge is shaped and how we care. Based on Haraway's understanding

53 See chapter two titled: Social housing design practices.

54 de La Bellacasa, p. 42.

55 Autodesk, 'Key Revit Concepts | Revit | Autodesk Knowledge Network', *Autodesk*, 2022 <https://knowledge.autodesk.com/support/revit/learn/caas/qsarticles/key-revit-concepts.html> [accessed 22 August 2022].

of knowledge as a relational practice that consequently has material effects on the way the world is mattered, care similarly contributes in mattering this world. [56] For her, language plays a significant role in knowledge-producing processes that require care. In a moving world that constitutes many human and non-human beings, a language of care is a continuous process of relational making through constantly being alert to voices' collectiveness and multiplicity.[57] For Haraway, 'bodies as objects of knowledge are material-semiotic generative nodes. Their boundaries materialise in social interaction.'[58] She calls for being attentive to 'the practices and art of fabricating meaning with different signs, words, ideas, descriptions and theories' known as 'semiotics technologies', and the impacts they have on how the world is shaped.[59] In other words, thinking with care entails creating a relational language of care that pays attention to the ways we inhabit a world of multiplicities and urges us 'to enlarge our ontological and political sense of kinship and alliance' through generating semiotics technologies that allow such kind of inhabitation.[60] This enables the creation of new layers of meanings instead of deconstructing or conforming to ready-made categories.[61]

Following de la Belllacasa, designing *Home in a Box* required being attentive to how its production allows a relational making of a *careful* language. This necessitated a language that

Figure 3.7: The image shows the content of the 'open on weekend' envelope, captured and edited by the author in August 2022

enables understanding of the CAAD-home situation through the multiplicity of architects, CAAD, and inhabitants' voices to allow new meanings of CAAD and home to emerge, resisting

56 de La Bellacasa, pp. 69–71.
57 de La Bellacasa, p. 72.
58 Donna J Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Simians, Cyborgs, and Women: The Reinvention of Nature*, 1988, 1 (p. 595).
59 de La Bellacasa, p. 71.
60 de La Bellacasa, p. 73.
61 de La Bellacasa, p. 72.

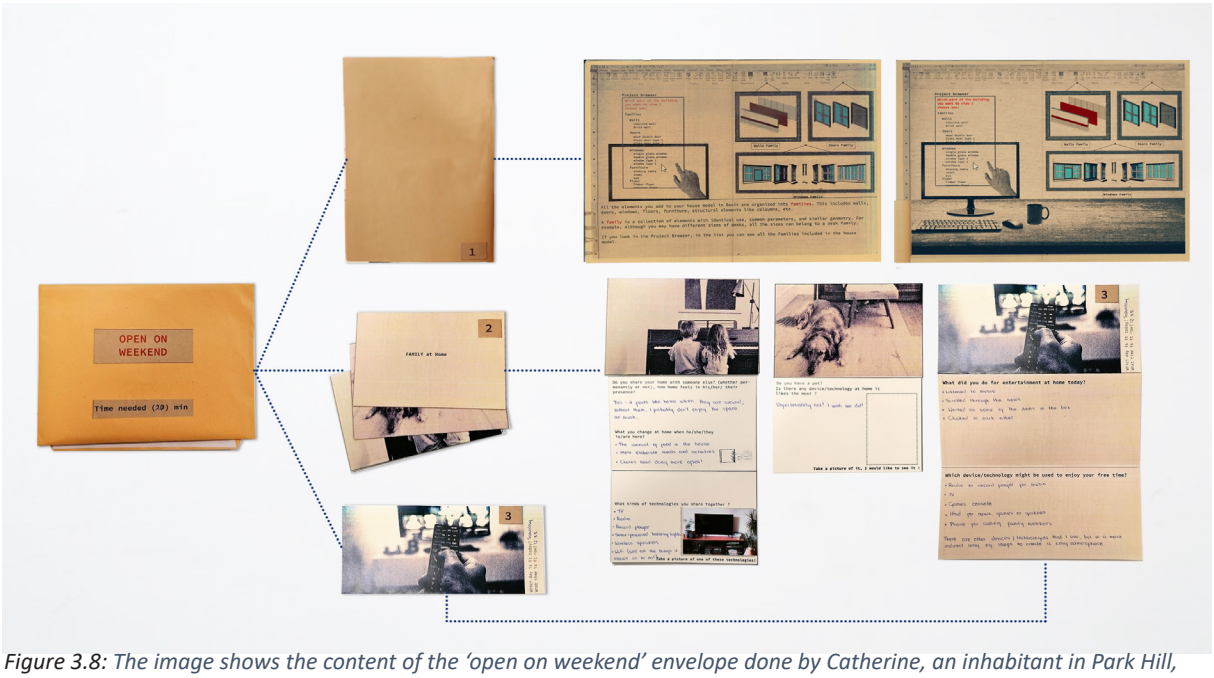

Figure 3.8: The image shows the content of the 'open on weekend' envelope done by Catherine, an inhabitant in Park Hill, captured and edited by the author in August 2022.

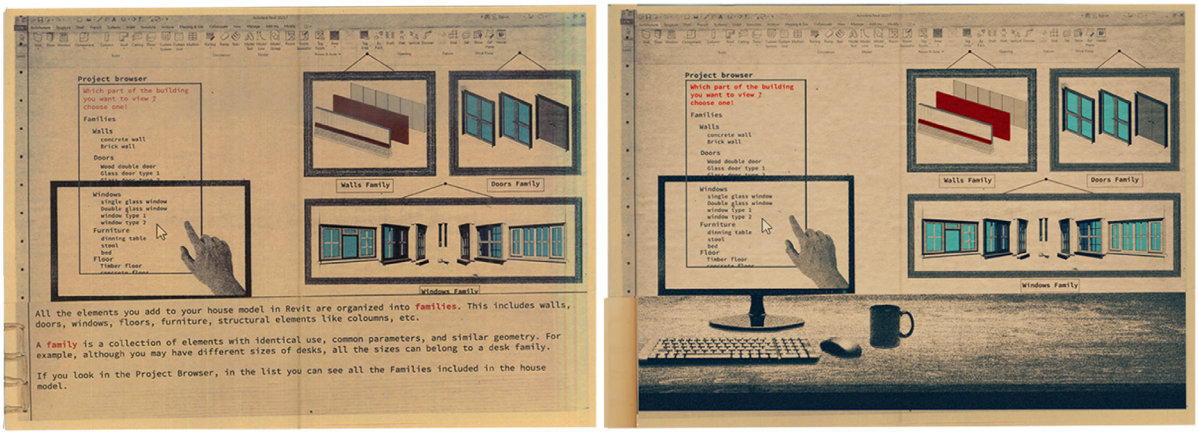

Figure 3.9: A booklet that shares with inhabitants the concept of "family" in Revit which is included in "open in weekend" envelope. Created by author in April 2021

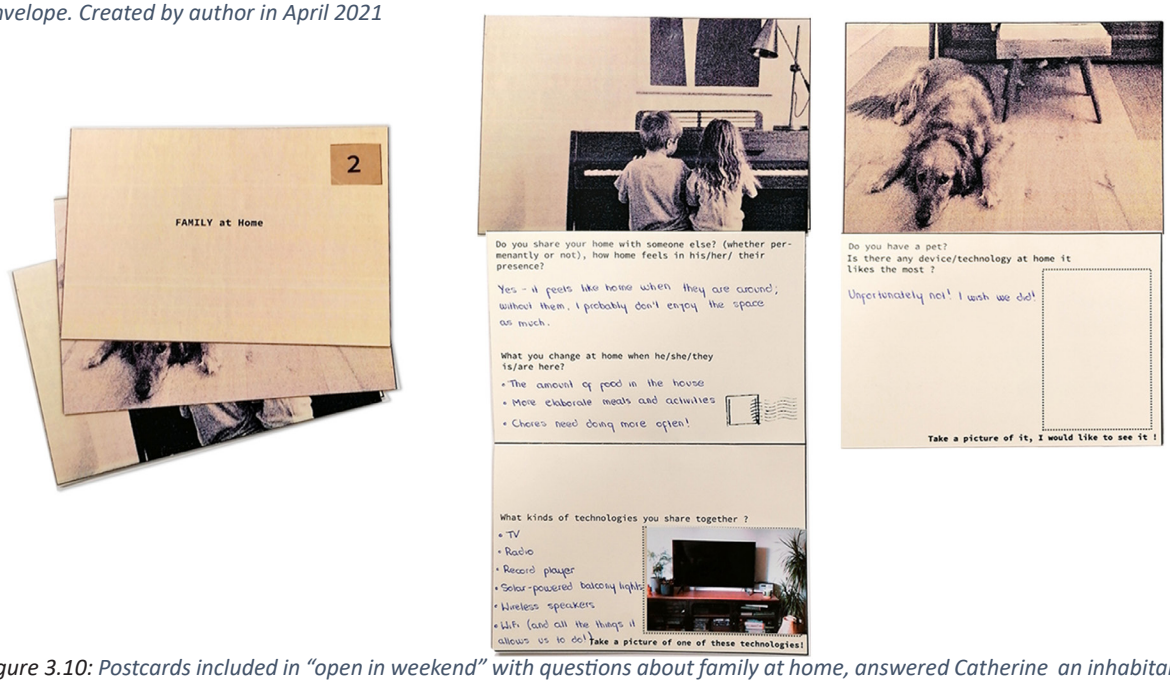

Figure 3.10: Postcards included in "open in weekend" with questions about family at home, answered Catherine an inhabitant at Park Hill, captured by the author in July 2021.

architects' taken-for-granted definitions. However, to design Home in a Box, I engaged in *careful* practices of reading, translating and transposing both the Revit quick guide Autodesk provides for architects and the book by Pink et al.: Making Homes: Ethnography and Design, as experimentation/exercise to both share CAAD architectural discourses with inhabitants and incite an understanding of CAAD-home from within inhabitants' homes.[62] I reinterpreted Revit's key concepts and tools introduced in Autodesk's guide and formulated them into booklets. And I juxtaposed them with the understanding by Pink et al. of the ecology of home that uses everyday domestic practices as entry points to explore home's environments and temporalities informed by using cultural probes tools to design the box's activities.[63] The transposition practices I engaged in to resituate 'professional' Revit into people's homes and to bring a design anthropological understanding of home into architectural practices placed me in a vulnerable position as an architect who is not 'more knowledgeable either in Revit or in domesticity (as it is predominantly predefined in architectural discourse) enacted by feeling discomfort while designing the box. These practices enabled me to create connections not only between CAAD and home territories that architects tend to separate but also to reconfigure how my feeling of discomfort and experience in designing the box belongs to larger power structures in which I am situated.[64]

62 'Revit Quick Start Guide | Revit | Autodesk Knowledge Network' <https://knowledge.autodesk.com/support/revit/learn/caas/qsguides/revit-quick-start-guide.html> [accessed 24 August 2022]; Pink and others.

63 Pink and others, p. 75.

64 See section subtitled: Site of production: 23rd November 2020- 1st May 2021 in chapter four.

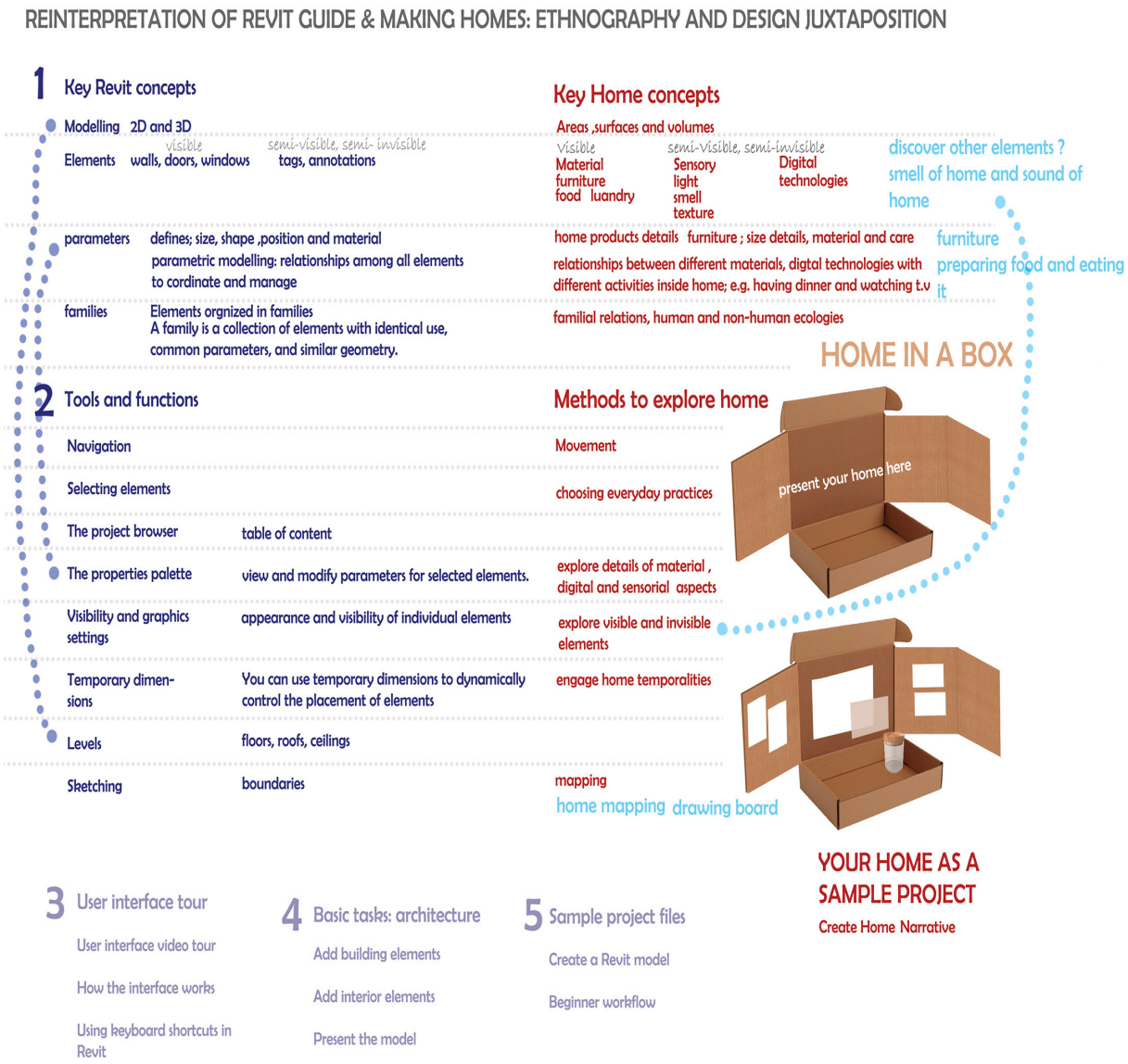

Figure 3.11: A diagram done by the author in March 2021 as a part of Home in a Box design process that shows reinterpretation of Autodesk's Revit Guide and Making Homes: Ethnography and design book.

Home in a Box temporalities

Pink et al. pay particular attention to the temporalities of home. They draw on understanding home as 'being in progress and ongoingly imagined in another alterity'.[65] Home is where inhabitants always attend to accounts of the past, present and future as they live and imagine their everyday life at home. Home temporalities are embodied in people's daily routines and rhythms, moments of transition at home like bedtime, using time technologies (like clocks), imagining home in the future, seasonality and weather.[66] These temporalities are usually easy to predict as they are daily organised and reorganised in similar (but not identical) ways and across different houses, with the potential for some to overlap or intersect. The ongoing activities that happen every day inside home and how they will be organised in the near or more distant future became central to the understanding of home by Pink et al. That's where people's imaginations of what to do next situate and operate across different timescales, making home an effective site for ethnographic research to intersect design.[67]

Jamer Hunt examines how ethnography and design are distinct in temporality and intervention. Ethnography's central focus is on how to observe, describe, analyse and interpret present moments that soon become past aligned with anthropologist/ethnographer tension to problematise intervention historically, politically and ethically. In contrast, designers engage in mattering the world through future-oriented interventional practices, which are 'generative, speculative, and transformational'.[68] However, Pink et al. suggest that understanding the future lies in interpreting how unexpected contingencies from the present everyday life as lived out at home shape what happens next, which can be discovered and uncovered by ethnography. They offer a profound perspective on designing for homes, where design, ethnography and everyday practices temporally align by engaging with people's quotidian temporalities at home through designs that combine ethnographic analytical potentials in uncovering temporal realities with design material practices that focus on the future.[69] Hunt emphasises that such projects 'compel us to reconsider how the present is futuring—to use Tony Fry's words—and how we may still have a chance to reconfigure that future potentiality. These projects slow down the future and its defuturing by prefiguring us in those future moments. They bring together the analytical incisiveness of an ethnographer's eye with the materialising vision of a designer.'[70]

I designed *Home in a Box* to become part of everyday domestic life's materialities and temporalities. The box was created to engage in the banal and mundane doings at home by eliciting particular questions on cooking, cleaning, laundry, before-bedtime routines, and other domestic practices using cultural probes as an ethnographically informed design tool. Care becomes embedded through the web of relations the box participates in with domestic practices instead of grounding it on moral obligations. Caring for inhabitants' knowledge of CAAD and home operates through being attentive to ways of involvement in glimpses of alternative livable domesticities (including all different entangled technologies) situated within 'other' possible domestic worlds in the making rather than leaning on architectural practices'

65 Pink and others, p. 31.
66 Pink and others, pp. 26–27.
67 Pink and others, p. 41.
68 Jamer Hunt, 'Prototyping the Social. Temporality and Speculative Futures at the Intersection of Design and Culture', *Design Anthropology: Object Cultures in Transition. London: Bloomsbury*, 2017, 87–100 (pp. 88–91).
69 Pink and others, pp. 41–43.
70 Hunt, p. 98.

dominant definition of CAAD and domestic life inside homes. In the production of *Home in a Box,* I participated in the temporalities of ethnographic and design as practices that attend to care materially and temporally to allow engagement in inhabitants' homes ecologies that incite ethical and political discussions on CAAD and home.

Through reflecting on her own research on soil-human relations, de la Bellacasa turns to care temporality, where care time 'entails "making time" to get involved with a diversity of timelines that make the web of more than human agencies'.[71] For her, it runs against technoscientific urgency to respond immediately to emergent crises. To care means to engage in a slow process of interference instead of technoscientific futuristic instant interventions, which are preoccupied with timescales that accelerate toward a specific technical defined goal through a linear trajectory.[72] Designing the box as a *careful* practice necessitates creating the box in a way that 'makes time' to slowly engage with people's domestic practices and imaginations that inhabit a diverse range of timelines inside homes to allow meaningful and intense involvement in producing 'another' CAAD-home knowledge. Whereas in architectural practices, CAAD use (specifically Revit) is determined as a 'more efficient' way to speed up the production of people's homes, and architects' temporal relation with people's homes mediated by CAAD mainly focuses on 'efficiency' through the repeated, less individualised, linear, and rational calculations the software offers.[73] *Home in a Box* creates a space for care from within inhabitants' homes, not through an external power structure, by engaging in 'making time' for people's everyday domestic temporalities. The box's *careful* involvement in home temporalities helps not only to reveal how various beings, things, and humans are *interdependently* related but also to intercept the linearity and productivity of CAAD use in architectural practices. The box's *more caring* engagement in home temporalities disrupts architectural practices' dominant temporal modes enacted by their belief in CAAD/ Revit efficiency in home design.

Home in a Box as a feminist power tool.

To think of *Home in a Box* as a feminist power tool means grasping the box amid the entanglement of relations and power dynamics of which it becomes part, including both inhabitants' participation and mine. To conceptualise the box's materiality, it is essential to present how the CAAD-home intersection formulates in architectural practices. *Home in a Box* introduces it inside people's homes.

In architectural offices, CAAD and home act as two independent yet overlapping lines of action—or so it would appear. The first follows the design process, where architects and practitioners craft ideas, formulating them into drawings, diagrams and models until the housing development is constructed on a physical site. The second line follows architects' actions when interfacing with software packages (like AutoCAD, SketchUp, Revit and others). They adhere to workflows to draw and model to the smallest detail, producing precise drawings (plans, elevations, sections) and rendered images that anticipate people's living spaces. In this process, architects work through software operations, dealing with multiple versions, file formats (DWG, JPG, PDF, etc.), pulldown menus, commands and errors.[74] CAAD's emergence in architectural practices is not exclusively connected to the design of dwellings,

71 de La Bellacasa, p. 171.
72 de La Bellacasa, pp. 172–73.
73 See chapter two titled :Social housing design practices.
74 Galo Canizares, *Digital Fabrications: Designer Stories for a Software-Based Planet* (ORO Editions/Applied Research & Design, 2019), p. 9.

but instead a consequence of sixty years of collective efforts in academia, the software market and architectural practice presenting the technology as an inevitable tool without discussion as to their agency in the wider architectural practice. Both lines intersect in a vague area of architectural drawing as design intent and material object, where architects uphold different tools and routines to perform actions that bring the buildings into being, known as *translation practices*.[75] Alberto Pérez-Gómez refers to these practices as producing 'mediating artefacts' where architects create different artefacts ranging from words to inscriptions and drawings to full mock-ups that make buildings a possible reality.[76] Throughout history, these artefacts have changed, transforming how architects relate to the buildings they design.[77] With CAAD use, additional translation actions and routines have emerged, mediating drawing and building through software interfaces, versions, and file types.[78] CAAD's intersection with home exceeds its occurrence in material practices. It also shows through how architects talk about home, where their discourse and interpretations tend to vanish the crossing lines separating both realms.[79]

Inhabitants' encounter with architectural software is contingent on access to software and computational devices, restricting CAAD use to a privileged group. *Home in a Box* creates a designed space for them as 'the other' to encounter CAAD, despite the technology usually taking place outside home and everyday domestic activities. As a physical object, this box enquires the daily domestic routines that inhabitants engage with, like eating, sleeping, doing the laundry, and cleaning through verbal, visual and sensory activities, camouflaging as a part of the home ecology. The box activities aim to explore this ecology temporally and spatially by blending in to engage with different domestic routines and gradually introducing CAAD to inhabitants who become active agents in producing more inclusive knowledge on CAAD. The CAAD-home juxtaposition the box creates within each site poses an 'otherwise' interpretation of domesticity and software, challenging how these notions are produced, imagined and presented in architectural practices.

Frichot helps me articulate *Home in a Box* as a feminist design methodology using her 'power tools' concept. Through Frichot's 'feminist power tools', I grasp engagement with *Home in a Box* as a web where multiple relations, powers, positions and practices emerge. Box has moved from its production site, where I engaged in its design, to Park Hill, as a collaboration site, where inhabitants interacted with its content. Frichot's concept allows for acknowledging how it is formulated and reformulated throughout this movement between its production site to the site where inhabitants collaborated in doing it. The use of 'feminist power tools' as the main theoretical account to understand Home in a Box design allows perceiving theory as a mode of practice. In the box's design, feminist theories of speculation and care are made practical through design material practices. However, this problematises perceiving the box as a materially-seized object that exists autonomously. Instead, it became understood as a part of a broader structure, where the box is always related to its surroundings, where the effect of its existence is always exchanged. So, what does the box do within each site?

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75 Albena Yaneva, 'Scaling up and down: Extraction Trials in Architectural Design', *Social Studies of Science*, 35.6 (2005), 867–94 (p. XVII).

76 For more details see: Alberto Pérez-Gómez and Louise Pelletier, *Architectural Representation and the Perspective Hinge* (Cambridge, Massachusetts: MIT press, 1997).

77 Alberto Pérez-Gómez, 'Questions of Representation: The Poetic Origin of Architecture', *Arq: Architectural Research Quarterly*, 9.3–4 (2005), 217–25 (p. 218).

78 Galo Canizares, 'More Translations (from Drawing to Building)', in *Drawing in the Post-Digital Era: From Exactitude to Extravagance.*, 2018, pp. 146–51 (p. 146).

79 See chapter two titled: Social housing design practices.

As a physical object, *Home in a Box* invokes different encounters that work on different levels. First, it enables interactions within a broader set of human and non-human agents, powers, ethics, and interpretations of design, CAAD and domesticity. Second, the box allows CAAD to be inserted in people's homes as a situation where two distinct practices meet with their different materialities and discourses. The encounters the box triggers are not necessarily physical but rather immaterial/ conceptual and continually transform and mobilise in each new site. However, the dynamics between the inhabitants, me, and the box operating in the vast relational network at the former level play a vital role in shaping the latter CAAD-home situation. And articulating the layers in which these encounters occur puts forward the role of *thinking* of the political and ethical dynamics of these relations in *designing* (as a form of *doing*) CAAD's intersection with home through the box.

Conclusion

Through this chapter, I introduce *Home in a Box* as a *careful* practice enacted by a political commitment and ethical involvement in producing 'another' knowledge of CAAD by engaging neglected and invisible experiences and imaginations from inside people's homes. I explored different layers of my engagement in materialising *Home in a Box* not only as a physical object, 'a box', but also as a conceptual tool to speculate another configurations of CAAD with care. I suggest designing the box as a feminist practice where care thinking and material doing of the box are part of the same practice.

In *How to Make Yourself a Feminist Design Power Tool,* central to Hélène Frichot argument on feminist design power tools formulation is how theory as a thinking tool is made actionable. She writes: 'A tool may well be immaterial, a think-tool, a mnemonic device, but that is not to suggest it cannot have an enormous impact on a situation, in relation to a site and an associated problem.' [80] She draws on Gilles Deleuze's suggestion that theory must be useful, similar to a box of tools.[81] Also, Isabelle Stenger's thinking tool: *Ecology of practice,* which helps comprehend how to think with a tool, has fundamentally contributed to Frichot's thinking on power tools. She argues for their active role in challenging the dominant status quo and creating alternative practices that impact not only on the situation in which it is produced and applied but also in exposing the one who thinks and puts them at risk. This demonstrates the role of the feminist design power tools in engaging ideas, problems and situations we face.[82]

In the box's design, I use Maria Puig de la Bellacasa's *thinking with care* as the main theoretical account and borrow *cultural probes* as an ethnographic design method to stay close to inhabitants' marginalised CAAD-home knowledge, creating alliances with the ever-moving domestic world. *Thinking with care* allowed me to be attentive to the entanglement of relations between practices, positions, and theories that the CAAD-home situation constitutes, acknowledging the vulnerable and troubled positionalities I experienced while establishing *careful* relations with the inhabitants that situated designing the box practices into broader architectural practices and power structures. By using de la Bellacasa's *thinking with care*, I tried to reflect on the role care takes in designing a box that involves in the relational making of a more caring CAAD-home language inside home that allows the production of a more inclusive knowledge through slow engagement in inhabitants' everyday domestic practices

80 Hélène Frichot, p. 8.
81 Hélène Frichot, p. 9. See Deleuze and Foucault, p. 208.
82 Hélène Frichot, p. 8.

occupying a range of timelines. This enabled inhabitants' meaningful participation in creating 'another' understanding of CAAD and home form within their homes instead of architectural practices' dominant perspective.

In this chapter, I suggest Home *in a Box* as a feminist power tool that constantly concerns how to resist existing power structures in architectural practice, which usually represent CAAD and home intersection as professionals-only terrain by enabling new CAAD-home encounters and other modes of practices to emerge from people's homes as a creative force. The box also encourages questioning my relationship as an architect/designer to the architecture milieu and exploring other potential ways for design practice.[83] The formulation of *Home in a Box* as a power tool necessitates articulating the box as a conceptual tool, as a tool that makes us think about CAAD-home intersection in architecture and relates explicitly to everyday domestic life with all its materialities and temporalities as the main site on which it is put to work. *Home in a Box* challenges the assumptions that undervalue inhabitants' CAAD-home experiences and classify them as 'less knowledgable'[84]. I set out *Home in a Box* design as a feminist design methodology that I bring to architecture for a CAAD-home inquiry that attends to a feminist ethos to question how the CAAD-home intersection is typically structured in architectural practices and disturb their dominant CAAD-home thinking through persistent practices that overlap both *thinking* and *doing* the box. Articulating the box as a feminist power tool necessitates understanding it as a design tool applied to the CAAD-home situation specifically and always entangled with different humans, things, and processes that constitute its production and collaboration sites, with careful consideration to how my own positions were constructed through designing the box, and how it is entangled in the architecture's milieu.

For Frichot, the feminist power tools are necessarily situated. She writes: 'No one takes hold of a tool, concept or otherwise, in quite the same way, just as no problem, site or situation is ever entirely the same.'[85] In this research, the box passed from my own hands to Park Hill's inhabitants' hands; each handling act was unique with each movement. The box's experience cannot be generalised to all inhabitants of Park hill or all people dwelling in other housing developments as a tool that operates sufficiently to meet the specific aims it was designed for or judges on the setting in which it resides but immerses in the emerging relationship dynamics between the box and the situation it occupies. As Stengers suggests, 'the gesture of taking in hand is not justified by, but both producing and produced by, the relationship of relevance between the situation and the tool.' With the box at hand, thinking about the CAAD-home intersection is provoked as a tool that tackles and actualises the power this synergy between the box, subject, and site has, empowering those who handle it to think of technology and Home beyond architects' definition.[86]

83 I extend this in the section subtitled Site of production: 23rd November 2020- 1st May 2021 in chapter four.

84 See chapter two titled: Social housing design practices.

85 Frichot, p. 8.

86 Stengers, p. 185.

Chapter Four
Home in a Box: Doing The Box.

Box in site

In this thesis, I introduce Home in a Box as a creative inquiry tool I designed to invoke encounters with CAAD inside home, allowing a meaningful engagement of inhabitants from within their everyday domestic lives. It is constructed and physically made of a 38 x 28 x 13cm rectangular cardboard box. And it held a variety of multimedia objects (such as booklets, zines, maps, postcards, an instant camera, a voice recorder, and a smelling jar).

In this chapter, I focus on how *Home in a Box* produces 'another' understanding of technology and domesticity through its interaction with a multiplicity of practices, positions, and ideas within the sites in which it was produced and collaborated, which critiques how architectural practices' dominant power structures often depict the intersection between CAAD and home. I trace how four boxes moved through two sites: my home, where its production took place, and Park Hill, where four inhabitants collaborated in the project throughout the timeline from November 2020 to October 2021. By narrating autobiographical notes, accompanied by annotations I wrote during and after designing the box, I remark on the vulnerable positionalities as an architect who is defined as between a designer, a user, and an inhabitant, which troubled me while engaging in its production. With Park Hill inhabitants' voices, I write about CAAD- home encounters inside their homes while collaborating in *doing* the box by interacting with the activities enclosed in the box in which I was not present. A multiplicity of research experiences informed this part: my experience in designing the box for five months (November 2020- May 2021), in-depth interviews with four Park Hill inhabitants who agreed to take *Home in a Box* into their homes and engage with its activities and the material each box enclosed between May-October 2021. The stories told in this part extend the analysis of *Home in a Box* as a 'feminist power tool' by questioning how the box passes from one hand to another and how its movement transforms the one who handles the box, the box itself, and the situation to which it is applied. It also contributes to understanding how the box invokes encounters through a web of relations between people, processes and ideas by allowing CAAD to intersect homes *carefully*.

Site of production: 23rd November 2020-1st May 2021

In this section, I follow my practice of making *Home in a Box* as an architect. I reflect on multiple practices, materialities, ideas, and emotions I encounter while engaging with the box design. Who am I as an architect? And what do design, CAAD, and home possibly mean? These two questions that I often ask while doing the box suggest troubled positions as a designer, CAAD user, and an inhabitant I shift between while designing the box. The box disrupted how design, CAAD, and home are often defined in architectural practices. This disruption cites the authoritative power structures formulating the cultures that shape the architect figure and each term's meaning. I write this section as an autobiographical diary spanning four months (November 2020-March 2021) of producing the box's design during COVID-19 at my home as the main production site. I navigate through the interruptions caused by producing the box as an 'other' design practice by reciting and reflecting on autobiographical notes accompanied by design annotations I wrote while designing Home in a Box.

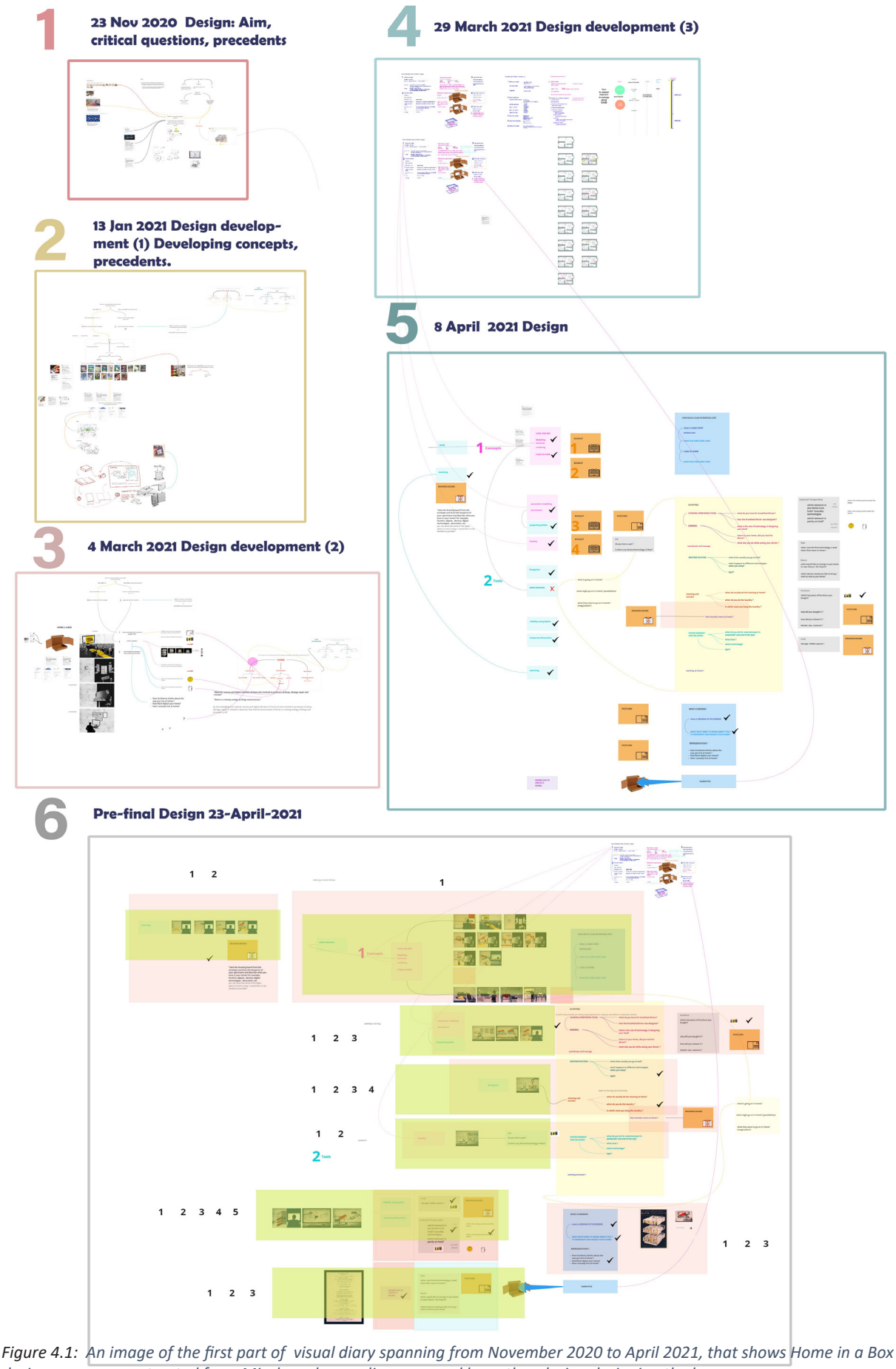


Figure 4.1: An image of the first part of visual diary spanning from November 2020 to April 2021, that shows Home in a Box design process as extracted from Miroboard, an online app used by author during designing the box.

