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A Different Kind of Empathy:
Chatbot Ethnography as Another Way of ‘Being There’

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Abstract

This thesis explores the development and deployment of the Ethnobot—a chatbot co-ethnographer—designed to investigate ethnographic presence in digitally mediated and algorithmically structured environments. Drawing from design anthropology, research through design (RtD), and human-computer interaction, the research traces how conventional ethnographic methods face limitations in capturing ephemeral, distributed interactions across Internet of Things (IoT) infrastructures and algorithmic cultures. Originating from fieldwork in the Smart Transactions in Public Spaces (STiPS) project, the Ethnobot emerged as a methodological and conceptual response to these constraints. Through iterative deployments across public festivals, educational initiatives, urban sensing projects, and service design contexts, the chatbot was co-designed to elicit participant narratives, facilitate reflective engagement, and document contextual data. This practice-led inquiry reframes empathy, presence, and co-ethnography by positioning the chatbot as a speculative yet functional research tool. It examines whether ethnographic engagement can persist without physical co-presence, and how designed agents can extend the epistemic commitments of ethnography. By situating the Ethnobot within broader debates on automation, design ethics, and participatory methodologies, the thesis contributes to emerging conversations on the future of ethnographic practice in socio-technical systems.

Lay Summary

This thesis investigates how chatbots—computer programs designed to hold conversations—can help researchers better understand people's experiences between their digital and non-digital life. Traditional ethnography, which involves closely observing and talking with people in their everyday environments, faces new challenges when much of life is now shaped by smartphones, sensors, and algorithms. To explore this, the researcher developed the 'Ethnobot', a chatbot designed to collect stories, reflections, and insights from participants across a variety of real-world settings, including festivals, schools, parks, and public services. Rather than replacing human ethnographers, the Ethnobot was designed as a digital partner that could ask meaningful questions, adapt to different situations, and help document cultural experiences as they

happen. Through a series of collaborative projects, the thesis shows how this tool was built, tested, and improved to support research in environments where physical presence is limited or impractical. By combining design thinking, anthropology, and artificial intelligence, the thesis offers a new way to ‘be there’ in research—one that is empathetic, reflective, and adaptable to the complexities of modern life. It also raises important questions about ethics, technology, and the role of researchers in shaping future tools for understanding human experience.

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Chapter 1: Introduction to the Research

1.1 From Ethnographer to Ethnobot

The conceptual base for the following research is built from my engagement with ethnography, digital systems, and design methodologies during my involvement in the Smart Transactions in Public Spaces (STiPS) project, funded by the PETRAS IoT UK Hub. The STiPS project aimed to investigate the future of the Internet of Things (IoT) in public space—initially a broad and undefined research brief that required methodological improvisation. It was in this context that the idea of using a chatbot for ethnographic purposes first emerged, reframing both the object and method of ethnographic inquiry. From the outset, STiPS operated with a central concept: that smartphones, sensors, and other IoT devices constituted a form of 'cultural infrastructure'— systems through which algorithmic interactions mediate everyday experience. As Striphas (2015) argues, algorithms now participate in what was once the exclusive domain of culture: sorting, classifying, and hierarchizing people, ideas, and things. Understanding these systems required reimagining how ethnographic presence could function in spaces increasingly structured by computation. For me, this led to an open question: could ethnography adapt to the rhythms and structures of algorithmic life, and if so, could this provide a new positionality in which to view ourselves as humans?

The problem was methodological; in our early ethnographic fieldwork—conducted at the Edinburgh Christmas Markets and the Royal Highland Show—relied on conventional ethnographic techniques: participant observation, autoethnography, and unstructured interviews. However, these methods proved difficult to scale and inadequate for capturing distributed, fleeting, and digitally mediated transactions. The research team was attempting to observe social and economic exchanges in environments where much of the 'action' was effectively invisible—taking place through mobile interfaces, back-end algorithms, and sensor systems. At the same time, we observed rich, compelling narratives unfolding in human-to-human interactions, narratives that conveyed diverse value propositions and could only be interpreted through human-led observational studies and qualitative inquiry. While collating fieldnotes and interviews across multiple staged ethnographic studies—each aimed at understanding the potential of IoT as it expanded into public space—something felt amiss. This gap led to an innovative proposition: a method for embedding ethnographic engagement directly within digital systems. At the time, festival environments lacked sufficient IoT infrastructure; even basic technologies such as card readers failed frequently.

1.2 The Decisive Anecdote: ‘what if Hector could be replaced by a chatbot?’

It was during this period of methodological uncertainty that a pivotal moment occurred: what I refer to as the ‘decisive anecdote’. In the adjunct STiPS project room—known as the Red Table—in the Design Informatics Research Department, a space both dependable and generative for critical thinking, we were discussing fieldnotes and user journeys. Being somewhat disillusioned by the imaginative leap required to practically envision what a future IoT infrastructure in public, and specifically festival, spaces might offer in terms of valuable research positions and propositions for discovering the unknown—and the unknown unknowns—a colleague, Rory Gianni, casually asked, “what if Hector could be replaced by a chatbot?”. This suggestion shocked me at first and then struck me as absurd. I had been conducting ethnography in situ, relying on immersive presence and real-time interpretive engagement. The idea of a chatbot performing such work felt reductive, and even perhaps a bit insulting.

Yet, the more I turned the question over in my mind—methodically, almost obsessively—the more it began to provoke deeper inquiry. Could a chatbot replicate the core functions of ethnographic engagement—eliciting stories, prompting reflection, and co-constructing meaning? What if the ethnographer’s presence *could* be designed? I began to consider whether my conversations with participants—so crucial to understanding context, value, and behaviour—might be simulated or scaffolded by a conversational agent. Could I build a system that collects fieldnotes not through observation but through dialogue? At the very least it provided a new positionality situated away from the human researcher into a somewhat autonomous agent that would potentially be a viable interlocutor for the digitally mediated ubiquitous computing that’s networked within IoT infrastructures. This moment marked a conceptual turning point, not in discarding the ethnographer's role, but in opening the door to rethinking *how* ethnographic presence might operate in data-saturated, digitally distributed contexts.

1.2 Motivations for Creating Digital Tools for Ethnography

The decision to pursue a chatbot as a methodological tool was not made lightly; it was shaped by several converging motivations. First, ethnographic methods needed to adapt; traditional approaches such as participant observation and field immersion have proven themselves difficult in environments mediated by mobile devices and ephemeral interactions (Marcus 1995). Digital ethnography, while promising, still leaned heavily on platforms such as social media, which did not account for embodied, real-world contexts. Likewise, social media and digital communication platforms like FaceTime and Zoom made it possible to maintain human-to-human interaction across great distances. In many ways, these tools have allowed researchers—and people more broadly—to grow and foster connections in meaningful ways. Although I have enjoyed conducting ethnographies around the world where I was actively facilitating empathy to understand the other, it was only

possible because I had been physically present and returned with those stories. There was, then, an impetus to find a way to facilitate empathy across time and space without being there.

Second, the rise of algorithmic culture has created new subjects of ethnographic inquiry. Algorithms are not merely tools; they are active participants in meaning-making systems. As Cohn notes, digital recommendation systems utilized in social media like TikTok can subtly influence how individuals perceive themselves and others, demonstrating the cultural agency of algorithms (Cohn 2007). Following Reiko Goto Collins, who describes empathy as the capacity to experience a “foreign consciousness”, I began to wonder whether ethnographic empathy could extend to algorithmic and material agents—not just to human participants (Collins 2012). This broader, more inclusive definition of empathy called for tools that could mediate between humans, machines, and environments.

Third, the decision to use a chatbot aligned with a growing body of work in design anthropology and human-computer interaction (HCI), where qualitative methods are often constrained by time, scale, and stakeholder expectations. The chatbot offered a way to operationalize ethnographic insight within these constraints, serving both research and design goals without reducing cultural complexity to a survey (Gunn, Otto, and Smith 2013). The chatbot, then, was not a replacement for ethnography, but a speculative extension of its core commitments: empathy, situatedness, and reflexivity. It became a co-ethnographer—a digital interlocutor capable of curating and documenting participant narratives in real time, while reducing the researcher’s physical presence.

‘Ethnobot’ is my neologism situated at the intersection of ethnography and automation; it marks a conceptual intervention that reframes how ethnographic data may be gathered, mediated, and interpreted within technologically-embedded environments. This term will serve as a key theoretical and methodological anchor throughout the remainder of this thesis. The projects that constitute the foundation for the development of the Ethnobot, and the basis for this thesis, were not initially undertaken with the Ethnobot as their original objective. Rather, they unfolded as broader research and design agendas, ranging from smart transactions in public spaces and fintech innovation to educational technology, creative industries, and urban engagement. These case studies, although diverse in scope and disciplinary alignment, served as generative sites for rethinking the ethnographer’s role and exploring new modes of methodological augmentation. In this sense, they provided fertile ground for testing, refining, and reimagining the chatbot as an ethnographic agent. The Ethnobot emerged within these varied contexts not as a pre-determined tool but as a conceptual and technological response to the epistemic challenges encountered in the field.

1.3 Considerations for Case Studies: Context, Ethnographic Intent, and Design Tensions

The STiPS project initially set out to investigate IoT-mediated value exchanges at public events, but its methodological constraints—particularly the difficulty of capturing informal, context-rich interactions—prompted a shift toward computational proxies for ethnographic presence. Thus, while the primary aim of…revolved around sectoral concerns (e.g., financial technology, IoT infrastructure, educational transformation), the project enabled the conceptual development of the Ethnobot through iterative, field-based design research. Across its various deployments, the Ethnobot was not treated as a static product but rather as a cultural and methodological probe, designed to interrogate which elements of ethnographic engagement might be distributed, delegated, or digitally mediated. It facilitated co-ethnographic interaction by eliciting participant narratives, curating multimodal data, and enabling context-sensitive reflection. These functions reflect core values in design ethnography, including empathy, reflexivity, and situational awareness (Salvador, Bell, and Anderson 1999; Wright and McCarthy 2010). Yet this methodological agenda frequently encountered tensions when aligned with institutional mandates or commercial priorities.

Supported by STiPS and the University of Edinburgh, the commercialization of this research eventually took form in the creation of inChat, a startup co-founded by Rory Gianni and myself. This transition from academic inquiry to entrepreneurial venture foregrounded the intersection between institutional, commercial, and scholarly aims. While commercial viability required demonstrating use cases in corporate wellness, educational technology, and user experience research, the ethnographic agenda foregrounded epistemic plurality, ethical co-production, and participatory accountability. In many respects, the dual imperatives of business and research became sites of negotiation. On the one hand, the development of inChat's Ethnobot practice offered a testbed for advancing chatbot capabilities in dialogic inquiry and reflective practice through services provided to creative industries and governmental agencies. On the other hand, the demands for productization, standardization, and scalability risked flattening the interpretive nuance central to ethnographic work (Suchman 2002; Dourish 2006). The Ethnobot's iterative development, therefore, required constant calibration between methodological integrity and applied relevance.

Positionally, I approached these projects first and foremost as an ethnographer. My focus remained on cultivating interpretive depth, ethical reflexivity, and empathetic attunement—qualities that, while not always congruent with business timelines, informed every stage of chatbot development. At the same time, the demands of collaboration, co-design, and technical deployment drew me into adjacent domains of service design, interaction design, user research, and educational technology. These fields shaped not only the affordances of the Ethnobot but also the epistemological questions it was designed to raise. By working across these interlocking domains, the Ethnobot came to reflect a hybrid ethos: grounded in ethnographic sensibility yet shaped by the exigencies of interdisciplinary and cross-sectoral practice.

1.4 Scope and Projects

The chatbot used for the Highland Show was designed to guide participants through a sequence of conversational prompts; it collected multimedia responses and automatically generated digital fieldnotes. This early deployment highlighted the bot's potential to elicit reflective narratives, particularly in contexts where anonymity and privacy were central concerns. Subsequent iterations—such as the Public Art Bot for Edinburgh City Council and urban environmental sensing projects—expanded both its technical scope and methodological sophistication. In each case, the Ethnobot was co-designed with stakeholders to ensure that its tone, logic, and dialogue structure were contextually appropriate. Each project thus contributed not only to the chatbot's technical and interactive evolution but also to a broader inquiry into what it means to 'be there' ethnographically in digitally mediated, algorithmically structured environments. In short, the case studies were not simply applications—they were provocations that pushed the boundaries of ethnographic methods and opened space for new forms of co-ethnographic encounter (Geertz 1988; Haraway 1988; Latour 2005).

"Can one 'be there' without being there: Can you replace Hector with a chatbot?" became the central question that this thesis attempts to address. Drawing on the ethnographic lineage from Malinowski's emphasis on immersive presence to Clifford Geertz's concept of 'thick description', the aim here is not to discard ethnographic embodiment, but to reconceptualize it within conditions shaped by digital infrastructure and algorithmic mediation (Malinowski 1922; Geertz 1973). The Ethnobot thus operates as both a research instrument and a theoretical proposition. It enables a form of 'designed presence'—a mode of mediated, reflexive, and participatory engagement that responds to the epistemological and ethical demands of contemporary ethnography. This thesis presents chatbot ethnography by proposing a framework for designing conversational agents that are context-aware, ethically responsive, and methodologically grounded. In doing so, it extends the repertoires of Design Ethnography, Service Design, and Design Thinking with tools that are both replicable and adaptable to complex sociotechnical contexts. While the central focus of this thesis is the Ethnobot's methodological development, it is important to acknowledge that many of the projects in which it was tested had broader or adjacent aims, ranging from fintech experimentation to public sector innovation and digital sensing. These contexts served as methodological testbeds in which the chatbot's interface logic, dialogic structure, and ethnographic functionality could be refined in response to real-world constraints and opportunities.

The chart below (Figure 1) presents the key projects that shaped successive iterations of the Ethnobot. It situates the work within a broader arc, beginning with early research under the STiPS initiative and culminating in the consultancy work undertaken through inChat. Chapter 5 offers a more detailed examination of each Ethnobot deployment, demonstrating how successive projects contributed to the evolving relationship between design, application, and methodological capability. These case studies underscore the iterative nature of the Ethnobot's development, in which each redesign—grounded in a research through design (RtD) approach—led to more robust applications, refined tools, and expanded conceptual understanding. The present section provides a contextual overview of this trajectory, foregrounding my specific contributions across projects.

1.5 Ethnobot Project Timeline with Descriptions and Authorial Role

Year(s)	Project Name	Project Description	Role and Contributions
2016–2018	STiPS Festival Ethnographies	Observational ethnographies at the Royal Highland Show and Edinburgh Christmas Markets exploring value exchanges and situational context within festival environments.	Conducted annual autoethnographic and participant observations; supervised master's student cohorts; compiled and analysed data; facilitated roundtable discussions with STiPS team to inform methodological direction.
2018–2019	STiPS Royal Highland Show	IoT-focused ethnographic research on value exchange in public spaces, including development of the first Ethnobot and a public art chatbot in collaboration with Edinburgh City Council.	Developed and deployed Ethnobot at Royal Highland Show; coined the term 'Ethnobot'; designed chatbot prototype; led roundtable development discussions; oversaw UX testing, deployment, and exit interviews; analysed logs and co-authored publication on findings.
2017–2019	Edinburgh City Council Public Art Bot	Stakeholder engagement research for public art planning, combining interviews, workshops, and chatbot-mediated dialogue.	Designed and led all research stages; implemented Ethnobot deployment; co-authored public art guidelines with council leadership; conducted UX testing and interviews; maintained stakeholder collaboration.
2018–2021	Fringe Festival: Dionysus	Developed a chatbot for artists to conversationally describe their work, supporting artist-audience engagement in the Fringe Festival context.	Conducted background research; led co-design workshops; designed and tested chatbot; monitored deployment; analysed data with inChat's co-founder.

2019–2022	Juno (Jupiter Artland)	Pedagogical chatbot designed for art interpretation and reflection, co-designed with stakeholders during the COVID-19 pandemic.	Adapted co-design for remote settings; led content development and UX testing; created branding and ethical frameworks; managed pandemic-era engagement methods.
2019	Alfred the Owl (Living Labs)	Replicable chatbot prototype developed to study park usage and public space engagement across several parks in Edinburgh.	Presented Ethnobot methodology; ran co-design workshops; developed prototype and deployment strategy; trained Living Labs team.
2019	inChat	Co-founded consultancy integrating chatbot ethnography with UX and service design research.	Co-founded inChat; led research ideation, co-design workshops, and client acquisition; shared responsibilities for operations, design, and research strategy.
2019	UX Web Publishing Services (University of Edinburgh)	Longitudinal chatbot study exploring service experience over three dialogue phases across a 3-month period.	Designed and developed chatbot; led co-design workshop; ran research and analysis; co-led debriefing and presentation of findings.
2020	Allichat (NHS and Voxsio)	Mental health chatbot for youth, combining AI-driven dialogue with educational content and COVID-related adaptations.	Redesigned modules on anxiety, loneliness, and isolation; collaborated with mental health professionals; developed diary journal and SOS features; worked under NDA.
2021	Alphie (EGG Theatre / TEA)	Online theatre education chatbot developed to support digital delivery of creative training during COVID-19 closures.	Led co-design process; mentored content developer; oversaw design critique; managed client communications.
2021	OSSIAN (Ocean ARTic)	Sound-enhanced chatbot co-designed with environmental artist to engage users in climate reflection linked to artistic experiences.	Led chatbot design and training; mentored artist in conversational UX; created initial prototype; provided ongoing design guidance.

2022	Henri (College Bridge, Los Angeles)	Professional development chatbot for metacognitive reflection and facilitator feedback, tested through A/B study over a year.	Designed chatbot and all iterations; led UX testing and collaborative analysis with College Bridge stakeholders; evaluated learning outcomes and user engagement.

Figure 1. Hector M. Fried, 'Project Timeline' of Descriptions and Roles, Excel table, 2025.

1.6 Thesis structure and conclusion

Chapter 1 has attempted to outline the conceptual genesis, methodological provocations, and practical motivations that led to the development of the Ethnobot as a co-ethnographer within algorithmically structured and digitally mediated environments. Its evolution was guided by the epistemological challenges posed by IoT, algorithmic culture, and the limits of traditional ethnographic methods in increasingly distributed field sites. The research was catalyzed by a deceptively simple but profound question: *can ethnographic engagement persist in the absence of physical co-presence?* This repositions the ethnographer's role—not only as observer and interpreter, but also as designer of mediated encounters. Drawing upon critical insights from design ethnography, human-computer interaction, and design anthropology, the Ethnobot was iteratively co-designed across multiple case studies to facilitate context-aware dialogue, elicit participant narratives, and curate field data in ways sensitive to the ethical and interpretive demands of ethnographic work (Gunn, Otto, and Smith 2013; Wright and McCarthy 2010).

Throughout its deployments, the Ethnobot functioned as both a methodological probe and a theoretical proposition. It offered a means of enacting 'designed presence'—a digitally mediated form of ethnographic engagement responsive to the hybrid realities of contemporary sociotechnical systems (Geertz 1988; Haraway 1988). At the same time, its development was shaped by the tensions between research integrity and commercial scalability, particularly in the context of the inChat consultancy. These tensions, rather than diminishing the work, offered generative sites of reflection on the role of ethnographic thinking in applied settings. The following chapters build upon this foundation by offering a critical account of the Ethnobot's theoretical lineage, design process, and field deployments. In doing so, this thesis seeks not only to document the iterative development of a novel methodological tool but also to contribute to broader conversations about ethnographic adaptation, co-design, and the ethics of presence in digitally augmented environments. The subsequent chapters each build on the provocations introduced within this opening chapter, with the intention to explore the theoretical, methodological, and practical implications of chatbot-mediated ethnography. The thesis traces the evolution of the Ethnobot from a speculative proposition to a functional research tool, deployed in diverse contexts and refined through iterative engagements. Together, these chapters articulate a research through design (RtD) approach to ethnographic innovation—one that is simultaneously responsive to the

epistemological commitments of anthropology and the operational constraints of applied design practice.

Chapter 2 situates this research within the historical and disciplinary emergence of design anthropology and design ethnography. It explores how ethnography—once peripheral to design—has become central to understanding sociotechnical complexity in a digitally mediated world. Drawing from key frameworks in human-centered design (HCD), research through design (RtD), and algorithmic culture (Striphas 2015; Gunn, Otto, and Smith 2013), the chapter establishes the epistemic grounding for chatbot ethnography by examining how smartphones, sensors, and IoT platforms function not just as tools, but as cultural actors. In doing so, it outlines a shift in ethnographic focus, from static cultural systems to dynamic, hybrid assemblages involving humans, machines, and infrastructures. Chapter 3 deepens this theoretical foundation by articulating the conceptual scaffolding that underpins this research. It introduces and interrelates three central perspectives: HCD, algorithmic culture, and the role of empathy in design ethnography. This triadic framing is used to interrogate the limits of traditional ethnographic presence and to define the methodological demands that chatbot ethnography must meet. The chapter critically engages with existing literature in interaction design, anthropology, and HCI to establish a lens through which the Ethnobot can be understood as both a methodological and ethical intervention.

Chapter 4 introduces the Ethnobot itself, detailing its conceptual development, technical architecture, and methodological affordances. It traces the Ethnobot's lineage through diary studies (Palen 2002), cultural probes (Gaver, Dunne, and Pacenti 1999), and mobile ethnography (Marcus 1995), positioning it as a situated, real-time tool for empathetic engagement in complex environments. This chapter addresses the methodological gap the Ethnobot seeks to fill—namely, how to conduct ethnographic research in distributed, digitally mediated contexts where traditional immersion is unfeasible. Drawing from design research conducted in public festivals, art installations, and civic consultations, it situates the Ethnobot as a novel form of 'designed presence'. Chapter 5 reframes a series of field-based projects—from the Royal Highland Show to urban sensing initiatives—as iterative testbeds for refining the Ethnobot's functionality and conceptual clarity. Rather than treat these case studies as discrete applications, the chapter explores how they contributed to the chatbot's evolving design logic, interaction style, and ethnographic capability. Emphasis is placed on co-design workshops, stakeholder collaboration, and the gradual transition from academic prototype to modular commercial tool. In this way, the chapter illuminates how RtD methodologies enabled recursive learning, technical adaptation, and conceptual advancement across diverse sociotechnical domains.

Chapter 6 takes up the central provocation of this thesis—'can Hector be replaced by a chatbot?'—and reframes it as an inquiry into the boundaries and possibilities of co-ethnographic agency. Here, the Ethnobot is examined not only as a methodological innovation but as an epistemic agent capable of sustaining ethnographic commitments such as empathy, reflexivity, and contextual sensitivity. Drawing from participatory design, affective computing, and debates in anthropology and artificial intelligence (AI), the chapter argues that while the chatbot cannot fully replace the ethnographer, it can act as a digital interlocutor that expands the field's

capacity to document, interpret, and co-construct cultural meaning. It concludes by considering how chatbot ethnographers challenge conventional notions of ‘being there’ in fieldwork. Chapter 7 concludes the thesis by offering a critical reflection on the contributions, tensions, and future trajectories of chatbot ethnography. It situates the Ethnobot as both a speculative and practical intervention in the ongoing reconfiguration of ethnographic methods. Key themes include the ethics of automation, the complexity of designing for empathy, and the challenges of sustaining interpretive richness within scalable systems. The chapter also addresses the broader implications of this research for human-centred AI, participatory design, and the methodological pluralism needed to navigate ethnography’s digital turn.

Together, these chapters provide a comprehensive examination of how ethnographic methods might be adapted—not abandoned—in an era defined by ubiquitous computing, algorithmic governance, and distributed agency. By attending to the theoretical, technical, and ethical dimensions of chatbot ethnography, this thesis contributes to ongoing efforts to reimagine what it means to engage meaningfully, empathetically, and critically in the design of socio-digital futures.

Chapter 2: Histories and Background

2.1 Introduction

The emergence of design anthropology as a distinct sub-discipline has marked a significant shift in how ethnographic methods are applied to design practice. The following explores the historical and methodological evolution of design anthropology and design ethnography, tracing their entanglement with fields such as human-centred design (HCD), research through design (RtD), and the cultural rise of algorithmic systems, drawing from foundational contributions that highlight the iterative, interpretive, and collaborative nature of design (Gunn, Otto, and Smith 2013; Cross 2011; Zimmerman, Stolterman, and Forlizzi 2010). It also situates both within the broader context of algorithmic culture and considers how artefacts like smartphones and chatbots operate not only as tools but also as agents within emerging sociotechnical assemblages (Striphas 2015). In establishing these theoretical and historical foundations, this chapter sets the stage for examining the methodological innovation of the Ethnobot, a practice-led intervention that reimagines ethnographic engagement through iterative, AI-enhanced design.

Ethnographic research holds practical value in the field of design, underscored by a deep-seated affinity between design principles and ethnographic methodologies. This connection goes beyond the surface, delving into the iterative interplay between processes and products, as well as the reflective involvement of both researchers and designers (Gunn et al 2013). It is a method that provocatively ventures beyond the individual user, into the intricate web of relationships connecting artefacts, data, and cultural infrastructure. Within the context of STiPS research, the term 'cultural infrastructure' aligns itself with the IoT platform and the indispensable tools for cultural transmission: our modern ubiquitous microcomputers, i.e., our smartphones. The smartphone serves as a gateway, but to what exactly? Pinpointing its destination is challenging, especially in the ever-expanding realm of IoT platforms. Yet, in the field of design anthropology, there exists a keen focus on what is now referred to as algorithmic culture. For the purposes of this research, the smartphone should be considered as a conduit for ongoing interactions with algorithms within diverse assemblages. This presents one of the most challenging frontiers of techno-culture to comprehend, owing to its rapid evolution. Thus, we draw from the discourse in anthropology to define algorithmic culture as the “ways in which computers, running complex mathematical formulae, engage in what is often considered to be the traditional work of culture: the sorting, classifying, and hierarchizing of people, places, objects, and ideas" (Striphas 2016, 396). A seemingly routine transaction in a public space signifies a cultural shift that defies easy definition; it may imply a shift in values or a new perspective for those involved. This cultural facet delves into the broader question of how to describe evolving cultural practices.

Ethnographers have grappled with the task of describing cultures, treating them as isolated systems belonging to people(s), objects (IoT), and algorithms

independently, instead of as an interconnected and interdependent thing that is growing alongside humanity. As intricate systems of interpretable symbols, culture is not a tangible entity that can be casually attributed to social events, behaviours, institutions or processes; it is a context within which these elements can be meaningfully and comprehensively described. Ethnography relies on the practice of ‘thick description’, popularized by Clifford Geertz, as a means of contextualization (Geertz, 1973). Within ethnography, this practice can be further dissected into emic and etic perspectives, representing insider and outsider viewpoints respectively, akin to subjective and deductive approaches (Duranti 1997). Both perspectives seek to establish a positional framework for interpretation. This research considers the amalgamation of diverse viewpoints to comprehend the varied relationships and values perceived within these perspectives through practice-led research encompassing narratives inclusive of non-human entities and issues, data flows can find grounding in the emerging landscapes of IoT and public spaces.

A new landscape beckons anthropological and design inquiry, creating the potential to offer a rich cultural description of algorithms, social media dynamics, and the very real human experiences intertwined within this web. It necessitates fostering empathy toward 'objects' and their relationships with humans and other entities, thereby laying the foundation for a theory of practice that encourages innovation in a multitude of value transactions across IoT platforms. My research aims to define this landscape, scrutinizing the interconnected interactions, validations, and self-referential aspects between human-centric, thing-centric, and algorithmic perspectives. In the realm of human-centred endeavours, it is frequently assumed that users possess sufficient knowledge and experience regarding potential solutions and their own needs. However, this assumption often proves inaccurate (Colby 1974; Fazil and Abulaish 2017). Users are unable to anticipate or describe all conceivable situations in which they might require a specific service. Nevertheless, when users have encountered a situation either in their current experiences or in the past, they can provide valuable feedback (Colby 1974; Crabtree 2009).