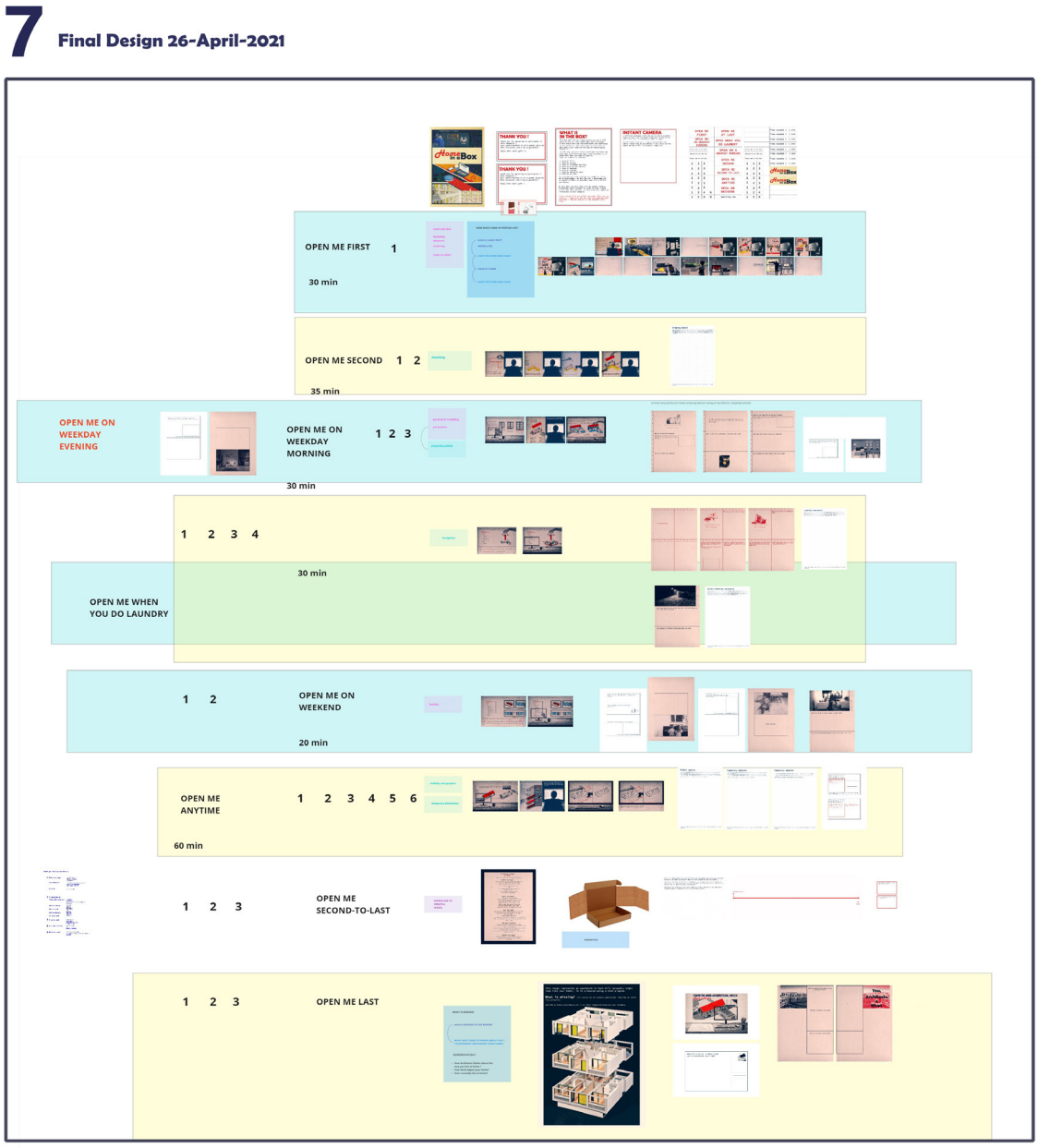


Figure 4.2: An image of the second part of visual diary spanning from November 2020 to April 2021, that shows Home in a Box design process as extracted from Miroboard, an online app used by author during designing the box.

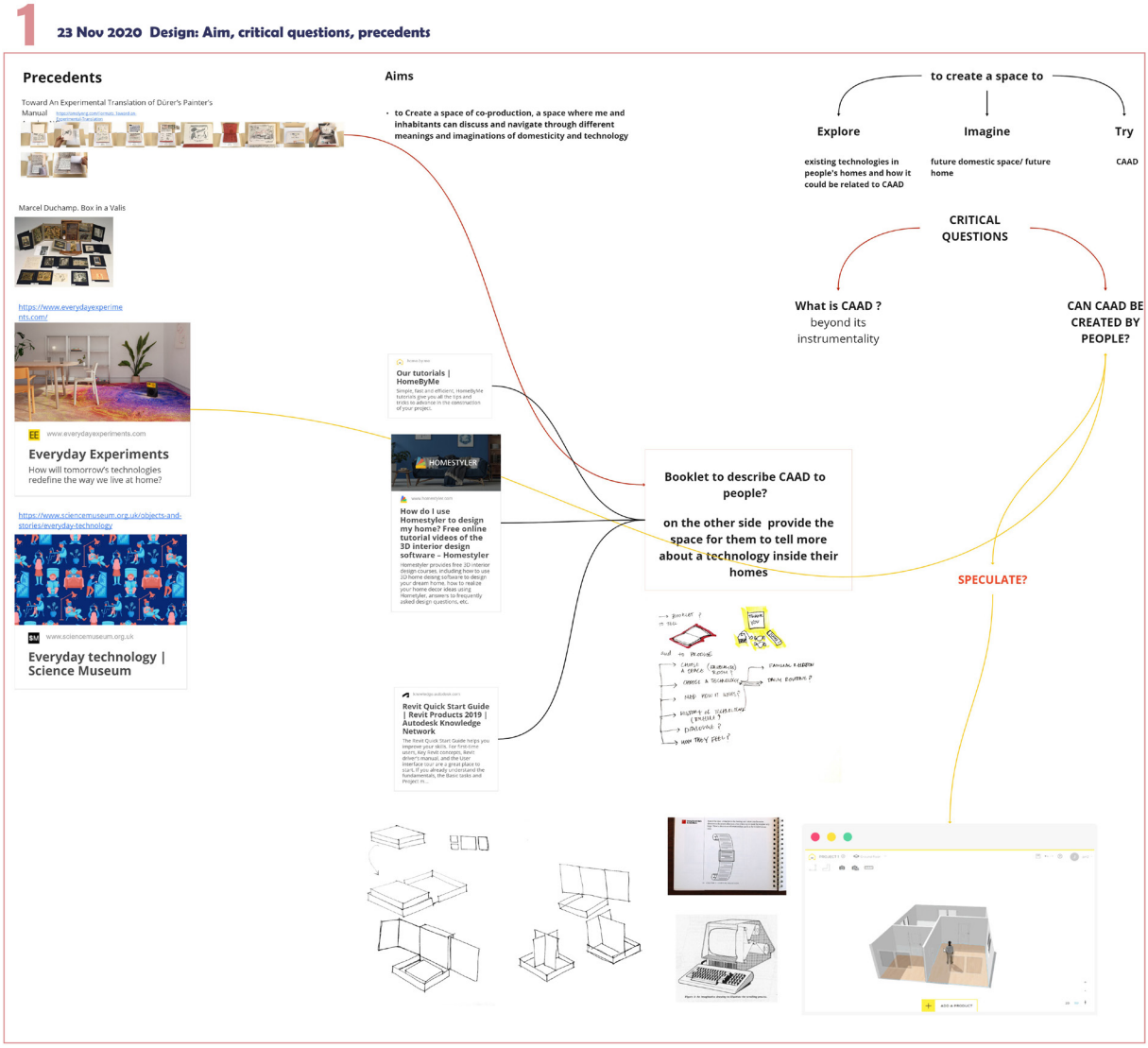


Figure 4.3: An image of the first stage of Home in a Box design process as extracted from Miroboard, an online app used as a design diary by author during designing the box. It shows part of design initial process dated in November 2020 including design aim, questions and precedents.

November 2020: Am I an architect?[1]

Aim: To create a co-production space where inhabitants and I can discuss and navigate domesticity and technology's different meanings and imaginations.

I have never been this anxious; I felt like indulging myself in the persistent pursuit of searching for other ways of using CAAD (or similar) software to create a home. I asked: how would ordinary people use a piece of software? How would they create the place they can call home? While being an architect kept pushing me back to how architects do so, as a haven for safe, definitive and satisfying answers. I found any viable way out for these questions always conflicted with what I already knew. My quest constantly required resisting all previous 'architecture's' allegiances I previously knew. Although I was trained as an architect myself - a profession inevitably associated with an excellent ability to design - anxiety and discomfort marked the Home in a Box *design. Feeling uncomfortable cites the disruption caused by confronting the task of doing design differently. Here, I mean other than what an architect would typically do. I started the* Home in a Box *design with inhabitants in mind who are often marginalised and represented as 'the other'. Not as an ethical and moral cause - most architectural practices would take a similar stance - but as genuine care that engages with the affective, ethical and active participation of its future users in the box's practical and material organisations.*[2]

I have never been part of any design team in an architectural practice. My design experiences were limited to design studios I undertook for five years. I pursued undergraduate architecture studies within an engineering faculty, followed by a few small freelancing projects after graduation. However, I do not deny that the familial kinships that tie me to several practising architects in my surroundings had the most significant effect. I learnt from their complaints that architects never have complete control over various design decisions. This is due to many out-of-control aspects of architectural practice (time, monies, clients, users, and even the in-office social dynamics). However, architects still tend to act as if they have authority over architectural production. This is not only symptomatic of the practice's certainty but has become a desired trait for the 'good architect' facing the practice's social and material reality with denial.

In Home in a Box's case, I designed it before knowing who from Park Hill would participate/ collaborate in its outcomes. Although engaging in designing buildings whose dwellers/users are unknown is quite a familiar situation for an architect, this time, being uncertain escalated my discomfort, sometimes

1 These sections in *red italic text* are my reflective voice. I start each section of this part with my voice as 'a designer' in grey text by borrowing annotations I wrote in Miroboard, an online app, during the box's design.

2 Maria Puig de La Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds*, Vol.41 (Minneapolis: University of Minnesota Press., 2017), p. 4.

to the extent of feeling my hands were tied. Being an architect equipped me with tools that situate me in an in-control position. In architecture practices, this is what is expected from an architect in charge of 'design', and this is how I was supposed to deal with the box's design. I felt troubled not for being short of the tools to deal with it but the contradiction of the available means with the care I have toward the box's users or, as I call them, 'collaborators' from Park Hill. Hence, I asked, am I an architect myself?

Architect as a designer

'Am I an architect?' is a question I often asked through the *Home in a box* design while uncomfortably positioned between thinking and doing the box. In designing the box, I simultaneously mobilised between being an architect and a researcher. Being an architect determines the inevitability of 'the designer' role in professional architecture settings, which usually mark design as a privileged *doing*. 'We did X to create Y' or 'A is created to achieve B' is what architects would typically say (in interviews or on their practice's web page) while explaining a specific building design. Where they not only distance their designs from the messiness of practice's everyday dynamics, they also remove related personal and subjective experiences they encounter while in the thinking-doing process any architectural design comprises. Design is usually depicted as a definite uninterrupted process. As an architect, my uncomfortable engagement in the materiality and practicality of the box's design was relatively unfamiliar. Designing *Home in a Box* took place after my fieldwork in architectural practices. This transition required me not only to shift from one site to another but also from being a 'researcher' to a 'designer'. In architectural practices, I was usually perceived less as an architect than a researcher.[3] However, designing the box that happened afterwards necessitated turning to the design tools architecture provided me to shape the box materially as an architect, returning to a position I had almost departed.

In architectural practices, 'design' is a verb for the building's creation process and a noun for its end product. In his book, *What designers know,* Bryan Lawson suggests that design as an intricate activity primarily deals with how architects relate to the buildings they produce, referring to how they think and draw them using various tools, work with others, and how they talk about all that. Its complexity lies in how all these dynamics are constituted by how architects' design knowledge is acquired, formulated, and transformed as professional individuals into broader social interactions with clients, inhabitants, and practitioners from other disciplines.[4] Intrinsically, architectural design happens through constitutive verbal and visual actions, where architects not only produce drawings of the buildings they design but also verbally evocate through internal conversations with themselves or externally with others different ideas that act, as Lawson describes, as 'bridges' enabling movement between various ideas that may appear visually detached.[5]

Jonathan Hill introduces two meanings of design as understood in architecture's discourse. The older one refers to drawing ideas, while the newer one to drawing appliances, both usually implied in architectural practices today. However, he suggests that understanding

3 See chapter two titled Social housing design practices.

4 Bryan Lawson, *What Designers Know* (Abingdon: Routledge, 2012), p. x. For more on design in architecture also see: Bryan Lawson, *How Designers Think* (Routledge, 2006); Bryan Lawson and Kees Dorst, *Design Expertise* (Abingdon: Routledge, 2013).

5 Lawson, What Designers Know, pp. 88–90.

the potential of design in drawing or producing ideas has several failings. This aids the representation of architects as superiors that fails to recognise users'/inhabitants' creativity as co-producers of architectural space. It assumes that ideas originate from architects and are imposed on inhabitants and promotes the supremacy of intellect over the manual, material and experiential.[6]

My conversations with architects during my fieldwork in architectural practices also revealed their tendency to take an authoritative position over design processes (with all the intricate dynamics it may incorporate) in which they engage. Being a designer is often the highlight of holding a professional title of an architect and positions the architect/designer in a grand status in the professional hierarchy.[7] It is not only 'to design' that presumes a distinguished position. It is also 'for whom you design' that can place architects even in a more privileged status, such as designing social housing for the vulnerable 'other'. In architectural practices, where my fieldwork was situated, caring for social housing inhabitants as 'the other' in design practices is idealised and detached from meaningful involvement within people's homes. Architects are perceived as the home's sole designer who knows better, thus in total control of its design.

Based on my experiences before *Home in a Box* design, architecture failed to equip me with creative and critical tools that would allow me to *carefully* design for engaging inhabitants' excluded experiences and imaginations of CAAD and home. Am I an architect? This question came after the box's design exposed me to the vulnerability of being an architect who is presumed to know how to 'design' the box but did not. The troubled positions incited by thinking of the box's design with care, by paying attention to what inhabitants know, want and do not want as a fundamental ethical and political question revealed how my experiences, positions, and practices operate within architectural practice's power structures which shaped these experiences in the first place.[8] Feeling discomfort cites how the box's design practices I engaged in do not fit within professional architectural structures' presumed expectations of the architect's role as a designer and disrupts how 'I' belongs to 'we' architects who seem to remove themselves from the design processes and essentially exposes the political and ethical dynamics of architectural design practices.[9] The question of who am 'I' and are 'we'? is critical in feminist work where relatings 'do not pre-exist', as Donna Haraway describes. She suggests that 'reality is an active verb' where being in such reality means thinking through the relations with the web of humans and non-humans that lead to divergent positions that disrupt pre-existing categories.[10] In intersectional feminism, communities and collectives in their existing worlds are subject to relational thinking, challenging how individual identities are ontologically predefined by pre-given boundaries and constantly affected by how politics and positionalities are collectively constituted.[11] As Frichot suggests: 'The "we" is thus less the numerical addition of a selection of discrete "I's" and more, rather, our capacity to shout out our position.'[12] Engaging in the box practically and materially is part of acknowledging the reformulation of how my own involvement is related to the broader power structures that

6 Jane Rendell and others, *Critical Architecture* (Abingdon: Routledge, 2007), I, pp. 167–68. Also see Jonathan Hill, 'Criticism by Design: Drawing, Wearing, Weathering', *The Journal of Architecture*, 10.3 (2005), 285–93.

7 Hélène Frichot, *How to Make Yourself a Feminist Design Power Tool*, The Practice of Theory and the Theory of Practice (Baunach, Germany: AADR – Art Architecture Design Research, 2016), p. 7

8 I extend discussions on care in section subtitled: CAAD speculation with care in chapter three.

9 See chapter two titled Social Housing Design Practices.

10 Donna Jeanne Haraway, *The Companion Species Manifesto: Dogs, People, and Significant Otherness* (Chicago: Prickly Paradigm Press, 2003), I, p. 6.

11 de La Bellacasa, p. 72.

12 Frichot, p. 29, emphasis added.

constitute architectural practices, that are already destabilised by engaging in the designing the box. The question of 'Am I an architect?' incited the practices of designing the box provoked by the ethical, political and affective capacities of thinking with care.

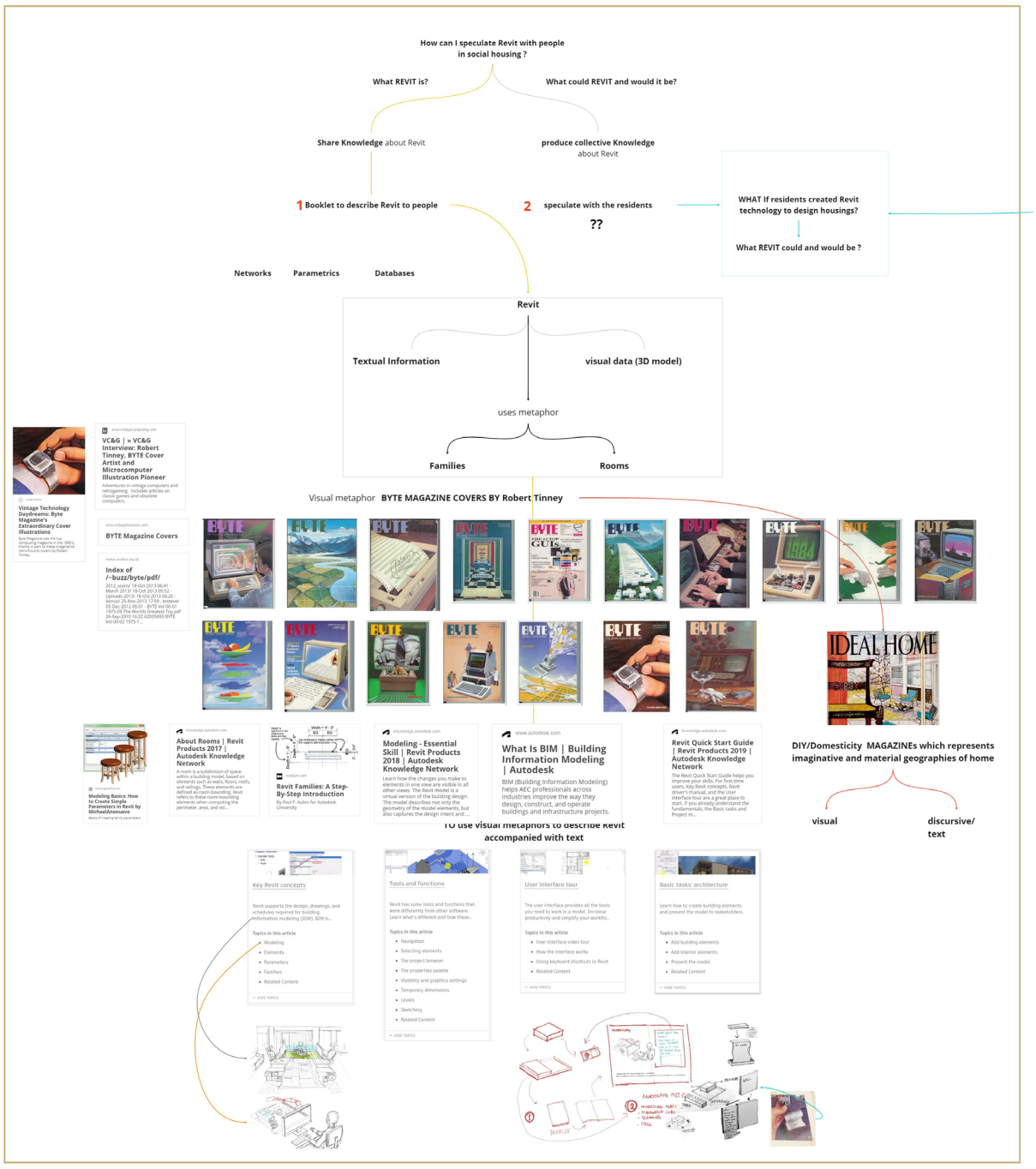


Figure 4.4: An image of the second stage of Home in a Box design process as extracted from Miroboard, an online app used as a design diary by author during designing the box. It shows part of design development process dated in January 2021 including developing design concepts and precedents.

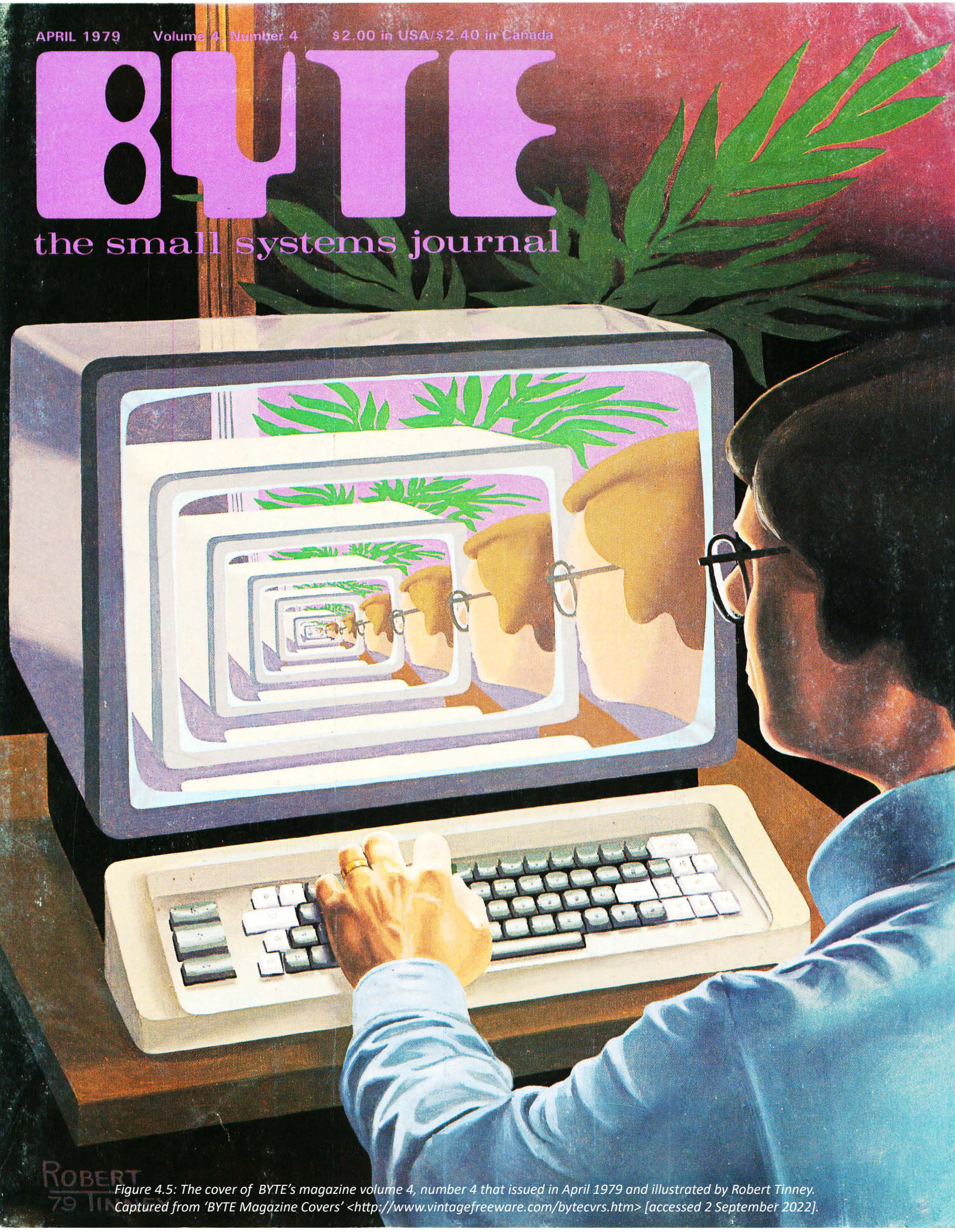


Figure 4.5: The cover of BYTE's magazine volume 4, number 4 that issued in April 1979 and illustrated by Robert Tinney. Captured from 'BYTE Magazine Covers' <http://www.vintagefreeware.com/bytecvrs.htm> [accessed 2 September 2022].

January 2021: Terrible in Revit

How can I speculate on Revit with people in social housing?

1- Share knowledge about Revit (What is Revit?)

2- Produce collective knowledge about Revit (What could and would Revit be?)

My relationship with CAAD software is terrible. Though I first engaged in drawing and modelling using CAAD early on at the school of architecture in 2011, I failed to keep pace with the relentless development of software in architecture, especially after BIM was introduced as a new means to practice architecture. My encounters with CAAD were limited to using AutoCAD, 3D Max, and SketchUp. These equipped me with the basic skills but kept me far from being an expert in Revit (the most popular BIM tool). However, I leaned more toward using Photoshop in my architectural practice. As an architect who has always been good at doing things with my hands using different art mediums, Photoshop felt more 'artistic' and less restrictive than most commands and mathematical calculations that rule the digital realm of CAAD.

I encountered my terribleness in CAAD after finishing my fieldwork in architectural practices and before producing Home in a Box*. This turning point witnessed my transition from a researcher of architectural practices to a* Home in a Box *designer. I embraced the modesty of my Revit knowledge as an advantage in architectural practices to trouble me later when confronting the task of designing a box that shares something about Revit with inhabitants. Overwhelmed by my anxiety, I frequently complained to my husband (who is an architect as well) about my troubling design task: If I am not a proficient Revit 'user', how would I embody the 'more knowledgeable' expert position to communicate Revit's technicalities in which I am a 'less knowledgeable' novice?*

'What is software?' I asked to alleviate my anxiety. I speculate Robert Tinney asked the same question when confronted with designing the cover of BYTE magazine's special issue on software in 1980.[13] *Surrounded by computer and technology consultants' editors, Tinney was the only artist for fourteen years on over eighty BYTE issues. In one interview, Benj Edwards, a tech journalist and historian, asked Tinney how that felt.*

Tinney described his outsiderness: 'I always felt a little uneasy around all the BYTE editors all those years, since I did not quite speak their language.'[14] *I*

13 BYTE was a popular North American technology magazine that provided its readers with computer science, technology news and do-it-yourself recipes for programs' codes. It was established in 1975 by Carl Helmers, a tech consultant and entrepreneur, and Wayne Greene, who was a radio magazine publisher at that time, to meet the growing interest in computers and programming. BYTE published its last issue by 1990, due to the decline in its popularity.

14 VC&G, 'VC&G | » VC&G Interview: Robert Tinney, BYTE Cover Artist and Microcomputer Illustration

delved into the archive I found online for BYTE's covers.[15] Looking for traces of his outsiderness, I paid particular attention to the eighty-something covers Tinney painted. Through his retro-futuristic styled covers, the computer's techno-world looked familiar, inhabited by humans and ordinary everyday things and processes, and were depicted using visual metaphors. The computer's technical nature Tinney communicated as a stranger/outsider (which I barely knew anything about) felt accessible to another stranger/outsider like me. I knew I was neither a tech expert nor a programmer, nor was he, and that in itself was a shared connection. I calmed my overwhelming worry about failing in the design task that awaited me: I am no Revit 'user', and most probably, nor are Park Hill inhabitants, and that is a bond we share!

Architect as a user

In the *Home in a Box* design, I asked: 'What is Revit?' to pursue ways that enabled me to share knowledge on architectural software with inhabitants. *Revit Quick Guide* was my departure point to find answers to my call. It is a quick guide that *Autodesk* provides through its online *Knowledge Network* for novices like me. It is packed with Revit's key concepts, tools and functions. It offers a tour throughout the user interface, with a sample project that illustrates how to work throughout the software.

I myself asked, 'What is Revit?', yearning to understand Revit's technical nature (that *Autodesk* offers) to rethink how it is usually perceived in architectural practices.

Autodesk welcomed me:

> *'The Revit Quick Start Guide helps you improve your skills. For first-time users, Key Revit concepts, Revit driver's manual, and the User interface tour are a great place to start. If you already understand the fundamentals, the Basic tasks and Project management articles show you how to design in Revit. Finally, if you want to work with a larger project, the Sample project files show how to use Revit on a project.'[16]*

I explored the quick guide while waiting for Revit itself to install on the university's computer where my work took place. Fifteen minutes later—after double clicks on Revit's icon occupying my desktop—Revit booted and started up to greet me with more questions about who I am:

- *Select all disciplines that apply to the work you do: Architecture, structure, MEP, Construction, and other.*

- *Which of the following describes your job role: Architect, Interior designer, Landscape architect, Urban planner, Virtual design manager, Building energy analyst, Sustainability consultant, Technician, Detailer, BIM manager, Project manager, Firm owner, Student/Educator, Other?*

Pioneer', *VC&G*, 2022 <https://www.vintagecomputing.com/index.php/archives/169/vcg-interview-robert-tinney-microcomputer-illustration-pioneer> [accessed 2 September 2022].

15 Vintagefreeware, 'BYTE Magazine Covers', *Vintagefreeware*, 2022 <http://www.vintagefreeware.com/bytecvrs.htm> [accessed 2 September 2022].

16 Autodesk, 'Revit Quick Start Guide | Revit | Autodesk Knowledge Network', *Autodesk*, 2022 <https://knowledge.autodesk.com/support/revit/learn/caas/qsguides/revit-quick-start-guide.html> [accessed 24 August 2022].

My query exposed my outsiderness, placing me at risk for not being a Revit user. It did not allude to how I would perceive Revit but equally questioned how Revit perceives me in the first place. Evident in the way both Autodesk's quick guide and Revit itself welcomed me (not specifically 'me' but everyone else) through the assumption often made about 'me' as the 'future' software user when it was designed. Wendy Hui Kyong Chun profoundly argues how software users' subjectivity is constructed. She suggests that 'Software produces "users"' through visually and textually loaded interfaces. Creating imaginary intimate relations that stay attuned to how their users are addressed as specific subjects, as owners of software's digital space.[17]

With CAAD being a primary work 'environment' for building design, the process of producing these designs became identified as 'software use' and architects as 'software users'. However, architects' engagement in self-reimagination becomes symptomatic of CAAD's use, influenced by how CAAD software encodes the world and structures of knowledge. Furthermore, it is contingent on how it requires architects' perpetual participation in its predefined protocols and adoption of software's propositions of production and labour systems in which architects must work.[18] Galo Canizares suggests that architectural software's design also allows engaging in othering practices of design users (digital human figures), software users and users' avatars. Users of architectural software become its 'precarious other', where their interactions with interface dynamics become the way that defines them as subjects.[19]

Architects are identified in architectural practices based on their preferences for specific tools and their use. They are usually labelled according to their expertise/ skill in architectural software. This can be traced back to how software developers designed these tools to presume who will use them and how they will do so.[20]

In exploring what Revit is, I encountered it by following Autodesk's quick guide and engaging with the software itself while claiming a Revit non-user position. As an architect/researcher, my encounters cite the vulnerability of being addressed as 'other' with Autodesk's persistent interest in preconditioning who I am as a user. It classifies 'users' according to the professional hierarchy that differentiates and labels them to their software's expertise, from the less knowledgeable novice to experts in which I did not fit. In *Home in a Box* design, I use Revit quick guide as an inevitable and risky exercise to help imagine 'other' shapes of Revit that perceived me as an 'other'. By redirecting and repurposing its instructions, I designed booklets that share CAAD (Revit in specific) fundamental concepts and tools with inhabitants who are marked as the 'less knowledgeable' in architectural practices.[21] To design the booklets, I attend to sharing knowledge on CAAD/Revit as a constitutive part of speculating 'other' configurations of CAAD with inhabitants, incited by asking how CAAD can be imagined and represented in these booklets as an essential question on their design underlying concepts and aesthetics. Thinking of the aesthetic design of the *Home in a Box* entails thinking about how the technology that produces future imaginations of people's homes can be otherwise imagined/represented as a critical political inquiry that relates to a broader landscape of how relationships between

17 Wendy Hui and Kyong Chun, 'On Software, or the Persistence of Visual Knowledge', *Grey Room*, 18 (2004), 26–51 (p. 43).

18 Aaron Tobey, 'Architect as User', *Journal of Architectural Education*, 73.2 (2019), 146–55 (p. 146).

19 Galo Canizares, 'Technologies of the Virtual Other: Bodies, Users, and Avatars', *Journal of Architectural Education*, 74.2 (2020), 237–49 (p. 238).

20 Canizares, 'Technologies of the Virtual Other: Bodies, Users, and Avatars', pp. 243–44.

21 For more details of how Revit quick guide is used to materialise the box see section: *Home in a Box* as an ethnographic design object. And for more details how CAAD involves in identifying inhabitants as others in architectural practices, see chapter two titled Social Housing Design Practices.

people and technology were shaped through representations of the future in popular culture.

Futuristic imaginaries

'So What If It Is Just Green Cheese?'

– Pink Floyd performing 'moon head' in the background, a piece of in-space kind of music—the presenter excitedly interrupts: 'So they are there, a quarter of a million miles away up there on the moon, early tomorrow morning, they will step out and see once and for all, to see if it is green cheese or not'; the music continues.[22]

On the night of the first 'American' moon landing, 20th of July 1969, '*What If It* Is *Just Green Cheese*' was a BBC television show people across the UK watched on communal screens or from their living rooms on home television to witness the broadcasted *Apollo 11* landing on the moon.[23] I speculate that in the global north the lunar landing is marked in people's collective imagination. Science, technology and the future converged, overlapped and embodied in the very moment they were sitting all night to watch what technology enabled them to do, not only being able to reach the moon but also bringing this moment 'live' to their living rooms. This moment embodied the celebration of the progress science reached, representing the peak of optimism about the future, which slowly regressed toward the end of the 1970s as the early promise of new reality did not come true.

In science and technology, thinking on technology is coupled with its towardness to the future these tools will occupy by constantly engaging in its portrayal.[24] The way these futures are foreseen is usually enmeshed with modes of productivity and efficiency. Scientific progression, which seemed unstoppable in the 1960s, incited different creative mediums (such as film, architecture, fashion and music) to question what possible shapes the future can take.[25] Going back in time, speculating the future 'visually' can be traced from the beginning of the 20th century. It originally stemmed from science fiction literary foundations in poems, journals and novels (like those written by Jules Verne and H. G. Wells).[26]

The celebration of techno-scientific visualised through art rose with the growth of mass market consumerism and advertisements. By the 1940s, the future was portrayed with flying cars and meals formulated into pills in mainstream culture and through sleek building styles that Art deco and modern architecture produced. The fascination with technology was evident in radio, cinema, magazines and comic books featuring futuristic 'legends' like Buck Rogers

22 Transcript from YouTube, 'Pink Floyd Moonhead - YouTube', *YouTube* <https://www.youtube.com/watch?v=b4Jiwv0oxmU> [accessed 16 September 2022].

23 National Science and Media Museum, 'Broadcasting TV from the Moon | National Science and Media Museum', *National Science and Media Museum*, 2022 <https://www.scienceandmediamuseum.org.uk/objects-and-stories/moon-to-living-room-apollo-11-broadcast> [accessed 16 September 2022].

24 Anthony Dunne and Fiona Raby, *Speculative Everything: Design, Fiction, and Social Dreaming* (Cambridge, Massachusetts: MIT press, 2013), p. 2.

25 Ivica Mitrović and others, *Beyond-Speculative-Design: Past – Present – Future* (Split: SpeculativeEdu; Arts Academy, University of Split, 2021), p. 65.

26 Elizabeth Guffey, 'Crafting Yesterday's Tomorrows: Retro-Futurism, Steampunk, and the Problem of Making in the Twenty-First Century', *The Journal of Modern Craft*, 7.3 (2014), 249–66 (p. 252).

and others.[27] Led by futurists writers, artists, and architects, futuristic visions of tomorrow were formulated in different mediums, stemming from ultimate faith in science and endorsing technological advancement that followed the years toward the 1970s, which witnessed the Russian-American space race to reach the moon in the 1950s-1960s, and bringing fictional technologies into real life like inventing actual flying cars.[28] That is when architectural groups such as *Superstudio and Archizoom* in Florence, and *Archigram* in London emerged as part of the *Radical design* movement to speculate on architectural and urban futures as a tool to critique conventional design and past planning. These radical design practices that prospered in the 1960s and diminished by the end of the 1970s formulate 'speculative design's' historical roots.[29]

In the 1980s, retro-futurism emerged as 'a half-nostalgic, half-sentimental memorialising of popular futurism', building over futurists' imagination of tomorrow's portrayal as space colonies, flying cars and robotic servants but more sceptical of scientific and technological progression.[30] This led the dystopian imaginaries of 'yesterday's tomorrow' to triumph in mass culture and media, like movies, posters and magazines. However, the neoliberal model of capitalism prevailed in the 1980s. With an orientation toward market-led systems, design practices became more commercialised. Any future political, social or ethical possible design imaginations were perceived as 'unreal'.[31] The emergence of CAAD technologies in architecture is a constitutive part of this historical narrative that cannot be understood in

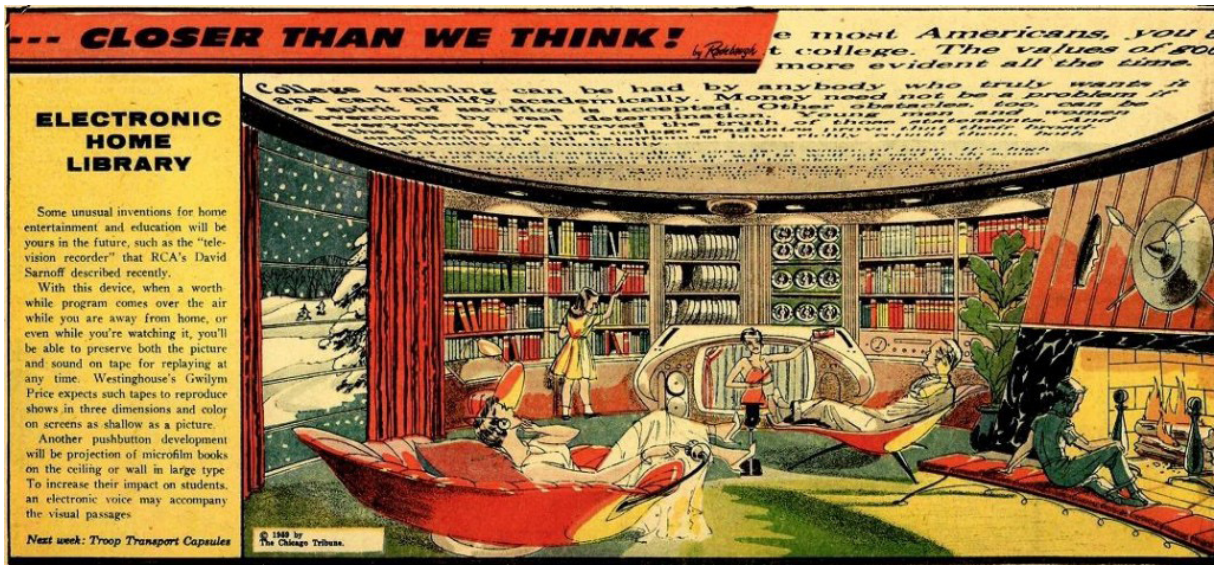


Figure 4.6:An illustration that speculates an electronic home library created by Arthur Radebaugh, an American illustrator and futurist, who depicted the future through a series of comic illustrations between 1958 to 1962 under the title of 'closer than we think'. "Closer Than We Think: 40 Visions Of The Future World According To Arthur Radebaugh » Design You Trust," accessed January 13, 2023, https://designyoutrust.com/2018/12/closer-than-we-think-40-visions-of-the-future-world-according-to-arthur-radebaugh/.

isolation, following a similar pattern of architects' oscillation between faith and scepticism in

27 Guffey, pp. 251–52.
28 Guffey, pp. 253–54; Sean. Topham, *Where's My Space Age? : The Rise and Fall of Futuristic Design.* (London: Prestel, 2003), pp. 7–56.
29 Mitrović and others, pp. 66–67; Dunne and Raby, p. 6.
30 Guffey, pp. 254–57.
31 Dunne and Raby, pp. 7–8.