Developers, like users, are human beings and may not always be adept at comprehending and empathizing with users (Colby 1974). Thus, there is a need to delve deeper into the broader scope of interactions that constitute the user experience and to harness the available tools for a more empathetic understanding. Moreover, it is important to acknowledge that the relationships among humans, non-humans, and inanimate objects can yield contextual insights that extend beyond a narrow focus on the human user. While user-centred design and human-centred design are often used interchangeably, there are discernible differences between the two. Likewise, the positioning of human-computer interaction and user experience research within the broader context remains somewhat ambiguous. While there is a growing body of research centred on animals and insects as users, the present discourse seeks to initiate a dialogue centred on human users. In either case, there exists a direct lineage that originates in the field of engineering. In the realm of commercial and corporate contexts, user-centred design and innovation have garnered significant interest. The importance of users and participatory design, in general, has been well-established (Bown 2009). Similarly, the fields of organizational development and business management have also exhibited a keen interest in these concepts. Within these contexts, substantial academic contributions

have been made, encompassing ethnography, design, and customer experiences within industrial and corporate cultures.

The value of ethnography and the role of cultural perspectives in applied areas such as design, product development, business, and innovation have gained prominence. Anthropologists working in corporate and commercial settings continue a long-standing tradition of studying organizations and corporate cultures, notably through the subfield of business anthropology. Coined in the 1980s, ‘business anthropology’ initially described anthropologists working outside academia, especially in consumer behaviour and marketing; it now broadly encompasses "any application of anthropology to business-oriented problems" (Gray 2010, 1). Numerous overlaps exist among applied anthropology, corporate ethnography, and design anthropology, all prominently represented at the interdisciplinary Ethnographic Praxis in Industry Conference (EPIC), which has promoted ethnographic practices and principles in industry since 2005 (Gunn, Otto, Smith 2013, 6). Building upon this context, the following sections explore the evolution of design thinking and research through design (RtD), examining their conceptual distinctions and shared epistemological foundations. The interplay between design, anthropology, and ethnography is also addressed, with a historical overview tracing the emergence of design ethnography and design anthropology as distinct yet overlapping domains. Finally, this sets the stage for exploring the evolving problem space where these fields continue to expand, positioning this thesis centrally within the ongoing development of chatbots in contemporary design research.

2.2 Design Thinking to Research Through Design

Much of the rhetoric within the financial and applied business industries stems from the oversimplification and use of design thinking reduced to hexagonal or double diamond approaches of iteration. Design thinking is complex, and a simple drawn double diamond does not do justice to the process, application, or methodology. The cataloguing and creation of easy-read references for design process and practice deserves careful consideration towards its formation, deviations, and current interventions under the duress and changes of current design problems and innovations. In contrast to conventional design thinking, which is often applied in business and innovation contexts to optimize and streamline processes, RtD embraces a more experimental, speculative, and critically reflective mode of inquiry. Rather than seeking immediate utility, RtD facilitates conceptual exploration and theoretical contribution through design practice (Zimmerman, Stolterman, and Forlizzi 2010; Gaver 2012; Krogh, Markussen, and Ludvigsen 2015). Although my methodological foundation lies in design ethnography, RtD has played a pivotal role in shaping my approach to design thinking. Specifically, RtD enabled a deeper understanding of design as a mode of inquiry, allowing me to iteratively prototype and evolve digital tools—what I term Ethnobots—to support ethnographic research. These chatbots, designed through repeated cycles of making and reflection, exemplify RtD’s emphasis on process over product. Rooted in an ethnomethodological perspective, my work embodies the principle of ‘research by designing’, where knowledge emerges through the act of iterative creation. This

section traces the historical trajectory of design thinking alongside the parallel evolution of RtD, highlighting their conceptual intersections and temporal convergence.

Design thinking as a practice emerges from multiple contributors but can be seen as a conglomeration of particular employed methodologies and ideas. "Design as a way of thinking" is a phrase coined by American political scientist, sociologist, and psychologist Herbert A. Simon in his book *The Sciences of the Artificial* (Simon 1996). Simon similarly uses the phrase "a means to scratch diamonds", an analogy used to discuss the intricacies of design processes, emphasizing the intricate relationship between inner systems and task environments required for the successful realization of design objectives. Simon's use of 'diamonds' symbolizes the precision required within the multifaceted nature of design and the critical role of material properties in shaping achievable design aims. In short, Simon creates a distinction between critical thinking and a design-centric mode of thinking, redefining design as "the transformation of existing conditions into preferred ones" (Simon 1996, 9, 12, 55, 286, and 187).

'Design as a way of thinking' is also utilized by Robert RTD McKim in his book 'Experiences in Visual Thinking' in which he analyses the elements of thinking, the first distinction being between conscious and subconscious thinking. Solving problems requires a range of thinking operations, the results revealing themselves in representations or so-called 'vehicles for thought' such as feelings, bodily gestures and mathematical notations or sensory images (McKim 1972). 'Visual thinking' provides a way to stimulate and capture visual thought, thus creating a visual form for any given problem and allowing for the cultivation of different perspectives. 'Graphic ideation' is idea generation and expression by means of drawing; this is McKim's approach to idea-sketching. Basically, it is idea generation and expression by means of drawing. McKim describes his 'express-test-cycle' for the graphic development of visual ideas as sketching images that usually accompany the conception of a new idea, then refining those images or moving on to explore and capture others. McKim claims this process can be stimulated and nurtured through the application of visual brainstorming, idea logging, and re-entering (Kress 1985).

Bryan Lawson's *How Designers Think: The Design Process Demystified* is a comprehensive guide to understanding design, its application, and its deconstruction. Similar to McKim's and Simon's writings, Lawson investigates design thinking by examining the concept of thinking itself. Lawson suggests that the word 'thinking', like the word 'design', is so commonly used in everyday language that it has acquired multiple meanings and thus requires redefining within epistemological investigations (Lawson 1980, 130). His work contributes to the discussion around design thinking through descriptions of design strategies, tactics, traps, and forms of conversation associated with design. Lawson suggests designers employ what may be referred to as 'solution-focused' rather than 'problem-focused' strategies, emphasizing the goal of reaching solutions over fully understanding problems. Examining the nature of design problems and solutions is perhaps more logical than it might initially seem. Design problems cannot be comprehensively formulated, and solutions cannot be logically derived from them. According to Lawson, design

problems are far too complex for a designer to simultaneously consider all factors involved (Lawson 1980, 182).

Nigel Cross helped clarify and develop the concept of design thinking as a domain-independent discipline (Cross 2018). Cross is credited with developing the first distance-learning courses in design. In his book *Design Thinking: Understanding How Designers Think and Work*, he details the gamut of design processes and explores them from a fresh perspective (Cross 2011). In his article 'Developing Design as a Discipline', he examines the history of modern design through his life and career, outlining developments in design computing, design methodology, design epistemology, and design cognition. Cross reflects on how many contemporary design techniques, methods, and approaches—including design methods, computer modelling, and virtual reality—originated from design research. He suggests that it can take approximately thirty years for 'ivory tower' research projects and ideas to become embedded into design practice (Cross 2018, 692).

Practitioners are often unaware that the methodologies and tools they use originate from the design research community. Similarly, contemporary observers and commentors frequently overlook this connection due to lack of explicit refences to the foundational work. However, the objectives of design research extend far beyond application in design practice. Importantly, research contributes to the enrichment of educational landscapes and has played a pivotal role in expanding the scope of design education, transitioning from a primarily apprenticeship and technical training model to a comprehensive understating of design thinking and its relevance. This evolution facilitates the emergence of design graduates who are not only better educated but also more cognizant of the design process and their own role as designers within society. Furthermore, the advancement of design as a discipline has enabled fruitful interdisciplinary engagements with fields ranging from computer and cognitive sciences to anthropology, psychology, management and philosophy. A cross-disciplinary exchange which highlights the influence of design research and its essential contribution to modern design thinking and practice (Cross 2018, 706).

Peter G. Rowe is credited with the first significant use of the phrase 'design thinking'. In his analysis of architecture and urban planning, he explores various theoretical perspectives, examining their problem-solving methods and revealing a common inquiry structure within the design discipline. Rowe defines design as a structured and principled mode of inquiry, comparable to other established methods of validation and evaluation prominent during the twentieth century (Rowe 1987). Rowe advocates for a new model of design as a means of enactment, where norms are tested against the complicities of specific temporal situation (Rubin, 1990, P.1). Rolf Faste expanded on McKim's work, emphasizing the practical application that designers need. Faste, as an American designer, made significant contributions to the fields of human-centric design and design education. His work, bridging the gap between mechanical engineering and art to establish the hands-on practice, Rowe refers to as 'design thinking'. Faste taught a wide range of courses that reflected his desire to integrate right- and left-brained thinking, including 'Aesthetics of Machinery', 'Ambidextrous Thinking', and 'Expression of Function' (Faste 2010, 1998).

Design thinking was adapted for commercial utilization by David Kelley, a colleague of Faste at Stanford University, who founded IDEO in 1991. Kelley also established the Hasso Plattner Institute of Design at Stanford University, commonly referred to as the 'd.school'. His primary contributions lie in human-centred design methodologies and the advancement of design thinking. IDEO's origins were rooted in product design, notably when Steve Jobs commissioned the development of a new mouse for the innovative Lisa computer. The design team replaced costly mechanisms used in earlier models with simpler, more manufacturable components—a design still prevalent in mechanical mice today. IDEO subsequently shifted its focus from industrial design to interaction design, driven by efforts to redefine user interactions with notebook-style computers. At the core of IDEO's application of design thinking in business lies a commitment to human-centred design, establishing them as industry leaders who exemplify best practices (IDEO, 2019).

Richard Buchanan's *Wicked Problems in Design Thinking* articulates an expansive view of design thinking as a strategy for addressing persistent human challenges. Buchanan identifies four key domains where design's impact is global, with a particular emphasis on symbolic and visual communications. The first includes graphic design, typography, advertising, magazine production, scientific illustration, and extends to photography, film, television, and computer displays. The second domain focuses on the design of material objects, covering the visual aesthetics of everyday items such as clothing, tools, machinery, and vehicles. It further delves into a comprehensive analysis of the multifaceted interactions between humans and products, encompassing physical, psychological, social, and cultural dimensions (Buchanan 1992, 9). The third domain involves designing activities and organized services, extending from traditional logistics management—merging physical resources, tools, and human efforts into efficient sequences for specific goals—to encompassing strategic planning and logical decision-making. The fourth and final domain addresses the creation of complex systems or environments for living, working, learning, and recreation, incorporating systems engineering, architecture, and urban planning (Buchanan 1992, 10).

Buchanan emphasizes the interconnectedness of these domains, asserting equal importance without prioritizing any single one. Buchanan's analysis underscores the versatility of design thinking in addressing complex challenges, highlighting its vital role in enhancing design education and enabling interdisciplinary partnerships. This approach not only showcases design's potential to significantly benefit society but also emphasizes the critical role of design research in shaping current practices and theoretical frameworks. Design thinking goes beyond functional analysis and integration to include a conscious reflection on the ideas, values, and unity of any functioning whole and delves into design's profound effect on human experiences, as well as exploring its wider societal ramifications, particularly in how it enriches the quality of experiences, making them more intelligent, satisfying, and meaningful. The emphasis is placed on design's capacity to influence cultural environments, with a particular focus on adaptability as a crucial element, demonstrating the expansive reach and impact of design in various spheres of life.

Like design thinking, RtD has evolved along parallel trajectories, often shaped by the same key theorists and practitioners. As a practice-based research methodology, RtD positions design itself as a primary mode of inquiry, emphasizing the generation of knowledge through the creative and iterative process of designing. The concept was first formally articulated by Christopher Frayling (1993), who classified design research into three distinct categories: research into design, research for design, and research through design. Among these, RtD stands out for its emphasis on knowledge generation through the act of designing itself, positioning the design process as a means of inquiry rather than merely a tool for problem-solving (Frayling 1993). Building on this foundation, Nigel Cross argued for "designerly ways of knowing", asserting that design possesses its own epistemological framework distinct from science or the humanities. He emphasized that knowledge is created through the process of making and reflection, rather than solely through theoretical analysis (Cross 2007).

In the 2000s, Bill Gaver advanced RtD as an interpretive and exploratory approach, emphasizing ambiguity and speculation as generative tools. His work on cultural probes illustrated how design artefacts serve as both interventions and sites of knowledge production (Gaver 2012). Similarly, Lars Hallnäs and Johan Redström framed design as a form of inquiry, particularly in relation to interaction design and slow technology, reinforcing the idea that RtD is not merely a problem-solving tool but a means of conceptual exploration (Hallnäs and Redström 2006). Further refinements were made by John Zimmerman, Erik Stolterman, and Jodi Forlizzi, who positioned RtD as a forward-looking design research strategy, incorporating elements of critical reflection and abductive reasoning. More recently, Peter Gall Krogh, Thomas Markussen, and Christina Ludvigsen introduced a structured approach to RtD through their five methods of drifting, which detail how experimentation in design can drive new knowledge formation (Zimmerman, Stolterman, and Forlizzi 2010; Krogh, Markussen, and Ludvigsen 2015). As RtD continues to evolve, it has become central to contemporary design research, speculative design, and interaction design, reinforcing its role as a rigorous methodology for generating knowledge through creative practice.

2.3 Permutations in Design, Anthropology, and Ethnography

Design is a process of thought and planning; to design means to ideate and to think through, before executing plans in the field, to “give form, structure and function to that idea” (Nelson and Stolterman 2003, 1). Design encompasses a wide range of subgenres such as industrial design, architecture, systems design, human-computer interaction design, service design, and strategic design and innovation, and has become a pervasive aspect of modern society. Furthermore, design has become a separate domain of activity in contemporary post-industrial and digital societies, where a specialist workforce of designers has emerged in their economic and organizational developments (Otto & Smith 2013, 1). Design specialists are engaged in a wide range of activities, from conceptualizing sustainable urban and rural developments to innovating mass-produced industrial products, developing

digital systems for professional and personal use, crafting public sector services, and strategizing for business and marketing innovation. Their work, adaptable across various social and economic contexts, contributes significantly to cultural production and societal transformation, emphasizing innovation and intrinsic value. Training for these professionals is increasingly provided by design schools, higher education institutions, and within corporate settings, supported by a spectrum of academic design studies, highlighting the role of design as a pivotal force in modern cultural and societal evolution (Otto & Smith 2013; Suchman 2001).

Anthropology is defined as the comparative study of societies and cultures within specific contexts, emphasizing research on social and cultural change, human creativity, and innovation. It emerged as a formal academic discipline in the late 19th century. Anthropology initially concentrated on the cultural institutions and practices of non-Western societies; however, in contemporary settings, anthropologists conduct research across a diverse array of social environments, from urban centres to remote rural villages in developing nations, as well as within technology companies and scientific laboratories (Barnett, 1953; Ingold, 2007). Throughout the 20th century the field adopted participant observation as its principal methodological approach for fieldwork. This technique, central to ethnography, enables detailed cultural descriptions through the researcher's prolonged immersion in a community, aiming to observe and document daily practices thoroughly. It is imperative for researchers to engage closely with community members, as gaining insight into everyday events and comprehending their significance requires time. Ethnographic research culminates in the production of an ethnography, which may manifest as a written report, book, film, or exhibition. This output strives to represent a specific social setting and cultural context while advancing theoretically informed arguments. Ethnography, therefore, is not merely a method but an inclusive process of inquiry and immersion, dedicated to understanding and depicting social life as encapsulated in the final ethnographic representation (Gunn, Otto, & Smith 2013, 2).

The intersection of design and anthropology, particularly through ethnography, has burgeoned into a significant field of study, illuminating the profound synergy between design practices and anthropological research (Gunn, Otto, & Smith, 2013,13). This relationship has been pivotal in enhancing designers' understanding of user needs and experiences, thereby informing the development of products and systems with ethnographic data and methods since the 1970s (Blomberg, Burrell, & Guest, 2003; Reese, 2002). Ethnography's role in design is characterized by its inquiry and discovery processes, fostering iterative design cycles with a deep focus on humanist approaches that resonate with the lived experiences of users (Gunn, Otto, & Smith, 2013, 3-225). User-centric ethnography has become indispensable in design, offering a methodology that captures aspects of reality beyond speculative design thinking. This approach generates vital data from actual usage within various cultural practices, subsequently informing the design process with a nuanced theoretical foundation (Gunn, Otto, & Smith, 2013, 4). Tim Brown, CEO of IDEO, emphasizes the importance of qualitative data over quantity, advocating for immersion in real-life contexts to derive meaningful insights for design reflection and innovation (Gunn, Otto, & Smith 2013, 382).

Despite shared methodologies, anthropology and design diverge in their objectives: anthropology aims to generalize and theorize about human societies, while design focuses on creating specific, transformative products and solutions. This distinction underscores design's future orientation, evaluated by the tangible impact of its outcomes on everyday life, contrasting with anthropology's traditional emphasis on observation and documentation without intent to alter social realities. Design anthropology emerges as a field aimed at bridging these disciplines, advocating for collaborative future-making and interventionist approaches that traditional anthropology eschews. By operating in multidisciplinary teams, design anthropologists navigate complex roles, fostering innovation through shared expertise and co-creation, a departure from the solitary scholarship typical of anthropology (Gunn, Otto, & Smith 2013, 4). Three key contributions of anthropology to design include theoretical and cultural interpretation, a balanced view of the past and future to inform design, and ethnography's unique ability to understand the value orientations of affected groups. These elements are integral to design anthropology's goal of transforming research and collaboration practices, pushing for societal change without compromising empathy or depth of understanding (Gunn, Otto, & Smith 2013, 2013, 6).

With the intention of understanding the needs and experiences of users and the contexts in which products and computer systems are used, designers became aware of the value of ethnographic data and methods in the 1970s. The usefulness of ethnographic research and information for design appears to come with a genuine affinity between design and ethnography as processes of inquiry and discovery, fuelling iterative processes (Gunn Otto & Smith 2013, 3). A central characteristic of design anthropology is a direct emphasis on the utility, the necessity of ethnographic methods for a humanist kind of design that accounts for the lived cultural worlds inhabited by designed things and their users. As early partnerships between anthropologists and designers could attest, ethnography has a lot to offer design (Gunn, Otto & Smith 2013, 225). Design is future oriented and measured by the success of relevant designed products and conceptual solutions for people’s everyday lives, while anthropology as a discipline lacks tools and practices to actively engage and collaborate in people’s formation of their futures. An important contribution of design anthropology is therefore to develop such tools and practices of collaborative future making. Additionally, the ultimate purpose of participant observation by anthropologists is to observe and document rather than to effect change; this often means minimizing their impact on the people among whom they conduct their studies.

The field of design anthropology is oriented toward intervention and transforming social reality. Design is (almost) always a process of collaboration between different disciplines and stakeholders, including designers, researchers, producers, and users. While anthropology maintains a tradition, which is only slowly changing, of the lone researcher who conducts individual fieldwork and produces a solo piece of scholarship, design anthropology breaks this tradition as its practitioners work in multidisciplinary teams, acting in complex roles as researchers,

facilitators, and co-creators in processes of design and innovation (Gunn, Otto & Smith 2013, 4).

Anthropology brings three key elements to design anthropology. The first element is the role of theory and cultural interpretation, where ideation, the generation of design concepts, is a central element of design that does not have a sustained tradition of theorizing the context of usage and interpreting the cultural meaning of things. This is anthropology's strength, with a long history of cultural interpretation (Geertz 1973), contextualization (Dilley 1999), and holistic explanation (Otto and Bubandt 2010) through cross-cultural comparison and the development of theoretical concepts.

Emphasizing the generative role of theory in developing design concepts and critically examining existing, often implicit conceptual frameworks, design anthropology integrates the rich tradition of contextualization and interpretation into the tasks of design. The second element of anthropology, which goes against design's concern with creation, innovation, and 'future-making' (Björgvinsson, Ehn, and Hillgren 2010), anthropology pragmatically investigates the past to understand the present, which includes modes for anticipating the future. It is thus a great challenge for design anthropology to extend the temporal horizon both forward and backwards, providing images of the future in a dependable construction of the past, avoiding risks of 'defuturing' which is inherent in design (Fry 2011) as well as generalizing and essentializing modern values of innovation and change (Suchman 2011). The third element of anthropology, through the hallmark practice of ethnography, enables design anthropology with a unique sensitivity to the value orientations of the various groups affected by design projects, such as disempowered groups, consumers, producers, and audiences. Design anthropology aims to integrate and develop these traditional qualities into new forms of research and collaborations in a push for transformation without the sacrifice of empathy and a clear depth of understanding (Otto & Smith 2013, 6).

2.4 History of Design Anthropology and Design Ethnography

As early as the 1930s, management researchers and designers collaborated with anthropologists in industrial settings to explore the social and physical aspects of worker productivity. This collaboration began notably with Lloyd Warner's involvement in the Hawthorne study, one of the first to demonstrate how informal social processes influenced factory workers' efficiency and output (Baba 1986; Gunn, Otto & Smith 2013). Subsequent studies throughout the 1940s and 1950s continued this research trajectory, increasingly focusing on developing techniques for interaction analysis. These techniques aimed to predict elements of interpersonal behaviour and generate insights useful for business management. Initially, industrial anthropologists primarily engaged with business management. However, World War II introduced new military-related specializations for social scientists in product development, termed 'engineering psychology' and 'human factors analysis' (Kaufferman 2002, 19–20). These studies examined the behavioural and

psychological factors of workers and pilots which prevented accidents, enhanced machinery control, and improved industrial products and equipment. In both Europe and the United States, research in engineering, human factors, and workplace behaviour expanded social scientists' roles in business management and industrial design, influenced notably by labour movements advocating for improved worker health and safety.

Since the 1980s, collaborations among social scientists, computer scientists, and system designers have emphasized the significance of integrating technology into workplace practices. Ethnographic research has become a central component within interdisciplinary fields such as computer-supported cooperative work (CSCW) and human-computer interaction (HCI). This research focuses on observing human behaviour around computers in the workplace, building on foundational contributions by Lucy Suchman and her colleagues at Xerox Palo Alto Research Centre's Work Practice and Technology Group. These areas of study pay close attention to the interaction between humans and computers in workplace environments, utilizing ethnography as a critical method for gathering data. This approach helps in understanding user needs and their experiences in real-world contexts. The underlying computer science aspects of CSCW and HCI are deeply rooted in cognitive and behavioural sciences, aiming to grasp user behaviour in industrial and corporate environments. Ethnography serves as an analytical tool grounded in ethnomethodology, focusing on the detailed observation of human behaviour and actions in their natural settings. This method aids in identifying general patterns that can inform design principles and directions (Suchman 1987, 1993, 2007).

In her book *Plans and Situated Action* (1987), Suchman explored interactions between people and computers, making it one of the earliest works addressing the relationship between design and anthropology (Otto & Smith 2013). Using ethnographic inquiry informed by activity theory, ethnomethodology, and conversation analysis, Suchman mapped plans, workflows, and situated actions to demonstrate how cultural conceptions shape the design and adaptation of technologies (Otto & Smith 2013). Jane Fulton Suri at IDEO and Liz Sanders from SonicRim applied creative participatory design methods as well as generative tools and frameworks from experimental psychology to understand the needs and work with users. During this period, more fragmented behavioural and psychological approaches were increasingly replaced by holistic and broadly contextual methods (Gunn, Otto & Smith 2013). In addition, other interesting consultancy and design firms in the US and specifically E-Lab LLC and the Doblin Group were greatly inspired by Xerox PARC, who played an integral role towards introducing ethnographic methods to industrial design and product development in the early 1990s. E-Lab's approach was unique as they employed an equal number of researchers and designers to work together in teams. Their main research strategy utilized ethnographic methods such as participant observation, qualitative interviews, video recording of daily consumer behaviour, and analysis (Wasson 2000; 379).

In the mid-1990s, growing interest in ethnography within industrial and commercial design led many companies across the United States and Europe to hire anthropologists, psychologists, and sociologists. Their goal was to gain deeper insights into user behaviours and needs, shifting away from fragmented

psychological approaches towards more holistic, contextual ethnographic techniques. This evolution was driven by interdisciplinary collaborations, highlighting ethnography's crucial role in developing user-centric design strategies and challenging traditional power dynamics in corporate design (Wasson 2008; Dourish 2006). Anthropologists' roles were often limited by predetermined expectations within these industrial contexts (Otto & Smith 2013). Wasson's (2002) 'bow tie model' illustrates the integration of ethnography into design, depicting an intermediate phase or 'knot' that creates shared frameworks and connects research and design practices. Blomberg and colleagues further outlined foundational ethnographic principles for design, emphasizing user integration through tools like experience models and user profiles. They advocated combining observational ethnography with creative design methods—such as scenarios and opportunity maps—positioning anthropologists and designers as pivotal agents of change. Their influential work, notably in the U.S., Europe, and Scandinavia, significantly advanced participatory design, bridging current practices with future design aspirations (Blomberg 2012, 2013, 2015; Mukherjee et al. 2013; Naghsh et al. 2008).

The Scandinavian tradition of participatory design emerged from trade union projects in the 1970s and 1980s, notably DUE, DEMOS, and UTOPIA. These projects critically examined the negative impacts of new technologies on workers' conditions (Bjerknes, Ehn, and Kyng 1987; Ehn 1988, 1993; Greenbaum and Kyng 1991). Workplace democracy was the central ideal of this tradition, emphasizing employees' inclusion and active participation in shaping their work environments (Bansler 1989; Bjerknes, Ehn, and Kyng 1987). Participatory design advocated for technologies and work processes that enhanced workers' skills and tools, enabling them to control their practices rather than being replaced by technology—a stance with significant political implications (Ehn 1988). This emphasis led to the development of various design techniques and methods, such as design games, cooperative prototyping, and simulations of work-technology relationships (Bødker 1991; Greenbaum and Kyng 1991), empowering disempowered groups to actively contribute to design processes. With rising commercial interest in user behaviour, concerns have been expressed regarding the potential erosion of these participatory values (Beck 2002; Kyng 2010). Nonetheless, participatory design in Scandinavia continues to evolve and is frequently supported by government-funded research collaborations involving academic researchers, public entities, and private organizations (Binder et al. 2011; Iversen and Smith 2012).

In congruence with participatory design the field of human-computer interaction design has expanded its scope beyond workplace studies and system development, the turn to values and experiences has occurred more generally within the field of HCI. The rise of industrial and commercial interest in ubiquitous and pervasive computing has led academic researchers in this field to address the need for integrating human values into critical and reflective approaches to design (Bannon 2005; Dourish 2007; McCarthy and Wright 2004; Sellen et al. 2009; Sengers et al. 2005; Zimmerman 2009). A more radical practice of design as co-creation that addresses a larger context of social relations, experiences, values, and ethics has developed beyond the human-centred approaches with a technology and system-focused design practice towards an understanding of users as end users or evaluators of technology. This criticality echoes Suchman's concerns in the focus

of everyday behaviour and imagination over cognition and intended practices (Suchman 2007), similarly raising issues with their attendance to ongoing appropriations of technology by people in their daily lives superseding the traditional focus on usability and interface design. Informing an outspoken concern with the role of users and how designers can involve and deal with stakeholders and participants in collaborative processes has a strong affiliation to participatory design (Muller 2002). Dourish links design and critical reflection with the potential of anthropology as he critiques the limited focus on ethnographic methods in and for design, and points to the transformative potential for classical anthropological studies for understanding relations between people and technologies anew (Dourish 2006, 2007).

This overview of the origins and development of design ethnography and design anthropology reveals an important issue—the unclear distinction between these two terms within design discourse. In the social sciences, anthropology refers broadly to the study of humans, with socio-cultural anthropology focusing explicitly on human cultures and societies. Ethnography, by contrast, is recognized as the formal methodological approach used to study human culture. Anecdotally, the term ‘design anthropology’ is infrequently used in design practice, whereas ‘design ethnography’ is far more common. This preference can be understood historically, especially considering pivotal moments such as the influential ethnographic study at Xerox PARC, which identified human error—not technology—as the source of exploding paint cartridges. At that time, neither design ethnography nor design anthropology were established terms; instead, it was simply ‘ethnography’ that engineers found beneficial, catalysing the emergence of user experience (UX) and embedding ethnography within design practice. Nevertheless, design anthropology continues to be formally defined as the applied branch of anthropology.

2.5 The Evolution of Chatbots: From ELIZA to Modern AI Assistants

The origins of chatbots trace back to ELIZA, developed by Joseph Weizenbaum in 1966 as a Rogerian therapist simulation. ELIZA functioned through pattern matching and keyword recognition, giving the illusion of intelligent conversation despite its lack of true understanding (Weizenbaum 1966). The system’s vague responses contributed to its perceived intelligence, raising early ethical concerns about human-machine interaction (McNeal et al. 2013). Weizenbaum later criticized the anthropomorphic tendencies of users, warning against the potential for AI to be mistaken for genuine intelligence (Weizenbaum 1976). Scholars such as Sherry Turkle noted that even those who understood ELIZA’s limitations engaged with it as though it possessed awareness (Turkle 2009, 2012, 2015). Building on ELIZA, Kenneth Colby developed Parry in 1972, designed to simulate a paranoid individual’s thought patterns, incorporating more advanced conversational strategies (McNeal et al. 2013). In 1997, Rollo Carpenter introduced Jabberwacky, one of the first learning-based chatbots that retained conversational data for response patterning. Jabberwacky later won the Loebner Prize in 2005 and 2006 (McNeal et al. 2013).

The 1990s and early 2000s saw further advancements in chatbot design. Dr. Sbaitso, a simple text-to-speech AI psychologist developed by Creative Labs, was distributed with Sound Blaster sound cards in the early 1990s (PC Mag 1991). In 1995, Dr. Richard Wallace introduced A.L.I.C.E. (Artificial Linguistic Internet Computer Entity), which used AIML (AI Markup Language) to simulate conversation (McNeal et al. 2013). A.L.I.C.E. won the Loebner Prize in 2000, 2001, and 2004 and remains foundational for modern chatbot architectures. Advancements in machine learning and natural language processing (NLP) led to more sophisticated chatbots. Ultra Hal, developed in 1997, used statistical models to enhance response relevance and expanded across multiple platforms, including Facebook and Twitter (McNeal et al. 2013). Meanwhile, SmarterChild, an AI integrated into AOL Instant Messenger (AIM) provided stock updates, weather forecasts, and personalized interactions (Vice Magazine 2018; CHA 2002).

The development of IBM Watson, a question-answering AI system, further showcased chatbot evolution. Watson's 2011 victory on *Jeopardy!* demonstrated its ability to process and synthesize vast amounts of data, leading to applications in healthcare, finance, and research (Ferrucci et al. 2013).[1] Concurrently, public service chatbots, such as Emma, were implemented in libraries and customer service roles, demonstrating the growing utility of AI-driven conversation (McNeal et al. 2013). Furthermore, the emergence of voice-activated virtual assistants transformed chatbot applications in the 2010s. Apple's Siri, introduced in 2010, set the precedent for Google Now (2012), Amazon Alexa (2014), and Microsoft Cortana (2015), integrating voice commands, predictive analytics, and third-party services (Castelluccio 2012; Morochove 2012; ENP Newswire 2015). These systems leveraged cloud computing and deep learning, enabling context-aware responses and personalized interactions. By the mid-2010s, chatbots became essential for business automation, particularly within customer service and e-commerce. Platforms like Facebook Messenger and Slack integrated chatbots for business operations, improving customer interactions through conversational AI (ENP Newswire 2016). However, chatbot development faced ethical challenges, exemplified by Microsoft's Tay, an AI Twitter bot that was taken offline in 2016 after exhibiting biased and inflammatory behaviour, highlighting the risks of unsupervised machine learning in conversational AI (Wakefield 2016). The release of GPT-3 in 2020 marked a transformative moment, leading to ChatGPT's public debut in November 2022. Unlike earlier chatbots, these large language models(LLM)-based systems can generate text dynamically, understand context, and engage in multi-turn conversations (Ma et al. 2024). Further refinements have led to specialized chatbots designed for data collection (Wei et al. 2024), civic engagement (Pinto and Macadar 2024), and personalized interactions (Kovačević et al. 2024). Today's chatbots incorporate multi-modal capabilities, supporting text, speech, and even visual inputs, solidifying their role in both professional and consumer domains.

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[1] *Jeopardy!* is a popular American television game show where contestants are provided with general knowledge clues in the form of answers and must respond with the correct question. The show, hosted by Alex Trebek for many years, has been a staple of American TV since 1964. Watson's victory marked one of the first times the American general public could witness an AI system using natural language processing.

This progression—from scripted rule-based bots in the 1960s to sophisticated AI-driven conversational agents in the 2020s—demonstrates not only technological evolution but also the shifting ethical and social implications of human-AI interaction. Recent advancements in conversational AI have fostered the development of diverse chatbot systems, each defined by their functional design, interaction modalities, and intended application. One of the earliest and most structured forms are rule-based chatbots, which operate via textual interfaces and predefined scripts. These systems are typically deployed for handling frequently asked questions or providing basic customer support, relying on intent recognition and rigid conversation flows crafted in platforms such as Dialogflow or Rasa (Sánchez Cuadrado et al. 2024). Contrastingly, LLM-based open-domain chatbots like ChatGPT and Bard have emerged as powerful tools capable of engaging in free-form dialogue. These chatbots leverage pre-trained LLMs, such as GPT-3.5 or GPT-4, and utilize prompt engineering to handle a broad array of conversational contexts. Their flexibility supports use cases ranging from exploratory learning to creative writing assistance (Ma et al. 2024). Bridging open-domain flexibility with focused functionality, task-oriented LLM-based chatbots represent a hybrid approach. These bots are designed to accomplish specific goals—such as booking services or retrieving structured information—by employing modular prompt templates, state-machine coordination, and domain-specific languages (DSLs) like YAML. This approach facilitates natural conversation while reducing development complexity (Sánchez Cuadrado et al. 2024).

A growing line of inquiry explores the affective dimension of chatbot interaction. Chatbots with dynamic personality infusion infuse generated responses with distinct behavioural traits—such as civility, vibrancy, or conscientiousness—through post-processing mechanisms applied via GPT-4. This personality modulation enhances user engagement, trust, and contextual relevance without altering the underlying model (Kovačević et al. 2024). Another notable application is in the health and wellness domain, where self-report collection chatbots are designed to gather user-reported data on topics like sleep, exercise, and mental health. These systems use zero-shot prompting with information-slot templates and persona modifiers to create empathetic, naturalistic conversations that promote user disclosure and data accuracy (Wei et al. 2024). Extending the civic potential of AI, civic engagement chatbots such as the GenPart model aim to increase digital participation among underserved populations. These generative chatbots go beyond standard e-informing and e-consulting frameworks to support unstructured, self-mobilized citizen interaction, particularly in contexts characterized by digital illiteracy or infrastructural barriers (Pinto and Macadar 2024).

Finally, the growing accessibility of tools like OpenAI's custom GPT framework has enabled the deployment of custom-GPT chatbots in domains such as science communication. For instance, the Arizona Waterbot and Aqua Advisor projects illustrate how LLM-based chatbots can be tailored—with minimal coding—to disseminate domain-specific, reliable information to the public, even within constrained resource environments (Muthyala, Lauer, and Carradini 2024). These developments have taken place at a remarkably rapid pace. From 2016 to 2019, chatbot design was dominated by rule-based architectures, which required developers to manually define intents and dialogue paths. The release of OpenAI's

GPT-3 in 2020 marked a turning point, enabling natural language generation with unprecedented fluency and flexibility. By late 2022, ChatGPT introduced these capabilities to the public, leading to mass adoption and democratization of chatbot deployment. Within just two years—between 2022 and 2024—researchers and developers advanced toward highly modular, personalized systems integrating structured task decomposition (Ma et al. 2024), dynamic personality traits (Kovačević et al. 2024), civic interaction design (Pinto and Macadar 2024), and domain-specific configurations (Muthyala, Lauer, and Carradini 2024). In effect, the evolution from rigid, rule-bound bots to multimodal, generative systems has occurred in less than five years, underscoring one of the most rapid transformations in the history of human-computer interaction.

2.6 Conclusion

From early industrial collaborations in the 1930s to the epistemological maturation of design anthropology and research through design (RtD), it is clear that ethnographic thinking has become indispensable to contemporary design inquiry. Design anthropology's evolution from observation to intervention underscores its capacity to engage in "collaborative future-making" (Gunn, Otto, and Smith 2013), while RtD offers a critical, iterative framework for generating knowledge through practice (Zimmerman, Stolterman, and Forlizzi 2010; Gaver 2012). As this chapter illustrates, the emergence of algorithmic culture and the increasing entanglement of human and non-human actors—such as smartphones, IoT platforms, and AI systems—demand new methodological approaches. The ethnographic lens must now accommodate the fluid, relational dynamics of technological assemblages, extending beyond traditional user-centric paradigms toward more inclusive and speculative perspectives (Striphas 2016; Geertz 1973). The convergence of ethnographic theory with computational systems has necessitated a shift from description to design, where ethnographers not only study but also shape the socio-technical worlds they inhabit.

The historical trajectory of chatbot development, from ELIZA to ChatGPT, exemplifies this shift. What began as an exploration of machine mimicry has evolved into the design of empathetic, co-creative systems capable of mediating cultural insight. As chatbots become increasingly embedded in everyday life, they offer novel opportunities for ethnographic practice, especially when designed through RtD to engage in dialogic, interpretive interaction. This progression reflects not only technological advancement but also the shifting ontological status of AI as an ethnographic participant, tool, and co-ethnographer. Taken together, these histories frame the methodological innovations presented in this thesis. By positioning the Ethnobot as both a product of and contributor to design ethnography, this research foregrounds a new practice space in which design, anthropology, and AI intersect. The next chapter builds upon this foundation by exploring inclusive perspectives, articulating a three-part lens that incorporates human-centred, thing-centred, and algorithmic viewpoints. These perspectives will be used to examine the design,

deployment, and interpretive potential of the Ethnobot, situating it as a critical methodological tool for ethnographic research.

Chapter 3: Inclusive Perspectives

3.1 Introduction

Chapter 3 critically examines human-centred interaction within the complexities of algorithmic culture, highlighting the integrated role of design ethnography in producing high-quality ethnographic interpretations. It draws inspiration from industry leaders such as IDEO and Stanford's D. School, particularly their practice of embedding empathy into design processes. The chapter first explores human-centred design, then moves into algorithmic culture, before revisiting design ethnography and emphasising the central role empathy plays within it. This theoretical framing sets the stage for the introduction of the Ethnobot as a methodological tool designed to reduce direct ethnographer intervention while maintaining results comparable to traditional ethnographic methods.

3.2 Human-Centred Design

Human-centred design is an approach to problem-solving that develops solutions to problems by involving the human perspective in all steps of the problem-solving process. According to the ISO 9241-210 standard, human-centred design focuses on understanding user's needs, contexts, behaviours, and experiences to inform the entire design process. Human-centred design is iterative, involving cycles of ideation, prototyping, testing, and refinement to ensure that designed solutions truly meet the intended user needs (ISO, 2010).[2] Human-centred design emphasizes designing products and systems with the user's needs, wants, and limitations at the forefront of its design priorities. Human-centred design is characterized by its stages of understanding user contexts, specifying user requirements, designing solutions, and user testing. Norman and Draper (1986) highlighted the importance of human-centred design in creating usable systems, asserting that user involvement in design contributes significantly to the system's usability. User experience research encompasses a range of methodologies and

[2] The International Organization for Standardization (ISO), established on 23 February 1947, is an independent, non-governmental entity with over 160 country members, developing voluntary international standards across various sectors, including quality and information security, to support global trade and innovation. These standards ensure product safety, reliability, and quality, enhancing international commerce and technological collaboration.

practices used to understand user behaviours, needs, and motivations through observation techniques, task analysis, and other feedback methodologies. User experience research is critical in identifying the problems and opportunities in a user's interaction with a product or service. It informs design decisions through empirical evidence gathered from user interactions, usability testing, and feedback (Hartson & Pyla, 2012). Service design is an interdisciplinary approach that combines different methods and tools from various fields to design services that improve the user's experience. It focuses on creating seamless service experiences for users, integrating the service's digital and physical touchpoints. Service design looks at the service from the user's perspective, aiming to make services more useful, usable, desirable, and efficient (Stickdorn & Schneider, 2010).

Human-centred design and user experience research underline a common goal: to design products, systems, and services that are deeply resonant and meaningful to their users. Design ethnography brings together these methodologies under a unified practice that emphasizes the deep understanding of people's lives, cultures, and environments to inform design processes. It involves immersive research methods that allow designers to observe and engage with users in their natural contexts. This ethnographic approach enables a profound understanding of human behaviours, needs, and motivations, which informs the human-centred design processes (Salvador, Bell, & Anderson, 1999). Through design ethnography, practitioners can apply the principles of human-centred design, user-centric design, use-centric design research, and service design in a cohesive manner. By grounding design decisions in ethnographic insights, designers can ensure that their solutions are not only usable and desirable but also culturally relevant and deeply human-centric. This synthesis of methodologies under design ethnography highlights the importance of an empathetic and nuanced understanding of human experiences in creating more effective and impactful designs. Human-centric design, user-centric design, user experience research, and service design are inherently connected through their 'human-centred' ethos. Design ethnography serves as a comprehensive framework that unites these methodologies, emphasizing the role of deep, ethnographic understanding in creating designs that truly resonate with users. Through this perspective, designers can create more inclusive, empathetic, and human-centric solutions that address real-world needs and challenges.

Since 2015 human-centred design has increasingly responded to the demands of a complex, interconnected world by embedding itself across diverse domains—from AI and public health to policymaking and sustainability. One of the most significant shifts has been the emergence of human-centred AI (HCAI**)**, which emphasizes designing intelligent systems that support human values, enhance user agency, and promote ethical accountability. Rather than prioritizing algorithmic efficiency alone, HCAI seeks to align AI development with human needs and social good (Shneiderman 2020). In the field of public health, HCD has played a vital role in designing more user-friendly and contextually appropriate health interventions. By emphasizing empathy and collaborative problem-solving, HCD methodologies have helped reduce participation burdens and improved engagement in health initiatives, particularly in underserved communities (Altman et al. 2023). Likewise, in policy design, HCD has enabled governments and organizations to craft policies grounded in the lived experiences of citizens, making policy processes more inclusive and effective (Bason 2017).

At a methodological level, design firms such as IDEO have continued to refine and disseminate structured HCD toolkits that promote co-creation, rapid prototyping, and iterative testing. These resources have enabled designers worldwide to embed empathy and user insight at every stage of the creative process. However, despite its popularity, HCD has not been immune to critique. Within international development, for example, scholars and practitioners have questioned its scalability and cultural adaptability, arguing that the model sometimes risks oversimplifying or misinterpreting users' needs, particularly in non-Western contexts (Andrews 2021). This has led to the rise of ‘more-than-human design’**,** an approach that extends human-centred thinking to consider ecological systems, non-human species, and the broader environment. This shift reflects a growing awareness of the anthropocentric limitations of traditional design thinking and calls for a more ecologically inclusive practice. Exhibitions such as *The Future is More Than Human* at London’s Design Museum in 2025 illustrate how designers are reimagining the role of design in fostering multispecies coexistence and planetary health (Design Museum 2025). In sum, the trajectory of human-centred design between 2015 and 2025 reveals a discipline that is both reflexive and adaptive. By embracing interdisciplinary methods, ethical imperatives, and inclusive perspectives, HCD continues to evolve in response to the technological, social, and ecological complexities of the present moment.

3.3 Algorithmic Culture

Algorithms play a central role in shaping contemporary socio-cultural dynamics, giving rise to what has been termed ‘algorithmic culture’—a growing area of interest within anthropology. Algorithms, and chatbots specifically, assume distinct methodological roles within the Ethnobot framework. This research argues for an integrated approach that merges theoretical and practical elements of design ethnography with insights from algorithmic systems. As a nascent anthropological field, algorithmic culture invites synthesis with design thinking, positioning this convergence as the focal point of the thesis. This study traces the historical evolution of algorithms and their cultural entanglements—referred to at times as algorithmic assemblages—and establishes their relevance through the lens of chatbot technologies. These technologies serve as a foundational element in reimagining ethnographic methods, particularly as demonstrated in the case studies of Chapter 4, which exemplify a broader and more inclusive practice of design ethnography (Striphas 2016).

An illustrative example of the effects of algorithmic culture and its entanglement with material culture is found in Jonathan Cohn’s paper, *My TiVo Thinks I'm Gay: Algorithmic Culture and Its Discontents* (Cohn 2016). This work sheds light on how algorithms can exert profound influence over an individual's life. TiVo, an early pioneer in digital recommendation systems, employed algorithms to suggest media content based on user preferences. These recommendations, while useful, also revealed cultural anxieties concerning taste, consumption, and sexual identity. As television series began to appeal to both heterosexual and homosexual audiences, these recommendations became intertwined with shifting norms surrounding sexual identity and stigma. However, it is crucial to recognize that

algorithms are not static entities; rather, they are dialectical systems that reflect contemporary capitalist contradictions, as posited by Christian Fuchs (Fuchs, 2016). These technologies not only impact cultures but are also continually transformed by them, as evidenced by Cohn (2016). Extending this perspective, Mike Annay's paper, ‘Towards an Ethics of Algorithms: Convening, Observation, Probability, and Timeliness’, offers several poignant examples of algorithmic significance. These examples involve algorithms deriving categories and associations by sensing and combining aspects of the world they are programmed to perceive, such as the National Security Agency's use of cell GPS data or Google's algorithmic labelling of potential terrorists based on online behaviour (Annay 2016).

In whatever capacity anthropology and design intersect, the commitment to concrete practice and reflective action is paramount. This commitment is reflected in the influence of figures such as Tim Ingold and Donald Schön, whose ideas inspire practitioners of design anthropology. Ingold's phenomenological approach to understanding social life, creativity, improvisation, and innovation as cultural processes informs our research. Similarly, Schön's concept of design practice as reflection-in-action, coupled with the intrinsic relation between knowing and doing, contributes to our understanding of designing as a reflexive engagement with concrete experience. Within this nexus of knowing, doing, and designing reflexively, this research introduces algorithms and chatbots as integral components to understand human-to-human connections. These elements enrich our understanding of the intricate web of interactions in the modern social landscape, where algorithms mediate our interactions with information and semi-autonomous agents like chatbots. This complex ‘social web of interactions’ continues to evolve and challenge our understanding of culture and technology.

3.4 A Brief History Situating Current Perspectives of AI

Furthermore, the growing integration of AI into everyday life intensifies the intersection between algorithmic culture and material culture. To contextualise this relationship, it is important to trace AI’s historical development. One of the earliest examples of programmable computing is Charles Babbage’s ‘Difference Engine’, a mechanical device designed in the 19th century to perform mathematical calculations automatically. Construction began in 1823, but the machine was never completed. In 1842, Babbage initiated a more ambitious project—the Analytical Engine—which, although never fully realised in practice, laid the foundational conceptual groundwork for others to follow. Historians argue that Babbage’s failure to complete either machine was due largely to the unreliability of contemporary mechanical technology. Nevertheless, many important programming principles emerged from his work and that of his collaborators, most notably from Ada Lovelace, Countess of Lovelace. Their conceptual innovations included conditional branching, iterative loops, and index variables—principles that would later underpin the logic of modern computational design (Felt 1916).

By the mid-twentieth century, these early developments had evolved into more complex theoretical and practical formulations. In October 1950, Alan Turing

published his now-famous paper in *Mind*, introducing what would come to be known as the Turing Test. At the time, Turing was employed at the University of Manchester, working alongside the world's first stored-program computer. His primary role involved designing and managing its software. Although he continued his mathematical research, Turing had also become engaged in philosophical discussions, particularly with the scientific philosopher Michael Polanyi. These conversations contributed to his articulation and publication of the view that human intelligence could, in principle, be simulated by a suitably programmed machine. The imitation game, proposed in the 1950 paper, shifted the discussion of artificial intelligence away from metaphysical questions about consciousness and toward observable behaviour, suggesting that the demonstration of intelligence could be judged functionally, rather than ontologically. The same paper also offered an accessible exposition of computability, building on his earlier work from 1936—at the age of 23—when he had introduced what would later be termed the Turing machine: a formal and mathematically rigorous definition of an 'effective method'. This model remains a foundational concept in theoretical computer science, and the Turing Test continues to be referenced in contemporary discussions about machine intelligence and cognition.

John McCarthy, widely credited with coining the term 'AI', played a foundational role in the development of modern internet-based computing. Trained as a mathematician, he was instrumental in the invention of computer time-sharing and served as Professor Emeritus at Stanford University. McCarthy organized the seminal 1956 Dartmouth Conference on AI and later co-founded the MIT AI Laboratory with Marvin Minsky. While at MIT, he developed the List Processing Language (LISP), which became a core programming language in AI research. After teaching briefly at Stanford in the early 1950s, he returned in 1962 and, by 1964, had established the Stanford AI Laboratory. Over his career, McCarthy received numerous honours, including the ACM Turing Award (1971), the Kyoto Prize (1988), the National Medal of Science (1991), and the Benjamin Franklin Medal (2003) (AI Magazine 2011). In parallel, Herbert A. Simon, J.C. Shaw, and Allen Newell made significant contributions to AI with the development of a general problem-solving program in 1957. Their system aimed to solve problems expressible as well-formed formulas or Horn clauses, modelling reasoning as a directed graph with axioms as sources and conclusions as sinks. Their work was particularly applicable to domains like predicate logic and Euclidean geometry and laid theoretical foundations for heuristic-based problem solving (Newell, Shaw, and Simon 1949).

The first industrial robot, Unimate*,* was developed by General Electric in 1961 and deployed at a General Motors assembly line in New Jersey. Comprising a large computer system connected to a robotic arm, Unimate performed repetitive tasks stored in its read-only memory. Specifically, it transported die castings and welded them onto automobile bodies—tasks previously hazardous to human workers due to toxic fumes and physical danger (Donlan 1982; Paul 1961). Around the same period, advances in conversational AI began with ELIZA*,* developed by Joseph Weizenbaum and released in 1966. Designed to simulate a Rogerian therapist, ELIZA operated by detecting keywords and generating pre-scripted responses, a principle that continues to underpin chatbot design today. Although ELIZA was not intelligent in a computational sense, the vagueness of its replies often led users to anthropomorphize it, believing it capable of genuine conversation (Weizenbaum

1966, 1976; McNeal et al. 2013). Richard Greenblatt, an MIT student, created MacHack, the first chess program to compete under tournament conditions, earn a chess rating, and win a match against a human opponent. Modern chess machines, building on this legacy, typically use brute-force search techniques—examining four to eight moves ahead to evaluate the best possible outcome and minimize the opponent's advantage (Proudfoot 2013). By the early 1970s, AI began to be applied to medicine. Researchers developed methods for representing clinical knowledge and biomedical problem-solving using causal, taxonomic, associative, rule-based, and frame-based models, laying the groundwork for expert systems in healthcare.

In 1970, INTERNIST-I*,* a computer-assisted diagnostic system, was developed at the University of Pittsburgh as an educational experiment intended to replicate the diagnostic expertise of Jack D. Myers, MD, then-chair of internal medicine. Funded by the Division of Research Resources and the National Library of Medicine, INTERNIST-I was part of a broader wave of early AI systems for clinical decision-making. Similar initiatives included the CASNET (Causal Associational Network) model for glaucoma at Rutgers, the Present Illness Program (PIP) at MIT and Tufts, and Stanford's systems for infectious disease therapy assistance. These projects focused on capturing domain-specific reasoning for complex biomedical interpretations, advancing the field of knowledge representation and expert systems in medicine (Kulikowski 2015; Nance 1991). This period marked a paradigm shift in AI, transitioning from rudimentary logic-based programs of the 1960s to more complex expert systems that supported problem-solving in knowledge-intensive domains. The emergence of visual and graphical modelling techniques during this era contributed to the development of what would later be recognized as ubiquitous computing (Skinner 2013). A notable example of this shift is Polly*,* a mobile robot developed in the early 1990s that demonstrated real-time computer vision and autonomous navigation. Built for under $10,000, Polly could offer lab tours, respond to human gestures, and navigate cluttered spaces using a specialized 'Polly Algorithm'. This algorithm enabled the robot to move in real-world, unmodified environments by processing low-resolution visual input and choosing a direction—left, right, or straight—based on the least cluttered path within 60-second decision frames (Horswill 1993).

Recommender systems have become central to shaping contemporary cultural production, circulation, and disruption. As algorithmic tools, they curate content by predicting user preferences based on prior behaviours, thereby influencing not only what media individuals consume but also how cultural trends emerge and evolve (Ricci, Rokach, and Shapira 2015). While these systems are often valued for their utility and appeal, they have also generated cultural anxieties—particularly around the intersections of taste, consumption, and sexual identity. Jonathan Cohn (2016, 2) highlights this in his analysis of TiVo, an early digital recommendation system, which linked user preferences with emerging social narratives around identity. As television series like *Ellen* (1994–1998) and *Will and Grace* (1998–2006) attracted diverse audiences, recommendation technologies became enmeshed with shifting norms and stigmas surrounding sexuality. In this way, algorithmic personalization not only reflected cultural values but also participated in their reconfiguration (Cohn 2016, 2).

The emergence of mobile recommender applications was, in part, a response to the growing challenge of app discovery, particularly as the number of mobile applications surpassed 700,000 on both Google Play and the Apple App Store by 2014. This saturation created significant navigational barriers for users, which recommender systems aimed to resolve by mitigating information overload and streamlining content selection. Notable examples include AppAware, which incorporates contextual information from mobile devices; AppJoy, which applies item-based collaborative filtering; and AppBrain, which generates category-specific recommendations by tracking installation histories (Xia et al. 2014). Underlying these systems are advancements in AI, particularly in machine learning—a subfield that enables computers to improve task performance through statistical modelling without explicit programming (Chellapilla 2001). Within this domain, deep learning has gained prominence due to its use of artificial neural networks (ANNs), which are structured hierarchically to process complex patterns. Unlike task-specific algorithms, deep neural networks (DNNs) consist of interconnected processing units, or ‘neurons’, that adjust their activations to optimize learning behaviour. These models have demonstrated superior performance in pattern recognition tasks and have won numerous international competitions, largely due to their increasing cost-efficiency and scalability (Schmidhuber 2015).

Since 2016, algorithmic culture has undergone significant transformation, marked by the deepening integration of algorithms into everyday life and a growing body of critical discourse examining their societal impacts. Algorithms now mediate a wide range of human experiences, from social media interactions to consumer behaviour. Platforms such as TikTok exemplify this shift, using highly personalized recommendation systems to shape user engagement, cultural production, and identity formation. While such platforms offer tailored experiences, they also raise concerns regarding the homogenization of culture and the spread of misinformation, as well as the psychological effects of algorithmic curation (Heffernan 2023). One of the emerging phenomena in this landscape is what some scholars refer to as ‘algorithmic anxiety’—a growing discomfort with the extent to which personal preferences, choices, and even creative expression are influenced by opaque computational processes. Users increasingly report feeling constrained by recommendation engines that prioritize engagement over diversity, leading to concerns about the erosion of individual agency and authenticity (Chayka 2024). In industries such as fashion, algorithms have been criticized for driving sameness, with some analysts arguing that bland or repetitive styles are the result of overreliance on predictive models rather than human creativity (Pathak 2024). News consumption has similarly been reshaped by algorithmic logics, as digital platforms prioritize sensationalist or emotionally charged content over verified information. This shift has contributed to the erosion of public trust and the creation of ‘information swamps’," prompting scholars and journalists to advocate for more transparent, trustworthy content curation mechanisms (McNamee 2024). Simultaneously, global initiatives have emerged to confront algorithmic bias and promote accountability. One notable example is the Algorithmic Justice League, founded by Joy Buolamwini in 2016, which campaigns for equitable AI by exposing racial and gender biases in facial recognition and other algorithmic systems (Buolamwini 2016).

Debates around surveillance and algorithmic governance have intensified, particularly as states experiment with AI-powered monitoring tools. In the aftermath

of the 2024 Paris Olympic Games, public concern grew in France over proposals to extend AI-based video surveillance beyond the event, reflecting broader anxieties about privacy, civil liberties, and the normalization of surveillance technologies (Le Monde 2024). Scholars such as Minna Ruckenstein have contributed to the field by examining how algorithms shape not only decision-making but also human emotion and sociality. In *The Feel of Algorithms* (2023), Ruckenstein explores the affective dimensions of algorithmic interaction, emphasizing the need for ethically responsible design practices. Others have drawn attention to the 'black box' nature of many algorithmic systems, underscoring the challenges of opacity, accountability, and public understanding in an increasingly data-driven society (Pasquale 2015). These developments underscore the need for continued critical inquiry and ethical reflection as algorithms play an increasingly central role in structuring contemporary cultural, political, and emotional life.