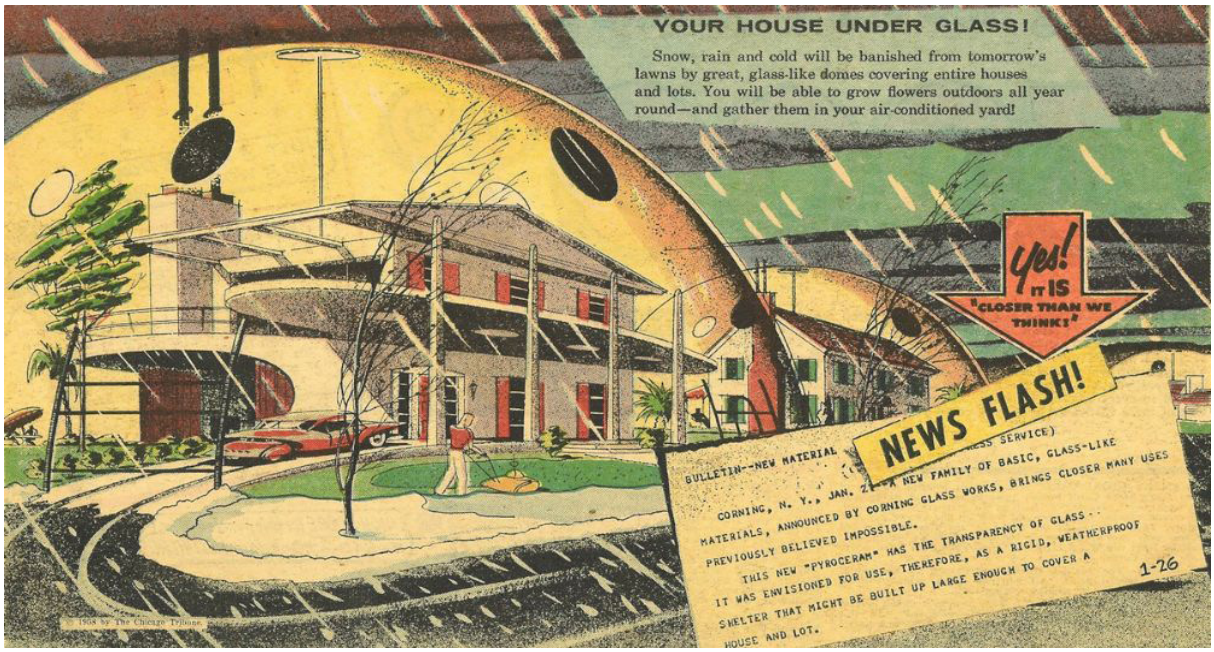


Figure 4.7:An illustration that speculates future houses under glass domes created by Arthur Radebaugh, an American illustrator and futurist, who depicted the future through a series of comic illustrations between 1958 to 1962 under the title of 'closer than we think'. "Closer Than We Think: 40 Visions Of The Future World According To Arthur Radebaugh » Design You Trust," accessed January 13, 2023, https://designyoutrust.com/2018/12/closer-than-we-think-40-visions-of-the-future-world-according-to-arthur-radebaugh/.

architectural software between the 1970s and 1990s.[32]

In his book, *Digital fabrications: Designer stories for a software-based planet*, Galo Canizares asks: 'which came first, the science fiction representation of the object or the desire for specific objects themselves?', questioning the role of future speculations in mid-twentieth-century science fiction in developing particular technological objects.[33] He traces historical and speculative connections to understand how fiction and fact intertwine, where science-fiction novels and movies influence the emergence of technologies like artificial intelligence.[34] For example, he presents how these links intersect homes' domestic realm. The desire for automation at home portrayed in the futuristic imaginaries of homes' intelligent systems in movies like *Iron Man (2008)* shifted into reality with the advent of intelligent personal assistants developed by Apple, Google, Microsoft, and IBM to operate inside people's homes. With 'OK, Google' and 'Hey, Siri', vocal interaction with these devices draws new machine-mediated dynamics between inhabitants and their home environments.[35]

Since architectural practices became centred around employing CAAD to predict how people's homes would look in the near future, my question on how to depict these environments in the booklets I share with inhabitants highlights the *Home in a Box's* aesthetics as an ethical and political practice that challenges how future, technology, and home are depicted by systems that produce these tools by staying attuned to people's collective imaginaries. My practice of designing the box's aesthetics encompasses encountering a variety of imaginaries produced by different practices across the twentieth and twenty-first centuries and exemplifying intersections between technology and home and art and science. Through scenes from three

32 See section subtitled Roots of doubt: how architects' relationship with software emerged (a brief history) section in chapter two.

33 Canizares, Digital Fabrications: Designer Stories for a Software-Based Planet, p. 183.

34 Canizares, Digital Fabrications: Designer Stories for a Software-Based Planet, pp. 183–91.

35 Canizares, Digital Fabrications: Designer Stories for a Software-Based Planet, pp. 186–88.

different practices, I build relations with the entanglement of doings, tools, and positions each practice incorporates to explore possible 'other' ways to visually depict CAAD/Revit in *Home in a Box's* booklets from a Revit non-user position. The three scenes I present offer examples of retro-futuristic and futuristic aesthetic styles used by practitioners from different disciplines (art, architecture, technology) to depict technology, future dwellings and homes from the 1970s to nowadays. Each scene suggests an exemplary representation illustrated by non-professional (outsider) or professional (insider) positions, including BYTE magazine's covers by the artist *Robert Tinney*, 1990s' CAAD renderings by avant-garde architects, and *Everyday Experiments* by *Space10* studio in collaboration with *IKEA*. Each practice offers much-needed insights into what practitioners might think of technology through different points of view, questioning how to represent technology to the non-professional 'other'; resisting how these tools allow the production of disconnected and abstract representations of people's future dwellings in the first place. However, these practices' imaginaries of home and technology should be understood in correlation to the history of yesterday's tomorrow depictions I narrated above.

Figure 4.8:A selection of different BYTE's magazine issues' covers illustrated by Robert Tinney. Captured from 'BYTE Magazine Covers' <http://www.vintagefreeware.com/bytecvrs.htm> [accessed 2 September 2022].

Figure 4.9:BYTE magazine's covers of three issues illustrated by Robert Tinney, accompanied with the description enclosed in each. Captured from 'BYTE Magazine Scans', 2022 <https://malus.exotica.org.uk/~buzz/byte/> [accessed 28 December 2022].

Scene (1) Robert Tinney's illustrated covers for BYTE magazine

When searching the internet for an example that depicts the visualisation of technologies, I came across *Robert Tinney's* retro-futuristic illustrations for *BYTE, a* popular North American microcomputing magazine, published between the 1970s and 1990s for the middle-class audience of computer hobbyists, specialists and enthusiasts from the general public. The magazine was founded in 1975 at the peak of optimism for the future by Carl Helmers. He was a previous consultant at NASA who was enthusiastic about revolutionising the computer world. He was introduced to Tinney by a mutual acquaintance not long before calling him to know if he would be interested in painting *BYTE's* covers. Tinney worked as an illustrator for *BYTE* for fifteen years, creating over eighty covers. Through these years, he was the only artist in a group of computing consultants and specialist editors. Tinney's art seems accessible even to the general unprofessional public (like myself). In an interview, he emphasised his efforts to keep computing professional editors away from offering ideas for the art. Instead, he focused on understanding the topics the editorial issue presented. In conversations with the editor of each issue ahead of the designing process, he asked questions and took notes to create visual

metaphors that helped represent the leading issue's theme. Metaphors were developed into several iterations of sketches, sent forth and back to editors (through FedEx) until the final illustration was produced.[36] However, the beginning of several issues enclosed a description demonstrating how Tinney's art covers visual metaphors linked to the issue's central theme and contents.

Although I was not born when this magazine was published nor knew much about computing topics *BYTE* introduced, Tinney's covers felt familiar. People inhabited his illustrations, and everyday life activities occupied speculative settings related to people's past, present and future. His aesthetic style presents nostalgic imaginaries of present technologies that *BYTE* editors envision as tomorrow's revolution. The way Tinney depicted technological concepts in each issue holds common everyday elements and draws connections with familiar landscapes in people's collective imagination. In the covers he painted, the nostalgic style in which he depicted microcomputing systems can be traced back and connected to the graphics of home decorating and DIY magazines popular in the 1940s-1960s that targeted middle-class audiences, like *Ideal Home* and *Practical Householder*.

Figure 4.10:A selection of home decorating and DIY magazines popular in the 1940s-1960s. From 'Museum of Domestic Design and Architecture Magazines Collection Records.', 2022 <https://moda.mdx.ac.uk/?s=MJC&post_type=object> [accessed 28 December 2022]; 'Ideal Home Magazine Cover 1960 (Dimbleby, How We Built Britain) Bk | Hickling Local History Group' <https://www.hicklingnottslocalhistory.com/ideal-home-magazine-cover-1960-ddimbleby-bk/> [accessed 28 December 2022].

36 VC&G.

In the 1950s, with the emergence of 'automation' as a technological concept, home magazines like *Ideal Home* were essential sites for imaginaries of home, entrenching the desire for a more 'automated' home. Evident advertisements depicted automated domestic machinery and appliances to promote spatial and temporal freedom at home, which changed how home is aesthetically and spatially arranged (kitchens, for example) and how domestic practices and responsibilities are perceived in everyday life.[37]

In the *BYTE* cover illustrations, Tinney speculated on a tomorrow where today's technologies dwell in past homes. Though I am not sure of the precedents that inspired him when designing BYTE's covers, I perceive the familiarity of Tinny's retro-futuristic aesthetics goes back to its intersection with home magazines' graphical representation styles in previous decades as a continuation of people's collective imaginaries of home, technology and the future. I understand BYTE covers production as an entanglement where Tinny's design practices are inseparable from his outsiderness (as a computing non-professional). Being one of the non-professional 'other', his representations of mainstream technological concepts became a part of the long history of people's collective knowledge of technology, in which published magazines played a vital role in its dissemination. Therefore, if home magazines were where present and futuristic depictions of home and technology resided, two decades later, BYTE covers became interrelated sites where nostalgic technological imaginaries entangled with a long history of speculating tomorrow as one extended landscape.

Scene (2) Avant-garde CAAD renderings (1990s)

Architects mostly became more familiar with CAAD by the mid to late 1990s. Personal computers with enhanced graphic and microprocessing capabilities occupied almost every office. That is when digital architecture Avant-garde started to explore and test different ideas using architectural software.

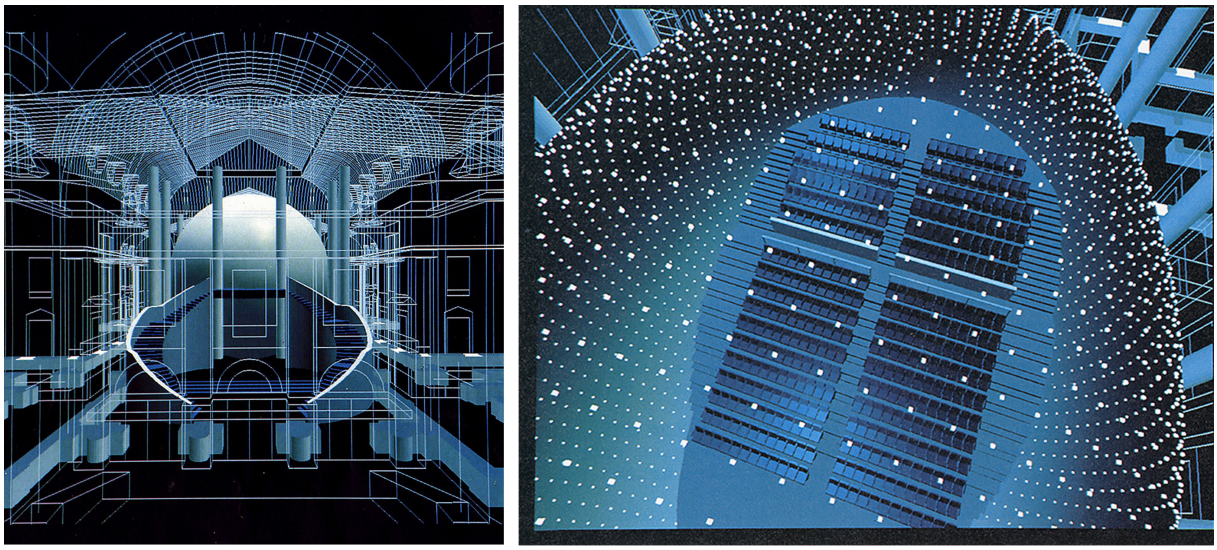


Figure 4.11:Rendering by Tadao Ando.Left: Tadao Ando. Architecture D'Aujourd'Hui 268 1990, 147, Right: Tadao Ando. Japan Architect 1 1991, 232. "About | RNDRD," accessed September 25, 2022, https://rndrd.com/about.

37 Adrian Forty, *Objects of Desire* (New York: Pantheon, 1986), p. 118; Martin Hand and Elizabeth Shove, 'Orchestrating Concepts: Kitchen Dynamics and Regime Change in Good Housekeeping and Ideal Home, 1922–2002', *Home Cultures*, 1.3 (2004), 235–56 (p. 243).

I try to imagine how they speculated buildings through 'novel' technology. Which future brought to their offices in the form of giant monitors, with whirring hard disks and PC fans running in the background. How did they think of people talking, walking, and inhabiting homes, offices, or cities through architectural software's pitch-black space? With CAAD's two-dimensional drafting, computers in architectural practices became inevitable. By the 2000s the accelerating development of computer screens introduced new possibilities in 3D modelling and architectural visualisation. I was keen to explore how architects created the future using CAAD visual capabilities. I found *RNDRD,* an online 'partial index' that allows exhibiting scanned architectural drawings, perspectives, collages and models produced by avant-garde architects in the twentieth century.[38] I filtered the available architectural graphics by their production year, particularly those from the 1980s and 1990s, in which CAAD became present in architectural practices. I scrolled between dozens of images to encounter the emergence of futuristic scenes. As I approached the 1990s 3D- modelled buildings dwelled in empty, dark, outer-space-like sites, which reminded me of the aesthetics from the well-known futuristic movies *2001: A Space Odyssey (1968) a*nd *Blade Runner* (1982). The virtual environment CAAD provided became an infinite medium for architects to explore different possibilities to test and imagine complex forms and materials in software's dark interstellar. Architects produced retro-futuristic representations of buildings and rendered these spaces into an abstract emptiness where no traces of people's dwellings were found. I speculate that the late 1990s highlighted a critical time when architects began to trust in CAAD's offer to architectural design. The celebration of this technological presence in architecture is evident in how architects used CAAD tools to explore discrete and abstracted futuristic imaginaries of tomorrow's buildings. It was shaped into dramatic light gradients, wireframes, pixilated points, translucent elements, and blue-washed images.

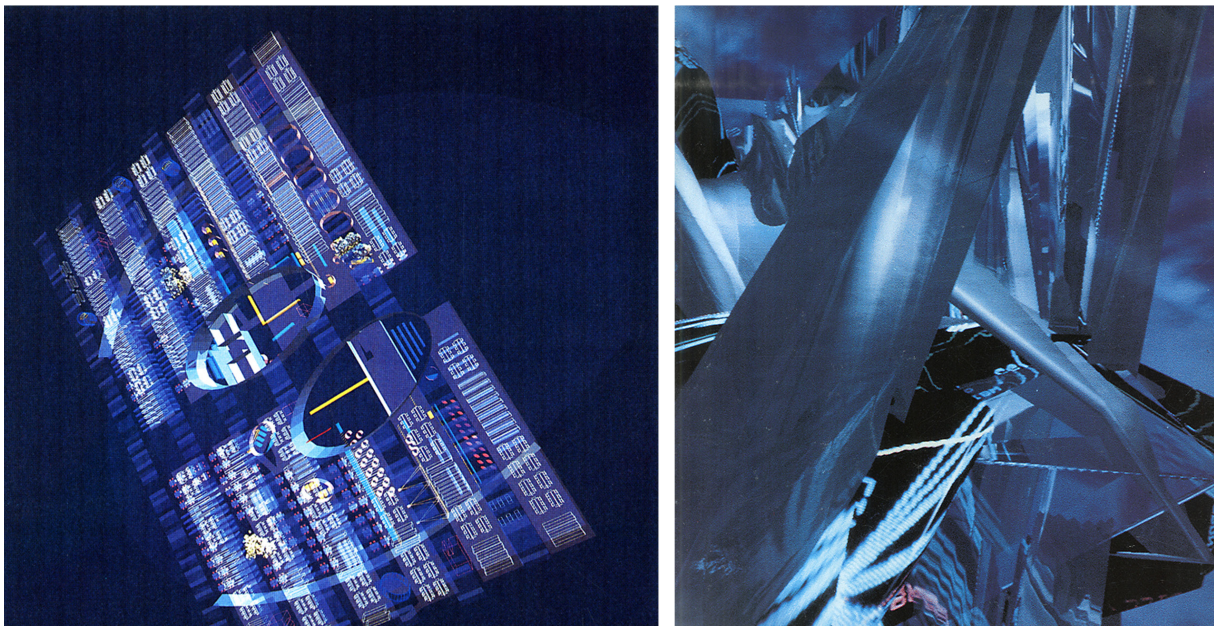


Figure 4.12:Rendering by Toyo Ito. Left:Toyo Ito. GA Japan vol 4 Summer 1993, 77, Right:Stephen Perrella and Tony Wong. Architectural Design 62 Nov 1992, 62. "About | RNDRD," accessed September 25, 2022, https://rndrd.com/about.

38 RNDRD, 'About | RNDRD', *RNDRD* <https://rndrd.com/about> [accessed 25 September 2022].

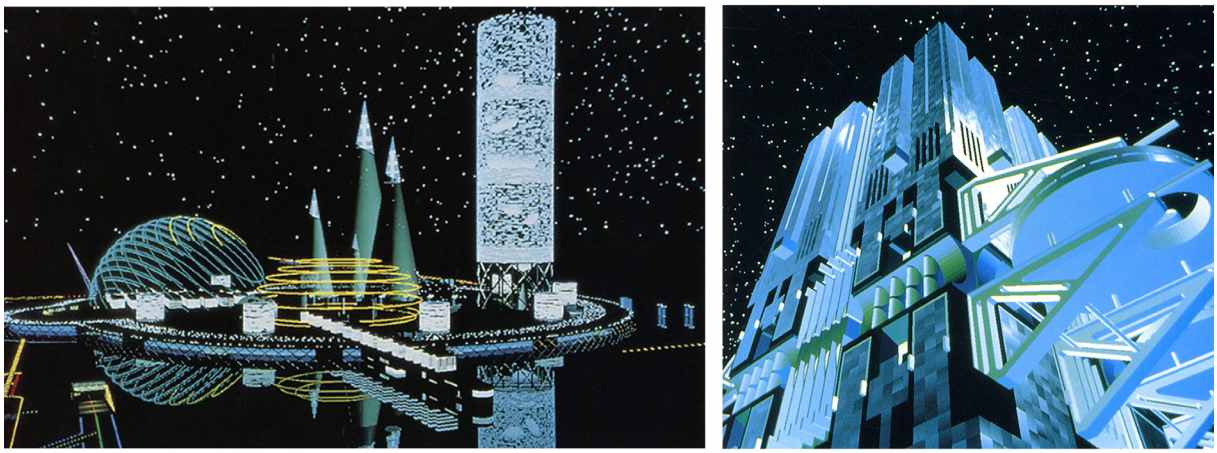


Figure 4.13:Renderings by Shin Takamatsu. Left:Shin Takamatsu. l'Arca 77 December 1993, 36, Right: Shin Takamatsu. JA Library 1993. "About | RNDRD," accessed September 25, 2022, https://rndrd.com/about.

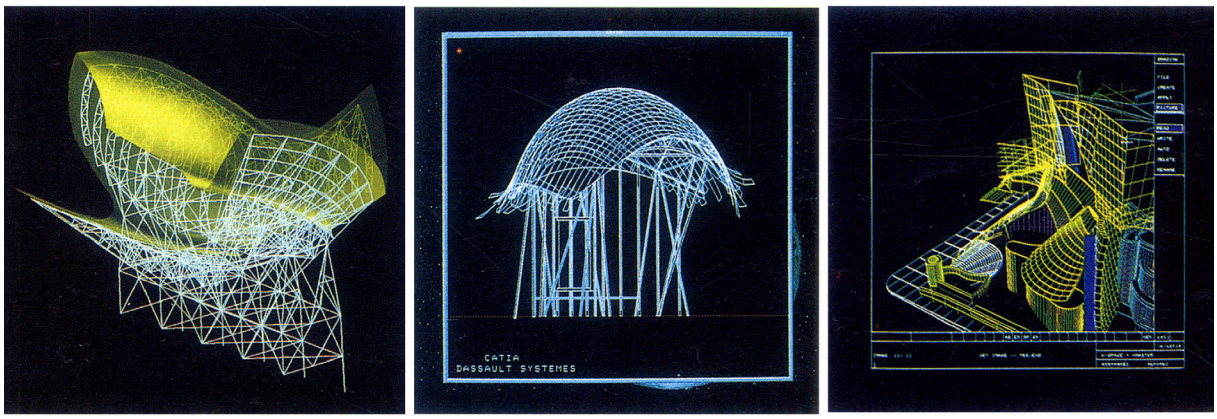


Figure 4.14:Renderings by Frank Gehry. Arquitectura Viva v.28 January-February 1993, 92-93. "About | RNDRD," accessed September 25, 2022, https://rndrd.com/about.

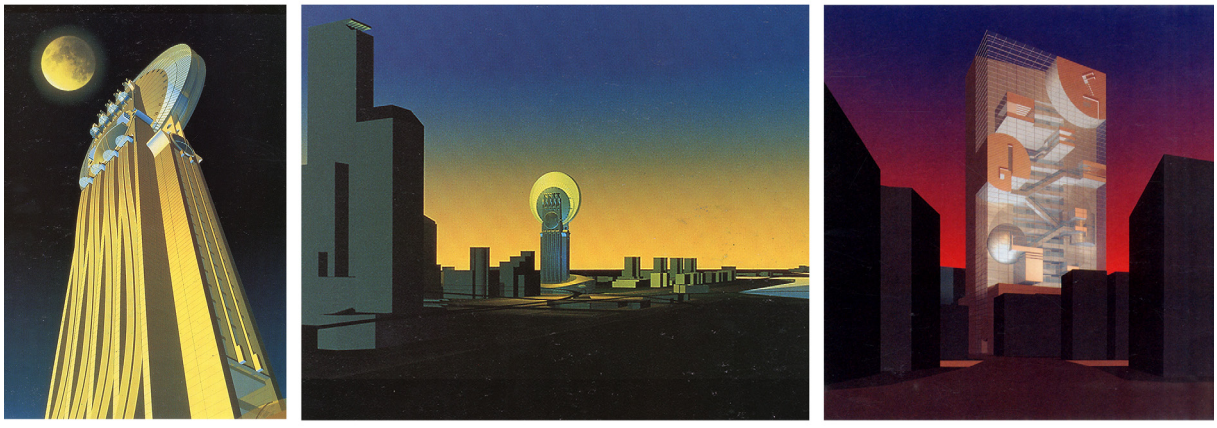


Figure 4.15:Rendering by Shin Takamatsu. Left and middle image: Shin Takamatsu. Architecture and Nothingness. L'Arca Milano 1996, 193, Right: Shin Takamatsu. Arquitectura Viva v. 29 March-April 1993, 93. "About | RNDRD," accessed September 25, 2022, https://rndrd.com/about.

Figure 4.16:A screenshot that shows the welcome page of Everyday Expermints by SPACE1O. Captured from'Everyday Experiments', 2022 <https://www.everydayexperiments.com/about-ee> [accessed 13 September 2022].

Scene (3) Everyday Experiments (2020-now)

With 'How will tomorrow's technologies redefine the way we live at home?' is how *Space10* introduces its research project, *Everyday Experiments.*[39] *Space10* is a research and design lab that IKEA sponsors to engage in 'innovative' and 'creative' practices for 'social change', with a particular interest in finding new ways to imagine people's everyday life.[40] In *Everyday Experiments*, Space10 collaborates with design and technology studios, including technologists, software developers, designers, artists, and bots, to explore technology's capabilities in reimagining life at home. With several 'what if' questions, they try to speculate on sensorial and material home environments using various digital technologies (such as virtual reality, augmented reality, machine learning, spatial mapping and many others) to create alternative spatial and temporal imaginations of people's homes.

Space10's experiments are problematic in how they disembody while producing these futuristic imaginaries (similar to architects' visualisations in scene 2). These speculations are the work resulting from the rally of professional designers and tech developers who recruit 'innovative' and productive technical means to imagine uninhabited homes whose inhabitants are usually invisible. Moreover, I highlight Ikea's sponsorship in the apparent interference of their products in several experiments by exclusively endorsing Ikea tables, chairs, shelves, and other furniture solutions inside people's homes. It is ethically problematic because the way home is imagined through Ikea's interpretation is based on their merchandise/commercial values and ever-progressive technology capabilities developed by other business partners rather than the inhabitants' meaningful participation.

39 SPACE10, 'Everyday Experiments', *SPACE10*, 2022 <https://www.everydayexperiments.com/about-ee> [accessed 13 September 2022].

40 SPACE10, 'About | SPACE10', *SPACE10*, 2022 <https://space10.com/about/> [accessed 13 September 2022].

All | Sustainability + Circularity | Lifestyle + Well-being | Privacy + Trust | Play + Learn | Design + Organize

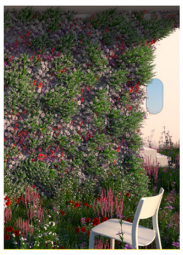
Through a range of experiments in a set of unique themes, we explore ways to enhance our interactions with space and improve our everyday lives.

Updatables
What if your furniture could evolve itself to stay relevant?

Evolutionary Algorithm | ML | AI | AR

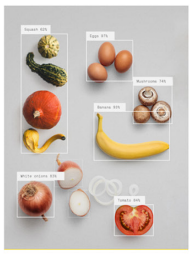
Kaleidoscopic Home
What if you could turn your home into an ever-evolving playground?

AR | Procedurally Generated Content



Forever Meadow
What if you could walk in a sanctuary without leaving your home?

AR | Procedurally Generated Content

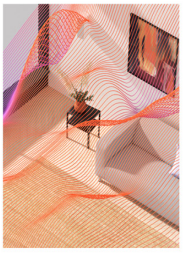


The Algorithmic Chef
What if artificial intelligence could write you a personalised cookbook?

Machine Learning | Object Detection

Virtual Oasis
What if augmented reality could transport you into a meditative retreat?

AR | ML | Spatial Audio



Convolution Reverb
What if spatial audio could turn your living room into the colosseum?

Spatial audio | Spatial Mapping | IoT

Mood Blossom
What if a flower could help you understand your feelings?

GAN | AI | AR

Sound Bubbles
What if you could use sound to create silence?

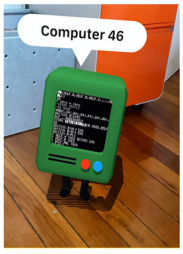
Spatial audio | IoT

Digital Buddy
What if you had a companion to help you navigate the complexities of the digital world?

Natural Human Interaction | AR | Machine Learning

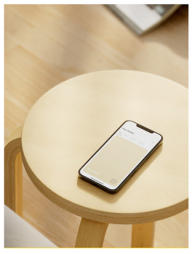
Chain of Traceability
What if the objects you own could share their entire history with you?

Blockchain | Object Recognition | Augmented Reality



Invisible Roommates
What if you could see how your devices were actually communicating?

AR | IoT



Studio
What if you could turn your smartphone into a democratic design tool for your home?

AR | Spatial Mapping

Optical Soundsystem
What if you could see the way music travels around your home?

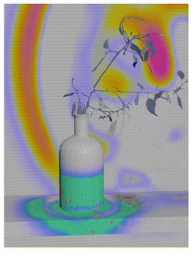
AR | Spatial Audio | Spatial Mapping

Extreme Measures
What if an elephant could measure the size of your space?

Spatial Mapping | AR | Object Detection

Shelve It
What if you could design the perfect shelf simply by looking at a wall?

3D Reconstruction | AR | Spatial Awareness



Spatial Instruments
What if your home could be played like a musical instrument?

Spatial Audio | AR | Object Detection

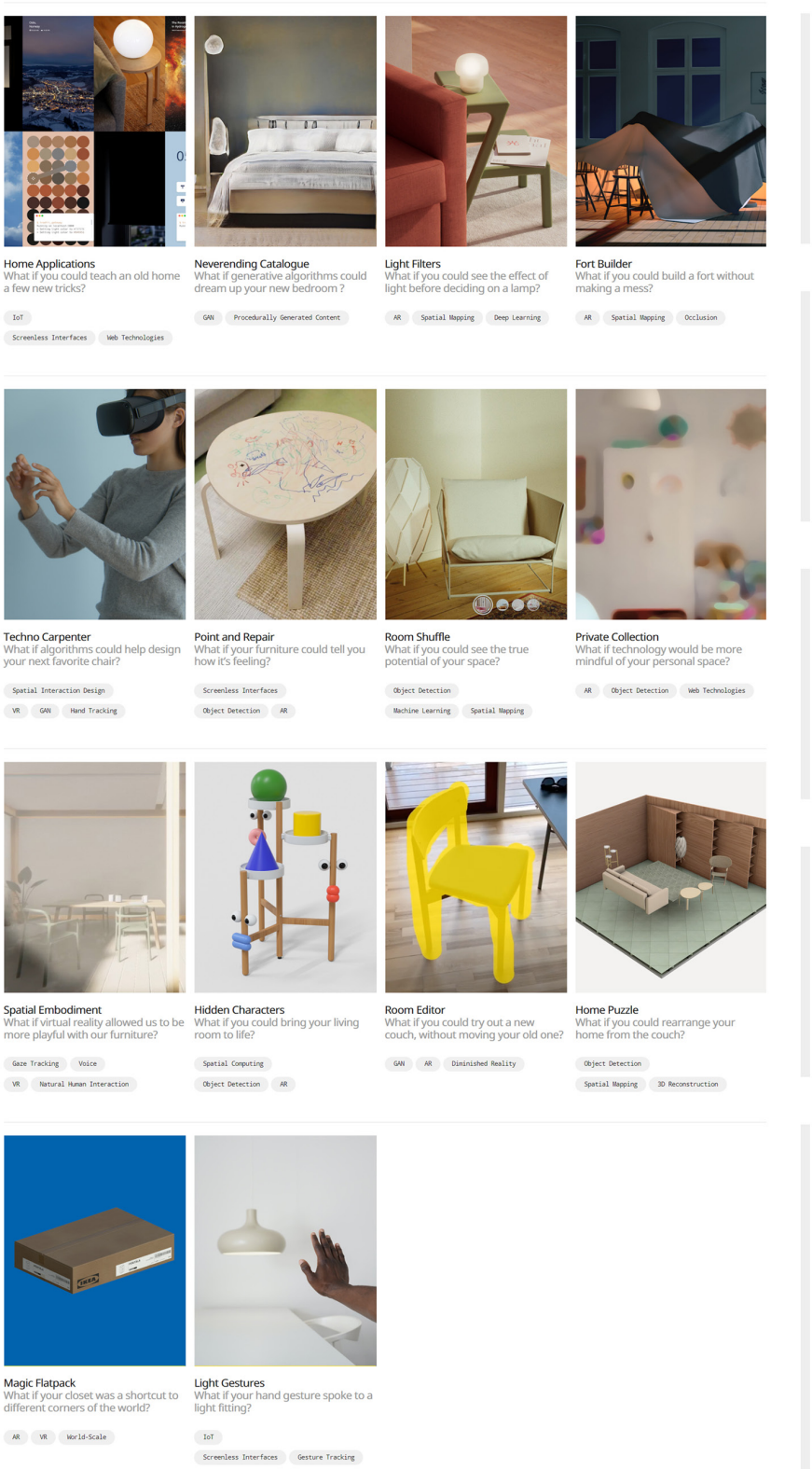


Figure 4.17:A screenshot that shows different Everyday Experiments done by SPACE1O. Captured from'Everyday Experiments', 2022 <https://www.everydayexperiments.com/about-ee> [accessed 13 September 2022].

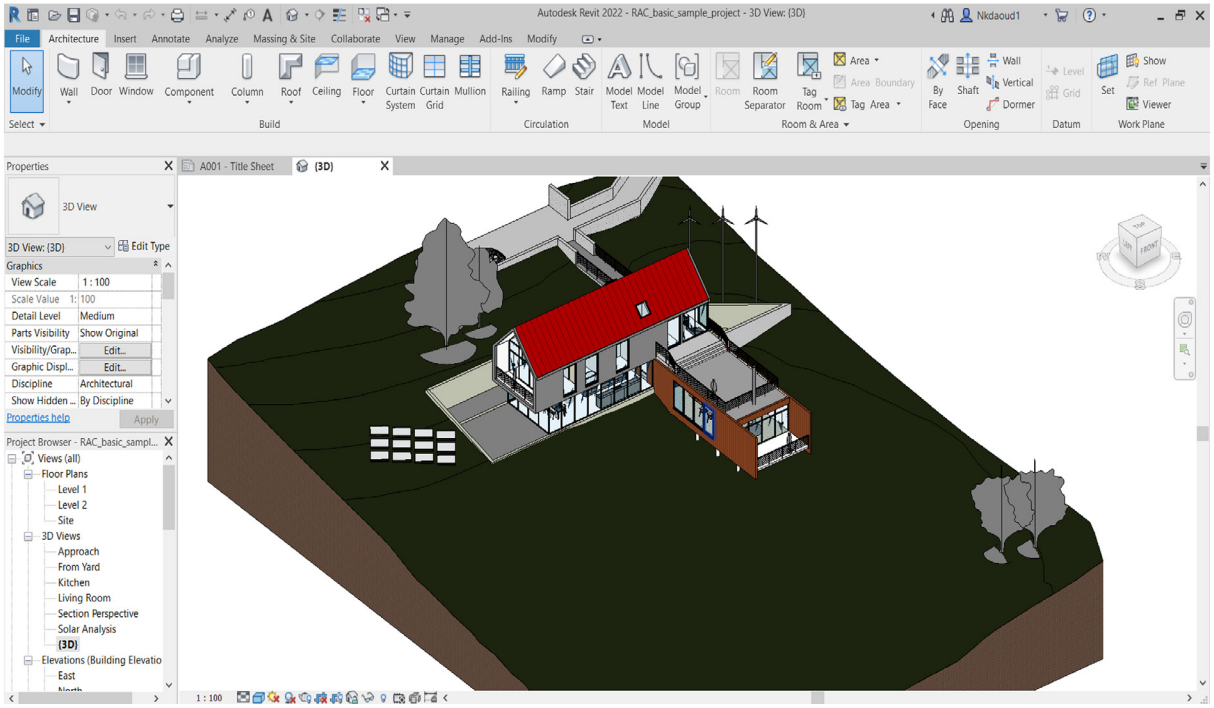


Figure 4.18:A screenshot that shows Autodesk Revit's Basic Sample Project, taken by the author in September 2022.

Home in a Box aesthetics

Autodesk Revit's Basic Sample Project welcomes me after waiting for the software to boot, a house that has never been built nor inhabited but dwells on every Revit startup screen.[41] Though *Autodesk* uses this project to present an example of what Revit can do, my encounters with this uninhabited home were reduced to utilising it as the central element in designing the visual graphics of the *Home in a Box's* booklets. Similar to avant-garde CAAD renderings in the 1990s and *Everyday Experiments*, Revit's sample home felt empty, disembodied from any traces of occupation and everyday life. The way technology imagines people's homes forms productive visual configurations that celebrate technoscientific progression by marking its inhabitants unseen. In the making of *Home in a Box*, I followed Tinney's aesthetic style to create 'another' version of Revit inhabited by people and everyday doings that challenges the way it marks inhabitants invisible. Using visual metaphors, I engage in *careful* practices of presenting Revit's key concepts that Autodesk's quick guide introduced in retro-futuristic-styled collages.[42]

I used Tinney's aesthetic style to design the box's booklets by adding people's figures and depicting familiar everyday doings to represent Revit's different concepts and processes. By borrowing these elements from nostalgic images common in the graphics of home decorating and DIY magazines in the 40s-60s, I tried to reconnect how domestic spaces are represented in Revit's abstract realm with inhabitants' collective imaginaries related to how they encountered representations of home in the past through different forms of media like these magazines. I find it essential to add a sense of familiarity to how a (probably new) technology of Revit could

41 For an in-depth theoretical and ontological reflection on Autodesk Revit's Basic Sample Project, see: Amelyn Ng, 'OOTB', *E-Flux Architecture*, 2019 <https://www.e-flux.com/architecture/positions/280207/ootb/> [accessed 26 September 2022].

42 See section subtitled as Home in a Box as an ethnographic design object in chapter three where I write extensively on booklets design.

Figure 4.19: Snapshots from Home in a Box's booklets binding process, taken from a video of unboxing the box created by the author in July 2021.

be presented to them.

As a non-Revit user, my engagement with Revit/Revit's sample house was limited to filtering the house's elements, disassembling them, making sectional cuts, and exporting scenes I wanted into images. Inspired by Tinney's illustrations of *BYTE* covers, I used *Photoshop* to explore ways to create collages speculating a Revit that relates to people's collective imaginaries and rethinks how it is perceived in architectural practices. The Revit I tried to represent in the booklets is populated with familiar everyday dynamics (people, things and doings) which connect to people's daily lives. I printed these booklets on retro-styled kraft paper and attached

them using handmade bookbinding techniques as conventional materiality because of their connotation as a more personal mode of production that can be perceived as intimate by inhabitants who collaborate in the box. However, I exhibit my practice of designing the visuals of booklets as an entanglement that enmeshes the power structures that produce imaginaries of technology, home and future, with the position I claimed as a Revit non-user while carefully thinking and material designing representations of Revit.

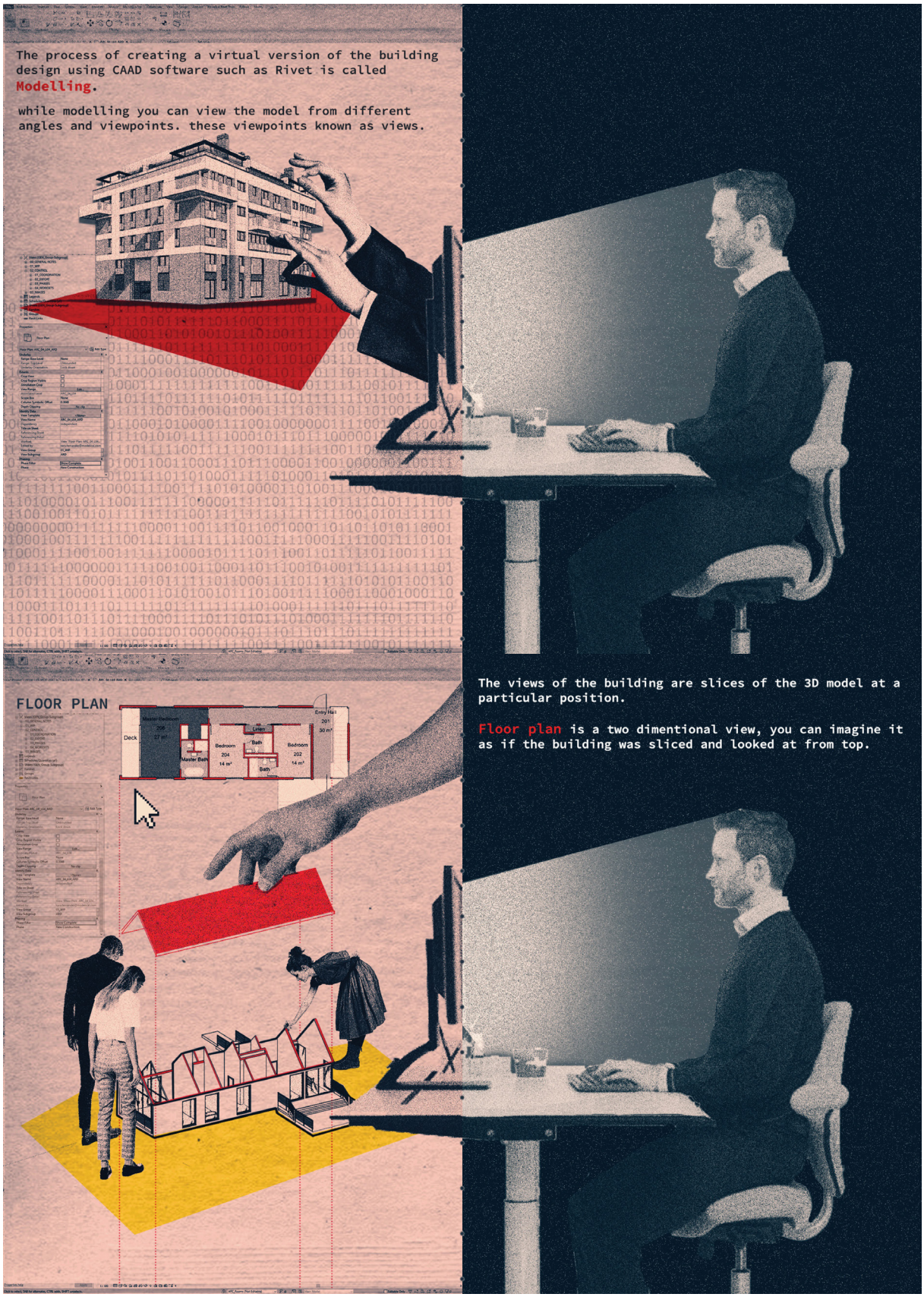


Figure 4.20: Four pages from a booklet about CAAD included in Home in a Box, designed by the author in April 2021. It shows what modelling and a floorplan mean.

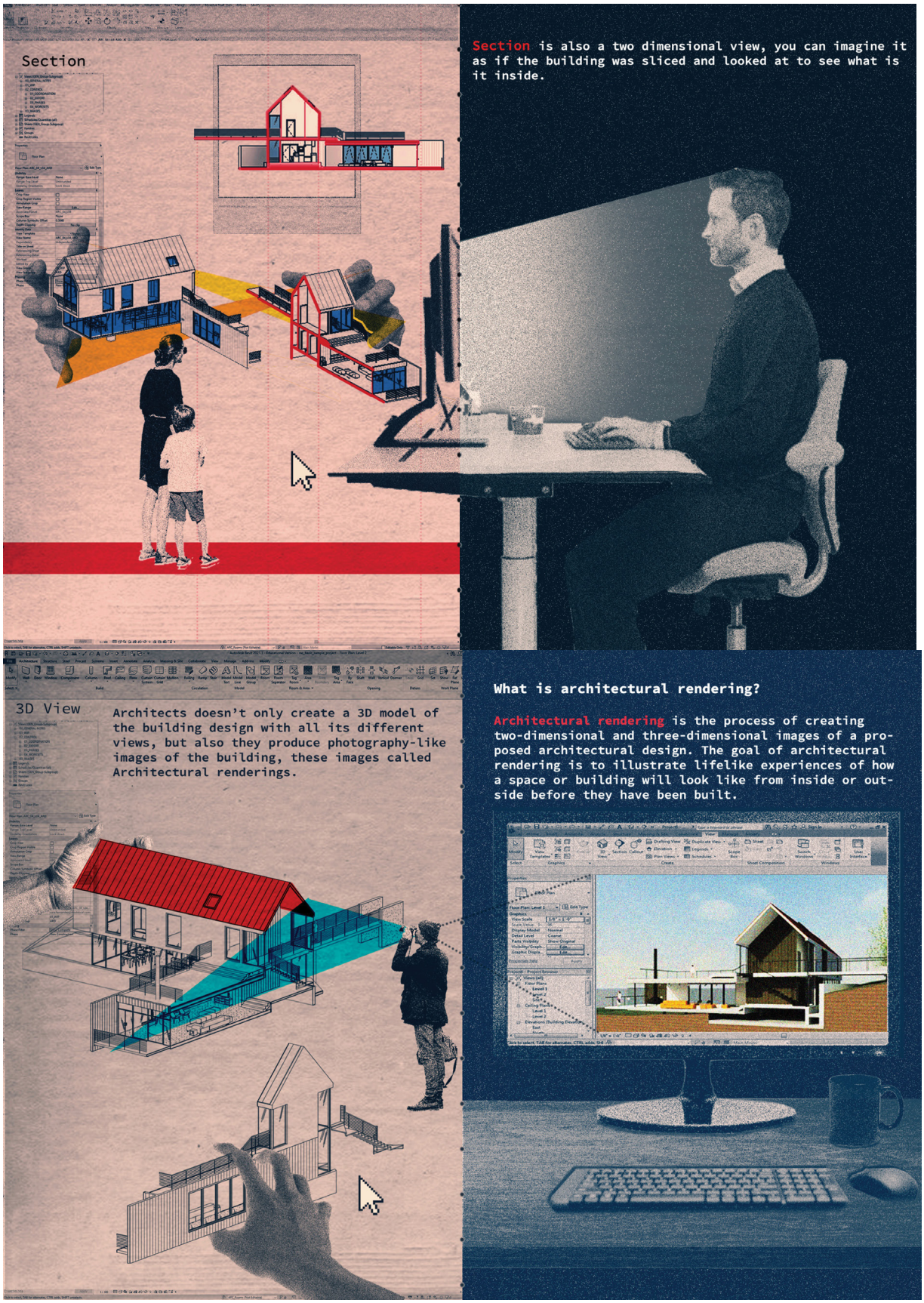


Figure 4.21: Four pages from a booklet about CAAD included in Home in a Box, designed by the author in April 2021. It shows what a section and rendering mean.

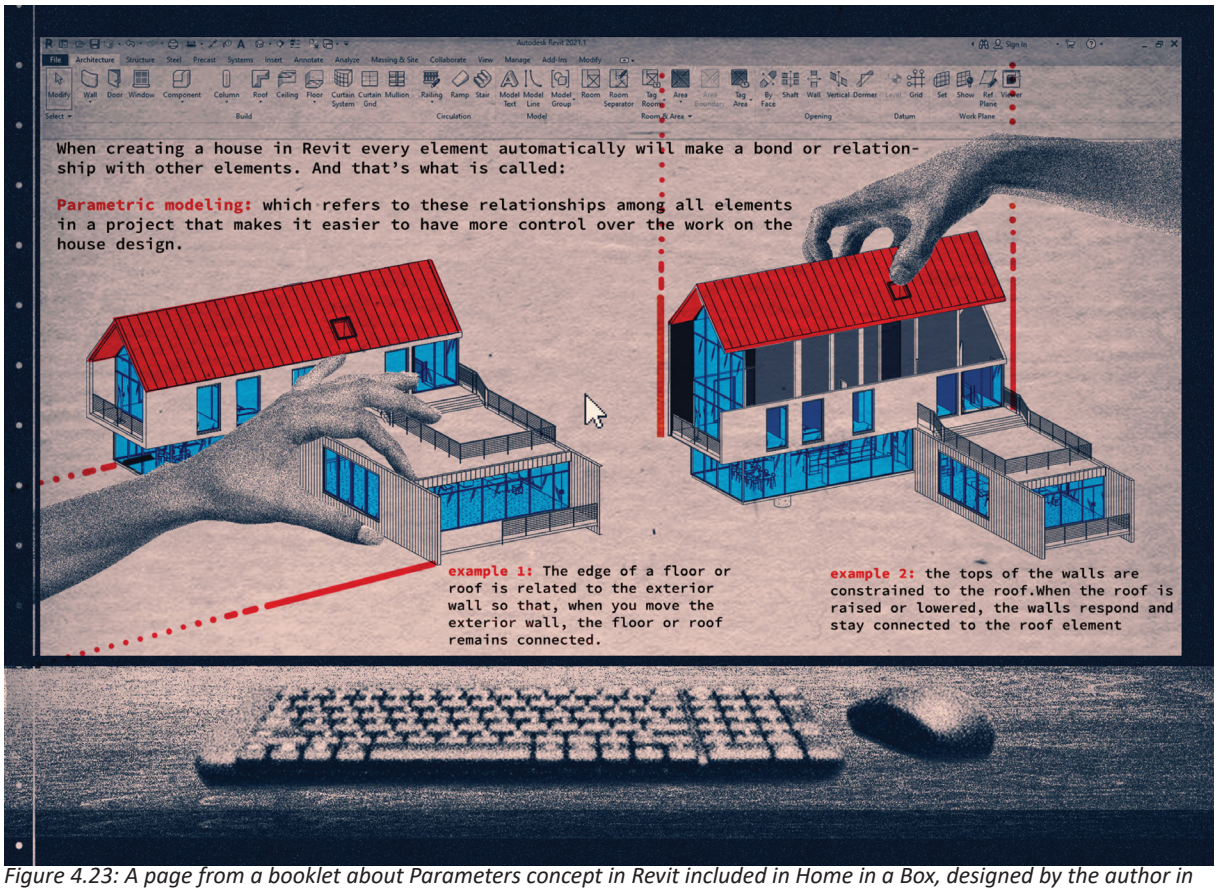


Figure 4.23: A page from a booklet about Parameters concept in Revit included in Home in a Box, designed by the author in April 2021. It shows what does Parametric modeling means.

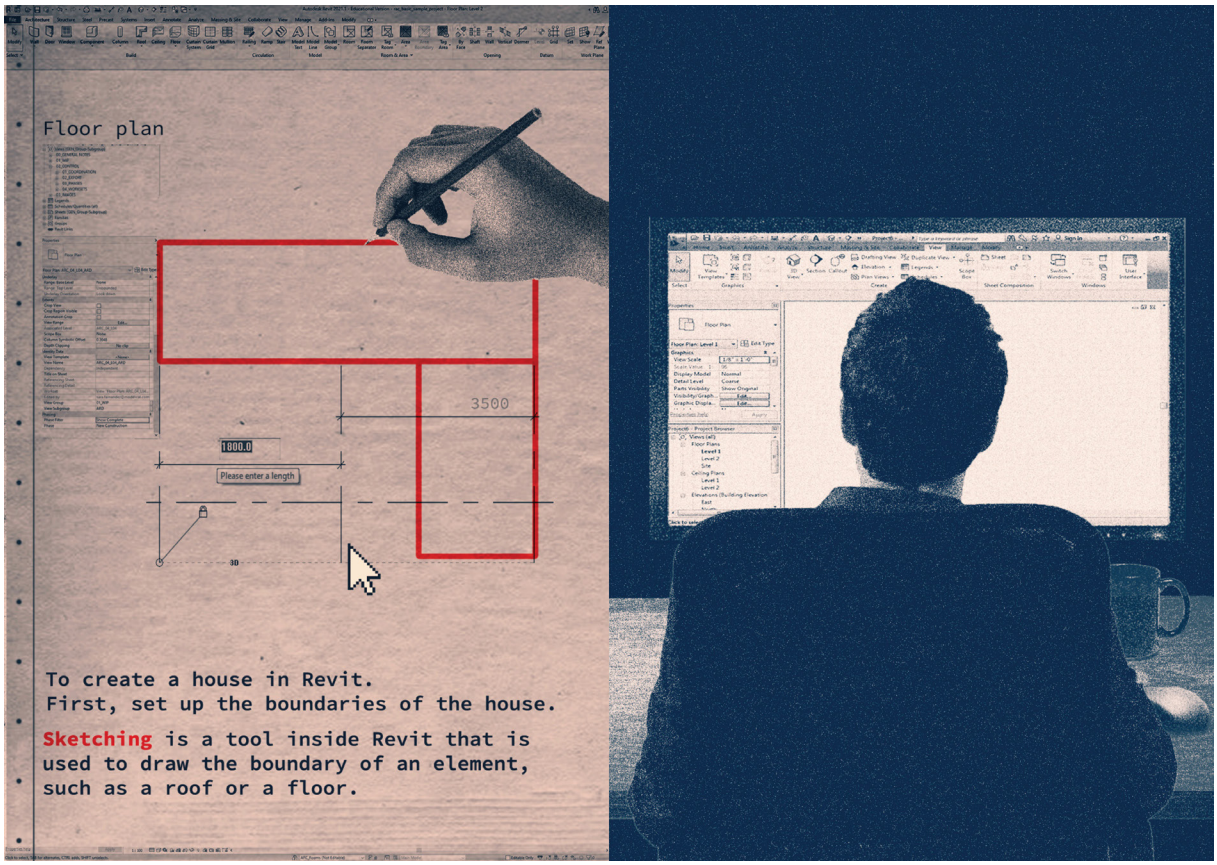


Figure 4.22: A page from a booklet about Sketching function in Revit included in Home in a Box, designed by the author in April 2021. It shows the use of sketching tool to start modelling a house.

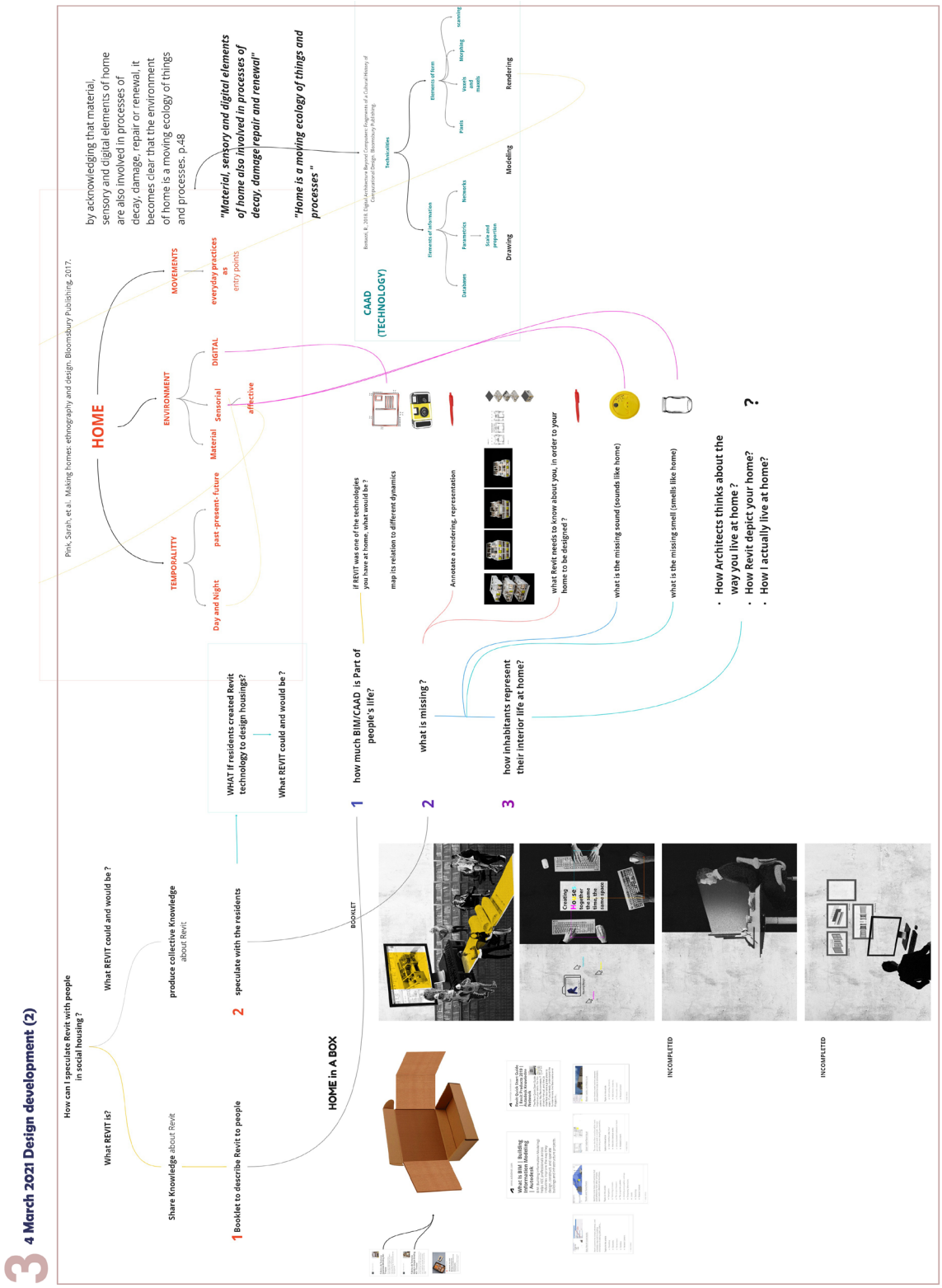


Figure 4.24: An image of the second stage of Home in a Box design process as extracted from Miroboard, an online app used as a design diary by author during designing the box. It shows part of design development process dated at the beginning March 2021.

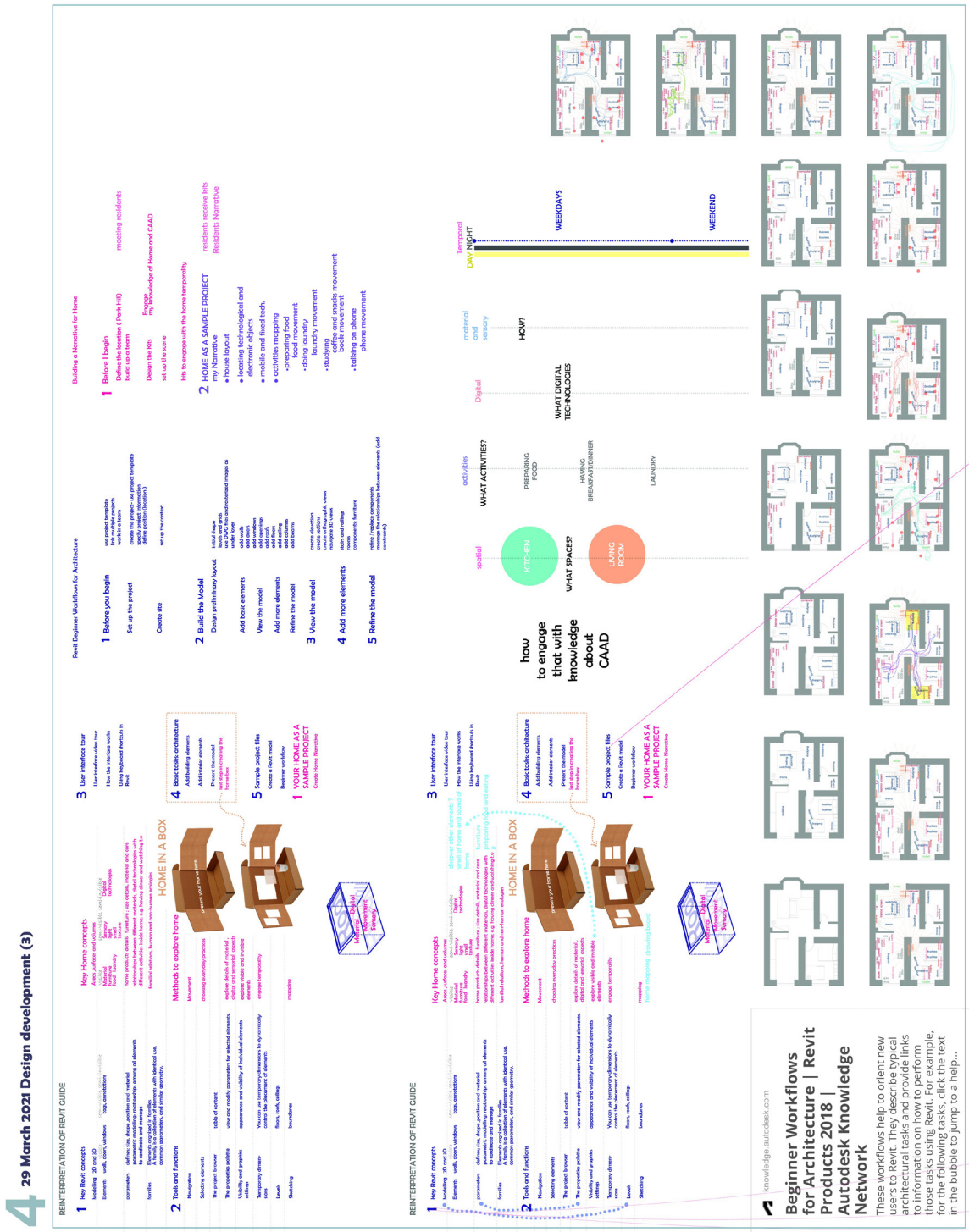


Figure 4.25: An image of the third stage of Home in a Box design process as extracted from Miroboard, an online app used as a design diary by author during designing the box. It shows part of design development process dated at the end of March 2021.

Figure 4.26: Image captured by the author in April 2021 that shows where my engagment in thinking and designing Home in a Box took place. In one corner of the living room within my home, the box's production site was situated.

March 2021: It is not the same home I knew!

What is Home? And how do inhabitants represent their interior life at home?

The time felt too heavy to be forgotten, too vague to be remembered. It has been one year since England announced the national lockdown. Home was the place that witnessed me thinking about and doing Home in a Box design. Fortunately, the home I inhabited with my husband was spacious enough to fit two workplaces for us: one in the bedroom and the other in the living room. I chose to occupy the latter. I laid a grey rug and placed my computer and books on the desk that leaned against two walls in the corner, where I hung up my thoughts. For me, the home office was 2.59 square metres, bounded and defined by a 133x195cm rug and the desk I fitted in the end corner of the living room. What is home? was a tricky question to answer while thinking of the box.

A book by Sarah Pink et al. titled Making Homes: Ethnography and Design says: 'Home is a moving ecology of things and processes', where 'material, sensory and digital elements of home are also involved in processes of decay, damage, repair or renewal'.[43] However, I did not know what shape the box would take to fit that home. I did not know who from Park Hill would agree to take it, where it would finally arrive, and how that home could be later enclosed within a 38 x 28 x 13cm rectangular cardboard box.

43 Sarah Pink and others, *Making Homes: Ethnography and Design* (Abingdon: Routledge, 2017), p. 48.

These three things were added to the list of what made me feel fear while designing this box, fearing the fluidity of infinite possibilities this box may end up being. Each time, I escaped my uncertainty by brewing a cup of tea or coffee in the kitchen or soaking in the sun in front of the bedroom's big French window. Fearing uncertainty is symptomatic of being an architect, where design is a practice designated with being solid and certain. What is home? I kept asking myself, thinking of how to design a box that would embrace people's homes. However, I found home at moments when I took off the architect's cloak I hid behind, in moments such as when I dimmed the lights to watch a movie with my husband in the evening or even when I tasted the food while we cooked a meal together. That's when I saw through being an inhabitant of my own home.

Architect as an inhabitant

What will happen when each of the four boxes arrives at a home? As its name suggests, each box needs to enclose people's homes where it will arrive, allowing the home it arrives in to give it the final shape. As an architect, encountering the open-endedness of *Home in a Box* design was not an easy task for me. The first time I came across Sarah Pink et al.'s *Making Homes: Ethnography and Design*, I realised that designing the box to engage in everyday life at home requires stripping out what I previously knew about homes as an architect. 'What is home?' I asked. I recited Pink's' book, trying to get acquainted with the 'home' the box would meet, projecting that home is a dynamic, ever-changing constellation where people, things and processes are constantly related.[44] Home never takes the same shape. It is made, unmade and remade. Cleaning, cooking, and tidying can form it into a new shape; well, future dreams of its inhabitant can reform it too.[45] It is a material, digital, sensory and affective atmospheric environment that can be understood through movement. [46]At home, you can grasp everything on the move, not only people but things like laundry, technologies, furniture, and cups of tea, even the fluid, invisible or intangible flows of electricity, gas, water, fresh air and music.[47]

My position as an architect continued to trouble me. The home I knew from Pink's book seemed uncontrollable. It deconstructed the home I previously knew, uncomfortably causing a feeling of fear. Architects perceive home through their engagement in its design, producing a series of drawings that portray building fabric that encloses predefined domestic activities. In architectural drawings, home is clearly defined. Architects draw lines; in Revit's case, they assemble walls from the software's library to create the building's form. Home then is shaped in the emptiness left. They ensure it follows the designated building regulations down to every centimetre, divided and labelled— kitchen for cooking, bedrooms for sleeping, and a living room for resting and entertainment. People's movements are imagined around the furniture architects lay, copied from predefined libraries. However, home portrayals produced by architects remain empty, with no traces of human inhabitation. They have no bins that need to be emptied, unmade beds, piled laundry, dirty dishes in the sink, or any out-of-order clutter. Everything at home is measured, under control, solid and certain. 'Out-of-control' homes bring fear to architectural practices' norms that feature architects as sole creators of home. Through

44 Pink and others, p. 15.
45 Pink and others, p. 31.
46 Pink and others, p. 46.
47 Pink and others, p. 88.

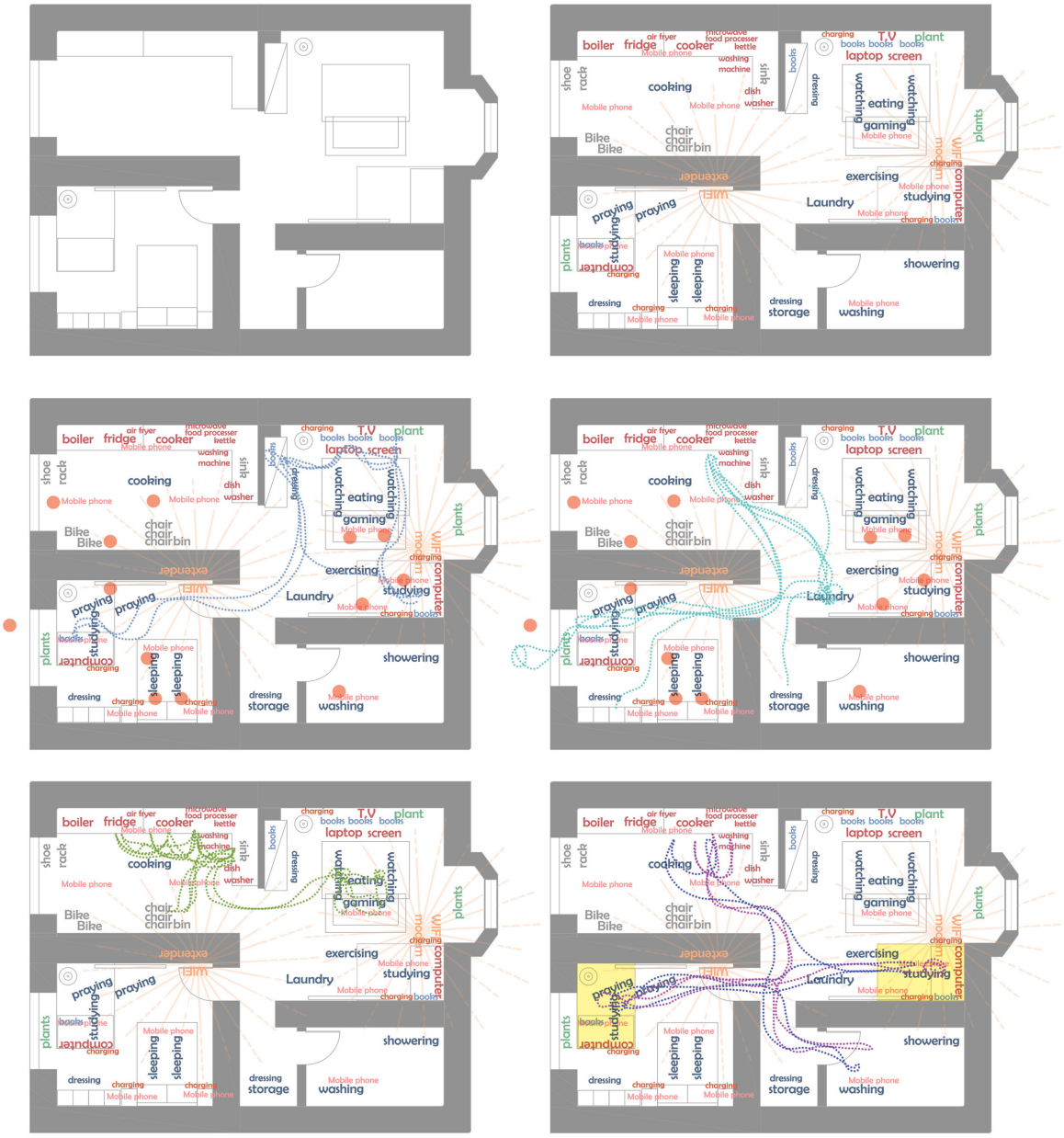


Figure 4.27: Home maps created by the author in March 2021, that shows traces of different movements and activities inside the house, like books, laundry, food movements, and activities like working from home, and cooking.

architectural drawings and models they produce, architects are perceived as authors who anticipate the future inhabitation inside these homes and hold authority and control over their everyday domestic dynamics.

The *Home in a Box* design happened almost one year after the pandemic broke out. At that time, shifting everything to at-home status became the new normal. As a self-isolating researcher, doing research became entwined and part of the banal life at home. Designing the box took place in the central part of my home, the living room. Although thinking of the box was ever entangled with domestic rhythms and routines at home, answering what home is and what shape Home in a Box needs to take to capture people's homes was far too hard

to answer. 'You have everything to start doing the box!' my supervisor said when I discussed the failed attempts to shape the box's activities. Being an architect seemed like a burden, and my 'architectural' knowledge predominated everything I knew about home, even after finding other answers from outside the profession.

I came to realise that I had to shift my ground from being an architect to designing the box as an inhabitant myself. However, it did not entirely work, as I soon returned to an *AutoCAD* file of a drawing of my home's floor plan. I had it because my husband and I, as two architects, drew it using AutoCAD a couple of years earlier. We tried to figure out different configurations for each room with the new furniture we bought at that time. I made some changes and drew rough outlines of the two home offices recently fitted. 'What is home?' I asked after exporting my home floor plan and importing it into *Photoshop*. I started by carefully labelling activities in each room and corner at home, adding different layers of things (furniture, books, technologies, plants). My home always seemed in reconfiguration. Captured in different scenarios, I tried to imagine different movements that shaped and reshaped it. I traced how my husband and I moved inside the home. I imagined ourselves working on weekday mornings, preparing to leave home for a walk in the afternoon, and cooking together in the evenings. I followed the books, mobile phones, laundry, and food, mapping their transition across different surfaces and rooms. I even speculated how the Wi-Fi network invisibly occupied and connected through the walls.

Home felt infinite and could only be caught through temporal cuts. Freezing time into slow motions seemed the only way to snapshot different activities, processes, and things at home. I knew that home with which the box would intersect was closer to the one I experienced as an inhabitant rather than as an architect. Home cannot be encapsulated through the definitive and productive means architects use in their practices. However, it requires '*careful*' thinking about ways of making time that allows capturing domestic dynamics on the go.[48]

48 I extend this in section subtitled: Home in a Box temporalities in chapter three.

Conclusion

In this section, I explored my engagement in thinking and doing *Home in a Box* as an architect. I looked at the design contingencies in the box's production site by reflecting on the multiple positions associated with my design, CAAD, and home knowledge. By paying particular attention to the shifts between different positions, I expose a broader set of interpretations, powers, emotions, languages and ethics incited by the interactions between me and the box. I encountered the process of writing about the dynamics of my engagement in the box's design as a practice of reflexivity, defined as the 'process of thinking about one's thinking'.[49] Reflexivity is central in feminist research, defined as a dynamic political practice that considers others' and one's own experiences exposing research's embedded power and offering other means for doing and writing it. It deconstructs the researcher's authority and dissolves it into reciprocal relationships with different subjects and materials.[50] As Douglas Macbeth suggests: 'By most accounts, reflexivity is a deconstructive exercise for locating the intersections of author, other, text, and world, and for penetrating the representational exercise itself '.[51]

Through the discomfort, anxiety and fear enacted by *Home in a Box's* design, I present the disruptions plagued by thinking and doing the box as an 'other' design practice. *Home in a Box* disturbed the way I understand *design, CAAD, and home* as an architect and a designer of the box. The troubles I encountered reveal how architectural practices operate within larger structures that define and produce 'the architect' figure, which troubled me while designing the box. Engaging in the box's design allowed a rethinking of the broad set of connected subjects, practices, semiotics and materials that define and imagine architectural design practices, which spurred a messy, unfamiliar and uncomfortable reflexive process. Wanda Pillow examines research practice's failure by advocating for a 'Reflexivity of discomfort' to be accountable for the successful, failed, and 'messy' research attempts that self-represent and self-determine one's and others' struggles.[52] I tried to be attentive to the politics of my location as a designer by presenting the intricacies of failed attempts to design the box which expand our understanding of design as a material, affective, ethical and political practice. By exploring other potential ways for an architect/designer to exist, *Home in a Box* introduces design as a situated practice where the designer is held accountable for the knowledge they claim and a tool to critique and problematise taken-for-granted design cultures. Which do not only shape architecture design practices but necessarily configure 'the designer' figure and formulate decisive imaginaries of the ones for whom they design.

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49 Mona Livholts, *Emergent Writing Methodologies in Feminist Studies* (Abingdon: Routledge, 2012), p. 4.

50 Wanda Pillow, 'Confession, Catharsis, or Cure? Rethinking the Uses of Reflexivity as Methodological Power in Qualitative Research', *International Journal of Qualitative Studies in Education*, 16.2 (2003), 175–96 (pp. 178–79).

51 Douglas Macbeth, 'On "Reflexivity" in Qualitative Research: Two Readings, and a Third', *Qualitative Inquiry*, 7.1 (2001), 35–68 (p. 35).