3.5 Design Ethnography and Empathy's Centrality, Utilitarianism, and Practicality

Design ethnography is a qualitative research approach that blends ethnographic methods with the goals of human-centred design. It focuses on understanding people's behaviours, values, and lived experiences within their cultural and social contexts, with the intent of informing design decisions and creating more empathetic, user-aligned solutions. Central to design ethnography is the practice of 'deep hanging out'—immersive observation and participatory engagement with users in their natural environments. Unlike traditional ethnography, which often emphasizes long-term fieldwork for academic insight, design ethnography is typically more applied and time-bound, aiming to reveal latent needs, unarticulated desires, and systemic pain points that may not surface through conventional interviews or surveys (Salvador, Bell, and Anderson 1999). Organizations like IDEO and the Stanford D. School have been influential in shaping contemporary applications of design ethnography. At IDEO, ethnographic research is positioned as a foundational phase in the design thinking process, particularly within inspiration and empathy-building stages. IDEO's approach emphasizes "look, listen, and ask" techniques to uncover meaningful user insights that drive iterative prototyping and human-centred innovation (Brown 2009). Similarly, the stanford d.school incorporates design ethnography into its pedagogy as a way to foster empathetic understanding and context-sensitive design interventions. Students are encouraged to engage directly with end users, conduct immersive fieldwork, and synthesize insights through storytelling, journey mapping, and sense-making activities—tools that allow designers to connect human experience to systemic design opportunities (Doorley et al. 2018).

In both cases, design ethnography serves not only as a method for gathering data but as a mindset—one that prioritizes empathy, humility, and curiosity in the pursuit of meaningful, inclusive innovation. In this context, design ethnography merges the explorative and analytical rigour of ethnography with the creative and pragmatic methodologies of design, aiming to cultivate human-centred solutions. At

the heart of this interdisciplinary fusion lies empathy, a cornerstone enabling designers to deeply understand and cater to the needs of their users. Empathy within design ethnography is anchored in several foundational principles and concepts: a user-centred orientation is crucial, underscoring the necessity of grasping and prioritizing the user's perspective, needs, and context throughout the design journey. This commitment guarantees that solutions are not only effective but also deeply resonate with the user's experiences (Sanders & Stappers, 2014). Immersing oneself in the user's context is vital for design ethnographers. By navigating the user's environment first-hand, designers gain direct exposure to the challenges, emotions, and motivations users face, offering invaluable insights that steer the design process (Salvador, Bell, & Anderson, 1999). Achieving a holistic understanding of the user involves transcending isolated behaviours or needs. Empathy in this discipline demands a thorough comprehension of the user within their socio-cultural, technological, and environmental contexts, ensuring designs reflect the intricacies of users' lives (Wright & McCarthy, 2010). Active listening and observation are key to empathetic design ethnography. Designers must tune into both verbal and non-verbal cues, employing observation, inquiry, and deep listening to unearth hidden needs and desires that inform design solutions (Gaver, Dunne, & Pacenti, 1999). Co-creation and collaboration with users are essential in nurturing empathy. This strategy engages users as active contributors in the design process, embedding solutions in users' genuine experiences and insights (Sanders & Simons, 2009).

Moreover, narratives and storytelling significantly contribute to emotionally connecting design teams with users. Sharing user stories and journeys illuminates the human impact of design decisions, fostering empathy and a more profound connection to the user experience (Suri, 2003). Reflexivity is crucial for design ethnographers to acknowledge and reflect on their biases and viewpoints and to comprehend how these might shape their interpretations. This self-awareness maintains an empathetic stance towards users (Battarbee, 2004). Empathy maps serve as a valuable instrument in design ethnography, assisting designers in visualizing and understanding users' feelings, thoughts, actions, and needs, thereby facilitating more empathetic and effective design solutions (Gray, 2010). Prototyping and iteration, informed by user feedback, are essential for ensuring that designs remain attuned to user needs. This iterative engagement allows for refining designs based on users' evolving feedback (Buchenau & Suri, 2000). Ethical sensitivity is a priority in empathetic design ethnography. Designers must uphold users' dignity, privacy, and well-being, with a keen focus on ethical considerations such as informed consent and confidentiality (DiSalvo, Louw, Holstius, Nourbakhsh, & Akin, 2002). Cultural sensitivity is imperative for understanding users within their distinct cultural contexts. Design ethnographers endeavour to recognize and honour cultural variances, eschewing assumptions or stereotypes, to ensure designs are inclusive and respectful (Dourish & Bell, 2011).

Empathy in design ethnography fosters a deep connection with users, aiming to create solutions that are not merely functional but also meaningful and impactful, resonating with users' real-world experiences, emotions, and needs. Through this empathetic lens, designs are truly centred on humans, enhancing users' lives in significant ways. For a moment let us compare and contrast the perspectives on empathy within the domains of sociology, anthropology, philosophy, and design research. In sociology, empathy plays a pivotal role in understanding human

behaviour and interactions. Max Weber's concept of ‘Verstehen’ emphasizes the importance of empathetic understanding in comprehending social actions and structures (Weber, 1949). Sociologists delve into the intricate dynamics of empathy to decipher subjective meanings and motivations, particularly when examining social phenomena. Within anthropology, empathy emerges as an essential tool for cultural understanding. Clifford Geertz's emphasis on ‘thick description’ underscores the need for anthropologists to empathetically immerse themselves in foreign cultures to gain deeper insights into their meaning systems (Geertz, 1973).

Victor Turner, in the context of symbolic anthropology, explores the empathetic bonds formed during liminal rituals, referred to as ‘communitas’ (Turner, 1969). Philosophers have extensively contemplated the nature of empathy and its moral implications. David Hume and Adam Smith have discussed empathy as the foundation of moral sentiments (Hume, 1739; Smith, 1759).[3] Martin Heidegger addresses empathy (*Einfühlung*) as a derivative act of mentally projecting oneself into another’s experience. (Heidegger, 1927). Emmanuel Levinas highlights the ethical aspects of empathy, emphasizing the responsibility to recognize and respond to the vulnerability of the Other (Levinas, 1969). Empathy is a central concept in design research, particularly in user-centred design and human-computer interaction. Designers such as Don Norman and Brenda Laurel stress the importance of empathizing with users to create products that align with users' mental models and emotions (Norman, 2004; Laurel, 2003). Indi Young advocates for ‘empathy interviews’ to gain deeper insights into user motivations and mental models (Young, 2007). Design researchers such as Kim Goodwin emphasize understanding user goals and behaviours through empathy research (Goodwin, 2009). While empathy is a common thread across these disciplines, the emphasis, applications, and methodologies vary significantly. Sociologists and anthropologists employ empathy to decipher social and cultural phenomena, often focusing on qualitative research methods. Philosophers explore empathy's moral and existential dimensions, probing its role in human ethics. Design researchers prioritize empathetic user understanding to create user-centred products and services, often involving practical research methods.

The concept of empathy resonates across sociology, anthropology, philosophy, and design research, albeit with distinct foci and applications. Sociologists and anthropologists use empathy to understand social and cultural contexts, philosophers probe its moral and existential implications, and design researchers employ it to create user-centric solutions. The diverse perspectives on empathy across these disciplines enrich our understanding of human experiences and interactions, contributing to a holistic comprehension of this fundamental human capacity. Alternatively, with a focus towards design ethnography Debroah Luptin and Sarah Pink explore the concept of ‘empathetic technologies’ and their impact on human emotions and interactions. Empathetic technologies refer to digital tools and devices that are designed to understand and respond to human emotions and feelings. Digital materiality is a key aspect of empathetic technologies, as it involves

[3] In reference to Hulme and Smith this research interprets “sympathy” as a synonym of “empathy.”

the tangible and sensory qualities of digital objects, such as the texture and feel of a touchscreen.

Their research suggests that a multidisciplinary approach, involving experts from various fields, is essential for studying and developing empathetic technologies that benefit users and society as a whole (Luptin & Pink 2017). Rob Kitchin's research on digital cities could involve considerations of how technology impacts urban life, including issues related to social inclusion and empathy within digitally connected urban environments (Kitchin, 2014). Then there are the previously mentioned industry leaders in design, with schools of thought in design and research that have operationalized empathy in their practices, for instance the Stanford D. School's human-centred design approach which encourages empathy by focusing on understanding the needs and perspectives of users. It emphasizes conducting research and engaging with users to gain insights and create solutions that address their real-world problems. Designers at IDEO spend time empathizing with end-users to gain a deep understanding of their experiences, which informs the design of products and services that meet users' needs.

In HCI designers aim to create interfaces and interactions that are intuitive and sensitive to users' emotions and needs. Research in HCI may explore how technology can facilitate empathetic interactions between humans and computers (Norman 2002). Co-design involves collaborating with end-users, which inherently fosters empathy. By actively involving users in the design process, designers can better understand their needs, preferences, and challenges, leading to more empathetic and user-centred solutions (Sanders & Stappers 2008). Co-ethnography involves working closely with participants to gain insights into their cultural practices and experiences. This method can lead to a deeper empathetic understanding of different cultural perspectives and behaviours or design practices that aim to understand and address user needs and emotions (Pink 2007). Likewise, sometimes things are built or rather designed for empathy. Empathic objects are designed to evoke emotional responses or enhance users' capacity for empathy. These objects can include interactive technologies that promote understanding and connection, such as empathic robots or virtual reality experiences (Norman 2004).

Empathy, in many practical and theoretical respects, is deeply grounded in physical presence and embodied experience. Anthropologist Tim Ingold has argued that empathy is not merely a cognitive act of imagining another’s perspective, but a fundamentally embodied and experiential process. He emphasizes that empathy emerges from our direct engagement with the world—through our bodies, senses, and immersion in specific social and cultural contexts (Ingold 2011). Rather than viewing empathy as a detached exercise in perspective-taking, Ingold frames it as a dynamic, ongoing process shaped by lived experience. This perspective highlights the inseparability of bodily perception and empathetic understanding, challenging conventional notions that position empathy as a purely mental or imaginative act. As Howes (2022) critically reflects, this view of empathy resists abstraction and instead calls for a renewed focus on sensory and environmental entanglements in anthropological theory.

Exploring alternative approaches to fostering empathy within ethnographic practice underlines how empathetic connection might be cultivated without the direct presence of the ethnographer. This is crucial when returning to the central question: *could Hector be replaced by a chatbot?* This speculative inquiry opens space for a pragmatic and flexible model of empathy, as exemplified in the work of Reiko Goto. Goto, particularly in collaboration with Tim Collins, approaches empathy as an experiential and affective phenomenon that can be intentionally designed into artistic and technological systems. Their collaborative projects, such as *Imagination and Empathy – Artists with Trees*, utilize multimedia installations, sound, and interactive elements to elicit emotional responses and deepen engagement with non-human life forms (Collins and Goto 2013). These works aim to translate abstract environmental issues into affectively resonant experiences, encouraging participants to reflect on their ecological entanglements and develop an ethical sensitivity toward the more-than-human world. The philosophical grounding of Collins and Goto's work draws upon Edith Stein's account of empathy as a distinct form of perception—one that enables an immediate, affective awareness of others' experiences (Stein 1989 1917).

By extending Stein's insights beyond human-to-human interaction, Goto and Collins create interfaces that promote empathetic connection with trees, challenging anthropocentric boundaries. Their portable sculptural interface, for example, translates real-time environmental data (e.g., CO_2 levels, sunlight) into sound, rendering the physiological responses of trees audible. This fusion of plant physiology, sensor technology, and artistic expression reflects a methodological commitment to both scientific rigour and emotional resonance. Contemporary research into plant intelligence and sensory perception—such as Trewavas' (2003) investigations on plant signalling and Chamovitz's (2012) studies on plant awareness—provides a scientific foundation for understanding plants as sentient, responsive beings. However, these scholars also caution against anthropomorphism, advocating instead for a nuanced approach to empathy that avoids imposing human categories onto non-human systems. This interdisciplinary discourse at the intersection of art, science, and philosophy informs the Ethnobot's design in this research. Drawing inspiration from Goto's operationalization of empathy, the Ethnobot explores how algorithmically mediated interfaces might foster empathetic understanding in ethnographic contexts, particularly in the absence of the human ethnographer. In doing so, it positions empathy not only as a human-centred ideal but as a relational and embodied dynamic that can be extended through technological means.

The research contained within this thesis presents the Ethnobot as a design intervention intended to operationalize empathy in support of understanding participants' experiences, thoughts, and actions—aligning with the methodological principles of design ethnography. Drawing on co-design practices, the development of the Ethnobot emphasized empathizing with stakeholders to inform the design of its conversational tasks and questions. This empathic engagement aimed to improve the chatbot's capacity to build meaningful connections with users, enabling it to act as a proxy for the ethnographer by generating insightful, context-sensitive prompts that supported deeper qualitative understanding. Within the broader framework of algorithmic culture, embedding empathy into algorithmic systems is critical for ensuring that such technologies promote human well-being, fairness, and mutual

understanding. As algorithms increasingly mediate social, cultural, and interpersonal dynamics, their design must reflect a form of empathy that extends beyond traditional human-to-human interactions—encompassing relational complexities between humans, things, and systems.

In this context, the chatbot is reimagined not merely as a tool but as a co-ethnographer—an interlocutor and agent capable of facilitating empathic understanding. This conceptual shift builds upon the work of Reiko Goto, whose artistic and environmental projects explore the role of empathy in cultivating emotional connections between people and the natural world. Goto's work demonstrates how technological and aesthetic interfaces can evoke empathic responses, offering a valuable framework for exploring empathy within digital and algorithmic systems (Goto 2015). Building on Reiko Goto's influence, this research explores how chatbots—specifically Ethnobots—can be operationalized as tools for conducting design ethnography. Central to this endeavour is the integration of empathy as a core design principle. A well-designed Ethnobot must not only facilitate data collection but also embody an empathetic orientation that mirrors the ethos of ethnographic practice.

In ethnography, empathy entails a deep engagement with and understanding of participants' experiences, emotions, and worldviews. It requires a careful balance of immersion, ethical attentiveness, and reflexivity to produce respectful and insightful representations of cultural life. As a qualitative methodology, ethnography is distinguished by its commitment to exploring lived realities through direct, sustained engagement within participants' environments. Several core methodological principles support the cultivation of empathy in ethnographic research. Chief among them is the effort to see the world from the perspective of others. Ethnographers achieve this through participant observation—immersing themselves in the daily rhythms and practices of the communities they study, thereby gaining first-hand insights into the emotional and social dynamics at play (Davies 2008). Active listening is another essential practice, requiring sustained attention to both verbal and non-verbal cues. Through this attentiveness, researchers can access the subtle affective and cultural textures that shape community life (Pink 2015).

An empathetic ethnographic stance also demands the suspension of judgment. Researchers must approach participants with openness, consciously bracketing their own assumptions and biases (Hammersley and Atkinson 2007). Reflexivity is key in this process, as ethnographers continuously interrogate how their positionality and emotional responses shape both their understanding and the knowledge they produce (England 1994). Ethnography's holistic orientation further supports empathy by situating behaviours and beliefs within broader socio-cultural contexts, revealing the complexity of human experience (Agar 1996). Finally, building rapport and trust with participants is foundational. Strong interpersonal relationships enable more authentic insights into the emotional dimensions of everyday life (Bernard 2011). Storytelling and narrative practices are especially powerful in this regard, offering access to individuals' inner worlds and allowing ethnographers to capture the richness of lived experience (Bochner and Ellis 2006). Within this framework, the Ethnobot is conceived as a technological extension of these

empathetic principles—an interface designed not only to collect responses but to support ethical, emotionally attuned research engagement.

3.6 Conclusion

Tracing the evolution of human-centred design over the last decade, a move toward more ethically responsive, interdisciplinary, and technologically integrated practices can be seen (Shneiderman 2020; Altman et al. 2023). The incorporation of empathy across fields—from public policy to AI—reflects an increasing demand for designs that prioritize human experience, situated knowledge, and inclusive engagement (IDEO 2015; Bason 2017). Furthermore,I suggest to examine algorithmic culture as a domain in which social, cultural, and political life is increasingly mediated by computation. Here, algorithms are not neutral tools but active cultural agents that sort, classify, and influence human behaviour and identity (Striphas 2016; Fuchs 2016). This has significant implications for ethnographic research, particularly in how we conceive of presence, interaction, and interpretive authority.

In this context, the Ethnobot emerges as a methodological intervention designed to operate within algorithmically mediated environments while preserving the core tenets of empathy and cultural sensitivity central to design ethnography. Through the integration of co-design practices, user experience research, and ethical reflexivity, the Ethnobot seeks to facilitate meaningful interactions that approximate the empathetic engagement of a human ethnographer. This reimagining of the chatbot not merely as a technical agent but as a co-ethnographer positions it within a growing movement to humanize algorithmic systems and embed relational ethics into digital methods (Goto 2015; Lupton and Pink 2017). By drawing on a range of disciplinary insights—from Ingold's embodied anthropology (2011) to Edith Stein's phenomenology of empathy (1989 [1917])—this chapter has argued for an expanded, contextually grounded model of empathetic design. In closing, the chapter attempts to establish a conceptual framework for understanding the role of empathy as both a methodological imperative and a design principle. It prepares the ground for the next chapter, where these frameworks are operationalized in the development, deployment, and analysis of the Ethnobot. As algorithmic systems continue to shape human experience, cultivating ethical, empathetic, and context-aware tools becomes not only a scholarly task but a design responsibility.

Chapter 4: Understanding the Ethnobot

4.1 Introduction

This chapter introduces the Ethnobot as a methodological intervention at the intersection of ethnography, design research, and digital technologies. Developed through iterative practice within both academic and applied contexts, the Ethnobot emerged as a response to the challenges of conducting ethnographic research in environments shaped by IoT, algorithmic infrastructures, and mobile digital engagement. Rather than functioning merely as a chatbot or survey tool, the Ethnobot is conceived as a co-ethnographic agent—capable of facilitating participant-driven dialogue, collecting multimodal data, and producing fieldnotes that reflect both experiential depth and contextual nuance. This chapter situates the Ethnobot within a lineage of methodological innovation, drawing connections to diary studies (Palen 2002; Rieman 1993), cultural probes (Gaver, Dunne, and Pacenti 1999), mobile ethnography (Marcus 1995; Axup and Viller 2005), and ecological momentary assessment (Shiffman 2008; Asselbergs et al. 2016). Each of these traditions offers specific insights into how everyday life can be captured in real time, in situ, and with minimal interference—principles that are foundational to the Ethnobot's design.

Furthermore, the chapter explores the conceptual and technical foundations of the Ethnobot, its methodological affordances, and its alignment with broader movements in human-computer interaction (Suchman 1987; Dourish 2001), design anthropology (Gunn, Otto, and Smith 2013), and service design. The chapter also situates the Ethnobot in methodological intersections within the existing contexts of diary studies, cultural probes, and mobile ethnography, highlighting both its methodological heritage and innovative adaptations of the aforementioned. Additionally, it discusses the creation and utility of digital field notes and addresses the relevance of ecological momentary assessment in capturing rich, real-time data. Through examining these intersections and the practical deployments of the Ethnobot, the chapter aims to illustrate its significance and versatility as an advanced methodological tool, marking a substantial progression in the integration of AI technologies with ethnographic and design research practices. Through iterative case studies, the Ethnobot demonstrates how AI tools can extend ethnographic presence and practice in complex, sociotechnical environments, but require a diverse and comprehensive adoption across methodological approaches to be most effective.

4.2 The Ethnobot Methodologically

Methodologically, the Ethnobot occupies a space between cultural probes (Gaver, Dunne, and Pacenti 1999), experience sampling methods (Csikszentmihalyi and Larson 1987), and mobile ethnography (Marcus 1995; Newman 1998; Axup and Viller 2005; Watts 2008, 712; Büscher and Urry 2009; Jain 2011; Vrumini 2010). It shares similarities with diary studies and generates fieldnotes that uniquely integrate the perspectives of user experience, thing-centred design, and AI. Ecological momentary assessment is also a relevant comparative method in this context. Participants curate a rich snapshot of a specific moment in their lives, which they then share with the research team through the Ethnobot app. The data from this snapshot are typically much richer than those yielded by experience sampling, which tends to favour short questions that can be completed repeatedly during a time period of several hours or days. At the same time, the spatial-temporal context of an Ethnobot interaction is far more constrained than that of a cultural probe. Just as in computer-assisted self-interviewing, talking to the Ethnobot decreased the researcher presence and makes it easier to talk about issues and opinions that might produce social backlash or be stigmatized. Even though the ethical principles of research demand that anonymity is preserved as much as feasible, participants may find it difficult to feel that they are talking in confidence when interacting face to face with a researcher, where they also need to observe the rules of interpersonal communication. I will now discuss the particular types of methods that are relatable to the Ethnobot.

Depending on its application, the Ethnobot can function as a chatbot interlocutor or as a methodological device for digital ethnography. It carries its own positionality within the research encounter, and its methodological foundation lies firmly within design ethnography—distinct from approaches popularised by IDEO or Stanford's d.school. Unlike those more narrowly human-centred frameworks, the Ethnobot embraces the inclusion of objects and AI as co-agents capable of facilitating empathic understanding. Additionally paralleling ecological momentary assessment (EMA) in its capacity to capture contextualised, real-time experiences, participants use the Ethnobot to curate a rich snapshot of a particular moment, which is then transmitted to the research team through the app. The data are typically more nuanced than those produced through traditional experience sampling, which tends to favour brief, repeated responses over short intervals. However, Ethnobot interactions occur within a more structured spatial-temporal framework than cultural probes, offering a balance between free-form reflection and methodological consistency. Like computer-assisted self-interviewing, the Ethnobot reduces researcher presence, which can ease participant disclosure, especially when discussing sensitive or potentially stigmatised topics. While ethical standards require researchers to preserve anonymity, participants may still feel inhibited in face-to-face settings due to social expectations. The chatbot format circumvents these interpersonal pressures, offering a more comfortable space for honest expression. The following sections will examine specific methods that align with the Ethnobot's design and further clarify its position within contemporary ethnographic research.

4.3 Diary Studies

Diary studies' origins begin in psychology and anthropology but have been used across health and medicine, education, and architecture (Mankoff 2005, Palen 2002). The methodological traditions stem from multiple fields but this particular use of HCI begins with influences from psychology in cognitive science research, such as the work of Norman and Sellen in 1980s and 1990s that used diary studies in their human error work (Palen 2002 (a); Norman 1981). In the 1990s diary studies were being used in differing areas of HCI research, including the work of Carayon and Chin (Palen 2002 (a), Carayon 1993, Chin 1992), but it was formally introduced with two publications: Kirakowski and Corbett's 1990 book on HCI methods (Kirakowski 1990), and Rieman's 1993 inter CHI paper (Reinman 1993). Diary studies have frequently been categorized into elicitation studies where participants capture media to be used later as memory triggers, and feedback studies with in situ prespecified questionnaires (Hess 2009, Sohn 2009, Carter 2005).

The Ethnobot sprang from an ethnographic approach that is methodologically similar to how those in HCI have adopted diary studies to understand user needs. Diary studies have the particular advantage of retrieving factual data in natural settings without the influence of an observer (Elsweiler 2010, Palen 2002 (b)).There is a long history of the collection of naturalistic data in human-computer interaction (HCI) and computer supported cooperative work (CSCW) using paper diaries to research effectively (Carter 2005, Palen 2002 (a), Palen 2002 (b), O'Hara 2001 (a), O'Hara 2001 (b), Brown 2000, Palen 2000, Grinter 2001, Adler 1998, Eldridge 1996, Newman 1996, Sellen 1994, Carayon 1993, Reinman 1993, Chin 1992). In HCI and CSCW diary studies are designed to capture real incidents and activities that occur in real situations. This is often driven by a piece of technology under scrutiny. Participants would be asked to record particular activities as they happen throughout the day into a diary. These were at times highly structured with very detailed particulars and predefined categories (Palen 2002 (a), Chin 1992), and at other times they can be unstructured with ample space for describing activities (Palen 2002 (a), Adler 1998).

Diary studies are highly tailored research tools, often designed to capture specific events or behaviours (Palen 2002a; Rieman 1993). For example, Rieman's study on photocopier use sought to document 'Eureka!' moments, with participants recording sudden insights during routine interactions (Rieman 1993). Sas (2009) applied a similar method to Facebook, focusing on memorable experiences—drawing on psychological research that links such memories to emotional intensity and personal meaning (Singer 1995; Woike 1995). Closely related is the experience sampling method (ESM), or ecological momentary assessment (EMA), introduced in the 1970s. Known as 'beeper studies', ESM involves prompting participants multiple times a day to log experiences in real time, thus minimizing recall bias and capturing contextual nuance (Larson 1983). ESM has been innovatively adapted for design research, notably at E-Lab under Rick Robinson, a former student of Mihaly Csikszentmihalyi, ESM's originator. In this adaptation, participants used pagers and cameras to document their surroundings, producing synchronized visual data reflective of user experience (Palen 2002; Robinson 1996). Diary methods have evolved alongside technological advances—from paper-based formats (Carayon 1993; Rieman 1993; Chin 1992), to beepers (Robinson 1996), voicemail reporting

(Palen 2002), mobile apps (Poppinga 2013), and most recently, chatbots. Voicemail diaries offered a mobile, low-effort alternative to pen-and-paper methods, while mobile texting posed practical challenges in dynamic settings, such as commuting or walking (Grinter and Eldridge 2001).

Benjamin Poopinga and Stefan Oehmcke designed a mobile diary application called Storyteller. This provided quick creation of entries while encouraging users to reflect on earlier recorded entries in a storytelling approach, dismantling people's tendency to forget to create entries and leading a way around the difficulties of reflection over several days of writing where entries lose relevance and contextually (Poppinga 2013). Researchers in HCI and CSCW continue to use the diary study method in a more anthropological and sociological approach as they stop counting and instead obtain descriptive accounts of activities (Palen 2002 (a)). This can be seen in research reflecting on writing with pens and their digital counterparts (Riche 2017), laptops and tablets (Muller 2009), social media (Sas 2009), investigating reading practice (Adler 1998), the effects of technology failure on planned activity (Eldridge 1996), teenage short text messaging (Grinter 2001), the temporal organization of computer-based authoring work (Newman 2006), information capture (Brown 2000), the information needs of mobile professionals (O'Hara 2001(a)), and shopping behaviour (O'Hara 2001(b)). Something akin to visual anthropology can be seen in the work of Brown (Brown 2000), O'Hara and Sellen (O'Hara 2001(a)), and O'Hara and Perry (O'Hara 2001 (b)), as they give participants cameras instead of paper and collect a visual montage of activities across multiple days of participants use then conduct follow up interviews (Pallen 2002 (a)).

Each innovation in data collection has helped remove specific barriers and enhance contextual awareness, refining the methodological tools available for studying modern life. As mobile phone usage has become ubiquitous—and as the general population has developed secondary digital literacies through activities such as texting, taking selfies, and food blogging—a new opportunity has emerged to integrate chatbots like the Ethnobot into design-specific research contexts, including diary studies. Although originally conceived as an ethnographic tool, the Ethnobot's potential extends into adjacent methodological domains. Its ability to operate autonomously, unobtrusively, and at scale creates a powerful and synergetic relationship between the participant and the technology. This allows researchers to engage users in real-time, context-rich interactions, capturing data with minimal disruption. In doing so, the Ethnobot represents an evolution of diary-based methods, adapting them to the realities of contemporary digital life while opening new possibilities for scalable, design-led inquiry.

4.4 Probes

In our previous Ethnobot study we designed an interaction more comparable to a diary study (Tallyn et al 2018). However, this Ethnobot iteration is better compared to a cultural probe or design probe. Gaver defines ‘cultural probes’ as a way to provoke “inspirational responses” so that there is an open-ended understanding of participants (Gaver et all 1999). On the other hand, ‘design probes’ allow for the expression of subjectivity and intimacy in the gathered insights from participants through the modification of artefacts (Wallace et al 2013; Nissen 2018). In a similar, but still different ilk ‘technology probes’ often take the form of prototypes in order to test a particular concept and open dialogue with potential users (Hutchinson et all 2003; Nissen 2018). Probes could also be used to evoke a context for the development of technology to act as a stimulus for understanding larger social practices, such as the way communication patterns evolve (Sengers & Gaver 2006). Probes vary widely with the level of inclusion of participants in the design process, with the difficulty of revealing tacit knowledge of participants, but there is value in a cultural probe’s ambiguity (Leeuwen et al 2011; Gaver 2003). Thus probes have increased in popularity, gaining nuanced insights into practices and perspectives of research participants (Graham et al 2007).