52 Pillow, pp.192–193.

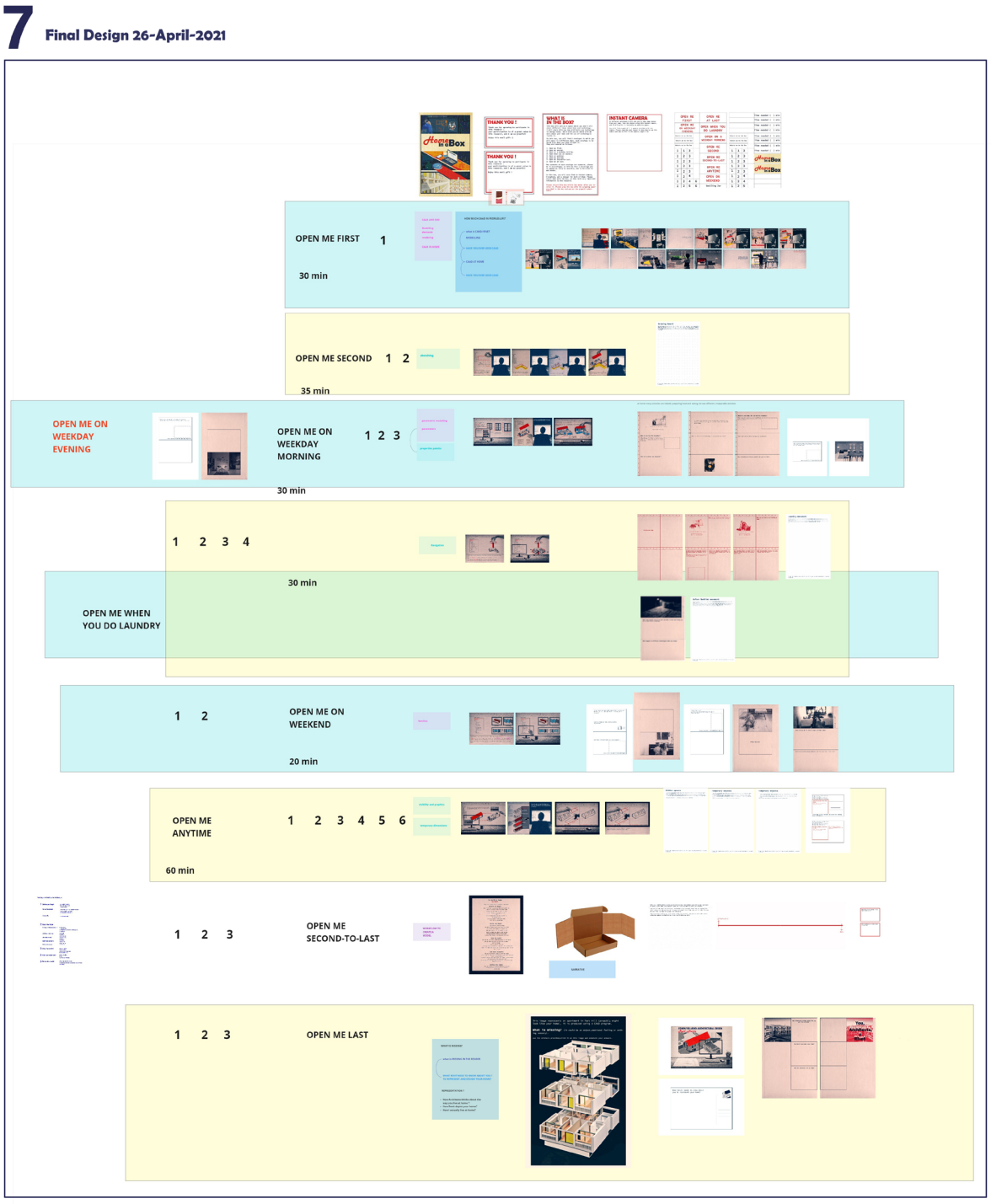

Figure 4.28: An image of final design of Home in a Box design as extracted from Miroboard, an online app used as a design diary by author during designing the box, dated at the end April 2021.

Site of collaboration: 2nd May 2021- 7th October 2021

In this part of the chapter, I introduce inhabitants' engagement in doing *Home in a Box* from the perspective of four Park Hill inhabitants who agreed to take the box home and collaborate in doing different activities enclosed for four to six weeks. In this part, I extend the critique of how domestic spaces and inhabitants' home-CAAD knowledge are often portrayed in architectural design cultures. I tried to offer an account of domesticity-CAAD assemblages within Park Hill inhabitants' homes. By reflecting spatial and temporal dynamics conveyed through the box's engagement in homes' different materialities and inhabitants' practices. This part answers two questions: What does *Home in a Box* do at home? And what are the domestic narratives inhabitants tell about CAAD and home while annotating, mapping, drawing, and taking photos in the box?

I was not present as the participants engaged in doing *Home in a Box*. As a result, I write this part in inhabitants' voices in the form of a roman à clef spanning the doing of *Home in a Box* at four different homes at Park Hill. *Roman à clef* is a French term for 'novel with a key'. It is a fictional narrative in which real people and events are disguised.[53] The keys to this multi-narrative are four people inhabiting four homes in different parts of Park Hill. They are hidden under fictional characters: Hugh, Catherine, Hannah and June,[54] offering biographical information about the everyday domestic lives of the real inhabitant each character represents. Each key reveals stories about their everyday life at home, encounters with different CAAD practices and engagement with the box from inside each home. I describe inhabitants' engagement in doing *Home in a Box* in four sections, each representing a key. I trace each box's entanglement with the home's spatial and temporal materialities from its arrival at each inhabitant's home, ending with its departure. This biographical multi-narrative articulates inhabitants' domestic realities informed by in-depth interviews[55] with four inhabitants after they engaged with *Home in a Box* and the material each provided in the box.

I approach home through the box's *careful* engagement in the inhabitant's everyday domestic practices. As a feminist power tool, *Home in a Box* expands a critique of the existing power structures in architectural practices.[56] In this part of the chapter, I introduce r*oman à clef* as a feminist writing practice for exploring inhabitants' embodied narratives marginal in architectural design cultures by reclaiming the authority to tell the stories of their homes while maintaining ethical and political capacities of writing the other. The use of *roman à clef* helps to convey the meaning that constitutes the critique of taken-for-granted home-CAAD portrayals in architectural practices by paying attention to how writing interweaves inhabitants' practices and thoughts across relations between home, the box and inhabitants spatially and temporally.

53 Ian Ousby, *Cambridge Paperback Guide to Literature in English* (Cambridge University Press, 1996), p. 332; Melissa Boyde, 'The Modernist Roman à Clef and Cultural Secrets, or, i Know That You Know That i Know That You Know', *Australian Literary Studies*, 24.3–4 (2009), 155–66 (p. 156) <https://ro.uow.edu.au/artspapers/219>.

54 Original inhabitants' names have been changed.

55 The interviews I had with inhabitants were recorded. However, one was reproduced from memory.

56 See chapter three titled: Home in a Box: Thinking the box.

Crowded-aided Domesticity: The story of the box that enclosed my [messy] home[57]

Hugh[58]

'It is on its way!'

Hi Hugh,

Tracking no. WLL71999310310GB

*We have your item at **Sheffield City Delivery Office,** and it's on its way. We normally expect to deliver to your address between 10:22 am- 2:22 pm.*

**Please be aware any time or date shown is not a guarantee.*

Flats run along three-metre-wide streets in this building. They are not like ordinary streets but more like wide corridors called ' streets in the sky' that connect all homes, tightly knitting them on one side and overlooking a communal park on the other. Deliveries are an issue in this building, and parcels can easily lose their way.[59] *Their arrival at your doorstep is not guaranteed, and picking them up from neighbours is a normal part of their journey. I work from home these days, and that is why I can quickly trace at which destination my parcel has landed. I have the flexibility to do that. Whenever I wait for one, I tend to go out to vape in the 'street', the corridor outside my flat. I keep checking my mobile phone for insights on where it would be at the moment; 'it is on its way', the app says. I stared at the concrete railing running along the street. I was trying to imagine all the wrong routes my parcel would pass through, all the houses it would visit, and all the hands it held until it finally arrived home.*

'Thanks Niveen - it has just arrived now!'[60] *I quickly wrote and tapped "send email" as I went home downstairs. My flat has two entrances, one upstairs at 'the street' and the second downstairs on the floor where my bedroom, my closet, and a living room with an open kitchen lie. I carried the box under my arm and stood in front of the door. I put my mobile phone in my trousers' pocket with the other hand while searching for the keys inside the same pocket. The hallway always welcomes me with sunlight shimmering from the living room windows whenever it is sunny outside. In this home, I live alone, but I share the space with my plants, eighteen of them, and a dozen framed artworks. Though I am not a particularly artistic person nor do I have a creative career*[61]*, art is important to me. I work as a data advisor at a well-known environmental agency in Manchester. Before the pandemic, I commuted to work daily, leaving my bed in the morning and returning to my sofa by evening. My living room became my new office temporarily; it is comfortable, and what's more, my parcels do not lose their way home.*

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57 These narratives in *navy italic* text are fictional writing by me while *blue italic* texts are inhabitants' voices captioned from interviews and the material they enclosed inside Home in a Box.

58 Hugh is the pseudonym I use to indicate inhabitant 1, I keep referring to him as such till the end of the text.

59 When I joined *Park Hill Residents' Group* on Facebook, I noticed many people complaining about parcel deliveries because of the way Park Hill is designed. Many people post on the group asking neighbours who got their parcels.

60 This was taken from an email I got from Hugh to let me know he received the box.

61 Interview with Hugh, 29th June 2021. (emphasis added)

Figure 4.29: Image captured by Hugh in June 2021, using the camera provided in the box, it shows the dining table in the living room.

The box was surprisingly bigger than I expected. It seemed more like a big shoe box. I moved the plant in the terracotta pot sitting on the dining table to one side and placed the box in the centre. With a fruit knife, I ripped the brown paper wrap on the four sides and found a cardboard box with a picture of my building, a man with a cat and "Home in a Box" printed on the top. Inside the box, I got a chocolate bar with tea bags wrapped as a gift with a thank you card, a 'what is in the Box' card and a pile of envelopes full of things to do. The pack of coloured markers I found inside suggests the activities the box held are more of a drawing type. It is quite a creative thing to do.[62] *I took the camera to try it out, I struggled a little bit with it, just getting used to what was in the frame.*[63] *I put everything back, closed the box, crumbled the massive wrapping paper, and returned to my desk. Like many others working from home, I wear a shirt top with pyjama bottoms on weekdays and my routine switches between at-home and at-work modes. Like the desk I recently bought that is neither in the living room nor the kitchen, I am neither at the office nor home when I am at work. I am just always in between.*

As a reminder, I kept 'what is in the Box' outside to sit on the dining table. I wonder, will all these envelopes capture my plants on the living room floor with framed art hanging on its walls as they watch me move around home? Will it get the tram's sounds passing by the flat and the wheels' screech as they round the

62 Interview with Hugh, 29th June 2021.
63 Interview with Hugh, 29th June 2021.

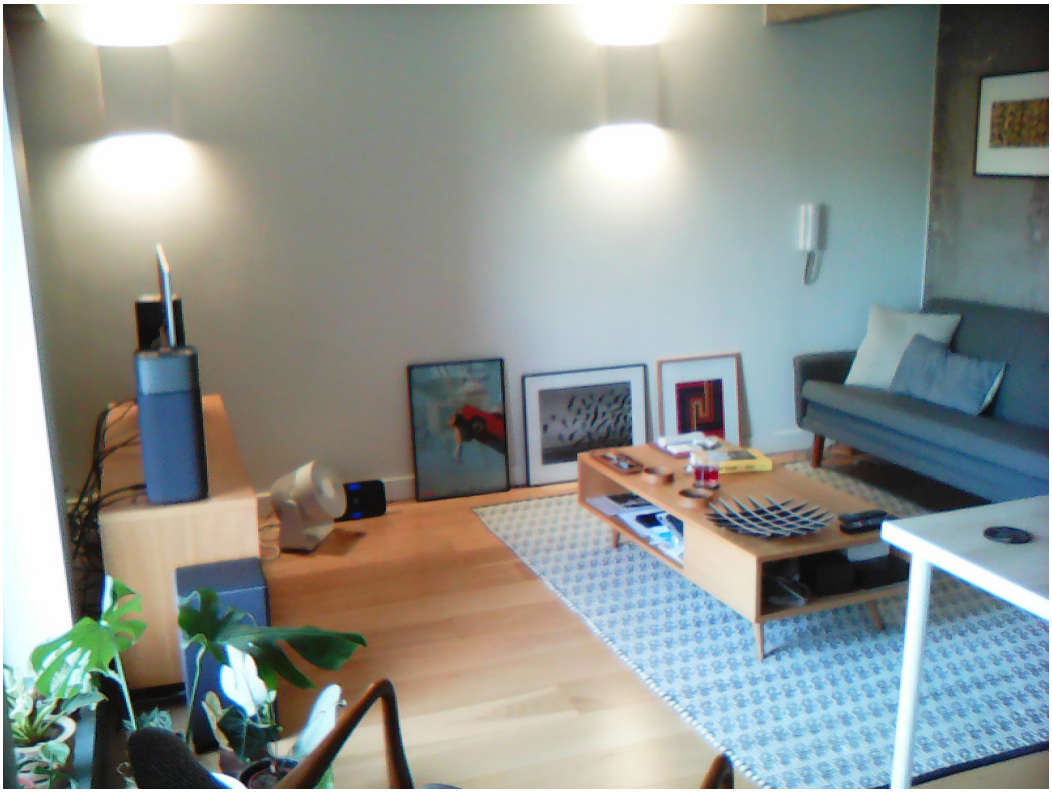


Figure 4.30: Image captured by Hugh in June 2021, using the camera provided in the box, it shows art work in the living room.

bend in the track'[64]*? Or even catch 'the light cast in the rooms at sunset'*[65] *that I love the most?*

*

'Open it first.'

OPEN ME FIRST
Time needed:(30)mins

In the evening, I prefer minimal lighting because I have no window coverings. After surviving another long day at work or, more specifically, at home, this evening, I am just passing the time watching football on TV.[66] *The box stood still on the dining table, witnessing me as I crossed by to have a drink. Back to the sofa, I sit with the box on my lap. 'Open me first', the envelope says. I read through the first thing, the information in the booklet feels easy to understand. Well, CAAD is not a new concept for me. Personally, I have been aware of CAAD for a long time, we*

64 Captioned what Hugh wrote in 'something sounds like home to you' activity in *Home in a Box.* In the interview, he mentioned that the sound of trams is the main sound at the flat but 'it does not link directly to home', personally he does not 'cross emphasis on sounds and smells'. However, in the 'What is missing' activity, he annotated 'noises' as one of the things that a rendering of Park Hill missed.

65 Captioned what Hugh annotated over the rendering provided in the 'What is missing' activity in *Home in a Box.*

66 Captioned what inhabitant 1 wrote in the post card labelled with 'open on weekday evening in *Home in a Box.(emphasis added)*

used it quite a lot at work. Yet, I am not an actual CAAD user. I am more of a user of its outputs, but it is kind of enough familiarity to understand what it is and how it can be.[67]

At work, we have surveyors who go out and survey the rivers' cross sections. So every hundred meters, somebody draws from the river bank through the river and up to the other bank. The drawings are created in AutoCAD and then given in different formats. We get them as PDF images, but we also get the drawing files. If we want to interrogate it a little bit more, we have surveyors that go out and survey other things. So they survey houses. It is not about houses; they survey how tall the doors are and how their heights act when water enters the building when the river floods. Again they are presented as drawing files that we would load into CAAD. The organisation I work with is big, so they cannot give out AutoCAD licences to everyone. We used to use a lot of free viewers, but there was something called Volo view, which I think was probably just one of the cheapest viewers. It was quite basic. I also have a feeling that I was able to get access to AutoCAD lite, or whatever it would be called. I cannot remember, but it was limited in its functionality. [68]

*

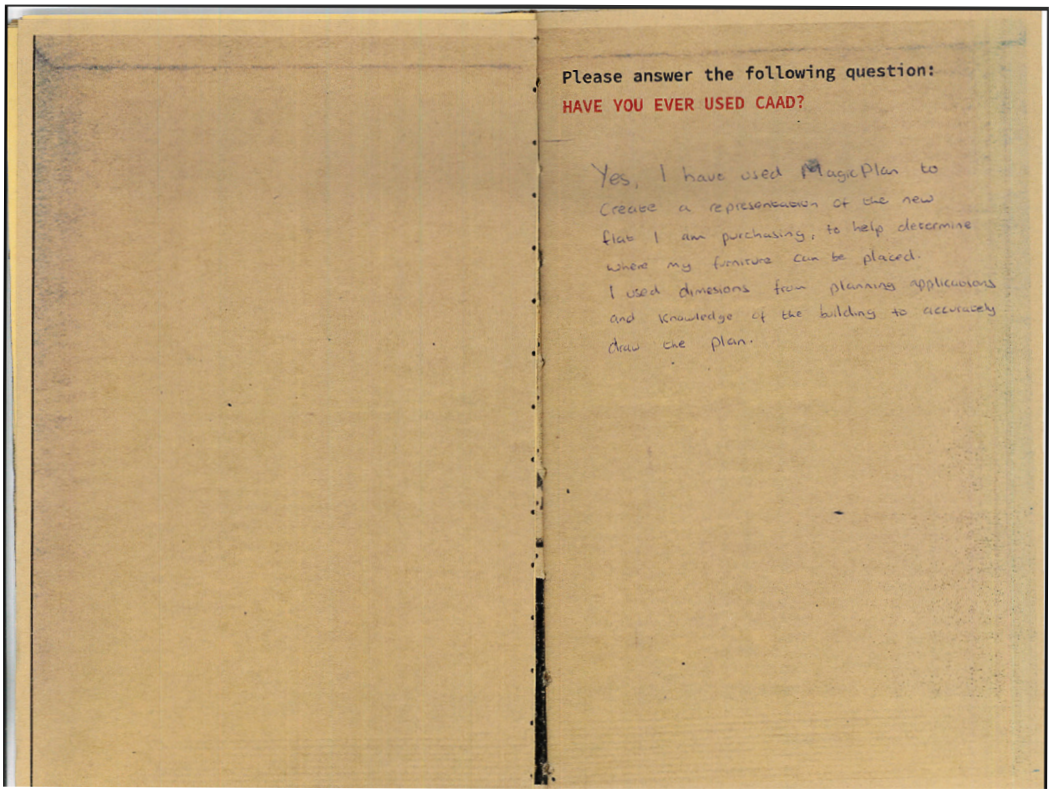


Figure 4.31: Image shows Hugh's answer to 'Have you ever used CAAD?' in booklet included in 'Open me first' envelope in Home in a Box. Captured by the author in June 2021.

Have you ever used CAAD? [69]

Yes, particularly when I think about the new flat I am moving into. I used

67 Interview with Hugh, 29th June 2021.
68 Interview with Hugh, 29th June 2021.
69 A question asked in the booklet in 'open me first' envelope in *Home in a Box*.

magicplan when trying to fit my furniture into my new flat design.[70]

*

Figure 4.32: Image captured by Hugh in June 2021, using the camera provided in the box, it shows some plants in the living room.

I am not moving far, my new flat is in Park Hill too, in the next development phase that they are just finishing off at the moment. All eighteen plants I live with will move with me to our new flat; the framed art will do as well. I guess what makes it home is all the things that are less common. So everybody needs a bed. Everyone needs a fridge, freezer, washing machine, sofa and table. However, things like the artwork on the wall, the house plants, and the decoration are key to making it a home, rather than just being a flexion of standard furniture in a box. Although the new flat is quite small, it is not going to feel cramped. I am not a minimalist, but I am not a cluttered person either!

I used magicplan when trying to fit my furniture. Well, I'd certainly want to see how I can furnish my new flat and how my existing furniture will fit into it. The app is built on a room-by-room basis. I could not draw the whole flat in one go. I only set up one room at a time. I started with the living room, the bathroom, and the bedrooms at the back and drew them all together. Though I knew what the square meter area of each room was, I did not have the dimensions for the flat. Because I already live here, I had to measure the distances between walls. There are a few little funny areas with a few nooks. The rooms are not square, but magicplan had the tools to allow me to do that. Then it is just a case of measuring up my own furniture, putting in the sofa with the same dimensions, a table, and everything else. You can move and rotate them to wherever you want. I still have the design, which changed completely the first time I did it. So it is easy to go back and tweak

70 Interview with Hugh, 29th June 2021.

and change as needed.[71]

*

*

Figure 4.33: Image captured by Hugh in June 2021, using the camera provided in the box, it shows some plants in his apartment.

In my current flat, I do not have a garden. I do not even have a balcony. Most places in Park Hill do have balconies, but mine does not. Whether you have a balcony or not, I think everyone at Park Hill likes the light that the flats get. In my own home, light is crucial. When you do have plants, and when you do have artworks that you do not want to fade, it is good to have an understanding of that. It helps you set out your room, put out your plants and hang your pictures on the wall. I have a nice long Corridor in my new flat with a blank wall at the end. It is the perfect place to put a nice tall mirror because it reflects the light out of the big window in the living room. I was disappointed because the architects had put a light switch right in the middle of the wall. I dreamt of being an architect when I was younger, but I never thought I would ask if they even really thought about that? It is the end of a corridor wall, a perfect place to put a mirror or a picture, but you cannot because of a light switch. [72]

*

'What is missing is just a sense of natural light!'

OPEN ME LAST

71 Interview with Hugh, 29th June 2021.
72 Interview with Hugh, 29th June 2021.

Time needed:(20)mins

The box spent six weeks with me at home. 'What is missing?' was the last thing it asked. Well, the problem with CAAD is that it does not recognise my framed art! In magicplan, for example, the furniture and fittings are limited. I do not know if there is a paid version that has more in it, but it is relatively limited. I could not decorate the walls, for example, so you cannot show mirrors or pictures on the wall. I think what it really misses is just a sense of natural light! I think it is essential at home—some of the furniture and items I have rely on understanding the natural light. When you have houseplants, you need to understand where the building has light in the rooms. I also have art on the window, on my walls, so conversely, you do not want those to be in direct sunlight! Maybe I would not expect it to be within a program like magicplan!. [73]

*

Hi Niveen

So sorry for being so slow to get this back. Is it possible to bring it to the school of architecture to drop it off—I would love to see inside the Arts Building. I am not working on Wednesday or Thursday afternoon so have time to do this? How about 15:30 tomorrow (Wednesday)?[74]

Cheers,

Hugh

73 Interview with Hugh, 29th June 2021.
74 Email I got from Hugh.

Catherine[75]

*

'I am home!'

'I am home!' This is how I announce my arrival whenever John is there. He knows how my day was from my tone. 'Wow, what is that?' John's eyes widened when he saw the box. 'It's a Home in a Box', I cheerfully replied. 'We will host it for a couple of weeks or maybe a month.'

In this cosy flat, I live with my partner, John. It feels like home when he is around. Without him, I probably do not enjoy the space as much. Though chores need often doing when he is here, we also have more elaborate meals and activities when we are together, and of course, more food in the house. We share TV, radio, record player, solar-powered balcony lights, wireless speakers and certainly, Wi-Fi and all the things it allows us to do!.[76] *We moved to Park Hill during the pandemic, almost a year ago. That was a decision we took when I started my PhD. In a market around the corner, an older man, with his daughter, lays dozens of plastic pots of flowers, plants and small trees on weekends. I buy one each time I pass by. The flat gradually filled up with plants. And home slowly grew up within a year. We purchased a new TV stand, donated the coffee table, included a chest of drawers, and brought plenty of books.*[77] *John is a student as well.*

Figure 4.34: Image captured by Catherine in July 2021, using the camera provided in the box, it shows John's desk in the hidden space under the stairs in thier home.

75 Catherine is the pseudonym I use to indicate inhabitant 2, I keep referring to her as such till the end of the text.

76 Captioned what Catherine wrote in 'Family at home' post card within 'open on weekend' envelope in *Home in a Box*.

77 Captioned what Catherine annotated on the timeline included in 'open second to last' in *Home in a Box*.

He is doing a course in computer science. In the hidden space under the stairs where the ceiling is slightly higher, his study area is in place.[78]

*

'I was not too worried about the time'

Figure 4.35: Image that shows 'Open on a weekday morning' envelope in Home in a Box that Catherine returned. Captured by the author in July 2021.

I have had the box for two weeks now. Each envelope I picked would interrupt me before I opened it to tell me how long it would take. 'Time needed: 30 mins', open me on a weekday morning. I was not too worried about the time. It did not matter if it said 20 minutes or an hour. It was helpful to have an idea of the time because I knew when I picked it up, like Oh, I can fit that in before I do my work, or if it is Saturday, if something does take an hour, I have got more time to do things more in-depth. It possibly helped me to choose the things where the order did not matter too much. Like 'open me on the weekend' or 'open me in the evening'. It possibly helped me to choose what day to do it because I knew I had finished my work early that day, for example. I did the activity and did not worry too much about the time.[79]

*

78 Marked in 'Hidden spaces' mapped by Catherine in *Home in a Box.*
79 Interview with Catherine, 16th August 2021.

‘That is what makes the experience of being in my home!’

OPEN ME ON A WEEKDAY MORNING
Time needed:(30)mins

I work from home more often now. So, I try to spend a bit more time on my breakfast. I got up late and spent the noon making two slices of toasted bread: sliced avocado and tomato with poached eggs. Our living room has a small corner where my little square desk is, overlooking our balcony’s pink and blue flowers. When working at home, I have breakfast at my desk. It is not ideal, but it is our only table. John is a morning person, but I am not. He would brew a cup of tea to keep me company while I had breakfast. We chatted for a while about a silly dream he had the last night. I ended up catching up on emails while eating in silence.[80]

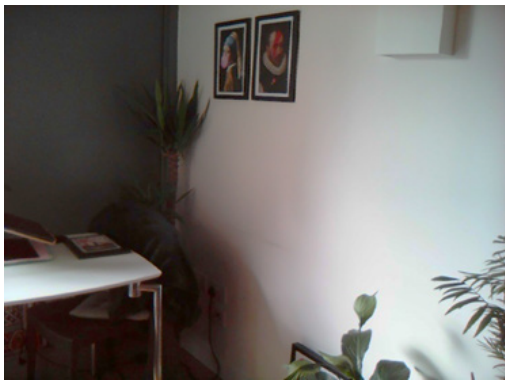


Figure 4.36:Two images captured by Catherine in July 2021, using the camera provided in the box, they show her breakfast and her desk where she had it.

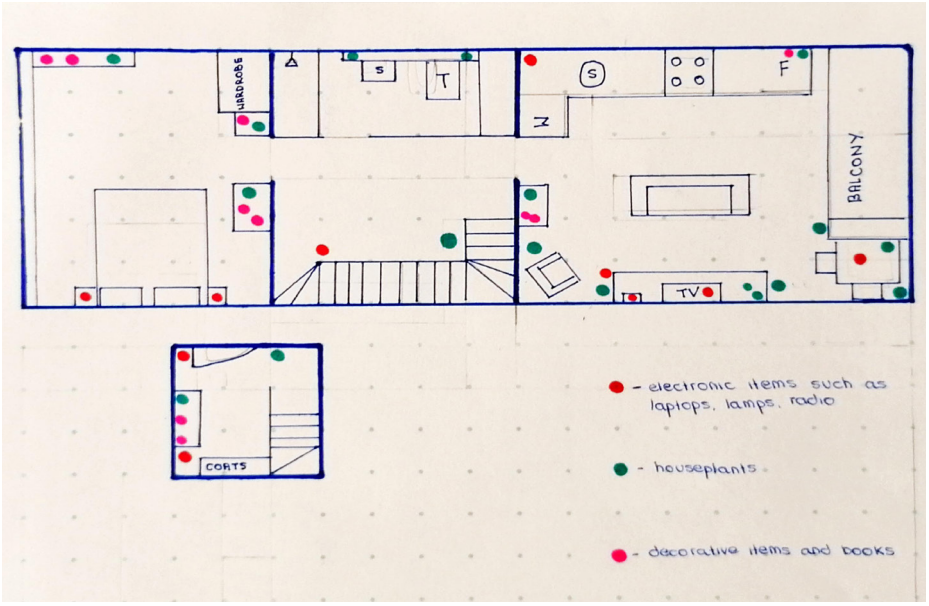
OPEN ME WHEN YOU DO LAUNDRY
Time needed:(30)mins

I often do laundry during work to break up working from home.[81]*If I need to study and there are loads of washing up or lots of mess everywhere, I will find it difficult to concentrate on the tasks that I need to do. So it is important to me to have a particular feeling and that things have a particular place. John, for example, could work like in a rubbish heap. If there is stuff piling up and things here and there, he is oblivious to what is on the sides and around him. So for him, that is not an important consideration. For me, having things like plants, things that I like to look at, and things in their place enable me to use the space I need to and get on with what I like to do.*[82]

Figure 4.37:An image captured by Catherine in July 2021, using the camera provided in the box, that show the laundry hanging in the living room.

80 Captioned what Catherine wrote in the booklet on breakfast included in ‘open on weekday’ envelope in *Home in a Box*.
81 Captioned what Catherine wrote in the booklet on laundry included in ‘open when you do laundry’ envelope in *Home in a Box*.
82 Interview with Catherine, 16th August 2021.

The laundry is usually hung in the living room. Close to the balcony. I always put it away if people come around. Possibly in the future, my home would have a permanent drying structure or heated rails more integrated into it. Many homes here were built when people did laundry by hand or used the laundrette. [83]



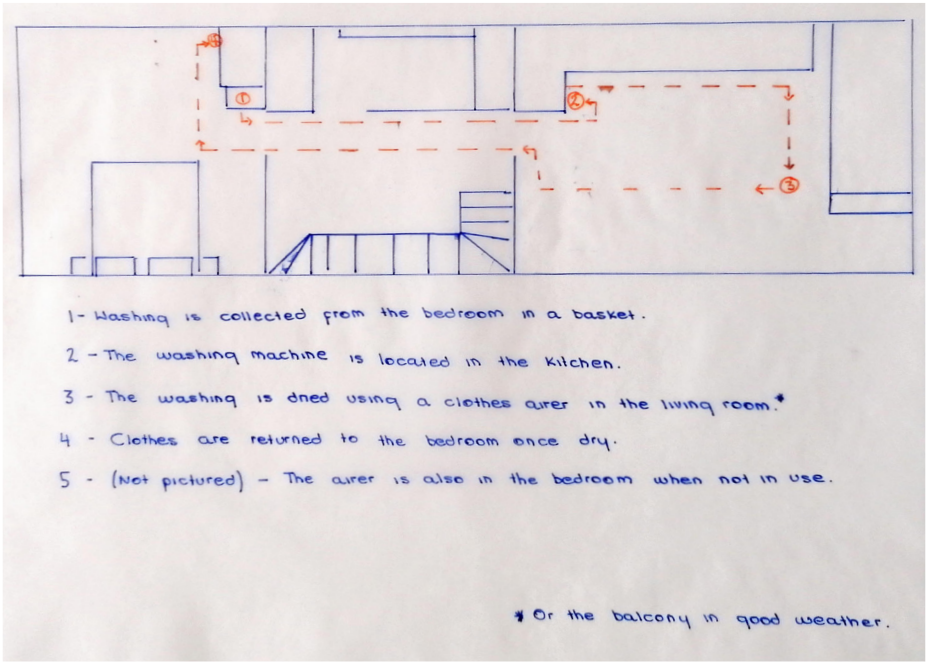


Figure 4.38:Two maps drawn by Catherine in July 2021, that show the floor plan of Catherine's home and the movement of laundry mapped on a tracing paper.

83 Captioned what Catherine wrote in the booklet on laundry included in 'open when you do laundry' envelope in *Home in a Box*.

*

We almost always have music playing on the radio, record player or via the TV. Today it was the Greatest Hits radio.[84] *In the evening, we use lamps so that the room feels cosier and there is a distinction between work and downtime.*[85] *In our flat, many things do not move and do not even belong to me. So, the sofa is not mine, and the bed is not mine. Without my technologies, my decorations, the sounds and specific things like what I eat and my washing look like, my home could be a generic floor plan of any similar flat type. In a building like Park Hill, there will be people whose flats look very similar to mine because of how the building is made and how it has been built. There will be other people in the building with a layout that looks the same.*[86]

I found a voice recorder inside one of the envelopes. The box asked me to record something that sounded like home. I recorded the song playing on the radio.[87] *I was keen to share music, sounds, and things like that. That is what makes the experience of being in my home. So, in some ways, it was not just showing what the walls are like and where things are positioned. It is about how I could convey how it feels to be in the space, what it looks like visually and how it is practically laid out. I was trying to convey what colour the light is like, whether it is relaxing like warm lights or yellow colours. There are changes that I make throughout the*

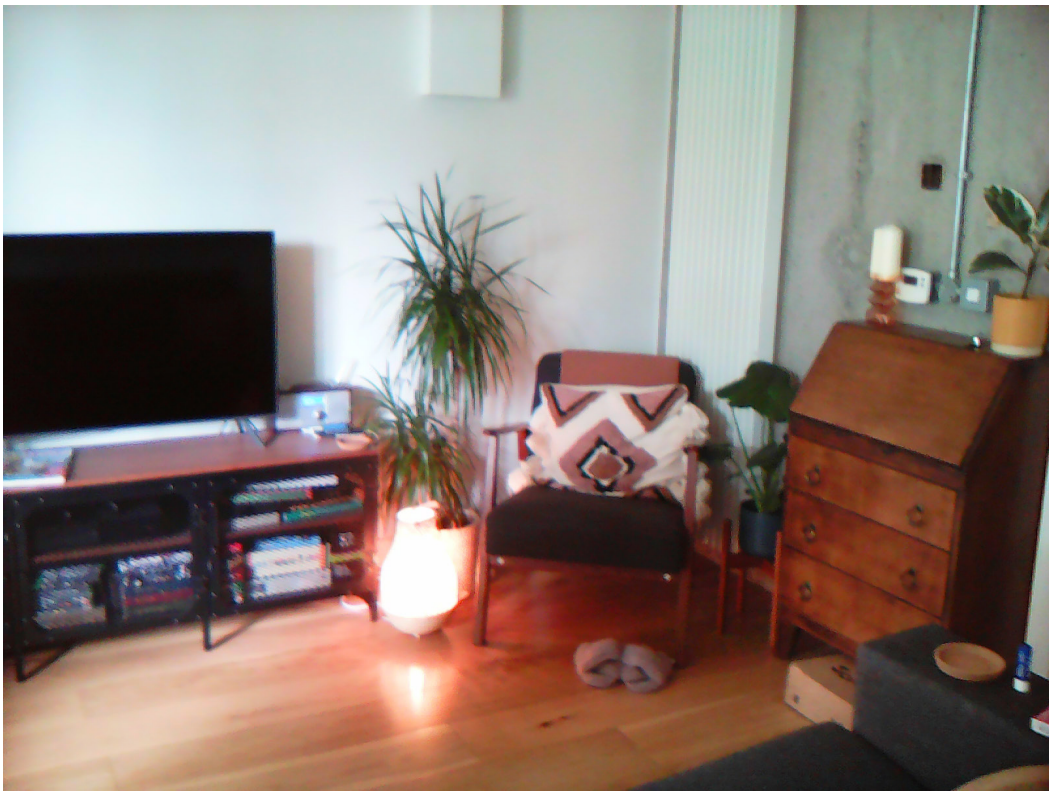


Figure 4.39: Image captured by Catherine in July 2021, using the camera provided in the box, it shows part of the atmospher of the living room in the afternoon.

84 Captioned what Catherine wrote in 'something sounds like home to you' activity in *Home in a Box.*
85 Captioned what Catherine wrote in the post card labelled with 'open on weekday evening in *Home in a Box.*
86 Interview with Catherine, 16th August 2021.
87 Captioned what Catherine wrote in 'something sounds like home to you' activity in *Home in a Box.*

day that alter how it feels. Such things as particular lamps or having certain lights on is a process that changes through the day through the seasons. In my home, I have loads of stuff, I love plants, and I love having things around. For me, art, the light and the lamps that I have, having a particular kind of feel and atmosphere, is really important in my home.[88]

*

'A very sanitised version of home!'

I've never used CAAD before. I just live in a small flat, and I would not have thought I could make use of that kind of software. I have always seen it as significant in television programmes. That is when someone has a lot of money and wants to build a house with several rooms or do something quite difficult in construction. I have always associated it with big projects that are not homely and unlike everyday houses. I like reading home magazines, and that is the context where I have seen it too. None of the images shows washing up, bins, or shoes on the floor and coats.

I met Revit through the box. I knew the software was full of walls, roofs and staircases.[89] *Revit captures the physicality, not necessarily the spirit;*[90] *a very sanitised version of home. I wonder how much it thinks about the everyday? Not just making things look lovely on the outside because I know spaces can look fantastic in software if you look at images or promo materials. In my home, I have things that have a feeling attached to them that I keep or display because they mean something. In which the software might not translate. I have dishes on my side and bins I need to take out. I think sometimes this software is like one snapshot that works while everything is clean and tidy, and there is no clutter and no elements. Situations where everything is behind closed doors.*[91]

*

'Is it going already?' John asks as I pack the box.

'I will drop it off at the Arts Tower tomorrow.'

I stared at the box for a bit and added: 'you know John, I loved the box. I think it probably captures things specific to our home that make it more homely rather than just like a house in a box. I guess trying to create a four-dimensional experience out of a 3D box.'

He smiled.

I took the packed box and put it on the side of the stairs.

I go on while filling a glass of water: 'My impression probably changed as I went through the box's envelopes. I probably became more confident as I went through it, to be more off-the-cuff.'

88 Interview with Catherine, 16th August 2021.
89 Interview with Catherine, 16th August 2021.
90 Captioned what Catherine answered to 'How Revit represents your home?' in *Home in a Box.*
91 Interview with Catherine, 16th August 2021.

I sat beside him on the sofa.

He listened: 'You remember one of the first activities was doing the floor plan. Perhaps that is what I was expecting from the box. If I think about architecture and design software, I am probably thinking about floor plans, maps, or drawings. Traditionally, architectural concepts think about walls, furniture, and the placement of things. As I went through the box, it was more about the space I was in and how I was using it rather than just depicting it in a static way. The activities sometimes had more mundane and more everyday influence.'

I added while picking up the tv's remote to turn it on, 'I really enjoyed the box, and I think I am ready to hand it back.' [92]

*

Hannah [93]

*

My parents had a big Victorian house in a small town. Though I live in student accommodation at Park Hill, I always love to spend the uni's summer holiday with family. My father brews coffee in the kitchen every morning. I sit on the stairs waiting for the box to be delivered as the warm aromatic smell fills the hallway.

'Is it Hannah Bolton? I have a parcel for her', the postman asks at the front door.

'Yes, it is me!'

'Can you sign here, please?' He reached out and handed me a box with a small electronic device to sign.

'Thank you, have a good day!' I smiled at him while moving my eyes to the big box I had just got.

'Well, now I have something fun to do over the summer!', I thought to myself as I sat at the wooden dining table to unwrap the box.

*

Here and there.

In my parent's house, my bedroom is much like a small version of my flat in Park Hill. Doing the box was about sitting there and almost visualising my flat in my head. I know many things do not apply here at home, I mean at my parents, but they apply there (in Park Hill). Many things were relatively easy to do while I was away, like the bits about my breakfast or the latest bit about furniture I bought. I would forget to do some parts, so I kept going back to rereading through them

92 Interview with Catherine, 16th August 2021.

93 Hannah is the pseudonym I use to indicate inhabitant 3, I keep referring to her as such till the end of the text.

and adding more. Not being there was interesting because it made me think about things to do with my flat that I had never thought about. I live there, I put my stuff in specific ways there, and that's it. I never realised I do not even own a TV, for example![94]

*

OPEN ME SECOND
Time needed:(35)mins

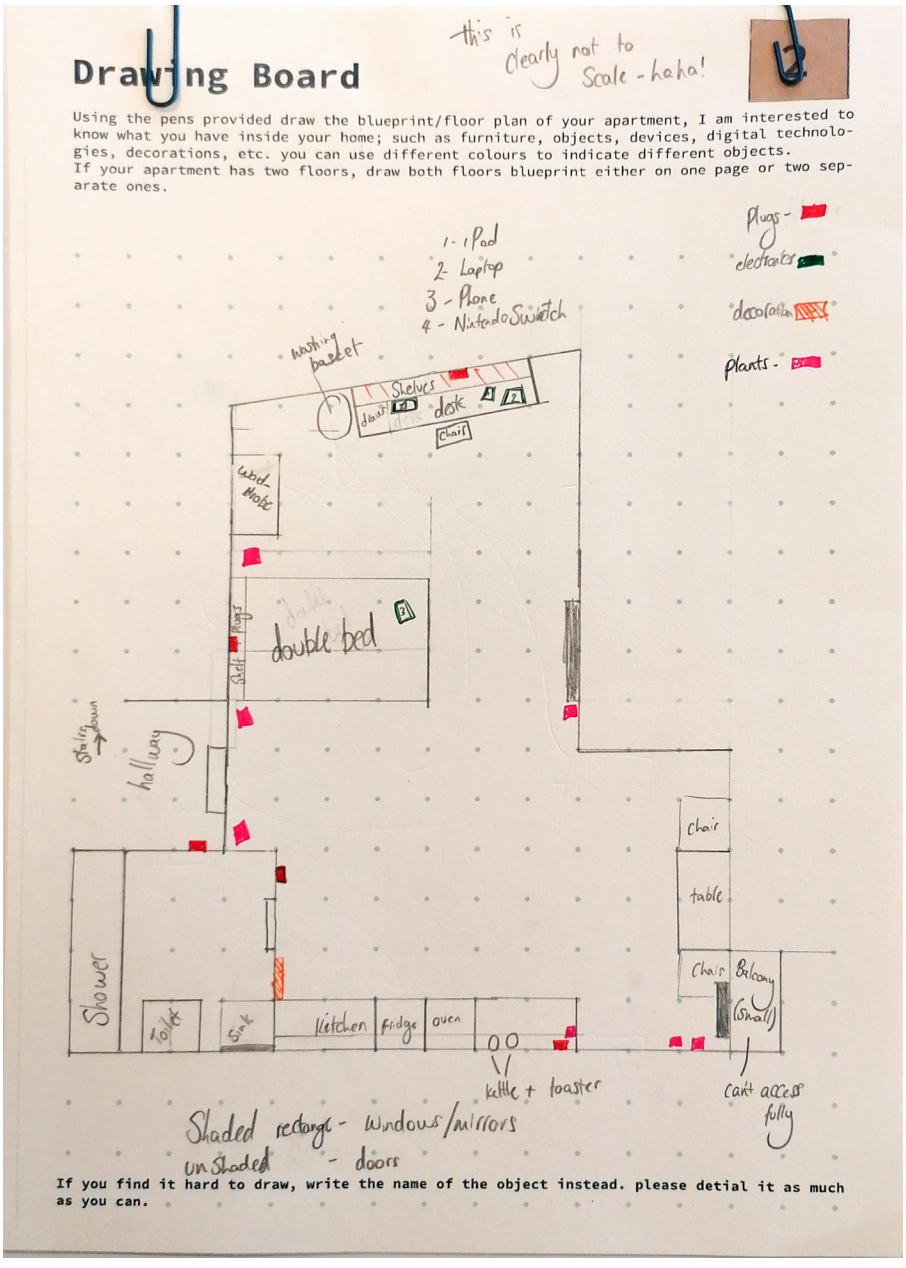


Figure 4.40: A floorplan drawn by Hannah in July-August 2021, that shows top view of her flat in Park Hill.

94 Interview with Hannah, 22nd September 2021.

'Dad, look, I have drawn my flat.'

'Wow, how have you done that in 10 minutes from memory?'

'Dad, I was stuck there in a lockdown. I had nothing else except to look at the walls!'[95]

*

I liked the drawing activity where I had to do a bird's eye view of my flat and then put the tracing paper on top of that, and add to it. It was because it reminded me of being in maths at school, and that was the only bit of maths that I was good at, drawing with a ruler and then adding all the little details. I did the drawing at home and literally sat at my desk at (my parents') home and just had my eyes shot. I could almost picture myself lying in bed and seeing myself from a bird's eye. I started with the wonky wall at the top because it annoys me. Whatever someone asks me about my flat. I tell them I have a wonky blue triangle, which is one thing I do not like about my flat.[96]

*

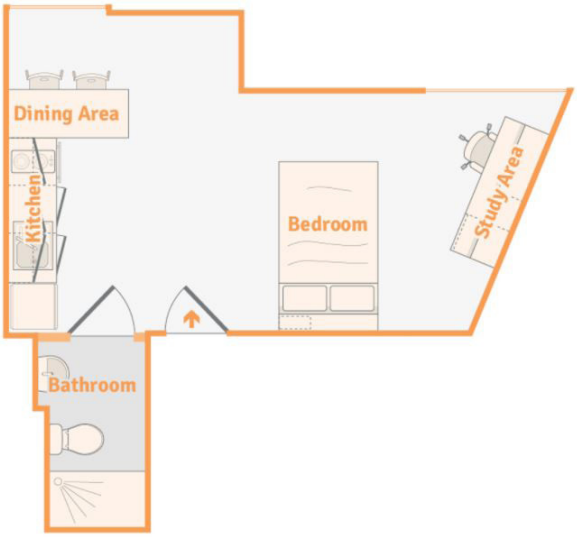


Figure 4.41:Floor plan of a classic studio at Béton House Student Accommodation in Park Hill, as appeard on their website in September 2021. https://betonhouse.co.uk

'It made me realise how much things in my flat had changed!'

While I did the box, it was interesting to see how far my flat has come along. From what I saw, especially last year, I don't know if that was more because we were all essentially stuck at home. As a student, it made me realise how much things in my flat had changed. I could go back to photos when I first moved in versus now. It was a strange feeling because I was just like, okay, my flat has been the same

95 Based on a real story Hannah told me in the interview dated 22nd September 2021.
96 Interview with Hannah, 22nd September 2021.

since the day I moved in, and it turns out it has not. It was a bit scary, as I was overwhelmed at how much my flat had changed since I was in it.[97]

(1)

'Revit represents home in a sellable version with no personality'

I remember seeing photos of my studio flat before moving in, on the Beton House website.[98] *I knew I wanted to live alone and did not want a flatmate. The way it was advertised to me when I paid for it seemed a lot smaller, with no real personality in the photos, showing very basic things. The floor plan on the website looked very small, but it felt big enough for me. It does not compare to what I have now. I remember walking in the first day and being like, oh no, this is huge! The flat did not look appealing, unlike when I first saw it on the website. The floorplan is different from mine; my bed is not as close to my desk, the wardrobe was not there, it came when I moved in, and the dining area is different. It has been like a change of plan for the architects or the people decorating it because it hasn't got a breakfast bar. It has a table with a chair and a stall. I think it does lack personality, which makes it look boring.*[99]

I feel Revit represents home in a sellable version, as more basic with no personality, to make it more marketable.[100] *Many renderings, like the floor plan of that flat shown on the website, don't look inviting and don't make me want to spend a hundred and seventy pounds a week to live there. It would just make somewhere more appealing. For example, my friends showed me the floor plans of a house they were buying. My reaction was that I would not want to buy that. I think it is because I am a marketing student. For me, it needs a personality for me, to sell it to me, something that makes it feel more tailored to the individual or that specific family or group of people. In other words, to make it more than just generic images, they can sell to anyone because anyone can live there. Like in Revit, architects left homes more open for inhabitants' interpretation to make them their own instead of putting in the hard work.*[101]

97 Interview with Hannah, 22nd September 2021.

98 Béton House, 'Béton House | Student Accommodation Sheffield', *Béton House*, 2021 <https://beton-house.co.uk/> [accessed 22 September 2021].

99 Interview with Hannah, 22nd September 2021.

100 Captioned Hannah's answer to ' how Revit represents your home? ' in Open me last' envelope in *Home in a Box.*

101 Interview with Hannah, 22nd September 2021.

(2)

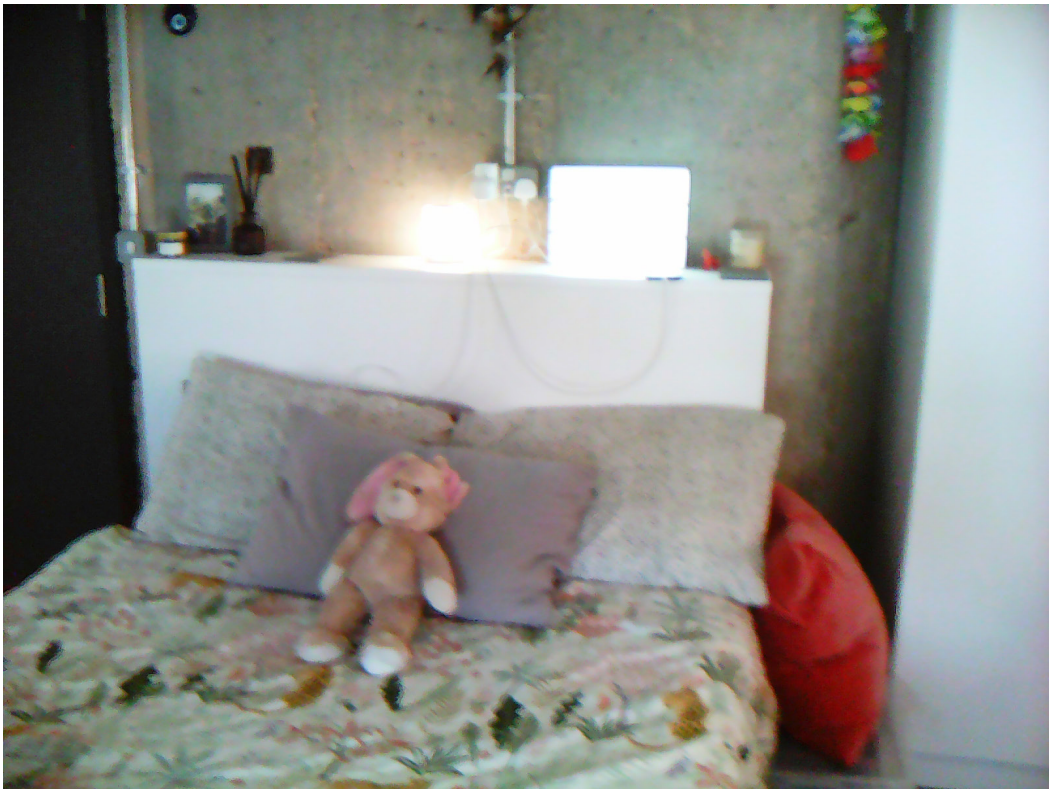


Figure 4.42: Image captured by Hannah in July-August 2021, using the camera provided in the box, that shows the soft light over her bed.

When I first moved, I felt like I was in a hospital because the main lights were so bright, and I did not use them over time. Besides the wonky wall, what annoyed me in the flat was that I could not have a full-sized oven, especially now that I don't have takeaways or pasta. I can cook a whole roast on weekends, but I have to deal with a small oven to do it! In student accommodations, architects don't consider how different students live, as if they can live anywhere! They think they will pay to live here as long it is convenient and affordable. Like the photos on the website, architects think they don't need to add details to sell the flat, and it would almost just sell itself.

I built my room in an IKEA room planner when I moved in. I wanted to build a room that looked like my flat's actual design because they had a virtual tour on the accommodation website, but I was not too fond of it. It was not helpful because the studio they advertised on the website was nothing like mine. I wanted to get a new bed and a storage unit from IKEA and see how it looked. In the app, you can only put in certain furniture styles; it does not match here because it is not IKEA. I just did it as a visual representation, but even then, I feel you struggle to make it look quite homely on the app. It is almost like a cartoon. It is virtual and cannot be homely because it is not real! I also tried the one with Augmented Reality (AR) features to see how the bed would look. It had a few glitches, and the bed looked funny, which annoyed me. I just bought it and hoped for the best. [102]

102 Interview with Hannah, 22nd September 2021.

(3)

Figure 4.43: Image captured by Hannah in July-August 2021, using the camera provided in the box, that shows Boston fern, a plant she bought.

The last thing I bought in my flat was this Boston fern, a small plant that will look nice above my bed and is easy to care for. [103] *I have a habit of accidentally buying huge plants online. I once bought a massive plant. It has got to go in the living room because it cannot fit in my bedroom at my parent's home.* [104] *After that, I used a CAAD tool provided by a website selling plants.* [105] *It helps me see the size of the plants they offer, which is useful. I like how you can see the plant sitting on your desk, for example. I can put it exactly where I would like to see it. If it looks nice, then I will buy it!.* [106]

*

103 Captioned what Hannah wrote on the postcard included in 'Open me on weekday morning' envelope in *Home in a Box.*

104 Interview with Hannah, 22nd September 2021.

105 Captioned Hannah's answer for ' Have you ever used CAAD tool at home?' in a booklet included in 'Open me first' envelope in *Home in a Box.*

106 Interview with Hannah, 22nd September 2021.

OPEN ME ANYTIME

Time needed:(60)mins.

'When he walks in the door, my cleaning goes out the window!'

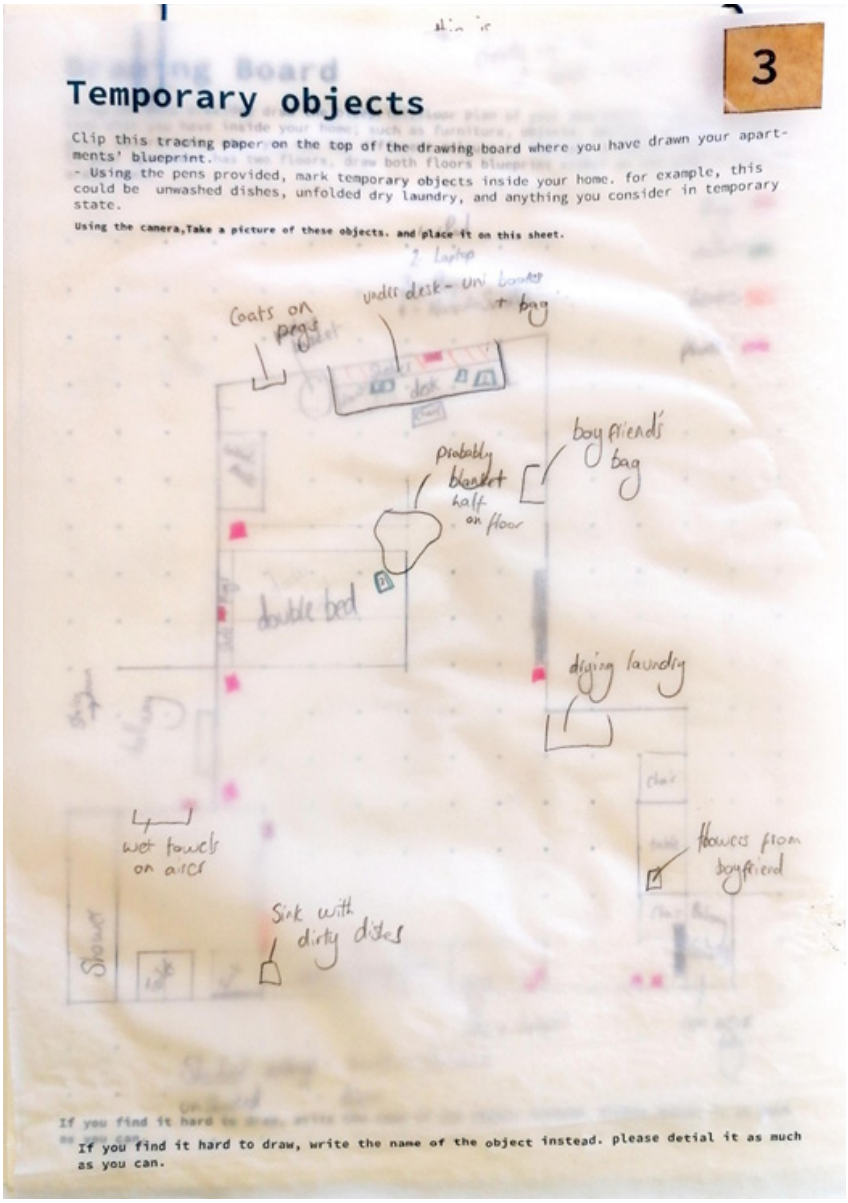


Figure 4.44: Map drawn by Hannah in July-August 2021, that shows different temporary objects in her flat.

In my flat in Park Hill, I live alone. It feels calm, like my own little bubble. However, it can get lonely, especially in lockdown! My boyfriend Liam works in another city. The flat became messier, busier, and chaotic when he came to stay.[107] *He always leaves socks on the floor! When he walks in the door, my cleaning goes out the window. Especially on Fridays when he comes over after work, and it is just a*

107 Captioned what Hannah wrote in 'Family at home' post card within 'open on weekend' envelope in *Home in a Box*.

mess. On Sunday afternoon, my flat is nice and smells amazing.[108] *It is usually the washing-up day, and I go to bed on that day feeling destressed, satisfied and calm that all is sorted for the week.*[109] *The smell of laundry tablets always reminds me of home, it reminds me of comfort.*[110] *When it gets to midweek, I get stressed, especially when I am at uni. And all of a sudden, bits of paper and stuff are lying everywhere even if I have tidied it on Sunday night.*[111]

*

Before I returned the box, I looked through it. I told myself, 'Yeah, this is like me in a box'. It talks about plants a lot, which is all I do. It makes me look like I know what I am doing. And as a student, it reflects what I am guessing most students' flats would be like, but with my little spin on stuff. You can read it easily in the box! Especially when Liam comes to stay, my flat is suddenly a mess.[112]

I looked back on what I had done in the box, and it made me laugh because Liam was not too happy about it.

Liam's nose wrinkled while looking at the box. 'Are you making me sound like a slob?'

'No,' I said while laughing. 'You leave your towel and your socks on the floor!' I added while putting all envelopes back in the box.[113]

*

108 Interview with Hannah, 22nd September 2021.

109 Captioned Hannah answer to 'How cleaning makes you feel?' within 'open me when you do laundry' envelope in *Home in a Box*.

110 Hannah added laundry tablets to the smelling jar added to the box, and this is how she describes 'Something smells like home' within 'open me anytime' envelope in *Home in a Box*.

111 Interview with Hannah, 22nd September 2021.

112 Interview with Hannah, 22nd September 2021.

113 Based on a real story Hannah told me in the interview, dated 22nd September 2021.

June[114]

*

Catherine and I met in the graduate students' main hall. She was typing on her laptop and drinking coffee in a paper cup when I was exploring the building. Catherine was the first person I met at the beginning of my PhD course. She took me on tour, showing me everything I needed to know as a freshly starting researcher. Since then, we have become friends. We regularly drink tea at the café to talk about PhDs and everything else!

Catherine told me a lot about a box she got with various activities she had to do at home. It is part of a PhD research in architecture. She tried to convince me to participate. I said yes. I was interested—I live in Park Hill and have always been around architects! One day Catherine and I had lunch at the same café where we usually meet. She asked Niveen to come with a box for me. I got the box that day, and through the three weeks it spent with me, it was fun to look at my home and maybe not in different ways but more specific ways, focusing on the different aspects of it. [115]

*

Figure 4.45:Photo captured by June in September-October 2021 ,using the camera provided in the box, that shows spider and monstera plants over her bookshelf.

114 June is the pseudonym I use to indicate inhabitant 4, I keep referring to her as such till the end of the text.

115 Interview with June, 14th October 2021.

When I moved into the flat, there was already a bed, a clothes rack, a table, five stools, a sofa bed, a chair that folds into a single mattress and a chest of drawers. Home had many pieces of furniture because my mom moved in first. I moved in later, in September 2020. Bonny, my cat, came two months later. Little by little, the flat began to fill up. I got a big tub of worms for composting on the balcony, and plants gradually settled around the flat. A frondy plant on the upstairs entrance window, while spider and monstera took up places in my bedroom. New shelves came later. I got one twice the height of the existing one to finally take all the books off pilled on the floor and the top of the chest drawers. [116]

*

OPEN ME FIRST
Time needed:(30)mins

'I used Sketchup as a child!'

My parents both are architects. In 2005, they had a practice on the ground floor of our house. Just one office, it was not a big one. They had to get on the computers in the house. [117] *I used Sketchup as a child to draw imagining spaces, mostly using the water texture to make the walls, floors and ceilings look like they were made of water.* [118] *I was probably six or seven, so it was quite an old version of SketchUp. It is way more sophisticated now. At that time, I thought I was doing the same job my parents did in the office. In SketchUp, I enjoyed making the same setup over and over again. I did a square building. I make the walls watery, and you can go inside and see it from inside, putting people and trees around. My favourite thing was to make a hole in the ground and then put water over it so that you could stand in the swimming pool and look up and see the people you had put up outside the home. I guess it was like seeing the thing you made from different perspectives and through different surfaces.* [119]

Around four years later, we used CAD/CAM at school. We drew things like clocks and vases that would be sent to an acrylic-printing machine. It cut out flat shapes we then slotted together. [120] *It was a laser printer. We designed the 2d shapes, and I cannot remember the name of the program we used. Then we slotted them together to make a 3d structure. We probably did that twice over two years. I imagine a few weeks were spent on the program. Then a few weeks were spent putting it together physically and sanding things down. I found that quite frustrating. You are just cutting things out of acrylic. For me, it looked like a complicated program that's going to be able to make you whatever you like. But it is just cutting flat pieces. A friend said she used it in design and technology lessons at the same age.* [121]

116 Captioned what June annotated on the timeline included in 'open second to last' in *Home in a Box*.
117 Interview with June, 14th October 2021.
118 Captioned June's answer to 'Have you ever used CAAD?' question asked in the booklet in 'open me first' envelope in *Home in a Box.* Which she reflected on later in the interview.
119 Interview with June, 14th October 2021.
120 Captioned June's answer to 'Have you ever used CAAD?' question asked in the booklet in 'open me first' envelope in *Home in a Box.* Which she reflected on later in the interview dated 14th October 2021.
121 Interview with June, 14th October 2021..

*

My mum stays here a few nights a week. This changes my awareness of how many chairs there are at the table; there are not enough nice ones! When she is here, we always have breakfast together in the morning. I sleep in my bedroom at night, and she folds the sofa into a bed. [122] *The rest of the week, I have my breakfast alone in the kitchen. The table I use is always messy because I use it for most things I do at home. I always have a cup of earl grey tea with oat milk while going on my phone to look at Instagram or text my friends. Sometimes, I do a lesson on Duolingo. I like my tea dark with little milk, in a big mug, so it is good for a cup of tea with breakfast! I usually have toast with vegan butter and marmite or honey, but today it is Challah toast I made two days ago. The challah is a fun design. It is made by plaiting six strands of dough together. I had to unplait it first because I thought I was doing it wrong! The shape of the loaf has to be right to get cooked evenly. I made it on Sunday night and Monday morning. It is a very soft bread; today, it was a little stale, so I toasted it a little bit.*[123]

Figure 4.46:Photo captured by June in September-October 2021 ,using the camera provided in the box, that shows her breakfast.

*

122 Captioned what June wrote in 'Family at home' post card within 'open on weekend' envelope in *Home in a Box*.

123 Captioned what June wrote about the breakfast she had in the booklet added in 'Open in a weekday morning' envelope in *Home in a Box*.

'I found it a difficult task, and I did not feel that this made me understand my home!'

OPEN ME SECOND
Time needed:(35)mins

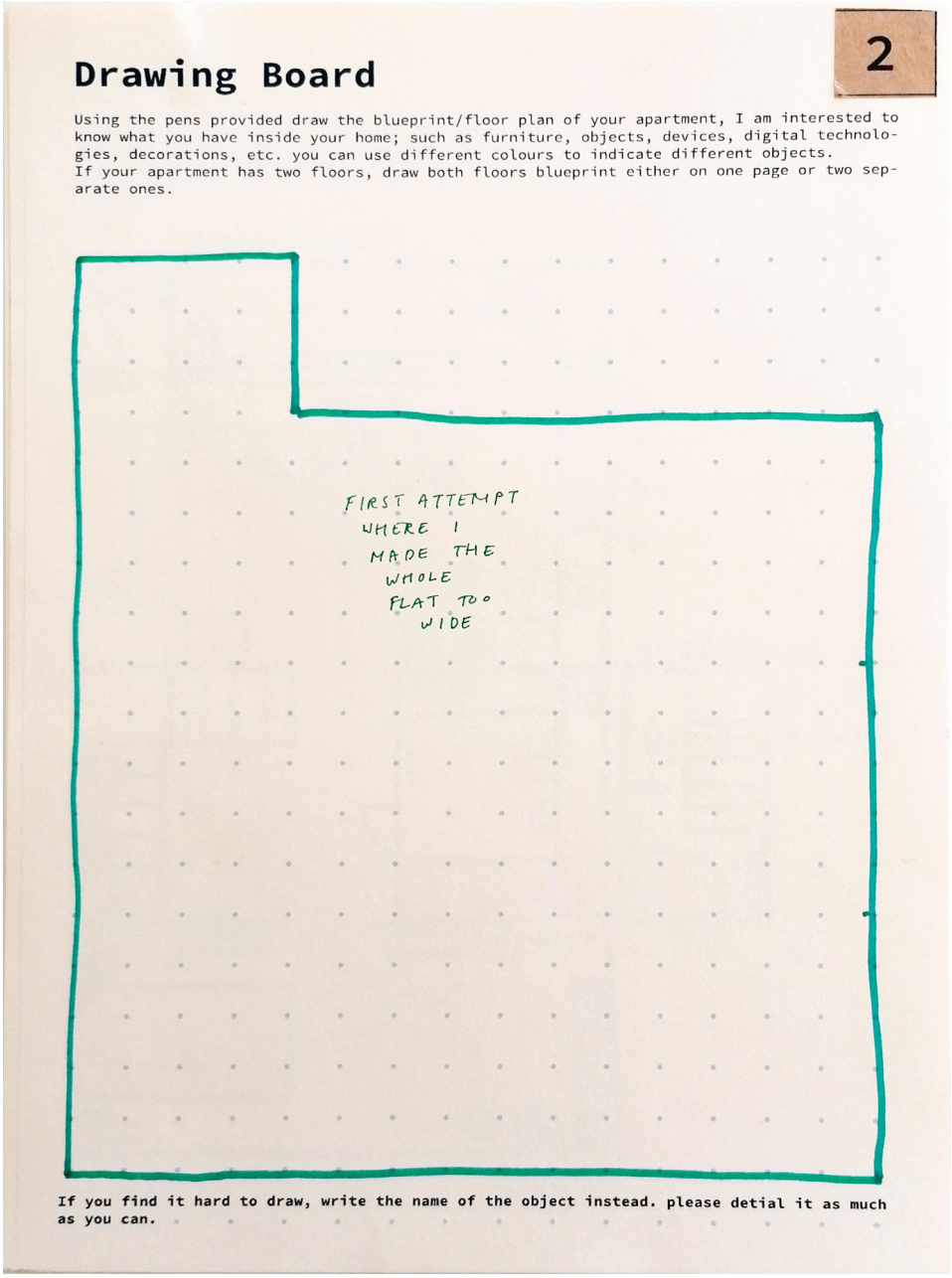


Figure 4.47:June's first attempt to draw her flat's floor plan, done in September-October 2021.

found the plan hard to draw. I was sitting at my table drawing it. I would get things wrong, like, within my line of vision, I would look up and be like: 'No, I can see that it is not right!' I just found it hard to translate that onto paper. Even though I have seen plans before, I know what plans are and how they work. I remember that I drew it in the early evening. The sun was going down, not in a nice song-sassy way, but it was getting dark. I was feeling tired. I do not remember if the washing machine was on. I feel I was not very connected to my home while

drawing it. I asked myself: 'how does this actually work? Let's try to get it down!' I always found spatial tasks difficult and did not feel that this made me understand my home. The plan probably took me a lot longer than the other tasks in the box. In the first failed attempt to draw my flat, I thought I would use all the space on the paper. Then I realised that it was like making everything way wider than it was long. This is just the shape of the kitchen, and I still need a whole rest for the plan. I added my first attempt drawing to the box. I thought it would be sneaky to throw it away. [124]

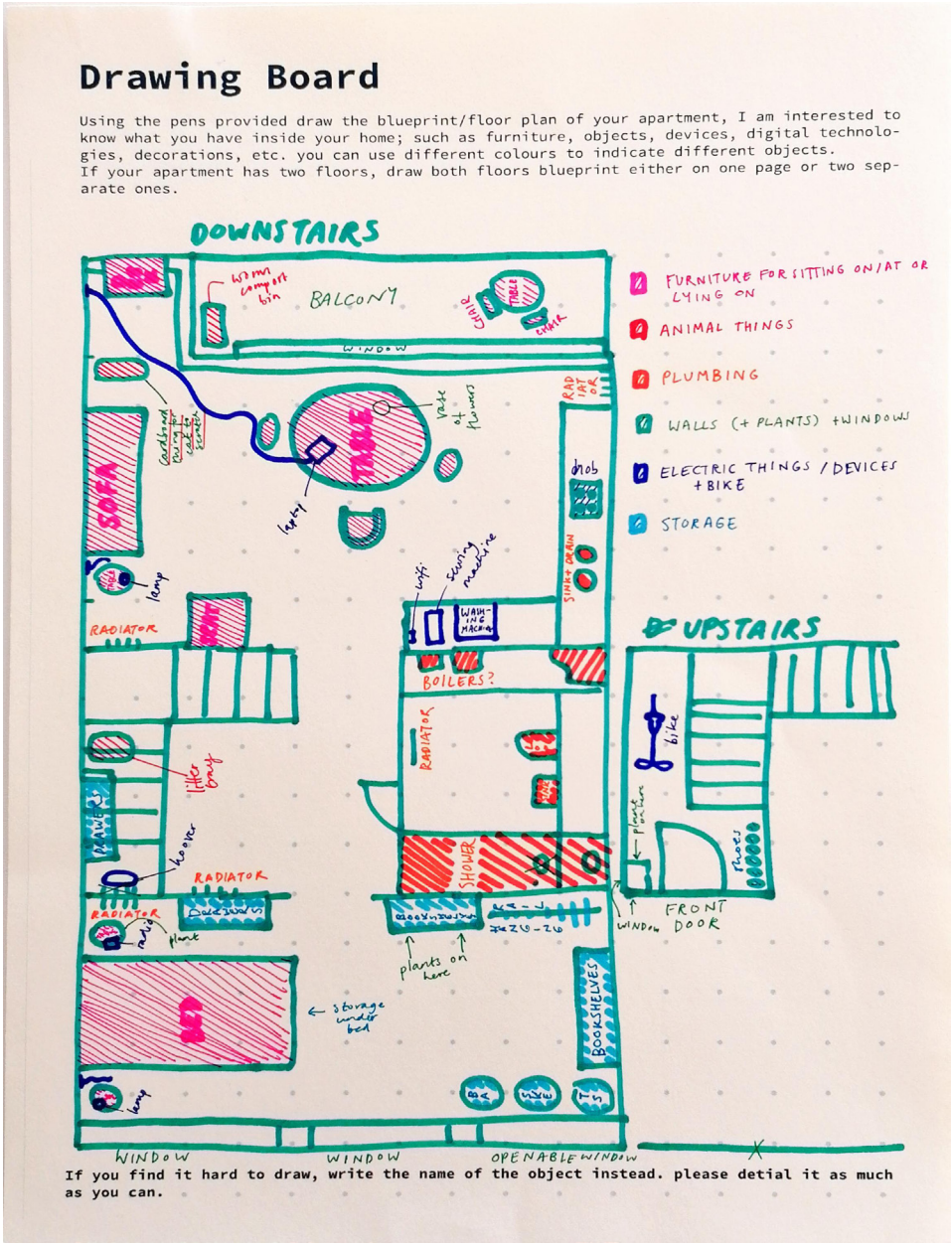


Figure 4.48:June's second attempt to draw her flat's floor plan, done in September-October 2021.

In my second attempt, I drew all the walls first. Everything in the kind of this turquoise colour I drew first, and then I drew everything else after that. I think that was the furniture and then was the storage. After that, I could see everything else around those things.

124 Interview with June, 14th October 2021.

I outlined the whole of the downstairs floor. I did that while sitting at the table on the chair. It is looking towards the window, which was not helpful because that is not where most of my life is. I was counting the dots, or half of it is the kitchen. About half of it is the hallway and the bedroom and drew the kitchen burst on the balcony. Then I walked into my room, looked around, and saw what it looked like and how everything fitted together. But I did not take the plan. I just went and looked and then came back to the table and drew it from memory. I did not go into the bathroom and look at it because I felt like I knew it well, but then I did get so confused about how the shower worked and how far back it went. I did not go and check. I changed the stairs. I looked up and could not make sense of how well I could draw it in a way to get it into what I had already drawn, so I decided I had made a mistake there, but that was how I saw it. It is going to carry on like this! The cord disrupted the flow of the room, so I already noticed it much more than I noticed the completely wrong stairs. Which I got very wrong. [125]

*

'The mess and clutter are important to my home!'

Figure 4.49:Photo captured by June in September-October 2021 ,using the camera provided in the box, that shows Home in a Box on her bed.

I sat on my bed at night, looking at what I had done through the box envelopes. I think it has got quite a lot of my home. It gives little scraps of things around the home, like examples of the clutter and things—I think I showed loads and loads of that!

The mess and clutter are important to my home. That is what makes it a space

125 Interview with June, 14th October 2021.

that I live in rather than a space that I visit, like when you go to a hotel, there is no clutter. However, you do not feel like you live there, even if you stay there for a long time. Something about personal objects being somewhere would make it more homely. I think those objects are emotional ties to your home. I think you could not fill your home with random clutter or objects you have never seen before because it would feel like someone else's home. It would be like you are entering a space that was not yours. [126]

*

My cat, Bonny, likes my mess too. She likes the suitcase under my bed and scratching cardboard boxes (including Home in a box, I could not stop her). She loves my laptop. If I am watching something and it is on the table, she will sit on the keyboard![127] *In my home, I usually do cleaning on weekends or Mondays. Usually, in the morning, after breakfast and having a shower. My pink shampoo bar makes the bathroom smell nice when I shower! For me, It smells like home!*[128] *I usually hoover after that, but sometimes I don't mop until the afternoon. The hoovering makes me feel hot and tired because it is not efficient. I hate it when I pull the hoover too far, and the plug comes out of the socket! My cat does not like the sound of the hoover either! I feel guilty seeing her when I use it.*[129]

Figure 4.50:Photo captured by June in September-October 2021 ,using the camera provided in the box, that shows her cat, Bonney.

126 Interview with June, 14th October 2021.

127 Captioned June's answer to 'Do you have a pet?' within 'open on weekend' envelope in *Home in a Box*. (emphasis added)

128 June added some of the shampoo bar to the smelling jar added to the box, and this is how she describes 'Something smells like home' within 'open me anytime' envelope in *Home in a Box*.

129 Captioned what June wrote about cleaning home within 'Open me when you do the laundry' envelope in *Home in a Box*.

*

'Revit represents my home empty!'

Architects think I live in a very tidy way at home, while Revit represents it as empty and unlived in![130] I am sure that the relationship between both is a symbiotic one. I think what computers produce are not emotional formats. What you can make on a computer the most easily will be an unemotional image. Dealing with flat planes is much easier on a computer than doing all sorts of little details and 3d sculptures that might help you make your home. I guess it is not Revit's fault. Every surface is obviously going to be completely clear in the produced drawings. Even the hand-drawn plan also needs clean lines and empty spaces for architects to work. What Revit is trying to do is make an empty space for someone to imagine their own life rather than see someone else's life. Suppose I was given a plan that had someone else's stuff. I would not want to move in there. Why would I do it if someone else is already there? So it is about creating a space where someone can project their stuff.