Graham suggests probes, whatever their form, share a common value in their constant dialogue with participants. In general, probes attempt to balance access to participants’ knowledge and provide the tools to portray their perspective in open-ended ways (Nissen 2018). In comparison to other forms of research methods, probes have a desirable minimal external influence on participants’ action (Gaver et al 2004) and they can be easily used to elicit specific populations’ views and perceptions, like the elderly (Nasir 2018, Wherton 2012, Gaver et al 1999). Whether they are used to gain a rich picture of personal contexts like investigating people’s values in the home environment (Sanders & Stappers 2008), understanding the design space of assistive living technologies for older people (Wherton et all 2012), exploring user needs in a range of care settings (Crabtree et all 2003), or investigating the meaning of independence for older adults (Burrows et all 2015), to get informative responses from respondents about awareness and connectedness (Dey et all 2006), and to gain insights into people’s everyday environments (Gaye and Holmquist 2004), probes continue to supplement traditional research methods.

4.5 Mobile Ethnography

As a technological-cultural probe the Ethnobot has facilitated ethnographic enquiry on the go in real time through a mobile phone. The term ‘mobile ethnography’ has been used since the second half of the 1990s, meaning either ethnography on the move (Marcus 1995; Newman 1998), or ethnography with a mobile device (Axup & Viller 2005). The dichotomy in meaning has since remained with one side, with (Watts 2008) defining “a 'mobile ethnography' […] by travelling with, and constituting, a moving field site; participating in the relations between things, people and places on-the-move” (Watts 2008, 712; Buscher & Uny 2009; Jain 2011; Vrumini 2010; Watts & Uny 2008). Mobile ethnography research is becoming more prevalent with smartphone use and other internet-based technology driven by the overwhelming usage of mobile devices and especially smartphones by

consumers (Muskat et al 2013), with their increased battery life and wider access to the internet on faster networks enhancing and speeding up the accessibility of mobile phones (Connelly et all 2006; Diaz et all. 2008).

Studies utilizing mobile devices and smartphones have been conducted (Axup and Villers 2005) in which backpackers share information on activities on social networks and explore how mobile applications empower people to monitor their personal health (Connelly et al 2008). The research of Stickdom and Zehrer's applied mobile ethnography and service design within the tourism industry (Stickdom and Zehrer's 2010) is a pertinent example of such research. Mobile phones play central roles in many people's lives (Mattila 2011), whether for health management applications or as a means to enable better contacts and nurture relationships (Quercia et al. 2010), smartphone users' behaviour changes with technology (Muskat 2013). There are lifelogging applications or services on smartphones that allow users to log their lives in various forms, e.g. via texts, images, audio clips, videos, and so on (Jiang et al 2019).

Researchers are utilizing mobile ethnography in the areas of health (Connelly et al. 2006; Logan et al. 2007; Rodgers et al. 2005), retail service experience (Kouroutbanassis, Giaglis & Vrechopoulos 2007) and visitor service experience (Frischhut, Stickdom & Zehrer 2012; Muskat et al 2013; Stickdom & Zehrer 2010). In the health arena, mobile phones were used to promote smoking cessation with text messaging as early as 2005 (Rodgers et al. 2005) and reminding patients to take medication (Connelly et al 2006; Logan et al. 2007). Current trends in education have students participating in lectures through clicker and clicker-like devices with the ability to give immediate feedback to the presenter (Trees et al. 2011). In consumer and marketing research the availability of 'pervasive information systems', (Brnbaum 1997) in a 'post-desktop RtD era' (Jonnson 2002) has seen the emergence of devices attached to supermarket trolleys, receiving shoppers' feedback on their shopping experience within the store (Kourouthanassis, Giaglis & Vrechopoulos 2007). Recently, research has been conducted with museum visitors setting touchpoints with a smartphone application that allow researchers to track the visitors' path through GPS data. This has been combined with their feedback by text messages, photos, and videos (Muskat et al. 2013; Stickdom & Zehrer 2010).

Similarly, there is research for understanding driving and automation in everyday life mobilities, which goes beyond observations and interview-based techniques (Osz et all 2018, Stayton et all 217, Pink et all 2018, Lindegern et all 2018). Mobile ethnography does makes it possible to collect direct user information beyond the recall of experiences and feedback with the eligibility to share experiences at the time of the experience, on the very location, and with context inclusive of mental and emotional perspectives and feelings (Muskat 2013, Frischhut, Stickdom & Zehrer 2012, Stickdom & Zehrer 2009). Muskat suggests there is now minimal friction when setting up a group of participants for data collection as the ubiquity in availability of both the hardware part (smartphone) and the application part (software) may be downloaded easily or shared by Bluetooth (Muskat et al 2013).

4.6 Field Notes

The current iterations of the Ethnobot have given precedence to dialogue texts, resembling SMS, over other methods of data recording. This development prompts an addition to the ongoing discourse on ethnography and human-computer interaction, particularly regarding the interplay among design, ethnography, and the utilization of fieldnotes. The nexus between anthropological ethnography and design has been extensively examined across numerous studies (Bereton et al, 2014; Crabtree, 2000; Dourish, 2006; Khovanskaya et al, 2017; Light, 2015; Wolf et al, 2006), though a detailed methodological guide for integrating fieldnotes into the design research process remains largely unexplored (Taylor et al., 2018). At the heart of anthropological ethnography lie fieldnotes, characterized by Sanjek (1990) and Maneen (1988) as succinct, coded reconstructions of events, observations, and dialogues. Researchers employ a variety of processes and materials referred to as ‘fieldnotes’, transitioning their observations to scholarly publications (Atkinson et al., 2007; Emerson et al., 2011; Lofland, 2006; Sanjek, 1990; Walford, 2009).

The formulation and presentation of fieldnotes are significantly shaped by their intended audience, whether it be the researchers themselves, the broader research community, participants (Emerson et al., 2001), or other relevant stakeholders. Serving as the foundation for cultural analysis, fieldnotes are elaborated into exhaustive, detailed narratives. These narratives are often derived from ‘head notes’ or ‘mental notes’, which are enriched by succinct ‘scratch notes’ penned during field activities (Emerson et al., 2001). The content and structure of fieldnotes vary, typically encompassing descriptions of research activities and the researcher's personal experiences within the field. Researchers are tasked with the discernment of focal points, aspects to document, and elements to exclude, leading to inherently interpretive accounts of events and conversations (Emerson et al., 2001). Taylor et al. (2018) advocate for a more explicit discussion on the role of fieldnote practices within the design process, positing that fieldnotes might be perceived as less robust primary data sources compared to verbatim transcriptions from audio and video recordings. They propose the inclusion of design activities, reflective learning, and the researchers' positionality, including impressions and emotional responses, which may not be captured through transcriptions, as these often omit non-verbalized observations.

It is proposed that the creation of fieldnotes be integrated as an iterative component of the design process, encompassing all phases from research initiation to deployment and analysis, alongside the varying perspectives of stakeholders in IoT. The Ethnobot methodology, with its structured dialogues, is designed with this holistic approach in mind, aiming to facilitate the type of analysis required for the research task. This approach allows for the Ethnobot to serve as a medium through which conversation logs, acting as contextual fieldnotes, are created by the researcher, derived from the participant, and enabled by the chatbot. Such a method accommodates the potential for ongoing adjustments in IoT, ranging from finite to general changes for analysis, data collection, or user requirements. The second iteration of the Ethnobot has been crafted around conversational narratives, encapsulating what I have called and described as a participant's 'curated moment’. These narratives are readily accessible through the EthnoReader, which can be

adjusted to meet various research needs or viewing preferences, thereby merging video, audio, text, and image data within a contextual framework of participant experiences to be utilized as fieldnotes.

4.7 Ecological Momentary Assessment

Researchers frequently utilize self-report questionnaires to monitor the progression of patients' clinical symptoms in mental health studies, recognizing their practicality despite limitations such as being retrospective and vulnerable to recall bias (Gentler, 2006). Moreover, these questionnaires are often administered in clinical settings, constraining the extent to which findings can be generalized to everyday life (Smith, 2003). To mitigate these limitations, there has been growing interest in ecological momentary assessment (EMA), a methodology that entails the repeated assessment of psychological phenomena within patients' natural environments, thereby offering more immediate and contextually relevant data collection (Shiffman, 2008; Ebner-Priemer, 2009).

Despite its advantages, the predominant form of EMA research, which relies on self-reporting, does not entirely eliminate systematic biases such as social desirability. The method is inherently limited by the respondents' capacity and willingness to answer questions daily, with prolonged application potentially leading to cumulative response burden that may compromise the validity of the measurements and response rates, which have been observed to decline significantly after two weeks (Broderick, 2003; Asselbergs et al, 2016). Nevertheless, EMA encompasses a wide array of data collection methods, including diaries and paper-and-pencil questionnaires, and more recently, prompts delivered via mobile phone. This approach reduces recall bias and enhances the ecological validity of the measurements, thereby allowing for a more accurate depiction of behavioural and emotional processes in daily life (Curvoiser 2010; Silk, 2011). Additionally, the advent of 'unobtrusive' EMA utilizes hardware and software sensors embedded within mobile phones to monitor user behaviour and contexts unobtrusively, such as physical activity and locations like work or home, thus minimizing the need for constant patient prompting and the associated response burden (Asselbergs et al., 2016).

Although unobtrusive EMA may not directly assess mental states, it can be instrumental in monitoring proxies for mental health, such as physiological states, behavioural patterns, and contextual triggers. This method has been explored in relation to various conditions including depression (Burns, 2011; Saeb, 2015), academic performance (Wang, 2014), and alcohol dependence (Gustafson, 2014). A notable study by Likam et al. (2013) employed personalized regression modelling to predict daily mood fluctuations from unobtrusively collected proxy variables, achieving high predictive accuracy over a two-month period with 32 participants. This suggests that combining self-report EMA with unobtrusive EMA could reduce the assessment burden on participants, potentially allowing for longer study durations (Asselbergs et al, 2016). Motivated by these promising results, Asselbergs et al. (2016) conducted a pilot replication study to further investigate the feasibility of unobtrusive EMA-based mood prediction and to understand the challenges of

collecting and processing unobtrusive EMA data and personalized predictive regression modelling.

Moving forward, the Ethnobot transcends being merely a singular research methodology, emerging instead as a complex amalgamation of various research methods. This conceptualization paves the way for an enriched discourse on perspectives that serve to broaden the scope of design ethnography. In the forthcoming chapter, Chapter 5, the discussion delves into a series of case studies originating from a research endeavour aimed at uncovering the narratives and values embedded within IoT infrastructure. This exploration scrutinizes the essential critical methods required to reconceptualize service design and user research, particularly in their interactions with objects, algorithms, and their 'mediated life experiences'.

4.8 Conclusion

This chapter has examined the Ethnobot as a methodological innovation situated at the intersection of ethnographic tradition and emerging digital practices. By tracing its evolution—from early prototypes deployed at public events to its current applications in service design and user research—it becomes evident that the Ethnobot is more than a chatbot. It is a composite research instrument that integrates principles from cultural probes, diary studies, mobile ethnography, and ecological momentary assessment to facilitate rich, context-sensitive inquiry. Grounded in design ethnography, the Ethnobot operates not only as a tool for data collection but as an epistemological interface—one that mediates between participant experience, technological infrastructures, and researcher interpretation. It supports real-time, multimodal fieldnotes and offers a methodological alternative to traditional forms of observation and interviewing, especially in environments where human presence is constrained. By leveraging the ubiquity of mobile technologies and chat interfaces, it adapts classical ethnographic goals—such as thick description and reflexive insight—to the demands of contemporary, digitally mediated fieldwork.

Crucially, the chapter has positioned the Ethnobot as a flexible, co-constructed platform that can accommodate both participant autonomy and researcher framing. Whether deployed as a conversational probe, a diary companion, or an unobtrusive fieldworker, its design fosters deeper participant engagement while reducing barriers to disclosure. In doing so, the Ethnobot contributes to the methodological diversification of ethnography, especially within human-computer interaction (HCI), design research, and the study of Internet of Things (IoT) environments.

As digital systems increasingly shape human experience, the Ethnobot demonstrates how ethnographic tools can evolve to remain relevant, scalable, and ethically attuned. It reframes fieldwork as a distributed, co-creative practice—one in which participants, technologies, and researchers collaborate to produce situated knowledge. This sets the stage for the following chapter, which applies the Ethnobot methodology across real-world case studies to explore how data, dialogue, and design intersect in contemporary sociotechnical systems.

Chapter 5: Case Studies

5.1 Introduction

This chapter frames a series of design-led research projects undertaken between 2016 and 2022 as iterative contributions to the conceptual and methodological development of the Ethnobot. The primary directive of these projects was not development and testing of the Ethnobot, each having their own research aims and directives, however each shaped the evolution of the Ethnobot's technical infrastructure, conversational logic, and applied research methodology. Rather than emphasizing project outcomes or stakeholder dynamics in isolation, this chapter situates each intervention within a trajectory of iterative experimentation, tracing the chatbot's transformation from an exploratory prototype into a scalable, customizable tool for qualitative inquiry. While socio-technical environments and stakeholder engagements remain central, they are examined here as the contexts through which the Ethnobot matured—conceptually, interactively, and ethically. The chapter concludes by outlining the co-design workshops that informed the chatbot's production and the eventual systematization of those processes into a modular platform developed by inChat a design consultancy co-founded during the course of this research. By adopting a co-design approach within a user experience (UX) and service design framework, this work establishes a foundation for extending Ethnobot methods across a variety of sectors, including art, education, and commercial user research. In doing so, it demonstrates the potential of integrating ethnographic sensibilities with design practice to enhance user engagement and interaction.

A key stylistic shift distinguishes the early case studies from those that came later. This divergence is intentional: the initial projects—particularly those conducted at the Royal Highland Show and Edinburgh Christmas Markets—employed traditional ethnographic methods to investigate values, transactions, and stakeholder interactions in situated festival environments. In contrast, subsequent case studies mark a methodological pivot, moving from researcher-led fieldwork to AI-mediated data collection. Despite the varied contexts and propositions of each project, this transition reflects a broader inquiry into the potential of algorithmic agents to support, and perhaps reconfigure, ethnographic practice. This transformation is marked by what I refer to as the 'decisive anecdote'—a pivotal moment that crystallized the central research provocation: *can Hector be replaced by a chatbot?* This question emerged not as a theoretical abstraction but from years of ethnographic fieldwork at public events, where the research team grappled with the challenges of capturing informal value exchanges through interpretively rich, yet anecdotal and non-standardized data. The proposal to substitute a human researcher with a chatbot signalled a methodological shift—from studying the ethnographic affordances of IoT environments to actively testing the capacity of computational tools to perform core ethnographic functions in applied, real-world settings.

Before proceeding, it is important to clarify two framing elements that underpin the chapter's contributions. First, the timeline of case studies provides essential

context for understanding the scope, evolution, and significance of this research. Second, the incorporation of co-design practices—particularly as they relate to the ethos and style of chatbot development—becomes increasingly relevant to RtD approach underpinning this inquiry. In the following sections, I explore the early ethnographic encounters that shaped the research question and then examine the iterative design processes that led to an AI-mediated ethnographic practice situated within an RtD methodology, followed by an examination of tools and methods that became key research outputs.

5.2 Defining the Research Question: Festival Ethnographies

The following research laid the conceptual groundwork for recognizing a critical gap in existing ethnographic methods—one that left researchers both constrained and compelled to seek new forms of inquiry. Conducted as part of the *Smart Transactions in Public Spaces* (STiPS) project, this work focused on examining everyday value exchanges occurring in public environments, with the aim of informing the design of future fintech systems. The limitations encountered during this phase—particularly in capturing complex, situated interactions—prompted a re-evaluation of available methodological tools. This recognition ultimately led to the exploration of chatbots as potential ethnographic agents. The research thus served as a catalyst for developing a novel prototype to support ethnographic inquiry—one that foregrounds empathic engagement and enables a multi-perspective understanding of values in digitally mediated contexts.

Small-scale ethnographic and auto-ethnographic studies—complemented by semi-structured interviews—were conducted in public settings. These methods were adapted to unpredictable outdoor conditions and shifting social contexts. Findings were visualized through diagrams and contextualized narratives detailing physical space, social norms, and participant behaviours. Together, they informed practical fintech design considerations, including payment preferences, vendor-customer communication, and logistical constraints at outdoor events. This work drew from two ethnographic strands: festival ethnography and exploratory ethnographic research. The research environment—a public festival space—initially lacked significant IoT integration. Yet, its focus on value exchange allowed the project to investigate emerging forms of IoT-mediated interactions. The following sections clarify how each ethnographic lineage informed our methodological framing.

5.3 Festival Ethnographies

Festival ethnography offers insight into cultural expression and communal identity through performative public events. Rooted in performance theory, it draws from Victor Turner's concept of 'communitas', wherein festivals dissolve hierarchies and foster shared social experiences (Turner 1969). Ritual theory, particularly Arnold van Gennep's rites of passage, interprets festivals as temporal and social thresholds (Van Gennep 1960). Cultural capital theory, via Pierre Bourdieu, highlights how festivals reflect and reproduce social distinction through the demonstration of cultural competence (Bourdieu 1986). Methodologically, festival ethnography relies on participant observation to immerse researchers in context while maintaining analytical rigour. Interviews and surveys provide complementary qualitative and quantitative data. Visual ethnography—through photography and video—captures the aesthetic and performative dimensions critical to these events. Key figures such as Turner, Van Gennep, and Bourdieu have shaped this field's understanding of how festivals function as spaces of social interaction and cultural transmission. Their work underscores the relevance of combining theoretical insights with multi-modal methods to analyse how festival environments reflect and reshape community values.

Ethnography as Exploratory Research

This project also engaged ethnography as a mode of exploratory research, not to speculate but to concretize plausible futures of IoT in public life. Exploratory ethnography foregrounds the complex, often unpredictable, realities of social interaction. Theoretical underpinnings include symbolic interactionism, which holds that individuals create meaning through social engagement (Blumer 1969). Ethnomethodology, as introduced by Harold Garfinkel, emphasizes the tacit practices that maintain social order (Garfinkel 1967). Phenomenology, particularly as developed by Husserl and Merleau-Ponty, centres on lived experience and subjective perception (Husserl 1931; Merleau-Ponty 1962). Methodologically, exploratory ethnography privileges participant observation and in-depth interviews, supported by reflexive fieldnotes. These techniques allow for a rich understanding of social phenomena from within, rather than imposing external analytical frameworks. This approach is iterative, adaptive, and particularly well-suited for investigating emerging technological contexts.

Royal Highland Show

Held annually in Ingliston near Edinburgh, the Royal Highland Show celebrates Scottish agriculture and rural life. Since becoming a fixed event in 1960, it has grown significantly, featuring livestock exhibitions, food stalls, machinery demonstrations, and artisan vendors. In 2015, the event hosted over 1,000 exhibitors, 4,500 animals, and nearly 190,000 visitors. Sponsored by the Royal Bank of Scotland (RBS) and organized by the Royal Highland and Agricultural Society of Scotland (RHASS), the show plays a vital cultural and economic role, contributing

over £47 million to the Scottish economy in 2014. Admission is ticketed, with prices around £27 in 2017. Inside, visitors encounter a broad array of goods and experiences—ranging from commercial transactions to free samples—positioning the event as a rich site of value exchange.

Methodology

This event marked the first field study of the STiPS project. With no formal collaboration established with the show's organizers, an auto-ethnographic approach was adopted. Researchers and students acted as typical attendees, documenting their experiences to capture customer perspectives. This method allowed for reflexive insight without disrupting vendors or staff. Ten participants (eight students, two researchers) collectively provided diverse observational accounts across the event's expansive grounds.

Findings

Tickets and Entry: In 2016, a student ticket cost £22, offering general access with some areas restricted to VIP guests. Entry queues varied depending on ticket type. Although card payment was advertised, technical issues required cash, underscoring the importance of flexible payment options.

Navigating the Event: Given the event's scale, attendees employed distinct strategies to navigate exploring by area, targeting specific attractions, methodically covering the map, or wandering aimlessly. Maps and signage were helpful but varied in quality (Figure 2). Digital aids such as WhatsApp facilitated coordination among groups, with landmark-based orientation and ad hoc meet-ups common.

Figure 2. Hector M. Fried, 'You are Here', Photograph, 2017 - 2018.

Purchasing Decisions: Researchers had small budgets, prompting thoughtful purchasing. Stallholders were typically knowledgeable and invested in their products, offering detailed information and encouraging interaction. Unique, non-branded, locally produced items were favoured over mass-market alternatives. Crowds influenced engagement—queues signalled desirability but sometimes deterred participation. Researchers also sought quieter spaces, such as an uncrowded gin bar, for respite.

Figure 3. Hector M. Fried, ‘Gin Bar’, Photograph, 2017 - 2018

Sampling and Promotion: Free samples and product demonstrations were frequent and effective, often leading to future purchase consideration. Vendors distributed business cards promoting online shops. High-pressure sales tactics, however, sometimes discouraged buying, perceived as undermining authenticity or fostering buyer’s remorse.

Figure 4. Hector M. Fried, 'Honey', *Photograph*, 2017 - 2018.

Trust and Repeat Purchase: For example, a researcher who purchased honey appreciated learning about the producer's methods and values, reinforcing her decision and encouraging future purchases. This contrasted with the impersonal nature of supermarket buying.

Payment Methods: Cash was prevalent, especially for small purchases, and often preferred for its immediacy. Limitations, however, included a finite cash supply and difficulties obtaining change. Card payments were available at many stalls,

particularly for high-value items, with vendors using various platforms (e.g., iZettle, Worldpay, FDMS). Some fallback methods included analogue card imprinting or taking card details for later processing. Group transactions introduced informal reciprocation, adding social complexity.

Figure 5. Hector M. Fried, 'Sweets', Photograph, 2017 - 2018.

Receipts: Receipts were rarely offered unless requested. For cash, this created gaps in spending records. Some vendors used hand-written slips, while card payments generated automatic digital or printed receipts. This inconsistency highlighted a tension between transaction documentation and operational friction (see Figure 6).

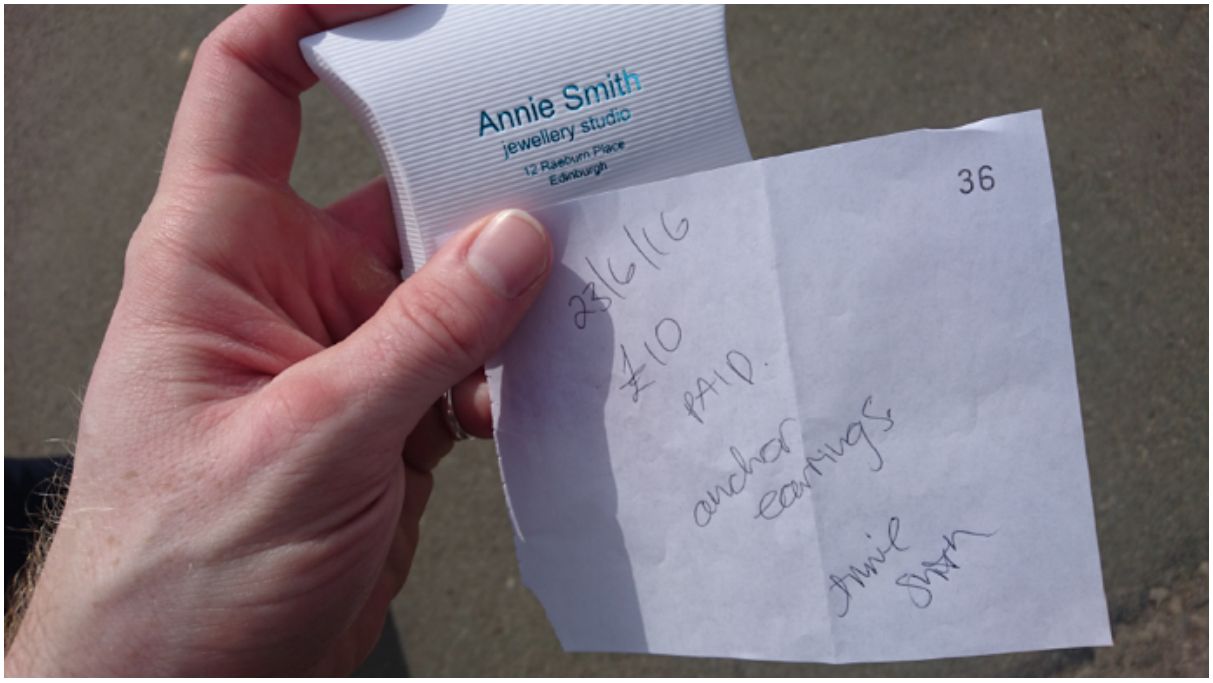


Figure 6. Hector M. Fried, 'Handwritten Receipt', Photograph, 2017 - 2018.

Marketing and Engagement: Some vendors prioritized awareness over immediate sales. Interactive displays and competitions (e.g., prize draws for email addresses) engaged visitors and fostered future contact. Promotional activities (e.g., smoothie-making with a bicycle blender) connected brand messages with experiential learning.

Figure 7. Hector M. Fried, 'Smoothie Bicycle', Photograph, 2017 - 2018.

Mobile Use: Phones played a central role in documenting and sharing experiences. Researchers photographed items and spaces to communicate with friends and family, posted to social media, and used WhatsApp for internal coordination. Devices also served broader communication functions, including accessing email and arranging transportation.

5.4 Summerhall Christmas Markets

Summerhall, a former veterinary school turned creative hub in Edinburgh, hosts a one-day Christmas market featuring artisanal goods, food, and seasonal drinks. The event supports local makers and small businesses, with 84 vendor stalls and around 3,500 attendees, including families admitted for free. Known for its curated, local feel, the market emphasizes quality over mass appeal. Prominent local brands such as Pickering's Gin and Barney's Beer—both based at Summerhall—reinforce its artisanal identity.

Methodology

This single-researcher study adopted a design anthropology perspective. Participant observation occurred during the event's first half, with visual mapping and informal field notes capturing experiential impressions. Semi-structured interviews were conducted later in the day with both vendors and customers. Follow-up conversations took place with Summerhall staff post-event. Interviews were recorded digitally when possible, and field notes were used to guide thematic analysis.

Findings

Attendees and Atmosphere: The market attracted predominantly middle-class families seeking a curated holiday experience. This demographic aligned with Summerhall's arts-oriented programming. Its brand lent the market a sense of refinement and local authenticity (Figure 8).

Figure 8. Hector M. Fried, 'Summerhall Market', Photograph, 2017-2018

Vendor Perspectives: Stallholders viewed Summerhall's reputation as a key asset. By associating with the venue's brand, they extended their reach to consumers who valued artisanal, high-quality products.

> Stallholder: *"The enticement of Summerhall, I suppose it's, um, well, it's the name as well, it's sort of synonymous, really, with artisan produce, um, you know, it's supporting small business people as well, there's Pickering's Gin here, for example, um, you know, it's, yeah… I suppose it fits in with my little business too".*

Vendors often had existing relationships with Summerhall or saw participation as a way to build lasting ties. The emphasis was on meaningful engagement over mere transaction.

Figure 9. Hector M. Fried, 'Jam', Photograph, 2017-2018.

Payment Methods: Most vendors accepted both cash and card. Summerhall's strong network connectivity ensured smooth card transactions. However, cash was still prevalent. Some stalls struggled with providing adequate change during peak times and occasionally directed customers to nearby ATMs.

> Stallholder: *"Um, yeah, uh, very often we run out of change, so we have to end up begging for, uh, for small change, but, um, but we get through".*

Receipts and Trust: Card payments automatically generated receipts, while cash payments often did not—unless explicitly requested. Trust was assumed, especially in lower-value exchanges.

Card Machines: Vendors used standard platforms such as Worldpay and Verifone, often rented for the event. They reported few technical problems.

> Stallholder: *"I was at an event on the 1st of December, and most people were really surprised that I could take payments, and they, and they, actually, I'm making a lot more sales, especially with the gift boxes, um, you know, on the back of that, so again, you know, really it was beneficial to have it".*

Information Exchange and Decision-Making: Most stalls operated like trade shows, emphasizing storytelling and hands-on experiences. Vendors discussed materials, techniques, and values—especially sustainability and dietary needs.