There will not be an option on Revit like "add clutter". Press this button to fill up the home. Those are all personal things that you add to your home. Because I think it's trying, making a blank slate to sell to people. You do not want to fill that blank slate with stuff someone else already has. Because I think making it representative of my home would make it less useful for the estate agents. I think Revit helps architects make a beautiful space and to be able to see the mistakes they might be making. It is a way to represent an image of home to people who might want to buy it. It is good for the business but makes it like a commodity, and I do not know what the alternative would be, maybe giving someone one of the 'Home in a box' boxes![131]

*

In the same café, I sat on a square laminated table, waiting for Catherine, to have lunch together. My scratched box sat on the third chair it had.

Cathrine smiled when she saw the box. Her eyes sparkled, 'You brought it with you!'

'Yes! I am going to hand it over to Niveen this afternoon', I excitedly said.

'Did you like it?' she asked.

' I liked the camera! It is the best aspect. I ran out of photos!' I replied.

'Really! I did not use them all.' Catherine laughed.

'I did not open it straight away. I think it was not until the third or fourth envelope. I liked that addition. I wanted to show what things look like by sticking those

130 Captioned June's answer to 'How do architects think about the way you live at home?' and 'How does Revit represent your home?' asked in 'Open me at Last' envelope in *Home in a Box*.

131 Interview with June, 14th October 2021.

Figure 4.51: Image captured by the author in October 2021, that shows Bonney's scratches on Home in a Box after it returned from June's flat in Park Hill.

pictures onto the plan. I think it kind of prompts you to be able to write about the things that you want to write about!'.

Cathrine continued listening to me while chewing her sandwich.

'I liked using many different senses, like the smell jar and the voice recorder. Maybe it would have been nice to incorporate those more or earlier. The things Revit did not manage to capture in the last big picture, the light and the sounds, I would not have remembered to include them in the box. I felt like the box prompted me to do that. I think Niveen can probably get a good image of what my home looks and feels like!'. [132]

*

132 Interview with June, 14th October 2021.

Conclusion

I designed Home in a Box to re-enact CAAD at home, juxtapose it with domestic spatialities and temporalities, and incite ethical and political questions about the inhabitant's CAAD-home imaginaries.[133] *Home in a Box's* arrival at inhabitants' homes interrupted the domestic ecology. It allowed a meaningful engagement that elicited narratives about home and CAAD, an understanding architectural practices often lack. In this section, I offered fictionalised narratives as an invitation to reconnect with 'other' CAAD-home imaginaries. I explored divergent spatial, temporal and digital domestic engagements incited by inhabitants' interactions with *Home in a Box*. The stories of Hugh, Catherine, Hannah and June present diverse answers to questions about what CAAD is and what home is. They argue for the emergence of 'other' modes of engagement and reclaim inhabitants' agency in formulating CAAD-home knowledge.

I used roman à clef as a critical and embodied writing practice. It configures writing as an ethical and political practice that stays attentive to inhabitants' positions, often depicted as the 'less knowledgeable other' in architectural practices. Roman à clef represents a *careful* attempt to resituate temporalities of inhabitants' engagements with home, CAAD and the box by filling the voids imaginatively. The stories told emerge with attention to inhabitants' sensitivity to how they relate to architectural power structures that produce representations of their domestic spaces. This section highlights home as a political site that undertakes a close narrative of inhabitants as the marginal 'other'. They are allowed to perform a role that speaks about the home's floor plans, three-dimensional models and architectural software to interpret home-CAAD encounters in the context of inhabitants. It extends to the critique of taken-for-granted architectural cultures and challenges CAAD understanding as a professional-only territory.

Inhabitants' narratives drew attention to the specificity of doing the box as a practice always entangled with their everyday lives and objects. Inhabitants' CAAD-home imaginaries provoked by the box are relational, situated and embodied. They cannot be understood in isolation of the specificity of each site/ home at which it arrived. The situatedness of doing the box at home is crucial to resist productive modes of architectural practices informed by using CAAD as they produce what Inhabitants described as '*empty*, '*basic*', and '*sellable/marketable*' versions of homes. The engagement with *Home in a Box* allowed an embodied perspective of the CAAD-home situation from within the inhabitants' homes, instead of authoritative ones in architectural design cultures. It elicited home material, sensory and digital environments and movements absent in architects' digital portrayals of home. It spanned a diversity of temporalities, uncovering inhabitants' domestic contingencies and CAAD encounters over time.

Inhabitants' engagement with Home in a Box's different activities is embodied in sharing knowledge about CAAD through booklets and producing collective knowledge about CAAD and home through interaction with the recording objects in the box (like camera, voice recording, postcards and other objects). Inhabitants' interaction with recording devices included in the box, like the camera and voice recorder, through involvement in the temporality of the experience of taking a photo, drawing a map or recording a sound allowed for a slow temporal encounter with different domestic timelines, material objects and sensory environments at home that architects' representations produced using CAAD often lack. The Images and drawings they produced using the box's recording objects are full of everyday dynamics (like laundry, dishes, and other daily clutter), engaging with the home's day-to-day activities and objects. They create

133 See section subtitled: Home in a Box as an ethnographic design object in chapter three.

visual and rhetorical disruptions to how CAAD is usually imagined and represented in architectural practices as efficient tools to produce people's homes as empty spaces. Their visuals became a constitutive part of inhabitants' narratives that carefully/ slowly discuss their understanding of home and CAAD tools and speculation of another more caring CAAD.

At the end of this section, I ask once more, what if inhabitants created the technologies used to design homes? What could and would they be? *Home in a Box* started as a speculative project that explores alternative imaginaries of CAAD from within inhabitants' homes through the ethical and political capacities of the box's engagement. Hugh, Catherine, Hannah, and June's stories highlight CAAD's tendency in representing home as an abstract entity that lacks everyday personal objects, movements and embodied temporalities. Evident in June's imagination of a Revit button that adds clutter to empty homes. Her speculation challenges the productive modes of architectural practices that eliminate inhabitants as vital co-producers of home. Even if Revit reclaims the capacity to produce unhomely spaces full of objects, the professional authority will shift to everyday objects. Revit will remain a space that belongs to the more knowledgeable professional and materialises architects' overpower on CAAD and domesticity.

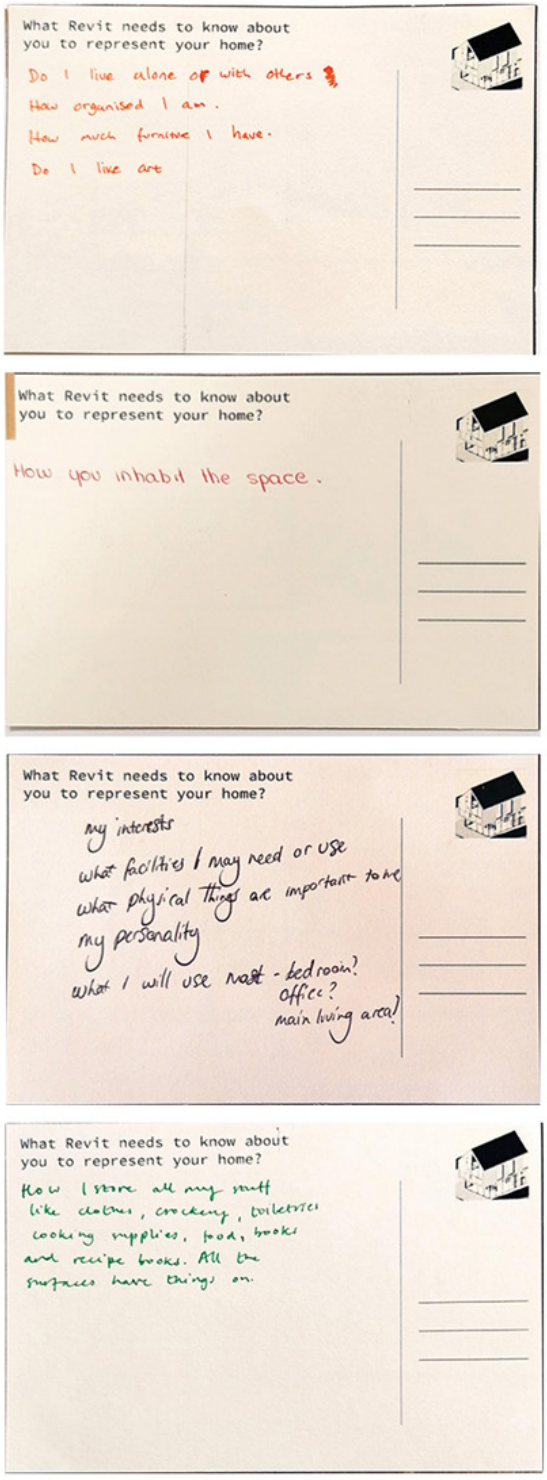


Figure 4.52: Image that shows Hugh, Catherine, Hannah,and June's answers on 'what Revit needs to know about you to represent your home?' postcard included in Home in a Box, captured by author between June-October 2021.

The biographical multi-narrative in this section suggests that 'other' more *caring* ways of using CAAD are possible by being attentive to inhabitants' meaningful engagement through involvement in various timelines and staying close to the web of the relation, emotions, objects, and different materialities that tie inhabitants to their homes spatially and temporally. It calls for activating the capacity to critique architectural CAAD practices that produce more of an '*empty shell*' and a '*physical*' and '*structural*' portrayal of homes with *'no personality'*, as inhabitants described.[134] Through *Home in a Box*, inhabitants engaged with different architectural representations either through

134 According to interviews with four Park Hill inhabitants.

booklets and activities included in the box. Inhabitants usually found CAAD representations '*disconnected*' and felt '*not on the same page'.* However, a more caring CAAD does not suggest eliminating the current practices in architecture but calls for affective, ethical and political engagement in the form of '*moments of exchange'* as June described, in which inhabitants reclaim their agency as co-producers of home.[135] As Catherine suggests, '*It is like the architect does the first part of the journey, and then inhabitants do the second part, and I think maybe that could be combined in some way*'.[136]

135 Interview with June, 14th October 2021.

136 Interview with Catherine, 16th August 2021.

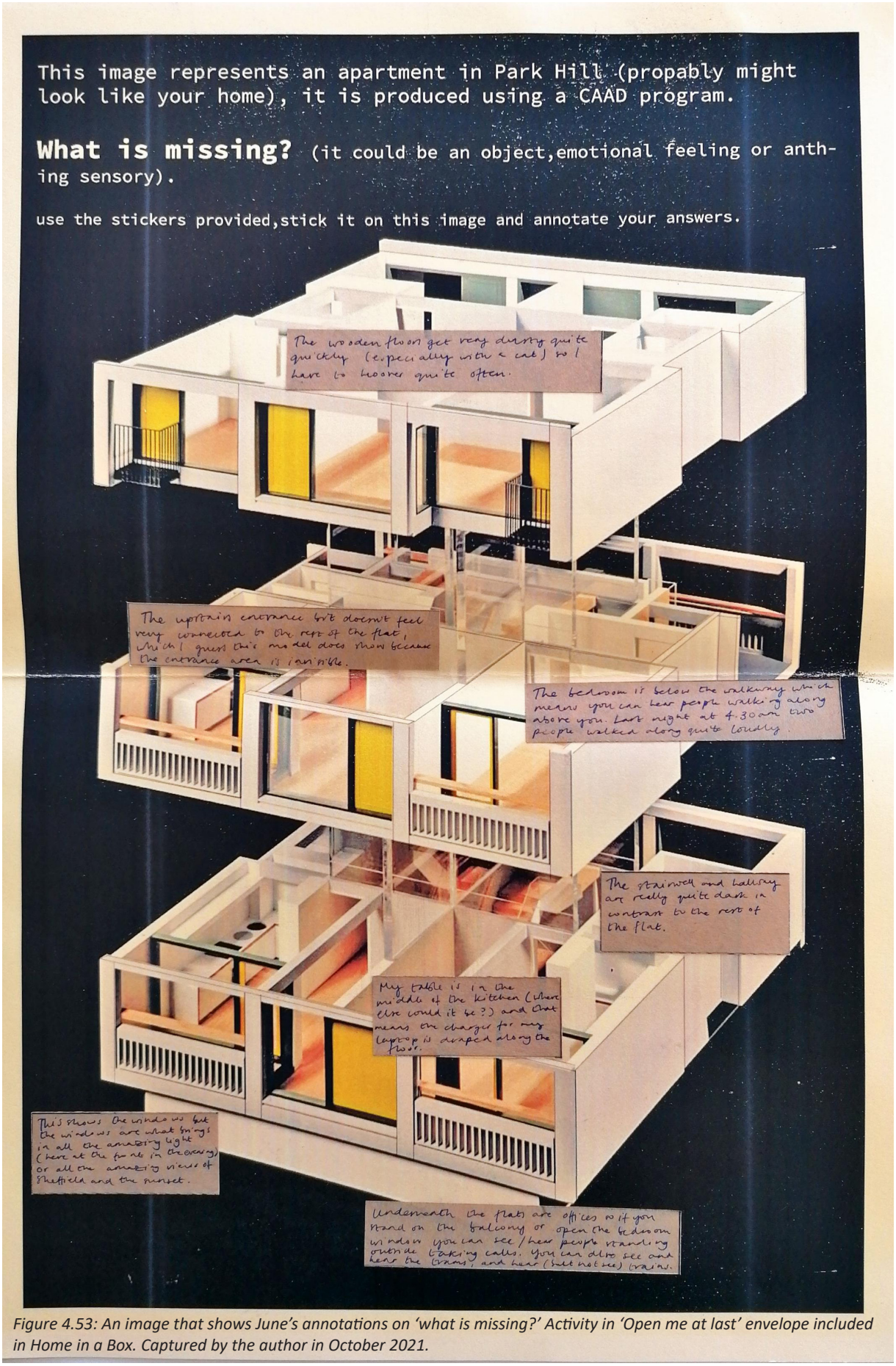


Figure 4.53: An image that shows June's annotations on 'what is missing?' Activity in 'Open me at last' envelope included in Home in a Box. Captured by the author in October 2021.

Thesis Conclusions

Overview

To invoke inhabitants' meaningful engagement that contributes to shaping and co-producing knowledge of architectural software and domesticity, this thesis calls a resistance to the ways in which CAAD and home are presented to us by architectural design practices. I attend to following the transformative possibilities of speculating on another forms of technologies used to design people's homes by reclaiming other 'forgotten' versions. Understanding these speculations necessitates being attentive to the ethical and political capacities of relations with inhabitants and acknowledging the architect/researcher's vulnerable positions enacted when engaging in situated, experimental and risky forms of resistance. Articulating these risky positions means being aware of how taken-for-granted definitions of CAAD, home and design are disrupted, challenging conventional ways we approach architectural research, theory and design, and suggesting 'another' modes of thinking and doing. In this thesis, I question: What social underpinnings, narratives and practices are incited by architects' use of architectural software (CAAD tools) in designing people's homes? How can I shift common CAAD-home imaginaries and bring CAAD into the proximity of inhabitants' homes from my position as an architect/researcher without the risk of repeating the same power structures that I instead aspire to challenge in this thesis? In what ways can I invoke inhabitants' meaningful engagement in shaping the knowledge of architectural software and domesticity?

This thesis offers a feminist methodology that starts a dialogue about architectural software and domesticity with inhabitants, situated within their homes–which architectural practices often lack. I introduce *Home in a Box* as a tool that enables an effective agency of inhabitants through different activities they collaborate in. Through the box, inhabitants tell stories about their situated, spatial and temporal experiences at home, and the use of technologies similar to CAAD. The box provoked the imaginaries of the CAAD they want and do not want to be used in representing their homes. My engagement in design practices to produce *Home in a Box* from different positions as a designer, CAAD user, and inhabitant allowed for a critique of power structures that shape how design practices using CAAD tools are performed to create people's homes . I have suggested that the temporalities of technology and science drive architects' design practices, configuring seemingly rational, efficient and productive means to produce homes emptied from inhabitants' individualised domestic experiences. Enacted by the technical and social intricacies of CAAD use in social housing design, architects have often been represented as the 'knowledgeable users' of architectural software with privileged social practices, whose involvement in designing for more vulnerable inhabitants unethically represents those inhabitants as 'others'. I have argued that by making *more-caring,* slow engagement in the ever-moving domestic ecologies, distant and authoritarian imaginaries of technology and domesticity can be resisted andsituated, relational and embodied perspectives can emerge.

In this thesis, I argue for a feminist methodology for inquiring about CAAD and home encounters within the dynamic ecologies of people's homes. By proposing *Home in a Box*, I offer an understanding of theory as practice informed by how I was involved in its design and writing. The box was designed using Maria Puig de la Bellacasa's *thinking with care* as the main theoretical account.[1] The material practices used to shape the box borrowed cultural probes as a method from design anthropology. This was followed by critiquing the relationalities and politics implied by engaging in its doing as means of its production. Collaboration was

1 Maria Puig de La Bellacasa, *Matters of Care: Speculative Ethics in More than Human Worlds*, Vol.41 (Minneapolis: University of Minnesota Press., 2017).

performed by me throughout its design and by inhabitants through participating in doing its contents. By understanding *Home in a Box* as a feminist power tool, the box has been posited as a conceptual tool that makes us think about the CAAD and home encounters in architectural design and as an object that provides practical ways to allow for inhabitants' meaningful engagement to create 'another' understanding of CAAD and home beyond architecture's dominant definitions.

Through this thesis, I critique how architectural design using CAAD tools is understood, how it affects the way the role of architects and inhabitants are represented, and how architectural software and domesticity are defined and understood in architectural practices. To do so, I follow a multiplicity of practices, positions, languages, politics, spatialities and temporalities that inform notions of CAAD, home and design inside two architectural practices: practice 'c' and practice 't',[2] my own home and homes of four inhabitants at the Park Hill housing development, in Sheffield. A review of the experiences I encountered in each site that follows different narratives with architects and inhabitants is provided in each of the four chapters that structure this thesis. These chapters explore ethical and political underpinnings of how knowledge of CAAD and home are produced, and the potential of creating another way to understand domesticity and architectural software.

I begin this thesis by tracing social underpinnings, narratives and practices prompted by architects' use of architectural software (CAAD tools) in designing people's homes. In the first two chapters, I follow how architects use CAAD, specifically Revit, to produce social housing developments. I pay attention to how they talk about CAAD and social housing, revealing different social and technical intricacies of their engagement in these design practices. In chapter one, on **Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD)**, I highlight the gap between how designing using CAAD is understood as *practice* and spoken/ written as *theory,* and how problematic that gap is given its importance to how architects practise CAAD. Through my experiences with practitioners in practice c and practice t, I follow how architects talk about CAAD. Architects in both practices, and others whom I tried to contact while planning for my fieldwork, seem sceptical toward their use of CAAD technologies. The gap between how architects use CAAD as a practice and how these tools are represented in discourse becomes uncertain, contradictory and ambiguous. I trace the roots of architects' oscillation between doubt and certainty in the capabilities architectural software provides. I discuss architects' doubt and its relation to themes related to architects' authority and CAAD instrumentality and argue for understanding architects' scepticism of CAAD as part of a broader assemblage that involves not only how CAAD is used in architectural practices but how it is produced and disseminated throughout history by different actors, like the software market and academia. I suggest architects' doubt and scepticism resulted from fear of losing control and perceiving "digital architecture" discourse as excessive and indulgent.

In chapter two, on **Social housing design practices**, I look in depth into hidden traces of CAAD in the speech of architects and practitioners from practice c and practices t. In particular, when architects talk about the housing/social housing projects they design I continue to explore answers to 'what does CAAD do'. I follow the social, ethical and technical intricacies of CAAD in producing social housing as a design process and as an object. I focus specifically on CAAD's embeddedness in architects' discussions on social housing, where CAAD's graphic presence in architects' discourse becomes an integral part of how architects express/talk and represent their relations to the housing developments they design and the people to whom they deliver.

2 Original architectural practices' names have been changed.

I narrate how social housing and CAAD intersect in practice c and practice t, based on how practitioners speak and talk about it, weaving it into more comprehensive discussions on authority, social responsibility and CAAD agency as leading threads to understand why these matter. I navigate through how social housing became 'social' and how designing social-housing typologies ultimately gives value and status to architectural practices. This notion of value/status is drawn directly from practices' perceived ethical responsibility for designing and delivering better homes for potentially vulnerable people, with local authorities and housing associations. However, I further discuss this 'social status' in relation to how architects represent their authoritative power over social housing design and how this operates within a market-based system. I suggest how CAAD tools are technically designed and used by architects to produce social housing, with an understanding of these homes as 'products'. I conclude that using CAAD, removing labour-time through architects' engagement in real-time modelling, terminates the political and ethical engagement of architects with the domestic space. Domestic space is hence stripped of its range of possible temporal and future spatial existences and becomes the lowest common denominator. This helps render inhabitants as invisible and promotes them as 'less knowledgeable other.'.

In chapter three, on ***Home in a Box*: thinking the box**, I introduce *Home in a Box* as a creative inquiry tool that I designed to invoke encounters with CAAD inside the home. It allows for inhabitants' agency to produce 'another' knowledge of CAAD by engaging neglected and invisible experiences and imaginations from inside people's homes. Through this chapter, I explore how it is constructed and physically made from a 38 x 28 x 13cm rectangular cardboard box. The box holds a variety of multimedia objects (such as booklets, zines, maps, postcards, an instant camera, a voice recorder, and a smelling jar). In parallel, I suggest that a box is a conceptual tool that allows engagement with feminist theory as a mode of practice to speculate other configurations of CAAD. In the design of *Home in a Box*, I use Maria Puig de la Bellacasa's *Matters of Care* as the main theoretical account and borrow *cultural probes* as an ethnographic design method to stay close to inhabitants' marginalised CAAD-home knowledge, creating alliances with the ever-moving domestic world.[3] I argue for *Home in a Box* as a feminist theory and methodology that enables an inquiry into CAAD-home encounters within inhabitants' homes by allowing a meaningful engagement of inhabitants to produce embodied knowledge on architectural software and domesticity—articulating the box as a twofold feminist practice that overlaps theory and design, where care-thinking and material-doing of the box are part of the same practice. I also use Hélène Frichot's concept of *Feminist power tools* as a theoretical account.[4] I suggest the box as a feminist power tool that grapples with how to resist existing power structures in architectural practice, which usually represent CAAD and home intersection as professionals-only terrain. The box enables new CAAD-home encounters and other modes of practices to emerge from people's homes as a creative force. The box also questions my relationship as an architect/designer to the architecture milieu and exploring other potential ways for design practice.

In chapter four, on ***Home in a Box*: doing the box**, I offer a theoretical analysis of the box in practice with a critique of the power structures that shape how design is defined and performed in architectural practices. I reflect on the box's interaction with a multiplicity of practices, positions, and ideas within the sites in which it was produced and collaborated. I trace how four boxes moved through two sites: my home, where its production took place, and Park Hill,

3 de La Bellacasa; Bill Gaver, Tony Dunne, and Elena Pacenti, 'Design: Cultural Probes', *Interactions*, 6.1 (1999), 21–29.

4 Hélène Frichot, *How to Make Yourself a Feminist Design Power Tool*, The Practice of Theory and the Theory of Practice (Baunach: AADR – Art Architecture Design Research, 2016).

where four inhabitants collaborated in the project, from November 2020 to October 2021. In the first part, I look at the design contingencies in the box's production site by reflecting on the multiple positions associated with my design, CAAD, and home knowledge. By paying particular attention to the shifts between different positions, I uncover a broader set of interpretations, powers, emotions, languages and ethics incited by the interactions between me and the box. By narrating autobiographical notes, accompanied by annotations I wrote during and after designing the box, I remark on the vulnerable positionalities as an architect who is defined as between a designer, a user, and an inhabitant, which troubled me while engaging in its production. In the second part, I write using the four Park Hill inhabitants' voices as a *roman à clef,* is a French term for 'novel with a key'. It is a fictional narrative in which real people and events are disguised.[5] The resulting 'stories' are a fictional narrative in which real people and events are disguised, hidden under the fictional characters: Hugh, Catherine, Hannah and June, yet offering biographical information about the everyday domestic lives of the real inhabitant each character represents. I offer fictionalised narratives as an invitation to reconnect with 'another' CAAD-home imaginaries. I argue that the inhabitants' engagement with *Home in a Box* allowed an embodied perspective of the CAAD-home situation from within their homes challenging the authoritative ones in architectural design cultures. The box in action elicited home material, sensory and digital environments and movements absent in architects' digital portrayals of home. It spanned a diversity of temporalities, uncovering inhabitants' domestic contingencies and CAAD encounters over time. Through *Home in a Box*, inhabitants were able share different details about cooking, eating, sleeping cleaning and doing the laundry through drawing, mapping, photo-taking, and annotating, sharing sensory aspects of home like sounds through sound-recording and smells through smell jars. By answering different questions, they were able to reveal their experiences with CAAD tools.

Contribution to knowledge

The aim of the thesis is to challenge architectural design cultures informed by CAAD that prescribes particular imaginaries of inhabitants' knowledge of CAAD and home. It aspires to contribute to new knowledge by providing new theoretical and practical means to approach CAAD and home encounters inside people's homes. Theoretically, the thesis seeks to engage with and contribute to ongoing academic debates on the rigid structure of design and the ways in which CAAD and home are approached and defined in the architectural profession. It suggests *Home in a Box* as a feminist critical spatial practice, as a theory concerned with inhabitants' meaningful engagement in critical debates on architectural software and domesticity, and speculating on another shape CAAD might take. Practically, this thesis offers ways to create tools that allow inhabitants' agencies to be activated from a distance without direct contact with them. Additionally, it proposes new strategies to engage in 'remote' fieldwork by reflecting on the tools and experiences of conducting research through the emergent times of the COVID-19 pandemic.

Through this thesis, I follow CAAD and home encounters in architectural practices and people's homes. I create a theoretical apparatus to approach architects' and inhabitants' understanding of CAAD. This interpretation of the way the software is performed allows me to challenge/question the idea of design itself. By introducing *Home in a Box*, I offer a way to engage in

5 Ian Ousby, *Cambridge Paperback Guide to Literature in English* (Cambridge University Press, 1996), p. 332; Melissa Boyde, 'The Modernist Roman à Clef and Cultural Secrets, or, i Know That You Know That i Know That You Know', *Australian Literary Studies*, 24.3–4 (2009), 155–66 (p. 156) <https://ro.uow.edu.au/artspapers/219>.

design practices that apply theory to practice and practice to theory. This challenges the gap I found between how CAAD design is understood as practice and written and spoken as a theory in architectural practices I engage with in this research.[6] The box also proposes a way that 'makes time' to slowly engage with people's domestic practices and imaginations that inhabit various timelines inside homes. If CAAD is produced and used to perpetuate fleeting building materialities through real-time modelling features, the box challenges how this undermines architects' ethical interpretations of the temporalities and spatialities of people's homes.[7]

Home in a Box contributes to providing other imaginaries speculated from within people's homes that neither negate the inevitability of these tools' existence nor the architects' role in designing homes in architectural practices. Instead, these imaginaries offer a way to understand what inhabitants want and do not want and activate their agency through their embodied engagement in the box's activities that became part of the sensory, material and digital dynamics that constitute home ecology.

Limitations and future research

At the beginning of this research, my initial interest was to follow how notions of CAAD and home are understood by architects who engage in social housing design practices and by vulnerable inhabitants who live in social housing. However, due to the COVID-19 outbreak, I shifted my research to involve privately rented inhabitants in Park Hill rather than those on social rent. The social restrictions that were in place at that time prevented face-to-face interactions, making accessibility to people in social rent nigh impossible. As a result, this thesis follows situated encounters of CAAD and home in social housing design in practice c and practice t and the (not social) inhabitation of four Park Hill inhabitants who I gained access to. Understanding the conclusions of this thesis are relative to these particular contexts and cannot be generalised. This suggests that there is scope to extend this thesis to explore the potential of *Home in a Box* in different social and geographical contexts. I hereby ask, what would happen if inhabitants from social housing engage with *Home in a Box*? what would happen if it was designed for people from a different geographical area? What would home mean? And what could the shape of CAAD be that the people would speculate with, especially since commercial CAAD tools, such as Revit, are intended to be used globally? Yet the box itself could be repeated and spread out to a much larger audience to extend this analysis.

In this thesis, I aimed to find ways to allow inhabitants' meaningful engagement in co-producing knowledge on architectural software and domesticity. To do so, I designed *Home in a Box* by thinking with care and borrowing cultural probes for the box to take its final material shape, ready for inhabitants to interact with its content once it arrives at their homes. Since questioning the notion of design and inhabitants' agency foregrounded throughout this thesis, I further ask: what shape *Home in a Box* would take if inhabitants engaged in materially and theoretically co-designing the box? And what potential ways to allow for meaningful engagement in designing the box from its initial stages rather than collaborating with the final product?

Working on this thesis through collaborating with architects in practice c and practice t, and

6 For more details on the gap between design practice and theory see chapter one titled Utilisation/ Exploitation of Computer-Aided Architectural Design (CAAD).

7 For more details on the role of real-time modelling in the way homes are understood in architectural practices, see section subtitled as CAAD -social housing 'technical' superimposition in chapter two.

inhabitants in Park Hill and designing *Home in a Box* over 2020–2021 have created valuable opportunities to learn and develop another understanding of the design practices I aspire to engage with as an architect, researcher, and (future) design tutor. In regard to this, I ask, how can we keep questioning the taken-for-granted definitions of the design notions we became familiar with and stay close to risky practices that hold to 'another' effective agency?

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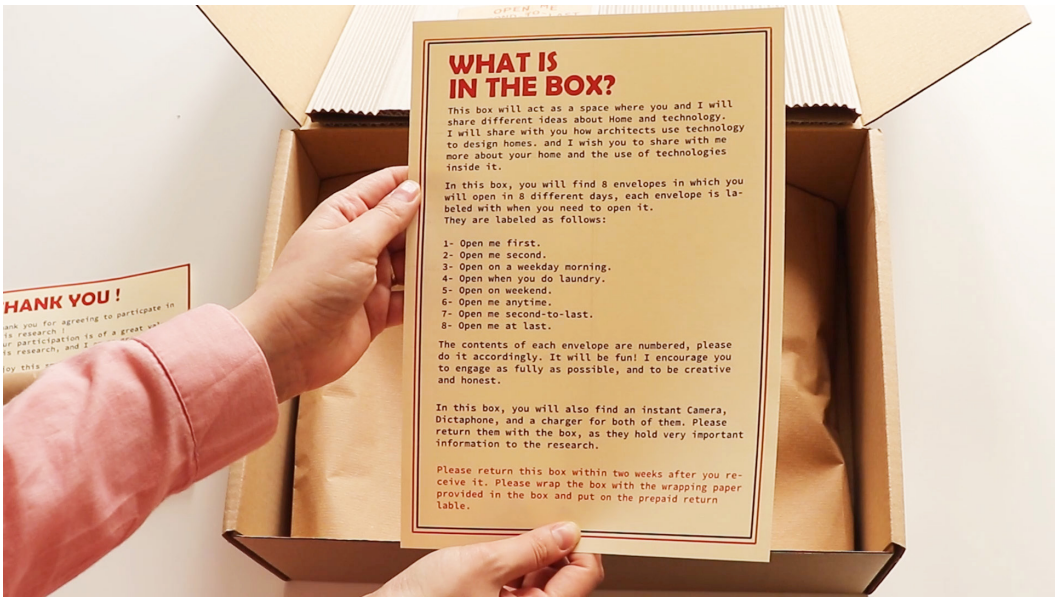
Appendices

Appendix A : Unboxing Home in a Box


THANK YOU !
Thank you for agreeing to particpate in this research !
your participation is of a great value to this research, and I am so greatful!
Enjoy this small gift !


THANK YOU !
Thank you for agreeing to particpate in this research !
your participation is of a great value to this research, and I am so greatful!
Enjoy this small gift !
THANK YOU !
Thank you for agreeing to particpate in this research !
your participation is of a great value to this research, and I am so greatful!
Enjoy this small gift !
Cadbury
Darkmilk
DARVILLES
EARL GREY
PEPPERMINT
GREEN TEA


WHAT IS
IN THE BOX?
This box will act as a space where you and I will share different ideas about Home and technology. I will share with you how architects use technology to design homes. and I wish you to share with me more about your home and the use of technologies inside it.
In this box, you will find 8 envelopes in which you will open in 8 different days, each envelope is labeled with when you need to open it.
They are labeled as follows:
1- Open me first.
2- Open me second.
3- Open on a weekday morning.
4- Open when you do laundry.
5- Open on weekend.
6- Open me anytime.
7- Open me second-to-last.
8- Open me at last.
The contents of each envelope are numbered, please do it accordingly. It will be fun! I encourage you to engage as fully as possible, and to be creative and honest.
In this box, you will also find an instant Camera, Dictaphone, and a charger for both of them. Please return them with the box, as they hold very important information to the research.
Please return this box within two weeks after you receive it. Please wrap the box with the wrapping paper provided in the box and put on the prepaid return lable.


Home in a Box


INSTANT CAMERA
OPEN ME FIRST
Time needed (30) min

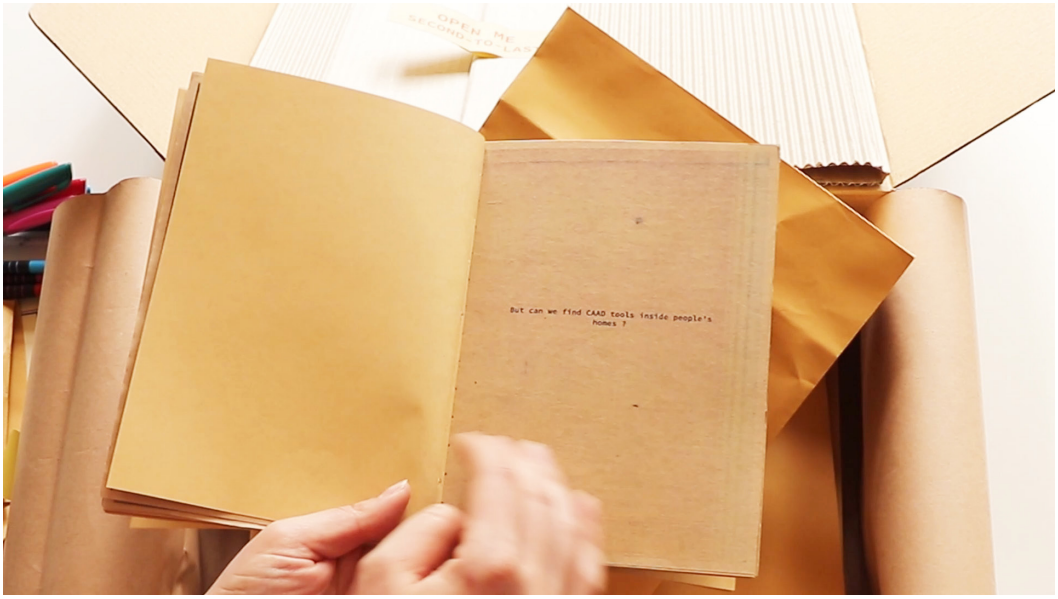

INSTANT CAMERA
OPEN ME FIRST

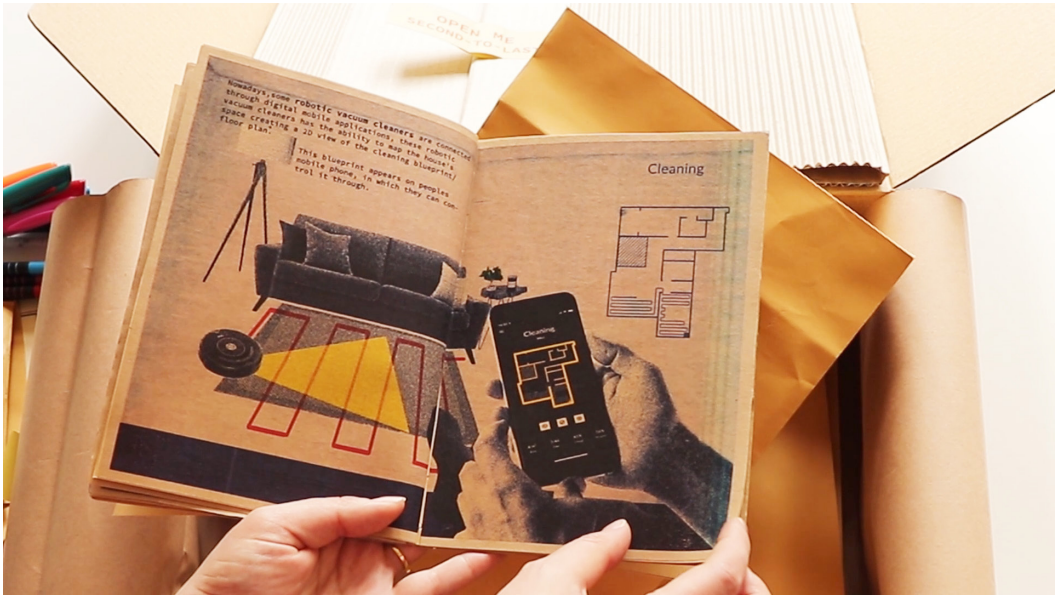

melling Jar
INSTANT CAMERA
OPEN ME FIRST


INSTANT CAMERA

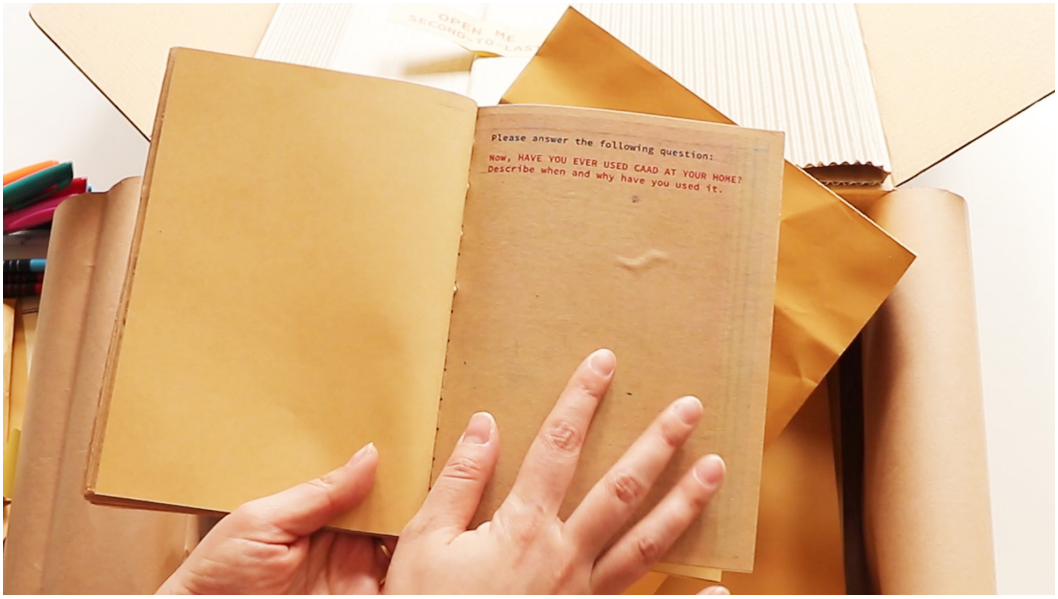
1. ‘Open Me First’ envelope.