Figure 10. Hector M. Fried, 'Dietary Requirements', Photograph, 2017-2018.

> Stallholder: *"Um, I think people are getting more into, um, sort of handmade and artisan products now, um, and they're willing to pay that little bit extra for something that's handmade and that a lot of thought and effort's gone into".*

Security: As a ticketed family event, security was assumed rather than visible. No incidents were reported, and vendors generally felt safe within the curated venue environment. There was only one security officer on staff at the time, but they did not appear to be present during the event. It is possible they were watching the CCTV in another room. No stallholder worried about anyone stealing from them at this event, as they considered Summerhall a safe place.

5.5 Princes Street Christmas Market

The Princes Street Christmas Market is a high-profile, month-long event held in Edinburgh's UNESCO World Heritage City Centre. It combines retail stalls, artisanal food and drink, and fairground attractions. Organized by Underbelly on behalf of Edinburgh City Council, it stretches from Festival Square to St Andrew Square and East Princes Street Gardens. In 2016–17, Edinburgh's Christmas drew around 800,000 visitors, with 500,000 tickets sold for associated events. The market attracts both international tourists and local families, offering tiered experiences geared toward children, teenagers, and adults.

Methodology

This study spanned December 2016 through early January 2017. It was led by a single researcher using a design anthropology framework. Participant observation formed the backbone of the study, with field notes and visual documentation used to capture space, atmosphere, and interactions. Informal conversations were used to identify interview subjects. Semi-structured interviews were conducted with vendors and customers, documented through handwritten notes and digital recordings. Interviews occurred over several visits, both pre- and post-Christmas.

Findings

Attendees and Atmosphere: The market was characterized by intense footfall and a diverse audience, including tourists from Europe and Asia, couples, families, and groups of friends. Socio-economic diversity was notable, although many visitors came prepared to spend (Figure 10).

Figure 11. Hector M. Fried, 'Families at Christmas Market', Photograph, 2017-2018

High visitor volume created strong incentives for vendors. Local businesses capitalized on the seasonal demand, particularly for gift items and instant food

Stallholder: *"It's a big family event. People expect to spend".*

Payment Methods: Cash was universally accepted and often preferred, especially for low-cost goods and food stalls.

Employee: *"My boss prefers cash—I'm just the candy floss man"* (Figure 12).

Figure 12. Hector M. Fried, 'Candy Floss Man', Photograph, 2017-2018.

Card payments were offered for higher-value items, typically via Worldpay or Verifone. Larger vendors and Underbelly-run operations supported multiple payment options. Some employees preferred card for its ease and reduced error risk.

> American visitor: *"I'd prefer to use my card, that's pretty much all I brought to the UK, so, yeah, that's what I would prefer to be able to use, but in a place like this I feel like they would prefer cash".* Specifically, food vendors that sold instant eats only had cash options (Figure 11), despite the fact that most stallholders would prefer to have a sale than not, and just wanted to ensure that.

Figure 13. Hector M. Fried, 'Cash Only', Photograph, 2017-2018.

Receipts and Trust: Receipts were typically provided only for card transactions. Handwritten receipts were available upon request, particularly for high-value craft purchases. Most stalls omitted receipts for small cash transactions unless prompted.

Card Machines and Technical Concerns: Vendors used a variety of devices (e.g., Payleven, iZettle, Sage Pay), most commonly Worldpay and Verifone. Connectivity was generally reliable, but some expressed concern about GPRS limitations during peak usage (Figure 14).

> Stallholder: *"But taking cards in itself is a massive pain in the ass, basically, because either you need to be plugged into the wi-fi or you use a GPRS. The problem with a lot of your GPRS or your, your mobile card machines is they run on 2G, which is sort of, you know, decades-old technology, so if you're not getting a signal or too many people are using that band, which is very tight, then you don't get a signal, so it's a – it's a ma – it can be a really huge issue, so finding a place with strong connections, strong wi-fi and all that, really affects how or what kind of payments you're going to be able to take, well, in our experience, anyway".*

Figure 14. Hector M. Fried, 'Card Machines', Photograph, 2017-2018.

Information Exchange and Decision-Making: Stalls emphasized storytelling and product provenance, particularly for artisanal goods. Gift purchases often included a desire to convey a product's uniqueness.

Stallholder: *"People want to know where it comes from—what it means".*

Food stalls were mixed in approach; instant food vendors typically focused on efficiency over narrative, while artisanal food sellers (e.g., chocolatiers) emphasized quality and origin (see Figures 15–16).

Figure 15. Hector M. Fried, 'Lanterns', Photograph, 2017-2018.

Figure 16. Hector M. Fried, 'Burgers and Chimney Cakes", Photograph, 2017-2018.

Security: Despite large crowds, crime was minimal. Most vendors and attendees assumed the space was safe. Few exhibited visible precautions: some vendors practiced subtle monitoring.

Event Navigation Requires Strategy: Attendees at large festivals often plan routes to maximize experiences. Navigating complex layouts, they rely on maps, mobile devices, and group coordination via messaging apps. These strategies reveal the cognitive and social labour involved in moving through such events.

Vendors Sell Stories and Brand Values: Selling at these markets entails more than product delivery—it involves relational engagement. Vendors often frame products through narratives of authenticity, provenance, and sustainability. Personal interactions reinforce trust and perceived value. Consumers frequently cite ethical alignment and uniqueness as motivators for purchase decisions.

Flexible Payment is Essential: Both cash and card were widely used, each offering distinct benefits. Cash is quick, tangible, and incurs no transaction fees but requires change and increases the risk of overspending. Card payments, preferred for higher-value items, are convenient and create automatic records, though sometimes hampered by connectivity issues. Vendors often used multiple systems to ensure successful sales.

Receipts as Financial and Experiential Records: Receipts were rarely issued unless requested or generated by a card machine. While vendors often saw them as unnecessary, attendees valued them for budgeting and post-event reflection. Digital payment records helped reconstruct event experiences and assisted with financial reconciliation among peers.

Transactions Are Relational and Distributed: Purchases were often shared within groups, involving informal reciprocation or delayed settlement. These exchanges underscore the relational and temporal complexity of seemingly simple transactions, extending across time, social networks, and even digital platforms.

Place and Venue Confer Value: The symbolic weight of place shaped perceptions of vendor authenticity and product quality. Prestigious venues such as Summerhall lent credibility to artisanal goods, while vendors selected locations strategically to associate with a specific aesthetic or audience.

Security Assumed, Not Visible: While crime was minimal, security protocols were largely invisible or assumed. At ticketed events, both vendors and attendees exhibited a general sense of safety. In contrast, non-ticketed outdoor events prompted low-level vigilance and peer-based security practices among vendors.

Phones as Ethnographic Tools: Mobile phones served multiple roles: documenting experiences, sharing moments, navigating events, coordinating groups, and receiving digital receipts. Devices became extensions of ethnographic practice.

5.6 Reflections on Defining the Research Question

In this exploratory research, festivals emerged as sites where narratives of value were embedded within spatial and social interactions, particularly at points of sale. Drawing on the anthropological concepts of place and space, these interactions were analysed as culturally situated moments, shaped by the dynamics of public gatherings and the evolving presence of IoT. Understanding these entanglements required an immersive methodological approach—one that combined participant observation with experiential engagement. Observing as ethnographers while simultaneously participating as attendees enabled a more textured understanding of how festivals function as both cultural and technological arenas. This dual participatory strategy also enabled the development of speculative use-case interventions that imagined how IoT technologies might become embedded in future public environments. Rather than abstract projections, these interventions were grounded in lived experiences, offering tangible insights into how digital infrastructures might intersect with festival practices. In this way, the research operated at the intersection of cultural anthropology, design fiction, and emerging technologies—framing festivals as complex spaces where cultural expression and digital mediation co-evolve (Appadurai 1996; Escobar 2001).

Despite the richness of the ethnographic data collected, the research ultimately fell short in capturing how IoT was materially and socially instantiated in public space. What remained absent was a reflexive understanding of positionality—both that of the researchers and of participants. While the studies offered compelling anecdotes, they lacked the immediacy and multiplicity afforded by more interactive, digitally mediated tools. Notably, the ethnographer was already using a mobile device to capture notes, take photographs, and receive digital receipts—an everyday technology that revealed glimpses into how mobile mediation might augment ethnographic practice. This realization—initially experienced as a limitation—became a productive inflection point. It prompted a methodological shift toward exploring chatbot-mediated interaction as an ethnographic strategy. Rather than replacing traditional methods, this approach offered a new lens for engaging with digitally entangled environments, expanding the possibilities for reflexive, real-time, and multi-perspective inquiry.

5.7 Answering the Research Question: Ethnobot Case Studies

As previously stated, the concept of the Ethnobot emerged from two years of reflective inquiry, design iteration, and methodological experimentation within the STiPS project at the University of Edinburgh, supported by the PETRAS IoT UK Hub. The question “can Hector be replaced by a chatbot?” was raised, an inquiry that marked a decisive shift in the project’s trajectory, inaugurating a new methodological direction centred on chatbot-mediated ethnography.

The first iteration of the Ethnobot was prototyped and deployed at the Royal Highland Show through mobile phone application, where it demonstrated considerable promise as a tool for qualitative inquiry. Its ability to elicit rich, participant-driven insights confirmed its potential for use in diverse research contexts. Building on this initial success, a more refined version of the Ethnobot was employed in the Edinburgh City Council Public Art Research Project, where it served as a core component in a service design process. This deployment required a collaborative design approach, involving stakeholders in co-creating interaction flows to ensure relevance and usability of the findings.

The momentum generated by these projects led to further institutional support: the PETRAS IoT UK Hub endorsed the formal evolution of the research into a startup venture, co-founded by myself and Rory Gianni under the name ‘inChat’. Since its founding, inChat has advanced the Ethnobot methodology for broader commercial application. Initially serving university-affiliated clients, the company has expanded to deliver both training on its research methods and bespoke chatbot-based interventions that include educational components. Workshops and design sessions have been conducted with organizations such as the Royal Bank of Scotland, Tesco Bank, and Edinburgh Living Lab. The latter collaboration resulted in the third major Ethnobot deployment: a customizable platform for the Park Life project, enabling the Edinburgh Living Lab team to conduct multi-site engagements using the tool, which would be a continued progression for inChat and my academic research. The following sections will outline the applied approaches used to engage with each project, then unpack the iterative development of the Ethnobot and its various applications, followed by a detailed examination of four key research deployments, and concluding with a reflection on the methodological insights, challenges, and contributions that emerged across these engagements.

Applied Approaches

The methodological approaches between research through design (RtD), co-design, and participatory design guided the development, deployment, and iterative refinement of the Ethnobot. RtD functioned as a practical design ethos—treating each iteration of the Ethnobot as a research opportunity to critically reflect on and refine methodological practices (Frayling 1993; Gaver 2012). In contrast, the co-design process was adopted as a pragmatic strategy to meet specific project requirements, recognizing that formulating meaningful research questions demanded

both subject-matter expertise and lived experience. This approach was essential to ensuring that each chatbot was contextually appropriate and aligned with the values, needs, and expectations of its stakeholders. Over time, this co-design process evolved into a distinct practice tailored specifically to the development of ethnographic chatbots. It drew heavily from participatory design traditions, involving stakeholders across the full lifecycle of the design process—including ideation, implementation, deployment, refinement, and analysis (Sanders and Stappers 2008; Björgvinsson, Ehn, and Hillgren 2012). This integrated approach ensured that each Ethnobot was both methodologically grounded and collaboratively constructed, enhancing its resonance and utility within applied research settings.

The choice to employ co-design or participatory design in an Ethnobot intervention depends on the context, participants, and goals of the research. While these approaches are often used interchangeably due to their shared emphasis on stakeholder engagement, they stem from distinct historical and methodological traditions that warrant differentiation—particularly when designing ethnographic tools like the Ethnobot. Participatory design originated in 1970s Scandinavia as 'cooperative design', rooted in labour movements that advocated for democratic influence over workplace technologies (Bjerknes, Ehn, and Kyng 1987). Co-design builds on this foundation but broadens its scope, inviting diverse users and communities to contribute throughout the entire design process, from ideation to implementation and evaluation (Sanders and Stappers 2008). Both traditions are grounded in values of empowerment, inclusion, and shared authorship (Simonsen and Robertson 2012). Though they share overlapping tools—such as workshops, prototyping, and iterative feedback—participatory design is often more formal and institutional, whereas co-design is typically more flexible and suited to grassroots or exploratory contexts.

From a practical standpoint in engaging with stakeholders, the term 'co-design' became more accessible and widely understood. As a result, we adopted it as common vernacular and used it to describe our workshops. In the development of the Ethnobot, co-design has proven effective in shaping chatbot interfaces and interactions that reflect stakeholder input, particularly where ongoing collaboration was feasible. However, in contexts where direct engagement is limited—such as with dispersed or hard-to-reach populations—participatory design methods can approximate similar empathic insights by involving representative stakeholders and scaling feedback mechanisms. Ultimately, both approaches support user-centred innovation and can be strategically employed to guide the design of chatbots or the broader ethnographic framework in which they are deployed. Whether through direct co-design or expansive participatory engagement, these methods ensure that Ethnobot interventions are contextually relevant, ethically grounded, and responsive to diverse communities. More importantly, through a research through design (RtD) approach, this study has developed a practical methodology for applying co-design within a structured workshop format—a process that will be discussed in detail in subsequent sections.

Iterative Growth: Developing the Ethnobot and Methods

The development of the Ethnobot emerged through a sustained sequence of design-led research initiatives, each contributing incrementally to its conceptual, technical, and methodological evolution. Spanning from the initial STiPS research project to my leadership role as chief design anthropologist at the inChat startup, both academic and industry-based deployments—whether aimed at inquiry or commercialization—formed a cumulative research trajectory. Within this trajectory, each context-specific implementation shaped the Ethnobot's evolving role as an ethnographic instrument. The integration of distinct features and functionalities across projects reflects a pattern of progressive refinement and adaptive growth.

The Ethnobot's ability to operate via mobile devices provided a flexible and accessible modality for embedding chatbot-based interactions across a range of research environments, including festivals, domestic settings, and public spaces. Each context introduced distinct design considerations shaped by the affordances of mobile technology. While few projects required alternative deployment formats, the transition from research to industry applications underscored the importance of ensuring mobile accessibility. To this end, we prioritized web-based deployment via HTML, allowing the chatbot to function seamlessly through standard mobile browsers without the need for dedicated apps. This approach broadened accessibility across digital devices and became foundational to our design strategy. It was later standardized within the inChat*'s* no-code platform, which enabled deployment and engagement with chatbots through shareable automatically generated QR codes. This simple yet effective solution was first identified during the Royal Highland Show Ethnobot deployment, where we preloaded interactions onto iPhones. The success of that implementation informed its consistent use in subsequent projects and its formal integration into the inChat platform's core functionality.

However, this iterative development process really began with the festival ethnographies conducted between 2016 and 2018 at the Royal Highland Show and Edinburgh's Christmas Markets. These early observational studies combined autoethnography, photography, and informal interviews to examine how value was transacted in public spaces. While rich in interpretive insight, the work also exposed the limitations of traditional ethnographic methods in dense, fast-moving environments, prompting a search for tools that could facilitate engagement without requiring constant researcher presence. Under the Smart Transactions in Public Spaces initiative, the first version of the Ethnobot was developed in response to this methodological gap. Designed for asynchronous interaction, the initial prototype featured a simplified, button-based interface to minimize cognitive load during live events. Developed through collaborative roundtables and wireframing sessions, the chatbot represented a methodological shift away from conventional researcher-led inquiry toward automated, self-guided ethnographic dialogue. This transition was further solidified through a public art consultation project with Edinburgh City Council. There, the Ethnobot evolved into a structured conversational tool designed to elicit participant reflections on civic aesthetics and policy. Its use in this context not only facilitated data collection but enabled participants to surface shared concerns and visions, culminating in collaboratively-generated policy recommendations.

The chatbot's role expanded further in the context of the Edinburgh Fringe Festival with the Dionysus bot, which emphasized tone, affect, and expressive dialogue. Artists used the chatbot to describe their performances in their own words, enriching bureaucratic registration processes with narrative and emotional depth. This iteration foregrounded the importance of co-designing linguistic style, semantics, and interactional rhythm, allowing the Ethnobot to serve as both a data collection tool and a medium for creative articulation. A similar emphasis on reflection and emotional resonance shaped the development of Juno at Jupiter Artland during the COVID-19 pandemic. In this project, the chatbot was used to support remote engagement with public art installations, offering a guided reflective experience for users while also enabling the co-creation of content through distributed workshops. Juno demonstrated the Ethnobot's capacity to function not only as a methodological tool but also as a reflective and pedagogical companion. It was designed with geolocation capabilities, enabling it to detect a user's proximity to specific artworks and initiate context-specific conversations based on their location.

A subsequent iteration, *Alfred the Owl*, developed in collaboration with Edinburgh Living Labs, emphasized adaptability and context-specific design. This version introduced a lightweight, template-based model that enabled non-specialist users to configure and deploy the chatbot with minimal technical support, underscoring the modularity and accessibility of the broader Ethnobot framework. This iteration was embedded within an IoT-enabled owl and deployed via a lo-fi network on a community message board in an Edinburgh park called The Meadows. The system was later replicated in additional public parks across Edinburgh. The location-specific deployment created natural boundaries for in situ engagement, anchoring conversations to the immediate environment of each park. By accessing the chatbot directly through the message board, park visitors were prompted to reflect on their experiences of that particular public space. The lo-fi, location-aware design allowed Alfred to initiate contextually-grounded dialogues with users, reinforcing the value of situated ethnographic interaction in urban settings.

In a different context, a collaboration with the University of Edinburgh's Web Publishing Services extended the Ethnobot's potential for longitudinal engagement. This deployment was structured around a three-stage interaction model—onboarding, diary-style check-ins, and exit interviews—enabling the collection of evolving user perspectives over a three-month period. The project demonstrated the chatbot's effectiveness for sustained qualitative inquiry and directly contributed to the development of the commercial inChat platform, particularly the design of the *Ethnoreader* tool. Targeted at academic staff, the chatbot was accessed primarily through workplace laptops, aligning with institutional digital practices and professional communication norms. As such, the design emphasized formal, work-appropriate dialogue in accordance with University of Edinburgh policies, reflecting both the technological and socio-organizational conditions of its use.

Further developments in ethical and psychological depth were achieved through the Allichat project, a collaboration with NHS and Voxsio focused on youth mental health. This project incorporated natural language understanding, structured reflection modules, and embedded duty-of-care safeguards co-developed with clinical partners. Allichat marked a significant expansion of what would become a future Ethnbot design intervention scope, requiring careful attention to tone, user

wellbeing, and ethical design protocols. In parallel, OSSIAN—a project under the Ocean ARTic initiative—explored the chatbot's potential for immersive environmental communication. By integrating soundscapes and poetic narrative structures, the chatbot scaffolded non-linear dialogues that encouraged users to reflect on climate change through sensory and emotional engagement. This instance marked the first time a chatbot was developed independently of our direct involvement with the inChat team. Although we provided the artist with design guidance, they independently developed and deployed the chatbot using the inChat no-code platform. In contrast, for the Egg Theatre project, an educational consultant specializing in theatre was commissioned to design the chatbot dialogue following inChat's framework. We then implemented and deployed that chatbot on their behalf, using the inChat no-code platform ourselves.

The inChat no-code platform was developed in response to the significant time and technical effort required to translate Ethnobot designs into functional interfaces. Its design evolved iteratively through the practical demands of deploying research chatbots across diverse contexts. A key turning point occurred during early collaboration with Jupiter Artland on *Juno*, a chatbot created to engage visitors in navigating the sculpture park. At the request of the client, the chatbot was designed to be editable by park staff, prompting the development of a prototype interface that enabled localized modifications aligned with their specific requirements. This experience led to critical reflection on the efficiencies of building custom chatbot infrastructure, ultimately motivating the creation of an in-house no-code platform. Parallel to this, our technical development followed its own trajectory: the initial Ethnobot for the Royal Highland Show was programmed in Python; a subsequent version for the Edinburgh City Council project utilized React; later iterations transitioned to Rasa, an open-source framework for building context-aware conversational agents with full control over data privacy and deployment (Bocklisch et al. 2017). Each project contributed to incremental advances in Ethnobot's capabilities, culminating in the no-code chatbot builder now integrated into the inChat platform. While this tool was used internally for deployments such as *Henri* and the Egg Theatre project, it was also offered as a free trial to selected external collaborators to support experimentation and broader engagement.

The integration of a no-code chatbot builder significantly enhanced the inChat platform, transforming it into a comprehensive environment for building, deploying, and analysing research-driven conversational agents. Central to this ecosystem was the 'Ethnoreader', a tool originally developed to analyse chat logs from the first Ethnobot deployment at the Royal Highland Show. Over time, the Ethnoreader evolved into a robust system for ethnographic interpretation, enabling the organization and analysis of chatbot data by question type, keywords, and participant responses. These analytical capabilities were further refined during the Edinburgh Fringe Festival deployment of Dionysus, where sentiment analysis became a core requirement. To support this, chat logs were made exportable in .json format, facilitating interoperability with external analytical tools such as Google Analytics. This advancement expanded the scope of Ethnobot deployments, supporting integration with a wide range of data analysis techniques, including sentiment analysis, machine learning, text and data mining, natural language processing, and natural language understanding.

The final example in this trajectory, Henri, was developed for a U.S.-based educational nonprofit focused on professional development. Henri used predictive dialogue flows and A/B testing to assess the impact of metacognitive reflection on learning outcomes. Its incorporation of memory loops and user feedback mechanisms extended the Ethnobot's utility into educational technology, positioning it as a dialogic learning companion. Collectively, these projects demonstrate how the Ethnobot evolved through iterative experimentation, responding to shifting sociotechnical contexts while continuously refining its methodological and interactive design (see Figure 17). Each deployment contributed to a broader understanding of how chatbots can function not only as data collection tools but as co-ethnographers, capable of mediating situated knowledge production in diverse and complex environments. Alongside these projects, in anticipation of future needs, a series of internal platform developments were undertaken independently of specific deployments or commercial releases. In 2022, these included the launch of the first no-code chatbot builder, integrations with Telegram, WhatsApp, and Stripe, email-based transcript and reporting features, and initial large language model (LLM) integration. In 2023, reminder and scheduling functions, chatbot-enabled payment flows, and expanded LLM capabilities were introduced. By 2024, vector store integration was added, enabling more advanced contextual interaction and data retrieval.

Ethnobot Project Iteration Summary

Year(s)	Project	Iteration/Feature Contributed
2016–2018	STiPS/Festival Ethnographies	Identified need for non-intrusive ethnographic tools
2018–2019	STiPS / Royal Highland Show Bot	First Ethnobot prototype (button-based interface), coded in Python
2017–2019	Public Art Bot (Edinburgh Council)	Stakeholder engagement via dialogue, Ethnoreader utilized in house for research report, coded in React
2018–2021	Fringe Festival: Dionysus	Conversational form-building, tone-of-voice design, utilized co-design workshop, Ethnoreader utilized in house for research report, .json files extrapolated for use with google analytics, coded in RASA
2019–2022	Juno (Jupiter Artland)	Pedagogical framing, remote workshop methods, coded in RASA

2019	Alfred the Owl (Living Labs)	Lightweight, replicable bot design, utilized co-design workshop, featured on lo-fi network housed in a plastic owl
2019	inChat's / UX Web Publishing Bot	Longitudinal engagement; modular dialogue system, utilized co-design workshop, coded in RASA
2020	Allichat (NHS and Voxsio)	Ethics integration, AI-enhanced reflection
2021	OSSIAN (Ocean ARTic)	Sound-enhanced narrative framing, built by artist on inChat's no-code platform
2021	EGG Theatre's Alphie	chatbot replicating in-person theatre training to support creativity, reflection, and collaboration; designed by a 'non-ethnographer', utilized co-design workshop, built inhouse on inChat's no-code platform
2022	Henri (College Bridge, Los Angeles)	Reflection, metacognition, and educational dialogue, built inhouse on inChat's no-code platform, Ethnoreader utilized for analysis by College Bridge

Figure 17. Hector M. Fried, 'Iterative Project Timeline' of Ethnobot Developments, Excel table, 2025.

Ethnobot Deployment at the Royal Highland Show

As computing systems become increasingly embedded in everyday life, the need for innovative methods to study human-technology interaction grows more urgent. This case study explores the use of a conversational agent—Ethnobot—as a novel ethnographic tool deployed during the Royal Highland Show in Scotland. The objective was to assess the feasibility of using chatbots to gather real-time, user-generated data within a large public event and to evaluate their effectiveness compared to traditional ethnographic methods.

Context and Background

The Royal Highland Show, a major cultural and agricultural event in Scotland, served as an ideal site to investigate the potential of chatbots for in situ data

collection. The event attracts thousands of visitors and offers a dynamic environment for analysing social interaction, consumer behaviour, and experiential engagement. Thirteen participants—comprising university affiliates and members of the general public—engaged with the Ethnobot over the course of the event, using smartphones to document their experiences through text and image-based inputs. This study draws on foundational work in human-computer interaction (HCI) and ethnography, including Suchman's notion of situated action (1987) and Dourish's theory of embodied interaction (2001). It builds upon the evolution of ethnographic methods adapted for ubiquitous computing environments, particularly those shaped by the Internet of Things (Tallyn, Fried 2018: Crabtree et al. 2006; Fraser et al. 2005). This was the first attempt to utilize an Ethnobot intervention to test its premise and effectiveness in design by deploying and analysing a chatbot for research purposes, specifically within the context of ethnographic inquiry (Figure 18).

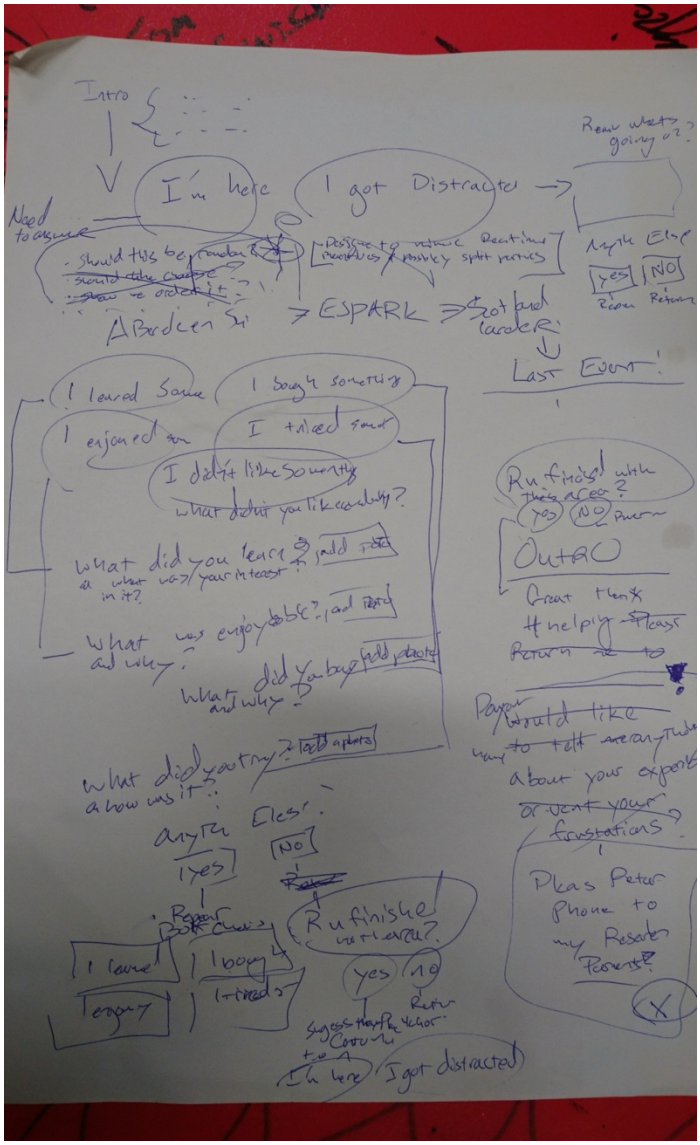


Figure 18. Hector M. Fried, 'First Ethnobot Design', chatbot dialogue and architecture in pen and paper, Photograph, 2018.