FLOOR PLAN
The views of the building are slices of the 3D model at a particular position.
Floor plan is a two dimentional view, you can imagine it as if the building was sliced and looked at from top.


But can we find CAAD tools inside people's homes ?


Cleaning


IKEA HOME PLANNER tool provides
through IKEA's website an online
platforms that allow people to build
their homes in, representing differ-
ent rooms types in 2D and 3D,with va-
rieties of options of real brands
furniture blocks and materials.
Click to draw walls


Please answer the following question:
Now, HAVE YOU EVER USED CAAD AT YOUR HOME?
Describe when and why have you used it.

2. ‘Open Me Second’ envelope.


Floor plan
To create a house in Revit,
First, set up the boundaries of the hou
Sketching is a tool inside Revit that
used to draw the boundary of an elemen
such as a roof or a floor.


element such as floor will be crea
matically after drawing its bound


Drawing Board
2

3. 'Open On A Weekday Morning' envelope.


OPEN
WEEKDAY
In Revit every element has a group of parameters.
these Parameters describe and specify the size, shape, position, material, and other information about an element in the model.
The properties palette
Material
Width
Length
thickness
Sill height
Time needed (30) min


At home many activities are related for instance, pre- ing food and eating it are two different and insepa- le activities.
2
4
Time needed (30) min


What do you have for breakfast?
Take a photo of your breakfast using the instant camera provided, its already full with an adhesive paper, wait it to be printed and put it in the box on the right.
4
Time needed (30) min


3
4

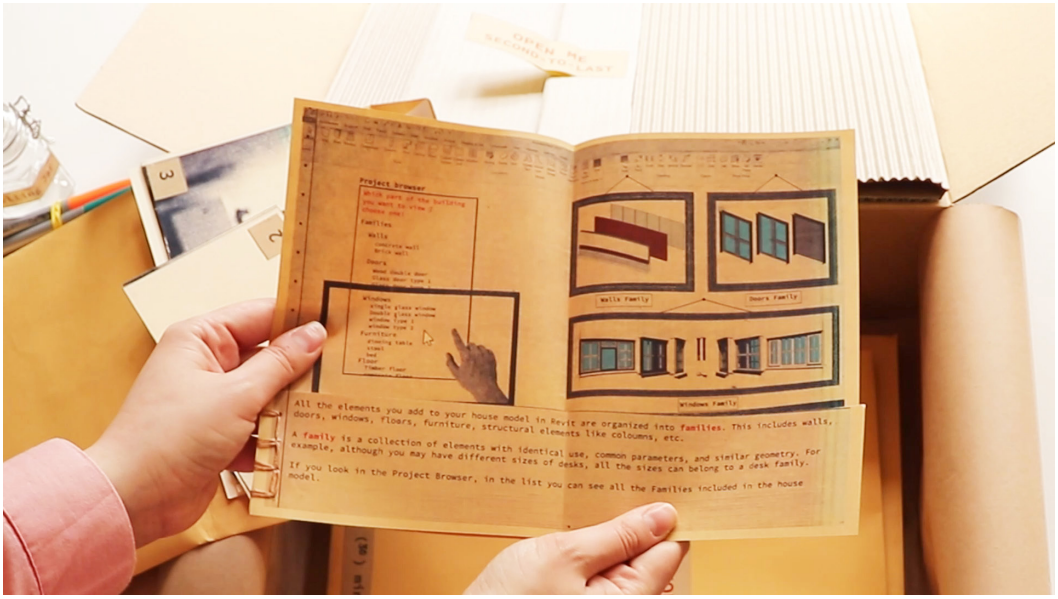

What was the last piece of furniture you bought? why did you bought it ? and how did you choose it (size, material, care details, etc)?
Take a picture of it ! I would like to see it!
2
1
4


OPEN ME
ON WEEKDAY
EVENING
OPEN ON
WEEKEND


what do you at home for relaxing this evening ?
and How do like the lighting of the room to be? why ?
Take a picture of how the room looks right
which day is it today?
what time is it now?

4. ‘Open On Weekend’ envelope.


OPEN ME
SECOND FAST
3
2
1


OPEN ME
SECOND FAST
3
2
Project Browser
Walls Family
Doors Family
Windows Family
All the elements you add to your house model in Revit are organized into families. This includes walls, doors, windows, floors, furniture, structural elements like coloumns, etc.
A family is a collection of elements with identical use, common parameters, and similar geometry. For example, although you may have different sizes of desks, all the sizes can belong to a desk family.
If you look in the Project Browser, in the list you can see all the Families included in the house model.


FAMILY at Home
2
3
OPEN WHEN YO

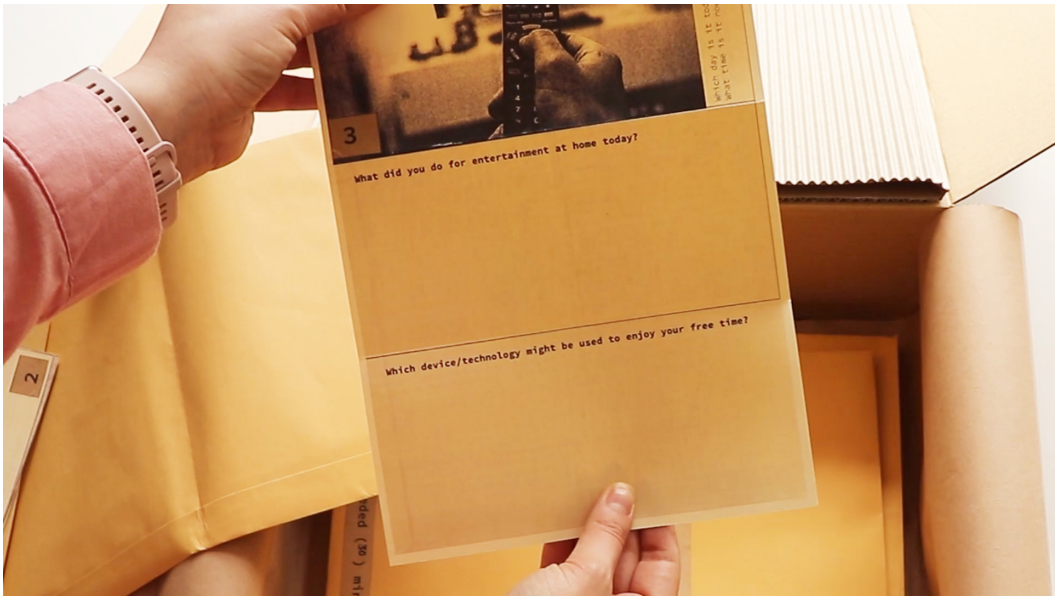

3
OPEN WHEN YO
DO LAUNDRY


Do you have a pet?
Is there any device/technology at home it likes the most ?
3
OPEN WHEN YO
DO LAUNDRY

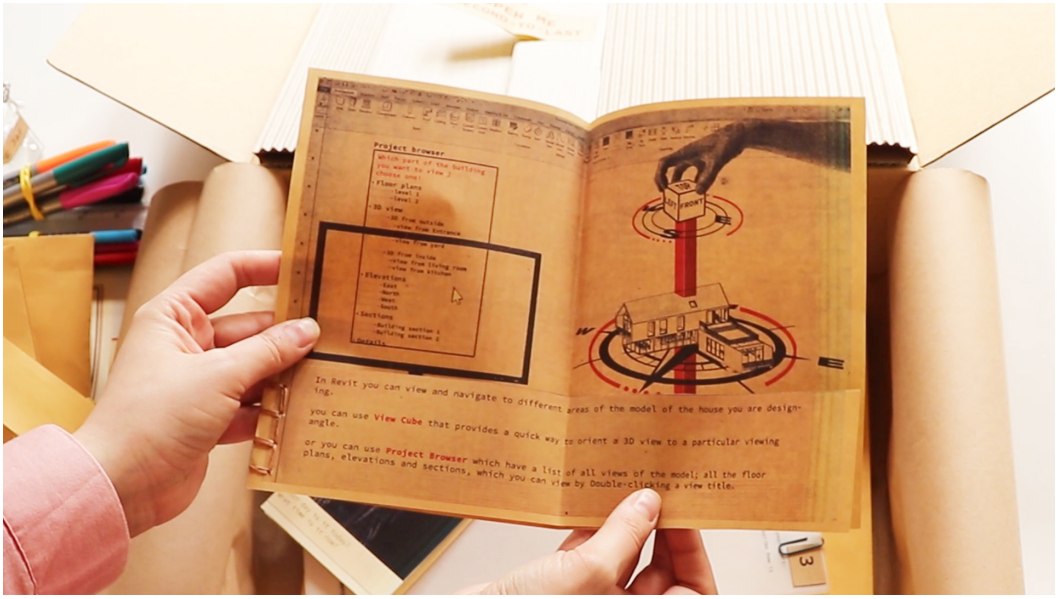

OPEN ME
SECOND-TO-LAST
3
2
OPEN WHEN YO
' AUNDRY


OPEN ME
SECOND-TO-LAST
3
Do you share your home with someone else? (whether permenantly or not), how home feels in his/her/ their presence?
What you change at home when he/she/they is/are here?
What kinds of technologies you share together ?
Take a picture of one of these technologies!
DO LAUN


OPEN ME
SECOND TO LAST
3
2


3
What did you do for entertainment at home today?
Which device/technology might be used to enjoy your free time?
2

5. ‘Open When You Do Laundry’ envelope.


Project browser
In Revit you can view and navigate to different areas of the model of the house you are design-
ing.
you can use View Cube that provides a quick way to orient a 3D view to a particular viewing
angle.
or you can use Project Browser which have a list of all views of the model; all the floor
plans, elevations and sections, which you can view by Double-clicking a view title.


Project browser


Moving around Home
Laundry movement


Which day and date is it today?
What is the time now?
Laundry movement


How cleaning makes you feel? Is this feeling related to how its smells, looks, etc?
Laundry movement

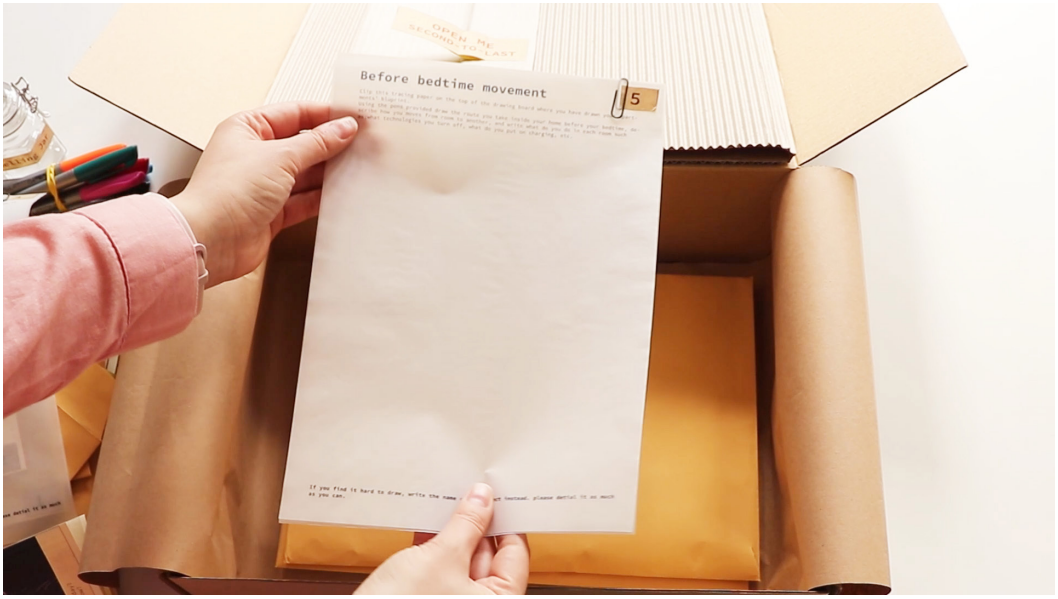

which day and date is it today?
what is the time now?
Laundry movement
3


In which room you hang the laundry ?
and what change the laundry do in
it?
Take a photo of the space you hang the laundry
at using the instant camera provided,and put
it in the box below.
Laundry movement
3

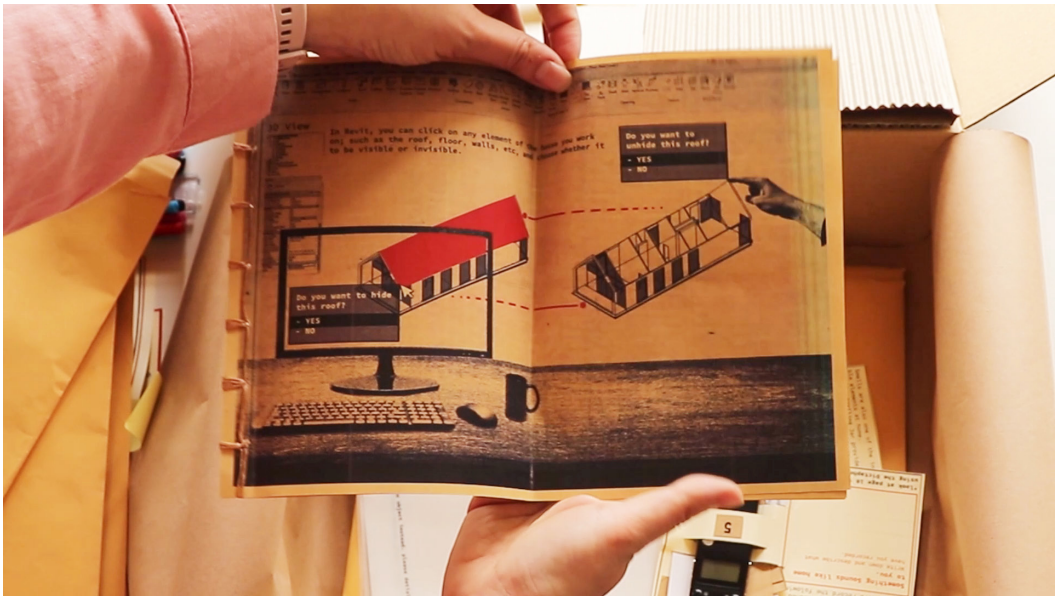

Laundry movement
3
1


OPEN ME
SECOND LAST
4
Time needed (60) min
5


4
What time usually you go to bed? and what is the last thing you do at home before sleeping?
What happens to different technologies when you sleep?
5


OPEN ME
SECOND LAST
Before bedtime movement
5

6. ‘Open Me Anytime’ envelope.




Hidden spaces
2
4


Temporary objects
3

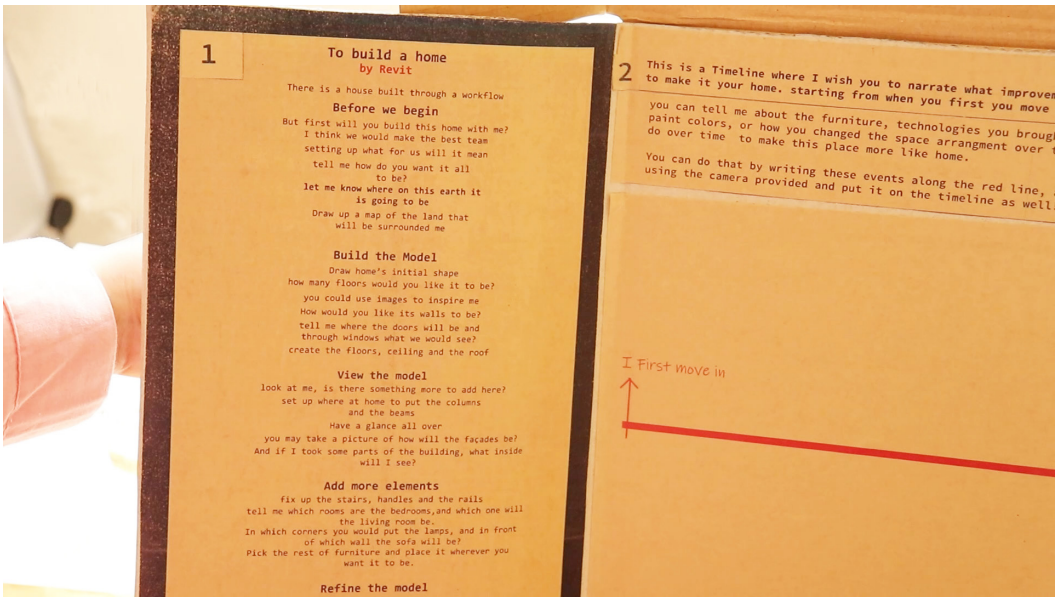

Temporary objects
4
3
Time needed (30')


OPEN ME
SECOND TO LAST
Sounds are one of the invisible elements at home.
Using the Dictaphone* attached to this card record the following:
Something Sounds like home to you.
Write down and describe what have you recorded.
5
2
3
time needed (30) min

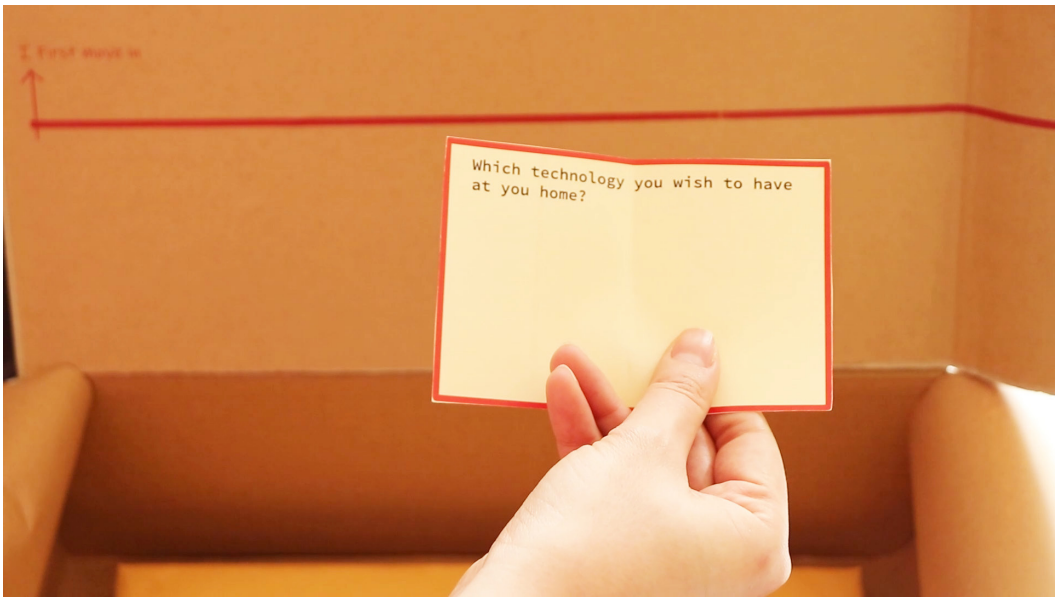

OPEN ME
SECOND TO LAST
Smells are also one of the invisible elements at home.
Use the Smelling Jar provided in the box and put inside it:
6
Something Smells like home to you.
Write down and describe what have you put inside.
Use the sticker bellow, to label the smelling jar with its contents:
Smelling Jar
needed (30) min

7. ‘Open Me Second-To-Last’.


To build a home
by Revit
Before we begin
Build the Model
View the model
Add more elements
Refine the model
2
This is a Timeline where I wish you to narrate what improvements you did to your apartment to make it your home. starting from when you first you move in until this moment.
you can tell me about the furniture, technologies you brought, about how you changed the paint colors, or how you changed the space arrangment over time. you can tell what did you do over time to make this place more like home.
You can do that by writing these events along the red line, and you can also take photos using the camera provided and put it on the timeline as well!
3
I First move in
NOW
Time needed (99) min


1
To build a home
by Revit
There is a house built through a workflow
Before we begin
But first will you build this home with me?
I think we would make the best team
setting up what for us will it mean
tell me how do you want it all
to be?
let me know where on this earth it
is going to be
Draw up a map of the land that
will be surrounded me
Build the Model
Draw home's initial shape
how many floors would you like it to be?
you could use images to inspire me
How would you like its walls to be?
tell me where the doors will be and
through windows what we would see?
create the floors, ceiling and the roof
View the model
look at me, is there something more to add here?
set up where at home to put the columns
and the beams
Have a glance all over
you may take a picture of how will the façades be?
And if I took some parts of the building, what inside
will I see?
Add more elements
fix up the stairs, handles and the rails
tell me which rooms are the bedrooms,and which one will
the living room be.
In which corners you would put the lamps, and in front
of which wall the sofa will be?
Pick the rest of furniture and place it wherever you
want it to be.
Refine the model
2
This is a Timeline where I wish you to narrate what improven
to make it your home. starting from when you first you move
you can tell me about the furniture, technologies you brough
paint colors, or how you changed the space arrangment over
do over time to make this place more like home.
You can do that by writing these events along the red line,
using the camera provided and put it on the timeline as well
I First move in


2
This is a Timeline where I wish you to narrate what improvements you did to your apartment to make it your home. starting from when you first you move in until this moment.
you can tell me about the furniture, technologies you brought, about how you changed the paint colors, or how you changed the space arrangment over time. you can tell what did you do over time to make this place more like home.
You can do that by writing these events along the red line, and you can also take photos using the camera provided and put it on the timeline as well!
3
I First move in
NOW
Time needed (99) min


Which technology you wish to have at you home?

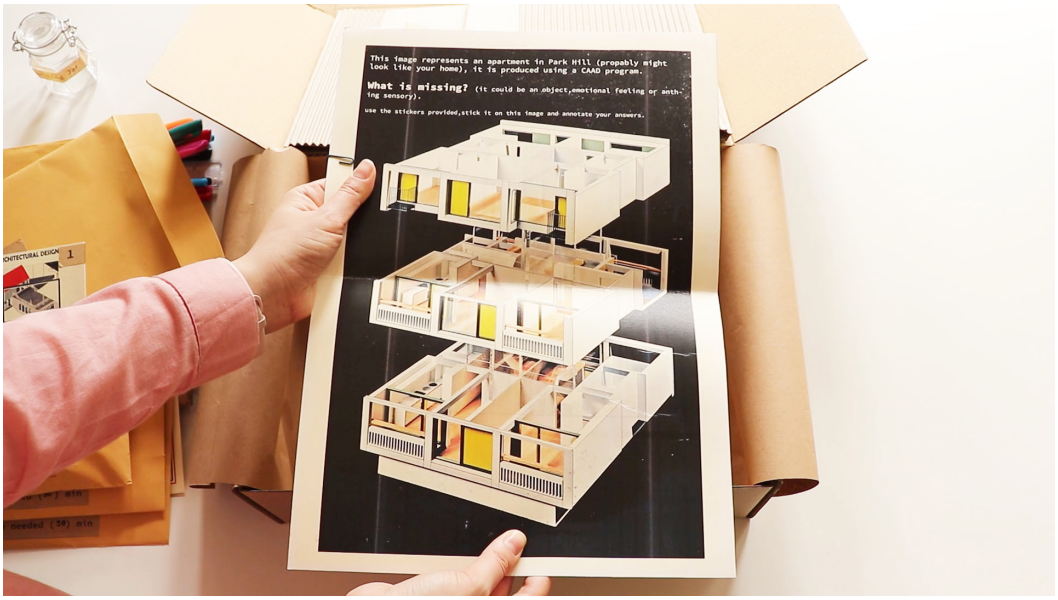

What would like to change in your home in the future?

8. ‘Open Me At Last’ envelope.


COMPUTER AIDED ARCHITECTURAL DESIGN
Revit Software
1
2


What Revit needs to know about
you to represent your home?
2


1
2


This image represents an apartment in Park Hill (propably might look like your home), it is produced using a CAAD program.
What is missing? (it could be an object,emotional feeling or anything sensory).
use the stickers provided,stick it on this image and annotate your answers.


3
You,
Architects,
&
Revit


How Architects thinks about the way you live at home ?
How you actually live at home?

Appendix B : List of interview questions

Architectural practices:
Practice 'c'

Questions asked to M.J. on 10th November 2020 :

- When it comes to your firm, I'm interested to know how you design social housing and mixed tenure housing with special attention to how you use CAD software packages throughout this design process. I want to understand how you talk about that and see that, so I want to understand things from your point of view. So, you can say that our discussion will be around two main parts: the first is to know more about the housing design process. And the other part is to know more about the CAAD tool used throughout this process.

- Can you describe more about the BIM level 2 mandate?

- Can you describe how people and residents interact with different representations created using BIM, Revit, and CAD in general?

- Can you describe the consequences of using these digital tools in terms of what are the limitations and difficulties you face when you use these tools?

Questions asked to M.S.on 25th November 2020:

- Can you describe the design process of social housing or mixed tenure housing through different stages using different CAAD tools by several practitioners?

- Can you tell me more about how many practitioners or how many architects typically work on one housing project? And Can you describe how different people deal with various files, several versions and workflows throughout the design process?

- Can you describe the technical protocols associated with the design process to organize and deal with the complexities of using BIM? Are there any protocols in the firm that are put in place to manage the process of sharing data throughout the 3D model? In terms of arranging the way you produce the design throughout the process?

- Can you describe the errors that may occur when you use, for example, Revit, and how you deal with different kinds of them, especially in the housing design process?

- Can you describe the role of the BIM manager?

- What are the CAAD or BIM use consequences and the limitations and difficulties you face when using these technologies? Can you tell me a story where CAAD or BIM obstructed the design process or a situation where it made things complex or messy?

- Can you describe how future residents interact with CAAD-produced plans, renderings, and other representations?

- Can you describe the aspiration you convey when you design a home for people who are going to live in these social or mixed tenure housing? In other words, Can you describe what it means to design a home for them?

Practice 't'

Questions asked to F.C. on 13th October 2020 :

- Can you describe the firm's aspiration when you design a home for people who are going to live in these social or mixed tenure housing? Can you describe what it means for you to design a home for those people and how it's different from creating a private house? what makes these housing complexes not only a house but a home for those people?

- Can you give me an example of a mixed tenure housing or social housing you designed in the firm? From your point of view, can you give me an example of a project that you believe is the best in achieving the firm's aspiration of creating a home for those people?

- Can you tell me more about how different CAAD tools are used throughout the housing example you mentioned? Can you give me more details about how you employed CAAD to achieve different tasks throughout the design process? How are these tools related to various design aspects and practitioners?

- Are there any protocols you follow when you deal with the technicalities of CAAD?

Questions asked to H.C. on 27h November 2020 :

- How has the housing design process been changed with the introduction of BIM technologies? How does this process interact with those different CAAD tools throughout the design process?

- Can you tell me how many people or practitioners usually work on one project? How do different parts of the team deal with varying files of CAAD, CAAD versions, and workflows? for example, how various changes and comments are communicated between parts of the design team?

- Do you have a BIM manager and coordinators? And if yes, can you describe their role in the project?

- Can you describe the errors that occurred when using CAAD, in the case of housing 's' when using MicroStation, and the kind of errors that happens now with using Revit or any other CAAD tool that you use now, and how you deal with these different kinds of errors, especially in the housing design process?

- Can you tell me an example or a story where Revit obstructed the design process at some stage in the project? Can you describe a situation where it made it more complex or even messy?

- Can you describe the consequences of using CAAD, in terms of the limitations and difficulties you face when using these technological tools?

- Can you describe what it means to design a home for people, especially when you design a home for people living in social housing or mixed tenure? Can you tell me if using Revit to

design these home help in creating a good home as you described?

- Do you use CGI renderings or plans produced using CAAD, or do you go with physical models and \ sketches to communicate with future social housing residents? And if CAAD is used, how do you see their interaction with these CAAD artefacts?

Questions asked to G.E. on 9th December 2020 :

- Can you describe your role as a BIM manager in the firm?

- Can you describe how Revit is prepared and is used in housing design throughout different stages? For example, how is the Revit file prepared for the architects to start modelling, so they can start doing the social housing design through it? So, can you take me through different stages regarding how BIM is employed through the design process?

- Can you describe what the base Revit templates and families are? How are they established and prepared for housing design?

- Can you describe how different people deal with them in practice? How do different people and practitioners deal with Revit, and other CAAD files, versions, and workflows throughout the design process? Can you describe the technical protocols associated with that in the design process that can make the process easier?

- Can you tell me how many practitioners work on the project regarding the design process and does all of them use Revit?

- Can you describe what the BIM execution plan (BEP) is and what BIM audits are, and how they happen?

- You mentioned Naviswork. Can you tell me more about it, what Navisworks is and how it works?

- How many practitioners use Naviswork? Do all architects run all these check-ups or whose role is this?

- Can you describe the errors that commonly occur when using Revit in housing projects and how you deal with these different kinds, especially in housing design projects?

- Can you tell me a story where Revit obstructed the design process at some stage in the project? Can you describe to me a situation where it made things more complex or messier?

- Can you describe the process of creating different CGI images in Revit?

- Can you describe the consequences of Revit or BIM use in terms of the limitations and difficulties you and architects face when using these technologies, especially in housing design?

- Do you think using BIM helps create better homes or better social housing?

- If you were in a position where you could change things in Revit, what would these changes be?

- Can you describe how you deal with Revit's new versions and updates? For example, do you train people for those new enhancements and features, or does it takes more time to adapt

them?

Park Hill

Questions asked to Hugh on 29th June 2021

- I would like to hear about your experience through the box's different activities? What did you feel when you did that? What did you find the most fun and most difficult? Can you suggest what to improve this in the future? What would you like to change, especially after you tried the box?

- In terms of time, do you think it takes more or less time to do? What do you think about the timeframe, generally?

- The box was titled Home in a Box. Do you think what you have done throughout the box represents your home? Does it represent your home inside this box?

- You mentioned that you used magicplan for an apartment you purchased. Is it the same apartment that you are in now? Or is it something else? And How do you feel when using this kind of technology that is similar to CAAD? What are the difficulties you go through while using it?

- When using it to represent your home, what did you find missing inside magicplan?

- Can you describe the process you went through while drawing your home's floorplan? What did you draw first? Then what did you do? How does that happen? For example, were you moved around your apartment while drawing it? Tell me more about the process.

- I would like to know how you felt after you finished it. Do you think that When you look at it, you feel like this represents your home?

- what do you think about all the brown booklets inside each envelope that told you something about CAAD? So what do you feel about these bits? After you went through these booklets, can you relate that to your use of magic plan? Can you reflect on that?

- Can you describe how did you use CAAD at work? If that's possible. So I can understand what your background is. Which CAAD software in specific did you encounter?

- In the activity that asks: 'What Revit needs to know about you to represent your home?', can you tell more about it? How would you like that to be represented? Can you describe your answers to this question more?

- How did you feel after you read all these parts about Revit specifically? So how do you feel about it? What do you think?

- What would you suggest for architects to be aware of when they Design Homes? And if you were in a place of a CAAD developer or Revit developer. What would you do about it? Or what would you work on it to help create and design your home?

Questions asked to Catherine on 29th June 2021

- I want to ask you first about your Impression of the box itself. So when you first received it, what did you feel, and how did that change while doing it until you finished it? And while you are going through the box experience, what do you find the most fun and the most difficult?

-What are your suggestions, in general, to make it better?

- As you noticed, the box is called Home in a Box. So as you know, I've tried to understand more about the ordinary and everyday life inside your home. So do you think what you have already done throughout the box represents your home? Do you think it is like a representation of your home inside a box?

- In the first envelope, the booklet included mentioned information about architectural software in general, with the key concepts. I was curious to know whether you have ever used these tools or something similar. And what do you think about these technologies? How does it feel to know that these technologies are used to design people's homes? Will you imagine yourself using these tools one day?

-Now that you know more about Revit, what do you find limiting or difficult in Revit? Specifically, as a tool that architects use to create homes for people, how does it make you feel like when you go through all this information about What it Revit is and what it does?

- What did you find missing about your home inside these applications? Imagine that your home was done inside the Revit application. What do you think you will miss in this representation?

- I want to know more about the process of doing this drawing. How did you draw the floor plan? What did you draw first? How did you go through all the details? Where at home did you draw it? Did you move around the home or stay in one space or area to draw all of it? So can you tell me more about this process?

- Can you tell me more about your answer in 'what you would like to Revit to know about you?' postcard and 'what is missing?' rendering activity? I want to know what has made you feel that Revit needs to know about you.

- Can you describe what made you feel that architect think of your home as simplistic or stripped back and what do you think about How does Revit feed into that? Does it help architects to keep looking about looking at the home as simplistic or stripped back, or do you think something else?

- What would you suggest for architects to be aware of when they design homes? And if you were in a place to develop or design Revit as software, what would you do? What would you change, or what would you like to add?

Questions asked to Hannah on 22nd September 2021

- As I understand, you have engaged with the box in two different places:: the one with the address that I sent the box to and your apartment in Park hill. Can you describe how that

happened and how that made you feel? So when first receiving it, what did you feel? And how that changed after you finished with it? How does it feel to have the box for a long time? I found this brochure inside. What did you want to say to me when you put it inside? Going through the box experience? What was the most fun part? Most difficult? What about the time? What are your suggestions to me to make it better in the future?

-Can you describe when did you use the Ikea planner? Is it for your current apartment? Can you describe the process? What did you do first? What errors did you face?

-So I am not familiar with plants AR and Robotic mower applications, so can you describe more about these apps, what are their name, is it mobile apps or website based?

-Is there always something missing in these applications? What did it miss about your home in these apps? Throughout the booklet, What did you find limiting and difficult in Revit as a tool that is used to design a home? How that made you feel?

-Can you describe how did you draw this floorplan? What did you draw first and then how did you go through all of these details? Did you move around home while drawing it? How did you move? Where did you draw it? Is it at park hill or not?

-can you describe to me further your answers in the 'What does Revit need to know about you?' postcard? What has made you feel that Revit needs to know that?

-Can you describe what made you feel that architects think of your home the way you described it, as more student community focused, size of facilities etc,? And how do you think Revit feeds into that?

-Why do you think home in Revit is a marketable and sellable version with no personality?

-What would you suggest for architects to be aware of when they design homes? And if you were in place of the developer of CAAD/ Revit? What would you do for it to help in designing your home? What would you change? What would you add?

Questions asked to June on 14th October 2021

- I want like to start by asking you about your experience with the box. How did it feel to have this box? what did you feel like when you first received it? How that changed after you got through the activities? What was the most fun part and the most difficult part? What about the timing of each envelope?

- If you want to suggest things I can do differently with this box. What would you suggest?

- Can you tell me more about your childhood part in which you played with SketchUp? How did you feel back then? Do you remember when it was that, like, in which year?

- you told me that you used CAAD/CAM in years seven, eight and nine in school, do you remember which software you used? How did you do it?

- Can you describe how you feel after reading all of the stuff about Revit in the box? If you imagine that this programme is used to design houses, how do you feel about it? Can you

describe what did you find like difficult or missing in these programmes?

-Do you think you will one day use non-architect CAAD tools, like the kinds of programmes such as the IKEA planner?

- Can you describe how did you draw the floorplan? Which was the first part that you drew? How did you come through all of these details? Where did you do it at home? Did you do it while you were sitting, or did you roam around looking at different things at home? Do you think that this represents your home?

- What is the difference between what you have done and what you can find on real estate agencies' websites? What do you think of this kind of floor plan? How do you feel about it?

- In the last envelope, you described how you found different aspects of home are missing in CAAD. Can you tell me more about why did you feel that? What do CAAD tools, such as Revit specifically, miss the most about your home?

- how do you think Revit helps architects represent your home in that way? Do you think Revit aids the way architects to represent your home or helps them represent it as tidy and empty?

- If you imagine like here that we have a 3D model of your home and architects have started putting on this small stuff and all clutter in your home. Do you think that it will represent it as a 'home'?

-Do you think Revit helps architects to do homes in that way, or do you think it is the architects who make Revit represent homes in that way?

- Imagine that one day you were one of the people who developed CAAD software. What would you change, or what would you add to Revit?

- Do you think that CAAD helps architects to sell these homes? Do you think it is good about Revit or bad that it gives you an empty representation of home when they sell it to people? Or do you think it is misleading in terms of the way they represent or design homes?

- As you noticed, this box is called Home in a Box. did you feel like this represents your home inside this box, or not?