Methodology

Participants were briefed and provided with a smartphone running the Ethnobot application. The chatbot guided users through a structured yet flexible conversational flow, prompting them to document their thoughts, actions, and locations through multiple-choice questions that could be answered by button tangents (followed by free-text input, and photo uploads (Figure 19). The study design incorporated two interaction sessions daily and concluded with brief, semi-structured interviews to triangulate findings.

Figure 19. Hector M. Fried, 'Button Tangents' ,first deployment of Ethnobot showcasing front end design, Photograph, 2018.

The study design incorporated two interaction sessions daily and concluded with brief, semi-structured interviews to triangulate findings.

The study aimed to evaluate:

1. User engagement with the chatbot;

2. The quality and type of data collected through chatbot interactions;

3. Participant perceptions of the chatbot experience.

The chatbot's dialogue system was designed to emulate the diary study and experience sampling traditions in HCI while integrating the principles of value constellations (where value is co-created across actor networks) and smart public space interactions (Pschetz et al. 2017).

Findings

Participants interacted with the Ethnobot for an average of 120 minutes, generating over 900 responses and contributing 151 photographs. While some users praised the chatbot's simplicity and real-time interaction capabilities, others expressed frustration with its rigid dialogue structure and repetitive prompts. Notably, 145 out of 236 prompts asking "Do you want to add something?" were answered affirmatively, indicating a high level of voluntary engagement. During these instances, users often expanded on the original topic or transitioned to related subjects.

Participants also used anthropomorphic language when describing the Ethnobot, attributing human-like traits to it, which influenced their expectations and interaction patterns. Certain participants particularly relished the opportunity to enhance their comments in an open-ended manner. For instance, one participant expressed her enjoyment by stating, "I really enjoyed going around and taking pictures and 'have you got something to add?', 'yeah I have'. I always responded positively to 'have you got something to add?', as I consistently had something to contribute". Out of the 922 participant responses, 151 consisted of photos. Photos were more prevalent in responses when participants were explicitly prompted to include them compared to when they were not. Participants provided a total of 133 photos, averaging ten per participant, in response to the prompt, "Take a photo and/or tell me about it". In contrast, only 18 photos in total, averaging one or two per participant, were added to requests that did not explicitly mention photos, for example, "What did you try? How was it?" (Figure 20).

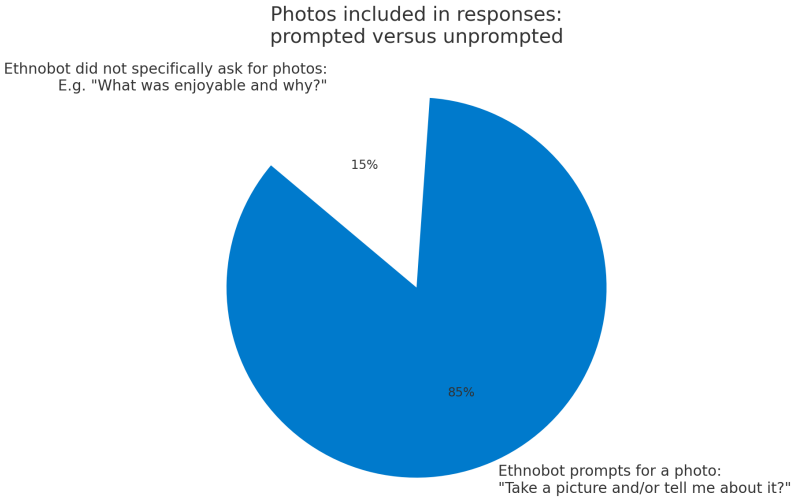


Figure 20. Hector M. Fried, 'Proportion of Responses that Included Photos when Prompted by Ethnobot Versus when Unprompted' from 2018 Ethnobot Interactions, Pie chart, 2025.

Chat logs revealed a predominance of present tense, moment-to-moment reporting, suggesting strong ecological validity. The chatbot effectively captured concrete details such as vendor names, product descriptions, and spatial references that participants struggled to recall during later interviews. Participants also provided short narratives about their actions or surroundings, events in progress, and the crowd density at various locations. As pointed out by Ella Tallyn and Hector Fried in *The Ethnobot: Gathering Ethnographies in the Age of IoT*, adding photographs greatly enhances the richness of these accounts (Tallyn et al., 2018). Photographs allow participants to precisely illustrate their points without needing extensive explanations. No photograph was shared in isolation; each was paired with a comment, usually serving as a caption. These annotations are invaluable for grasping the significance or context of the image. Narrative descriptions often segue into or intertwine with personal opinions, especially regarding likes or dislikes, desires or needs, items participants aspire to purchase yet restrain themselves from obtaining, things they yearn for but cannot afford, and novel experiences that spark inquiries and reflections (Figure 21).

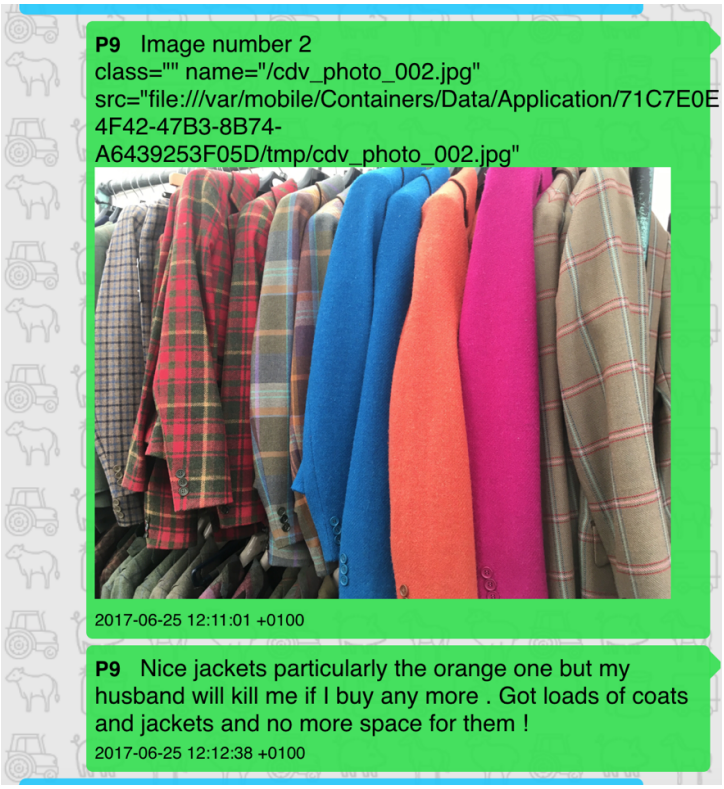


Figure 21. Hector M. Fried, 'Chatlog', Image, 2018.

Interviews, however, provided deeper emotional reflections and highlighted limitations in the chatbot's ability to address personal or sensitive content. Interviewees also described the chatbot's guidance system as occasionally disjointed, particularly when directions lacked contextual justification. Overall, comparing the insights gathered from interviews with those from the chat logs reveals differences in the type of information shared. Interviews tend to elicit broader reflections on the event, like one participant's observation of improvements in craft stalls over the years. Interviews also draw out more personal background information and deeper emotions. For instance, participants shared feelings of homesickness or awe at the scale of machinery compared to what they're accustomed to in their home countries, and the unique atmosphere of the event evoking nostalgia or a renewed connection with the farming community. Responses in interviews sometimes revealed a willingness to express dissatisfaction or discomfort more openly than in the chat logs, possibly due to the more interactive and empathetic nature of human conversation. Issues such as overwhelming crowds and personal disinterest in the commercial or agricultural aspects of the event were mentioned. Despite the detailed records in the chat logs, including photographs and notes on interesting finds, some participants provided a contrasting perspective in the interviews, highlighting aspects like financial constraints or a general lack of interest in the items for sale. The Ethnobot did prompt participants for any additional comments at the end of their session, yet few extended their responses beyond a sentence, in stark contrast to the more detailed and expansive discussions during the follow-up interviews.

Discussion

The study highlights both the promise and limitations of chatbot-assisted ethnographic research. Pre-set responses facilitated efficient interaction during a crowded event but constrained user expression in open-ended scenarios. The balance between guided exploration and user autonomy emerged as a critical design tension. Participants appreciated opportunities to deviate from the chatbot's path and document alternative experiences, especially through the ‘I got distracted’ feature (Figure 22). Participants frequently utilized the ‘I got distracted’ function: approximately 55 times. Furthermore, participants' acknowledgment of their presence at specified locations using ‘I'm here’ function occurred 27 times, prompting additional inquiries from the Ethnobot (Tallyn et al., 2018).

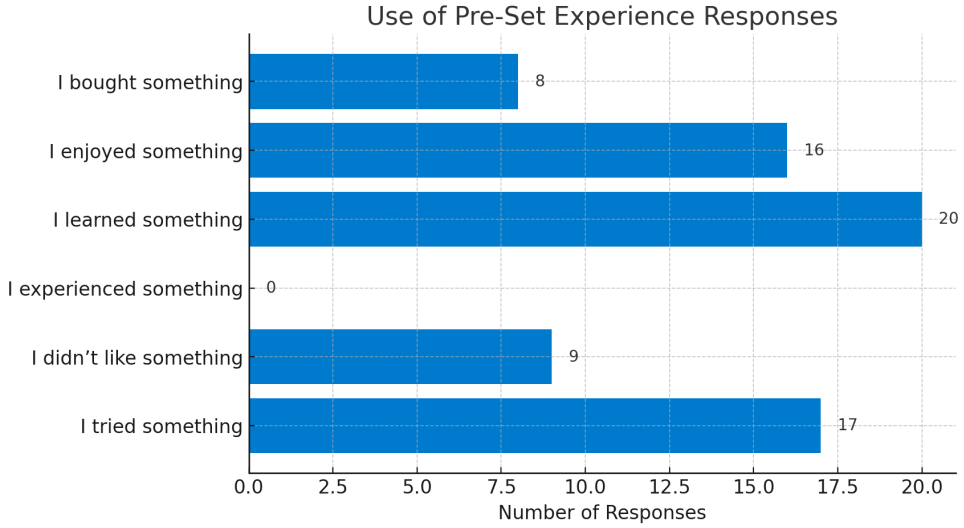


Figure 22. Hector M. Fried, ‘Usage of Pre-set experience Response Options’ in 2018 Ethnobot interactions, Bar chart, 2025.

The findings support the view that while chatbots cannot replace human ethnographers, they can act as supplemental data collection agents, particularly in environments where researcher presence might influence behaviour or would be logistically impractical. The data collected at the Royal Highland Show contributed to research documented by Ella Tallyn, Hector Fried, Rory Gianni, Amy Isard, and Chris Speed (2018) in their paper, "The Ethnobot: Gathering Ethnographies in the Age of IoT". This paper critically examines the development and deployment of a chatbot as an innovative research instrument designed for capturing ethnographic data within IoT-enabled contexts. The study specifically explores the chatbot's efficacy in obtaining detailed, real-time feedback from participants at the Royal Highland Show in Scotland, utilising a combination of predefined prompts and open-ended questions to record transient experiences potentially overlooked by conventional methodologies. Furthermore, figures 19 and 21 from this publication are reproduced herein to elucidate key findings from the original research, both of which were created by Hector Fried, who retains full creative ownership of these images.

Limitations

Key limitations include the small, pre-selected participant group and the Ethnobot's lack of adaptability to group dynamics or accessibility needs. Manual interaction requirements posed potential risks in high-mobility environments, suggesting the need for future audio or voice-command capabilities. Furthermore, while the Ethnobot was effective at prompting in-the-moment reporting, it lacked the empathic nuance of human interviewers.

Conclusion

This deployment demonstrated the Ethnobot's viability as a tool for gathering ethnographic data in real-time during large-scale public events. Although limited in scope, the study underscores the potential for scalable, chatbot-mediated research in public spaces, particularly when integrated with broader methodological frameworks. The findings advocate for continued refinement of chatbot systems through ethnographic design principles, emphasizing flexibility, contextual awareness, and participant autonomy in shaping future research engagements.

Ethnobot as a Cultural Probe in Edinburgh City Council's Public Art Strategy

This case study presents the Ethnobot as a technological cultural probe employed in the service design context of Edinburgh City Council's Public Art Research Project. The research aimed to reassess and reimagine the city's public art strategy by engaging stakeholders through a mobile chatbot-mediated inquiry. Through multimodal interactions—text, images, and video—Ethnobot captured nuanced insights into the experiences, challenges, and values surrounding public art in Edinburgh. This deployment illustrates the role of conversational agents in co-creating service systems and informing policy through situated, reflective dialogues.

Context and Background

Service design increasingly embraces iterative, participatory approaches that consider services not as isolated transactions, but as co-produced experiences embedded in complex systems (Sangiorgi 2011). In this context, Edinburgh City Council sought to revise its public art policy through a co-designed process involving artists, council officials, curators, and academic researchers. The Ethnobot was positioned as a mobile, semi-autonomous companion facilitating stakeholder reflection in public spaces. Theoretical foundations include Wetter-Edman et al.'s (2014) model of value creation in service ecosystems, which emphasizes actor-resource configurations and institutional norms across micro, meso, and macro

levels. The use of chatbots in service research also aligns with cultural and technological probe methodologies, offering an open-ended, participatory mechanism for eliciting intimate and subjective insights (Gaver et al. 1999; Wallace et al. 2013; Hutchinson et al. 2003).

There was therefore a critical imperative to ensure that all key questions were asked in a standardized format, allowing stakeholders an equitable opportunity to provide clear and meaningful feedback. To achieve this, the dialogue structure had to be consistent across participants, necessitating the design of a more linear question sequence. This structure followed an inquiry method that was both acceptable and accessible to diverse stakeholders. The resulting dialogue flow—while linear in progression—was carefully designed to guide users through increasingly complex topics. This was accomplished through a priming strategy: beginning with simple, easily answerable questions, followed by open-ended prompts that prepared participants to engage with more sensitive or conceptually demanding inquiries (Gaver, Dunne, and Pacenti 1999; Wright and McCarthy 2010).

Methodology

The research was carried out in four stages:

1. Stage 1 – Stakeholder Interviews: In-depth interviews with 21 stakeholders including city council staff, artists, gallery directors, and academics identified five thematic concerns: (1) Quality, Taste, and Appropriateness; (2) Authority, Responsibility, and Ownership; (3) Expertise; (4) Trust and Risk; and (5) Reactive or Absent Processes.

2. Stage 2 – Co-Design Workshops: Two participatory workshops enabled stakeholders to collaboratively explore tensions within Edinburgh's public art landscape. Using speculative design scenarios, participants proposed improvements and reaffirmed the five key themes.

3. Stage 3 – Ethnobot Deployment: Twelve participants—each a representative stakeholder—used the Ethnobot over a two-month period. Participants selected three public artworks to visit, each representing either a transformative piece, a contentious installation, or a potential site for a new or replacement work. The Ethnobot guided participants through contextualized questions aligned with the five key themes, while also allowing for multimedia submissions.

4. Stage 4 – Roundtable and Guideline Development: Insights from chat logs and interviews culminated in a roundtable workshop where stakeholders collaboratively developed co-designed guidelines for a new public art process.

Findings

Stakeholders reported high engagement with the Ethnobot, with 11 out of 12 participants describing it as effective in facilitating reflection. Participants appreciated the freedom to explore the city and articulate their thoughts without the presence of a human researcher. The chat interface fostered candid discussions, aided by the perceived anonymity of chatbot interaction. The Ethnobot's structured dialogue helped frame difficult issues. However, some participants expressed fatigue or time constraints, limiting their willingness to engage extensively with optional questions. The requirement to take photos at each site was generally well received, enhancing contextual storytelling without imposing significant burden.

Participants selected for this study were experts in their own field and were chosen to represent a network of knowledgeable people who should be involved in explaining, creating, and deciding the types of changes and processes that could be implemented concerning public works of art for the greater benefit of the city. All participants had a vested interested in ensuring the conversation and steering of the future of public works of art in city of Edinburgh was in line with their expert view and agenda, and some had already taken part in workshops and interviews or had been involved in commissioning the research. This would influence the nature of participation and interaction with the Ethnobot, thus the process for each participant was individual. Most participants followed separate routes, except for the final group, who had embarked on a similar path of exploration together, and even drove some way from the city centre. Although participants averaged about an hour and half with the Ethnobot, the time they took varied greatly, demonstrating a very individual outcome in terms of length of engagement with works of art, distances travelled between them, and thinking about the specific questions (Figure 23).

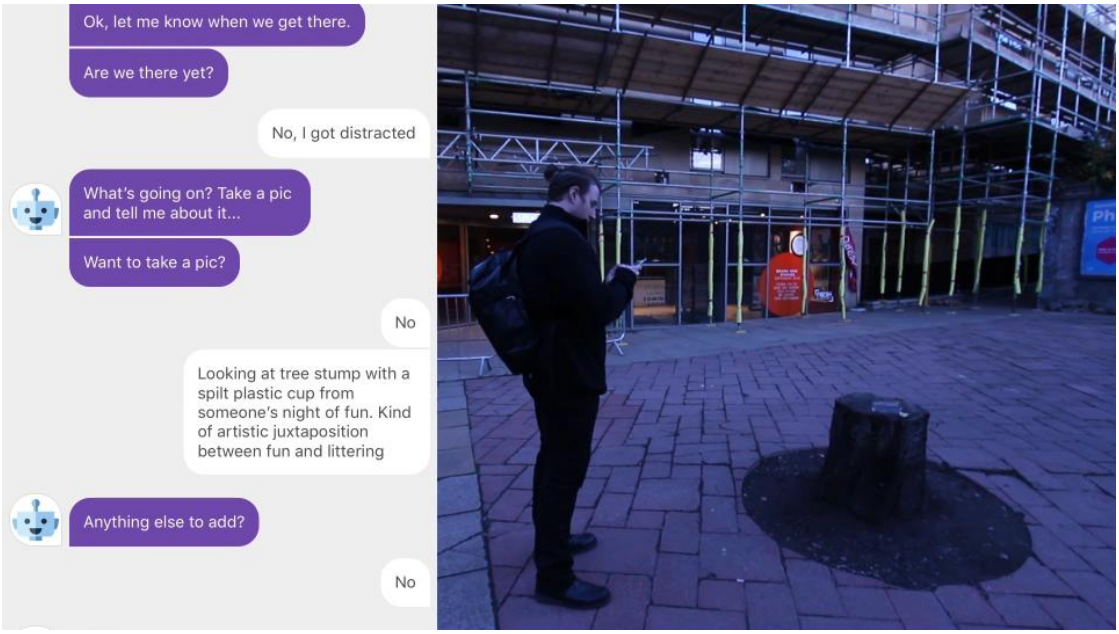


Figure 23. Hector M. Fried, 'Getting Distracted' example of user's journeys being individual and unique with Public Art Ethnobot, Image, 2018.

By facilitating temporally and spatially situated dialogue through guided activities and mixed-format prompts, this approach enabled participants to produce rich, multimedia narratives. It offered a distinctive methodological middle ground—combining the structured inquiry of traditional ethnography with the open-ended, participant-driven ethos of cultural probes (Gaver, Dunne, and Pacenti 1999) (Figure 23).

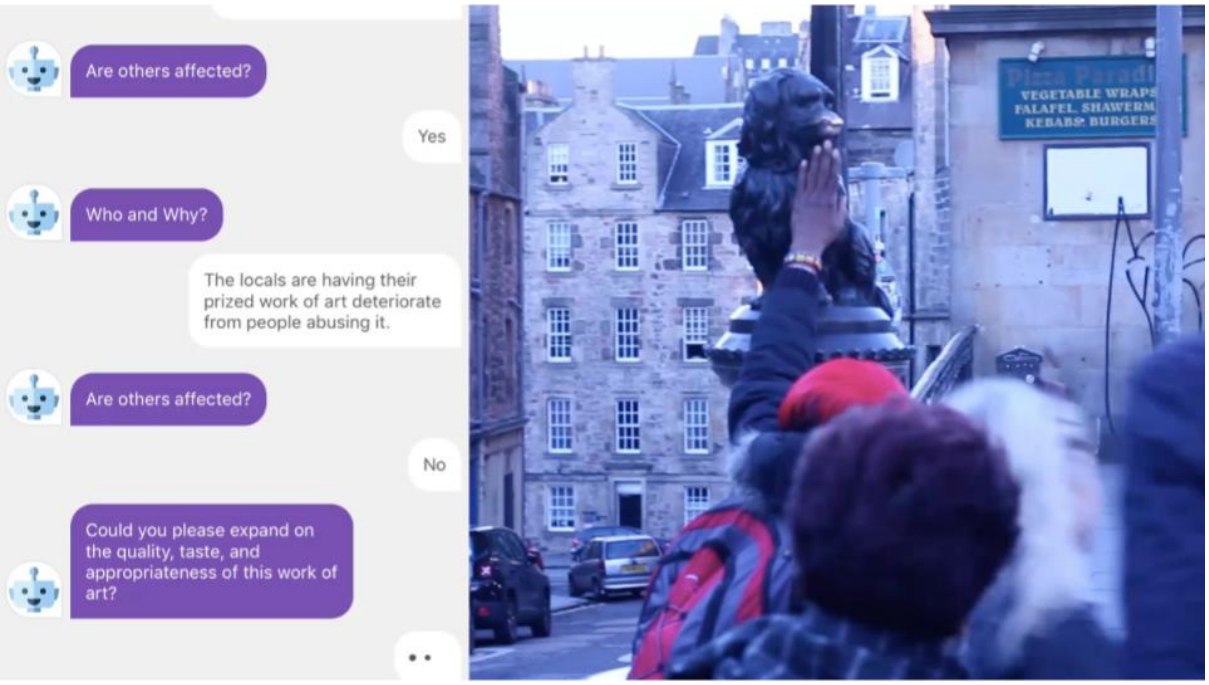


Figure 24. Hector M. Fried, 'Caught in the Act' an example of in real time interaction with Public Art Ethnobot, Image, 2018.

Interviews revealed that while the chatbot was successful in prompting real-time reflection, participants sometimes held back more complex or politically sensitive opinions due to the awareness that researchers would later review their responses. One participant noted that full anonymity might have enabled greater honesty. Importantly, a recurring theme in the conversations was the implicit demand for a clear, transparent, and accountable public art commissioning process. This insight emerged not only from the dialogue block explicitly focused on process but also throughout the participants' reflections on authority, inclusion, and public engagement.

Discussion

The Ethnobot served as both a reflective tool and a mobile research instrument, enabling stakeholders to articulate their views while physically navigating the city's public artworks. This spatial and temporal coupling fostered deeper contextual engagement, distinguishing it from more abstract, desk-based consultations. Compared to earlier iterations of the Ethnobot—such as its deployment at the Royal Highland Show—this version featured a branching dialogue structure tailored to suit expert users and thematic depth. The study demonstrated the potential of conversational agents to function as cultural probes, uncovering both

explicit and latent design challenges. The findings validate the role of chatbot-mediated research in service design contexts, particularly where institutional complexity and diverse stakeholder perspectives intersect. The dialogue system prompted participants to reflect on their own roles and responsibilities, contributing to a collective sensemaking process.

Limitations

While the chatbot offered a relatively low-pressure environment for data collection, several limitations were identified. Technical constraints, such as the lack of speech-to-text functionality and reliance on typing, were noted by participants as barriers, especially in poor weather conditions. One participant with mobility issues also found the physical navigation aspect challenging. Furthermore, participants occasionally encountered repetitive prompts or rigid dialogue structures, reducing the illusion of spontaneity. These issues underscore the need for greater dialogue variation and adaptive response pathways. Finally, the presence of the research team during device handover and exit interviews may have subtly influenced participant responses, suggesting the potential benefit of remote onboarding in future studies.

Conclusion

This case study demonstrates the value of Ethnobot as a technological cultural probe in service design, particularly in navigating the multifaceted challenges of public art policy. Through multimodal, place-based interaction, the chatbot facilitated reflective stakeholder engagement and contributed to a co-designed framework for policy innovation. The research culminated in the development of draft guidelines for Edinburgh City Council's public art commissioning process, including the proposal for a public art officer, a manifesto, and a dynamic expert coalition model. These guidelines emphasize flexibility, public consultation, and the potential of temporary installations to test artistic interventions. While the implementation of the guidelines was ultimately stalled by the COVID-19 pandemic, the study affirms the Ethnobot's capacity to catalyse meaningful stakeholder dialogue and structure complex, multi-perspective policy conversations. As cities grapple with cultural inclusion and spatial equity, chatbot-driven research presents a compelling methodology for participatory urban governance.

'Alfred the Owl': Sensing Urban Nature through Conversational Agents

This case study presents the third iteration of Ethnobot—named *Alfred the Owl*—as part of a larger Edinburgh Living Lab initiative to explore urban park engagement through digital technologies. While the initial focus centred on analysing park usage via sensor-based data, the project expanded to incorporate qualitative perspectives. By integrating chatbot interactions with social media analysis and citizen science platforms, the study aimed to foreground public sentiment, narrative experience, and reflective engagement with urban nature.

Context and Background

Urban parks have long served as vital spaces for social, ecological, and psychological well-being. This project draws on early urban sociology, including the work of Robert E. Park, who emphasized the role of the city as a living organism, and the figure of *Homo urbanicus*, which typifies the urban dweller's negotiation of public space. These theories frame parks as arenas where environmental interaction, identity, and public life intersect. The project was situated within the Edinburgh Living Lab—a cross-institutional initiative focused on co-creating urban innovation. The deployment of Alfred the Owl emerged from a recognition that quantitative sensor data alone could not adequately capture the layered, affective experiences of park visitors. Instead, a hybrid methodology was developed to include chatbots, social media scraping, augmented reality applications, and participatory digital platforms such as iSpot and iNaturalist. The IoT-enabled owl would be placed on community message boards across parks, including Inverleith Park, Leith Links, Bruntsfield Links, and Saughton Park, after the successful prototyping of the first iteration in the Meadows.

Methodology

The Alfred the Owl chatbot was conceived as a digital field companion, deployed across multiple park environments in Edinburgh. Building on insights from earlier Ethnobot implementations—particularly those at the Royal Highland Show and in public art consultations—the chatbot facilitated playful yet reflective dialogues rooted in real-time, situated engagement. Its design drew upon the methodological tradition of cultural probes (Gaver, Dunne, and Pacenti 1999), while also incorporating insights from environmental psychology and urban informatics to support context-aware interaction. These design decisions were initially generated through a co-design workshop and subsequently refined through iterative exchanges with Edinburgh Living Labs. The intervention was embedded directly within the park setting, enabled by a low-fidelity IoT installation—lo-fi Connection Owl—powered by solar energy and mounted on a public-facing park dashboard to invite spontaneous user interaction (Figure 25).

Figure 25. Hector M. Fried, ‘Alfred the IoT Owl’ perched on solar powered park dashboard and in conversation with park users, Photograph, 2019.

Rather than functioning as a survey, Alfred emphasized narrative and experiential input, allowing users to generate ‘micro-ethnographies’ of their park visits that functioned similarly to WhatsApp, focusing on collecting text and image-based feedback from park visitors. The chatbot prompted users to reflect on their surroundings, wildlife encounters, environmental changes, and emotional states; it even included a random pun generator tailored to jokes about owls as fun engagement for potential park users to use with children. The aim was to understand visitor motivations, frequency of visits, activities, and values associated with the park experience. Concurrently, a data dashboard was tested to display real-time data on park usage, bat populations, and human-park interactions, providing a comprehensive overview of the park's ecosystem. It was a simple and easy engagement and to support this, Alfred was designed with a chatbot schematic featuring:

- A branching dialogue system tailored to park-based activities;

- Prompts for photography, sensory description, and emotional tagging;

- Questions aligned with broader Living Lab objectives around biodiversity awareness, park safety, and climate resilience (see Figure 26).

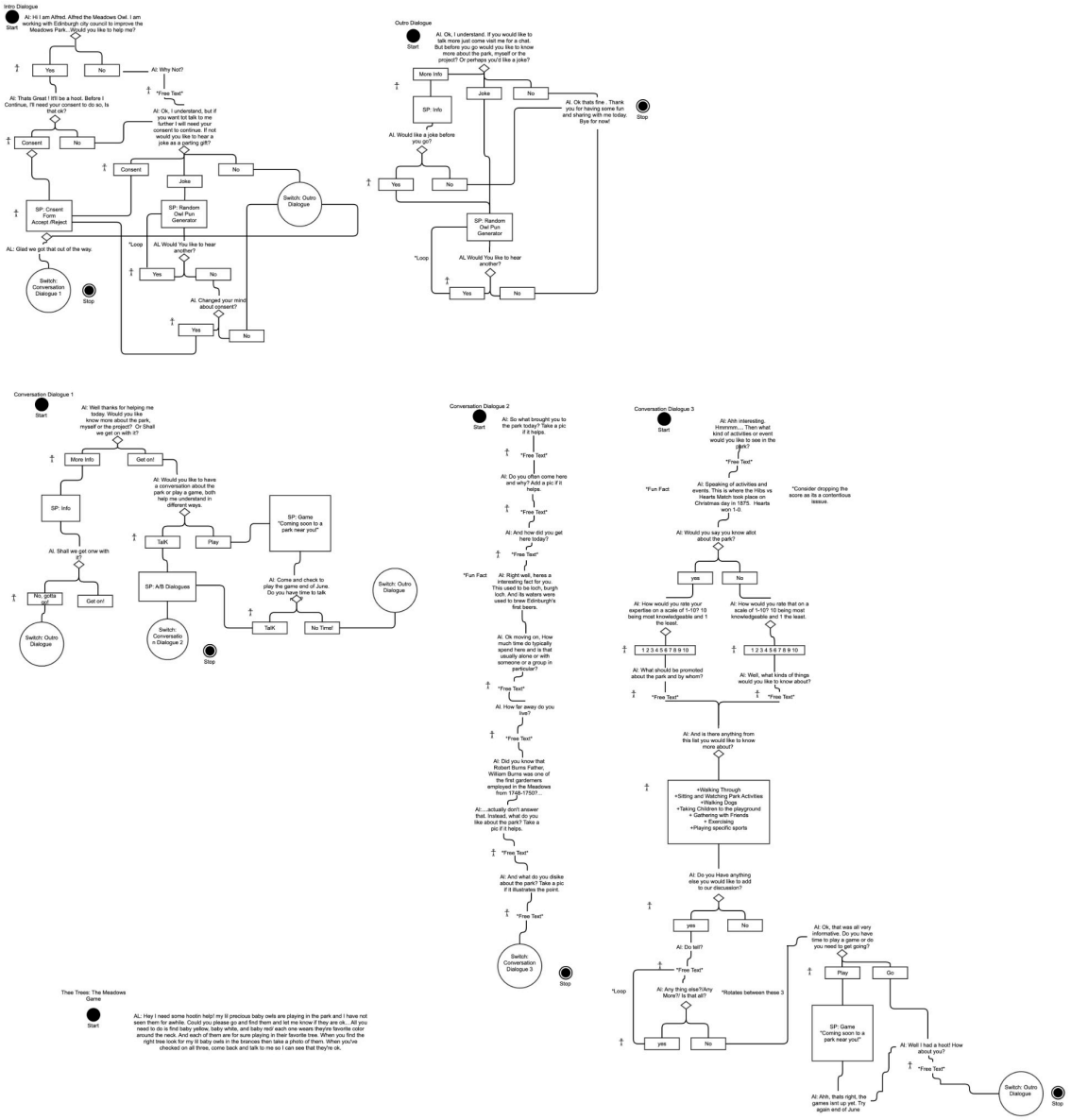


Figure 26. Hector M. Fried, 'Chatbot Schematic: Alfred the Owl', Image, 2019.

Data were triangulated across three modalities:

1. Chatbot conversations collected via mobile app;

2. Geo-located social media posts referencing Edinburgh parks;

3. Participatory data from citizen-science platforms (e.g., wildlife observations).

Findings

Alfred the Owl captured a range of participant experiences that sensors alone could not. While park usage data from IoT devices showed footfall patterns and temperature changes, the chatbot revealed deeper layers: feelings of solitude, connection with nature, environmental concern, and the impact of seasonal change. Participants described the chatbot as “curious”, “companionable”, and even “therapeutic”. This anthropomorphization contributed to higher engagement and emotional resonance. Several users reported speaking to Alfred as though it were a real owl, framing their narratives as dialogues rather than survey responses.

Photography and description prompts generated rich media logs, which were contextually anchored in time and space. These were particularly useful in capturing fleeting or hard-to-quantify phenomena—e.g., “the smell of wet earth”, “the rustle of a squirrel”, or “a moment of stillness by the pond”. Such experiential details were absent from sensor data but central to users’ relationships with the park. Social media sentiment analysis revealed overlapping themes—especially related to safety, accessibility, and biodiversity. However, chatbot interactions often revealed contradictions or elaborations not present in social feeds. For instance, while Twitter data highlighted complaints about park maintenance, Alfred’s users expressed nuanced views, balancing critique with appreciation.

Discussion

The case illustrates the affordances of chatbot-mediated fieldwork in complementing sensor-based urban analytics. Alfred the Owl facilitated a form of ‘slow data’ collection—attuned to pace, presence, and perception. Unlike real-time dashboards or passive monitoring systems, Alfred invited participants to dwell, reflect, and narrate. In doing so, it advanced a non-extractive, participatory model of environmental sensing. Rather than merely capturing data from users, Alfred elicited co-authored experiences. This aligns with ongoing conversations in urban HCI and digital placemaking about the ethics and aesthetics of data collection in public space.

The project also demonstrated the limitations of sensor data when used in isolation. While sensor platforms could show how many people passed through a park and when, they offered little insight into why people came, how they felt, or what aspects of the environment mattered most. Alfred filled this gap through the

combination of qualitative chatbot interaction with geospatial data, which enabled new forms of analysis. For example, chatbot narratives could be mapped onto sensor-derived heatmaps, revealing correlations between reported experience and ambient conditions (e.g., more contemplative responses in shaded, quiet areas).

Limitations

Despite its successes, the study faced several limitations. The Alfred chatbot was not universally accessible since it required a smartphone and a willingness to interact with a text-based interface. Moreover, while anthropomorphization increased engagement, it occasionally created unrealistic expectations about conversational complexity.

Another limitation was the lack of multilingual support, which constrained inclusivity. Participants with limited English proficiency may have been excluded from full engagement. Additionally, the study did not systematically evaluate long-term retention or behavioural change following interaction with Alfred.

Finally, there were challenges in integrating Alfred's data with more structured datasets. While chatbot entries offered depth, their open-endedness made computational analysis more complex, requiring labour-intensive thematic coding.

Conclusion

The Alfred the Owl iteration of Ethnobot reveals the transformative potential of conversational agents in urban environmental research. By situating chatbot interaction within everyday park visits, the study created a hybrid methodology that merged real-time dialogue with narrative reflection, sensory observation, and spatial context. This approach moves beyond traditional smart city paradigms that privilege efficiency and surveillance, offering instead a human-centred, story-rich framework for understanding public space. Alfred functioned not just as a data-gathering tool but as a digital presence fostering attention, empathy, and environmental imagination.

As cities increasingly integrate sensing technologies, projects like this underscore the need for interpretive, participatory tools that foreground the meaning of place, not just its metrics. Ethnobots—whether owls or otherwise—offer a compelling direction for the future of urban fieldwork, blending technological mediation with ethnographic sensibility.

Henri- An Educational Mouse Enhancing Metacognitive Reflection in Professional Development

This case study explores the integration of Henri, a co-designed Ethnobot, into a professional development (PD) course focused on alternative grading practices in higher education. Rooted in theories of metacognition and reflective inquiry, the project investigates how a chatbot can facilitate instructor reflection, scale facilitator contact, and humanize online professional learning. By leveraging

Henri as a conversational agent, the project aims to augment participant engagement and improve the quality of reflective feedback in asynchronous PD environments.

Context and Background

Professional development in education has long emphasized metacognition and practitioner reflection as core mechanisms for instructional growth (Schoenbach, Greenleaf, and Murphy 2012). Effective PD hinges on iterative inquiry models where educators reflect on their practice over time (Brown, Roediger, and McDaniel 2018). Yet, such reflection demands sustained facilitator involvement—a resource-intensive challenge in scaled or asynchronous learning environments. The onset of the COVID-19 pandemic accelerated shifts toward remote education and redefined expectations for online learning, creating both urgency and opportunity for innovation in PD delivery (D'Orville 2020; Taylor and Haras 2020). Within this context, the chatbot Henri was introduced to explore whether automated, conversational interfaces could extend the facilitator's reach while promoting meaningful reflection among instructors.

This study draws on inChat's Ethnobot platform, previously deployed in urban park, service design, and museum contexts. Henri was adapted specifically for PD in higher education, representing a novel application of chatbot-mediated ethnography to instructor development.

Statement of Problem

Despite the increasing availability of PD programmes, growth and completion rates in higher education remain uneven, constrained by time limitations, resource scarcity, and uneven engagement (World Economic Forum 2016; Taylor and Haras 2020). Reflection tools—often delivered as open-ended surveys—frequently yield low participation and superficial insights (Asare-Marfo 2022). This study addresses the challenge of enhancing participant engagement and metacognitive reflection in asynchronous PD. The hypothesis was that a co-designed, empathetic chatbot—Henri—could elicit deeper reflection and provide facilitators with richer data than traditional surveys, all while maintaining a humanized tone. The intervention focused on the course's final 'exit ticket', a critical moment for reflective synthesis and instructor feedback.

The Chatbot: Henri and the Ethnobot Platform

Henri was developed using the Ethnobot technology created by the Centre for Design Informatics and commercialized by inChat. The chatbot framework enables the curation of structured yet conversational dialogues across web, mobile, and IoT interfaces. Designed as a lightweight research tool, Ethnobot allows for pre-programmed conversational branching and in situ emotional and cognitive reporting (Tallyn, Ella, and Fried 2018). Henri's persona—a friendly and inquisitive mouse—was developed by the College Bridge team in collaboration with inChat. The design drew from conversational UX principles, ensuring natural flow, emotional warmth, and low cognitive load. Henri was framed as a 'curious learning buddy', prompting participants to discuss plans, challenges, and instructional strategies.

Chatbots in Education

Henri's development was grounded in the growing literature on educational chatbots. These agents have been shown to support learning material delivery, self-assessment, administrative tasks, and reflective practice across various contexts (Larizia et al. 2018; Durall and Kapros 2020). Research also demonstrates their effectiveness in improving learner motivation, satisfaction, and engagement (Okonkwo and Ade-Ibijola 2021; Ismail and Ade-Ibijola 2019).Chatbots provide real-time support, manage high user volumes, and integrate feedback loops. However, challenges remain, and include ethical data handling, usability, programming complexity, and sustaining user interest. Henri's deployment built on this foundation, applying chatbot affordances to metacognitive reflection in a PD course setting.

Why use a Bot?

Henri's development emerged from inChat's broader inquiry: can a chatbot function as a co-ethnographer? Inspired by human-centred design principles popularized by IDEO and the Stanford d.school (IDEO 2019), the Ethnobot seeks to bridge empathy across time and space. It draws from design ethnography to elicit in-the-moment insights, with prior applications in UX, art curation, and public service contexts. Earlier research demonstrated that chatbot surveys produced more nuanced responses than traditional web forms (Kim, Lee, and Gweon 2019). Henri extends this logic into professional learning, leveraging conversational scaffolding to deepen instructor self-awareness and connect participants across asynchronous environments.

The Course and Context: Alternative Grading

The PD course centred on alternative grading systems such as specifications, standards-based, and mastery grading that reject traditional norm-based assessment. These practices emphasize clear criteria, iterative feedback, progress over numerical scores, and student agency (Grading for Growth 2021; Schinske and Tanner 2014; Quintana and Quintana 2020).

Course objectives:

- Evaluating key elements of mastery-based grading;
- Creating assessable learning targets;
- Designing grading plans that promote growth;
- Applying grading methods that support equity and flexibility.

Delivered via Canvas, the course offered multimedia modules, flexible deadlines, and an asynchronous community of practice (CoP). This CoP model encouraged collective sense-making and aligned naturally with Henri's conversational ethos (Lave and Wenger 1991; Ostermann 2015).

Co-Designing Henri

The co-design process between College Bridge and inChat was informal but iterative. Rather than a single workshop, the process unfolded over multiple Zoom calls, covering:

- User needs and course objectives;
- Key reflection points for intervention;
- Question development and dialogue mapping;
- Persona and brand design (Henri the mouse);
- Prototyping, testing, and refinement.

Methodology

To assess Henri's impact, the study compared six course cohorts, three using traditional surveys and three using the Henri chatbot.

Sixty faculty members participated across all cohorts, with 23 completing the course. Data from chatbot logs, facilitator reflections, and participant interviews were analysed thematically.

To support this, Henri was designed with:

- A dialogue centred on five themes: progress, barriers, next steps, emotional tone, and feedback;
- Follow-up probing, which was enabled for short or vague responses;
- An optional, lightweight check-in during the final modules delivered.

Findings

Henri produced higher engagement and richer qualitative data than the traditional survey. Participants used more words, greater emotional variation, and more explicit reflections on teaching practice. Unlike surveys, Henri's format invited open dialogue, leading to deeper metacognitive responses. Participants expressed appreciation for the bot's tone and conversational style. Some noted feeling "heard" or "supported", despite knowing it was an automated system. Henri had been branded specifically in tone, register and culture of College Bridge that was leveraged to create an effective dialogue design to deliver across these key requirements: course feedback, implementation of methods by participants, instructor requirements to assess engagement, and reflection (see Figure 27).

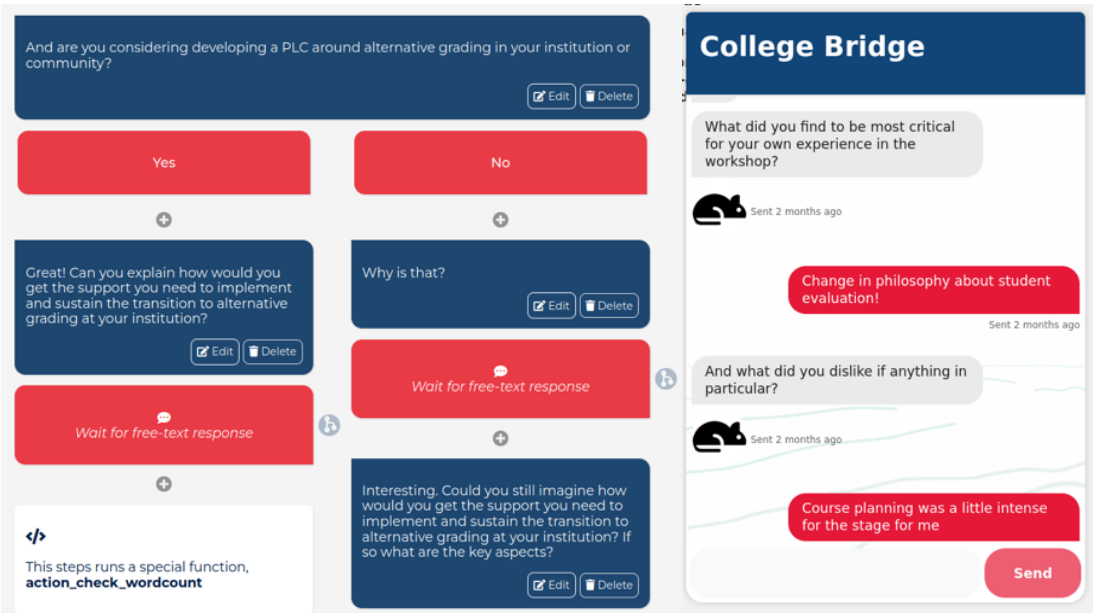


Figure 27. Hector M. Fried, 'Design to Deploy', example of dialogue development and deployment in action from inChat's no-code platform to web browser loaded Ethnobot, Image, 2022.

Facilitators reported time savings due to reduced need for nudging or follow-up. The bot also surfaced early signals of disengagement, enabling timely interventions. However, engagement varied by cohort. The second chatbot cohort—coinciding with term time—had higher participation than the first. Facilitator context and calendar timing appeared to mediate uptake. Moreover, while Henri increased the quantity and quality of data produced, it could not fully replicate the relational nuance of human facilitation.

Discussion

Henri demonstrates the potential of chatbots to foster reflection, personalize online PD, and extend facilitator presence. As a co-ethnographer, Henri enabled time-shifted empathy, prompting introspection at a scale unfeasible for human moderators. The shift from survey to dialogue significantly improved engagement quality, aligning with professional development's goals of growth and practitioner agency. The project echoes the legacy of ELIZA—Weizenbaum's early chatbot simulating a Rogerian therapist—highlighting how structured pattern recognition can still produce meaningful exchanges when situated in the right context. Henri's persona and framing were central to its success, emphasizing the importance of tone, pacing, and pedagogical fit. Nevertheless, challenges remain. Ethical considerations, data handling, and equitable access must be addressed. Scaling Henri beyond small cohorts requires better onboarding, dialogue personalization, and integration with learning analytics. Future work might explore multilingual support, audio input, or longitudinal deployment across PD programmes.

Conclusion

Henri the Educational Mouse illustrates a promising convergence of ethnographic design, chatbot technology, and reflective pedagogy. By transforming a routine survey into a conversational exchange, Henri deepened metacognitive reflection and rehumanized asynchronous learning. This case study affirms the value of chatbots not merely as automation tools but as mediators of empathy, connection, and professional growth. As education continues to adapt to digital modalities, conversational agents like Henri can help sustain the human dimension of learning—scaling presence, fostering dialogue, and supporting communities of reflective practitioners.

Reflections on Iterating an Answer

The iterative development of the Ethnobot represents a cumulative trajectory of design research that is both situated and speculative. Rather than following a linear path, the chatbot evolved through recursive engagements with specific contexts, each revealing new epistemic and methodological possibilities. The process—anchored in research through design (Frayling 1993; Gaver 2012) and co-design traditions (Sanders and Stappers 2008)—enabled the Ethnobot to adapt across diverse sociotechnical settings, from rural festivals to urban parks, public art consultations, and professional learning environments. Reflecting on this progression, the question posed during the STiPS project—"Can Hector be replaced by a chatbot?"—proved to be less about substitution than about augmentation. The deployments did not seek to automate ethnography wholesale, but to reconfigure its modalities through digital affordances. Each chatbot instance—from Henri's pedagogical reflection to Alfred's urban sensing—constituted a partial answer to that initial provocation, refining what ethnographic presence, data, and dialogue might look like in hybrid, mediated settings.

The design process foregrounded a tension between structure and spontaneity, automation and empathy. The Royal Highland Show deployment highlighted the value of capturing moment-to-moment accounts yet also revealed constraints in expression due to rigid prompt flows. Subsequent iterations, particularly in public art and educational settings, emphasized branching dialogue and co-authored reflection, better supporting contextual nuance and participant agency. These refinements were not simply technical upgrades; they represented shifts in ethnographic stance—acknowledging the chatbot not as a passive tool but as a mediating benefits presence capable of shaping what is said, when, and how (Suchman 1987; Dourish 2001). An Ethnobot intervention offers multiple research benefits by supporting diverse modes of engagement with users, audiences, participants, and visitors. Key advantages include real-time and context rich output, a familiar and easy to use format, open-ended conversations, scalability, remote deployment, and a decreased observer effect (Figure 28).

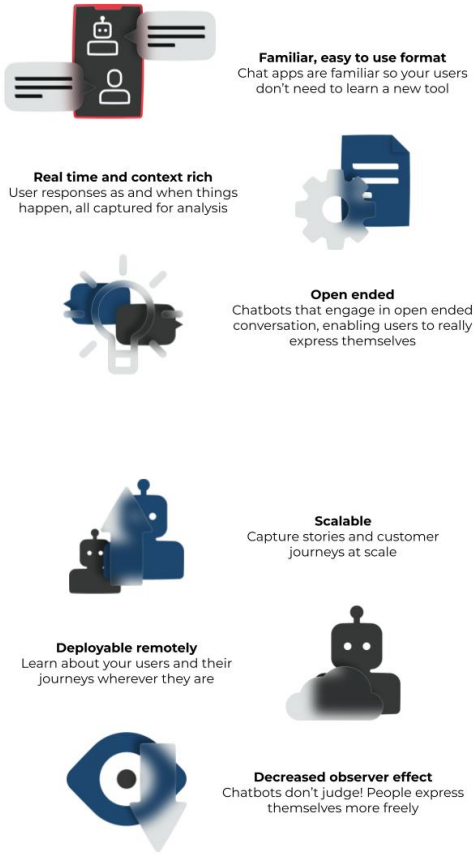


Figure 28. inChat, 'Benefits', infographics, 2023.

Crucially, the Ethnobot's evolution was inseparable from the design cultures and institutional frameworks that shaped its use. The movement from university-sponsored experiments to public sector collaborations and commercial partnerships illustrates how ethnographic tools emerge within overlapping research and innovation ecologies. The resulting startup, inChat, embodies this hybridity: a platform at once rooted in academic inquiry and responsive to applied demands for scalable, reflective engagement. The reflexive insight across these iterations is that

chatbot ethnography is not a fixed methodology but a flexible research configuration. It is one that must continuously negotiate between fidelity to context, responsiveness to users, and the constraints of automation. The Ethnobot thus serves not only as an instrument of inquiry but as a site of methodological invention—an evolving response to the changing conditions of fieldwork, participation, and digital mediation.

5.8 Design Tools as Research Outputs

The following discussion outlines principal research contributions that emerged from a multi-year investigation into chatbot-mediated ethnography. These contributions extend beyond the validation of chatbots as methodological tools, offering original insights into ethnographic innovation, practical implementation strategies, and design considerations for future applications. Building on the foundation of the Smart Transactions in Public Spaces (STiPS) project and culminating in the establishment of the inChat platform, the research explored how conversational agents—Ethnobots—can be designed, deployed, and analysed as tools for participatory, situated inquiry. Through iterative case studies across sectors including public art, environmental sensing, service design, and education, the research advanced both theoretical understanding and practical techniques for engaging users in co-constructed dialogue systems.

Central to this work is the recognition that chatbots are not merely technical interfaces, but socio-technical artefacts shaped by design decisions, institutional contexts, and user expectations. Their development requires attention to ethical concerns, contextual appropriateness, and interactional nuance—concerns that traditional approaches to automation and survey instrumentation often overlook. Responding to this gap, the research adopted a hybrid methodology that draws from research through design (Frayling 1993; Gaver 2012), participatory design traditions (Bjerknes, Ehn, and Kyng 1987; Sanders and Stappers 2008), and ethnographic sensitivity to everyday experience.

This section will showcase five interrelated outputs the become formal design tools for developing chatbots for ethnographic inquiry: (1) a chatbot development process for structuring project delivery, (2) a co-design workshop methodology for participatory dialogue creation, (3) the conceptual framework of ‘bot-think’ for ethical and contextual awareness, (4) visual styling cues for enhancing engagement and recognizability, and (5) a no-code platform for operationalizing chatbot systems. Together, these methods constitute a comprehensive toolkit for researchers, designers, and practitioners seeking to create responsive, inclusive, and analysable conversational agents. More than a set of tools, these outputs reflect a broader contribution to the discourse on digital ethnography and human-computer interaction. They illustrate how chatbots, when thoughtfully designed and collaboratively developed, can function as co-ethnographers—generating rich insights, supporting reflective engagement, and mediating knowledge production in complex sociotechnical environments. The following sections introduce the tools and offer illustrative examples, with particular emphasis on the co-design workshop due to its significant contribution. This is followed by a review of the service design innovations

that enabled the rapid transformation of workshop outputs into deployable minimal viable products (MVPs) through inChat's no-code platform.

Developed Design Tools

These core methods and tools have emerged as foundational to the Ethnobot research and inChat consultancy practice, and were developed collaboratively with my co-founder and have been applied, tested, and iteratively refined across a range of case studies. Together, they constitute a flexible yet structured framework for chatbot-mediated ethnography, grounded in a use case–driven approach and informed by co-design principles and ethnographic sensitivity. In addition to supporting the creation of ethical and effective chatbot systems, these methods are intended to be accessible to researchers, designers, and creative practitioners seeking to apply conversational agents in situated, participatory contexts.

1. Chatbot Development Process

This method provides an end-to-end framework for designing and implementing chatbot systems, from initial scoping to deployment. Emphasizing a software as a service (SaaS) model, the process prioritizes transparency, shared understanding, and stakeholder alignment. It includes clear phases—problem definition, interaction design, dialogue flow development, testing, and deployment—each framed by collaborative planning and mutual accountability. By outlining responsibilities and timelines, the method helps manage expectations and ensures that the resulting chatbot aligns with research or service objectives (see Figure 29).

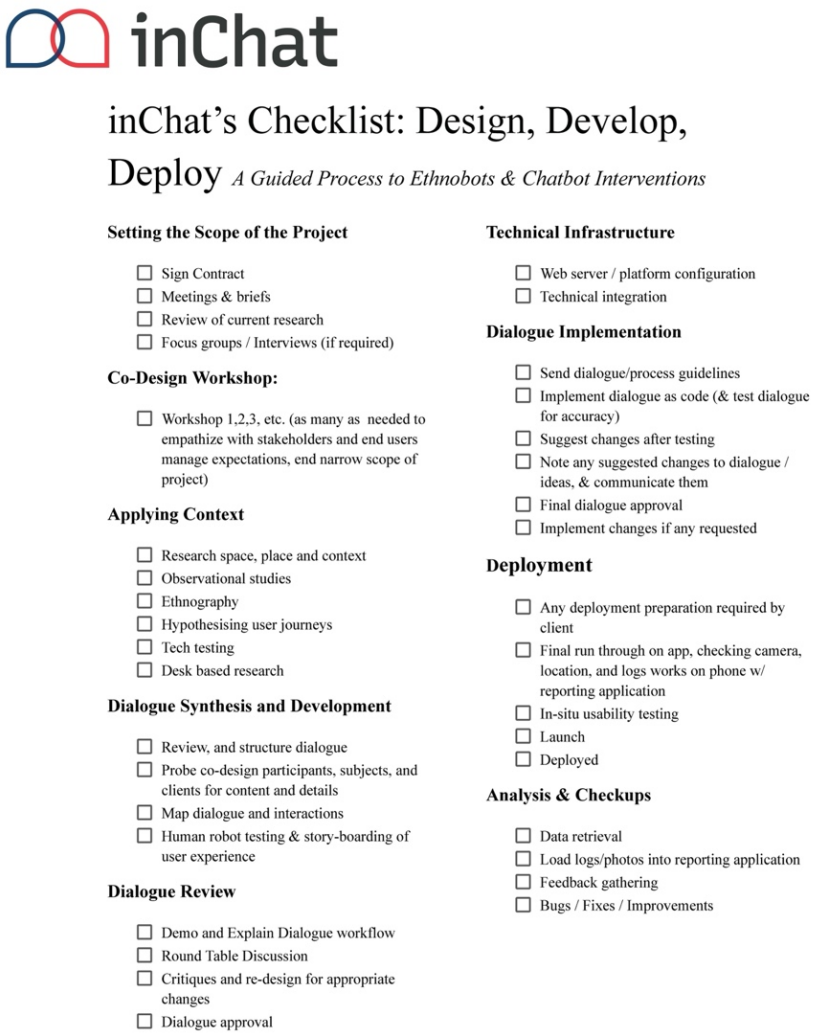


Figure 29. Hector M. Fried, 'inChat's Checklist' a guide to Develop Ethnobot and Chatbot interventions, Image, 2025.

2. Co-Design Workshop

The co-design workshop is a central methodological innovation developed through this research. It facilitates the rapid, participatory prototyping of chatbots in collaboration with stakeholders, ensuring that the chatbot's tone, functionality, and purpose reflect collective values and user needs. Workshops can be conducted in-person or remotely, often within a few hours, and are adaptable across disciplines and contexts. Originally developed to generate ethnographic dialogue flows, the method has since been repurposed for broader applications—including the development of research provocations, participatory design interventions, and speculative futures. A distinctive component of this workshop is 'rapid human-bot testing', an in-house UX testing technique developed by inChat. This lightweight testing method requires no programming; one participant takes the role of the user, while another reads from the chatbot script, simulating its behaviour in real time. This

enables immediate identification of breakdowns in logic, tone, or flow—decreasing the likelihood of deploying ineffective or misaligned systems. Importantly, this approach allows engagement with communities who are often excluded from AI design processes, enhancing inclusivity, adoption, and contextual relevance (see Figure 30).

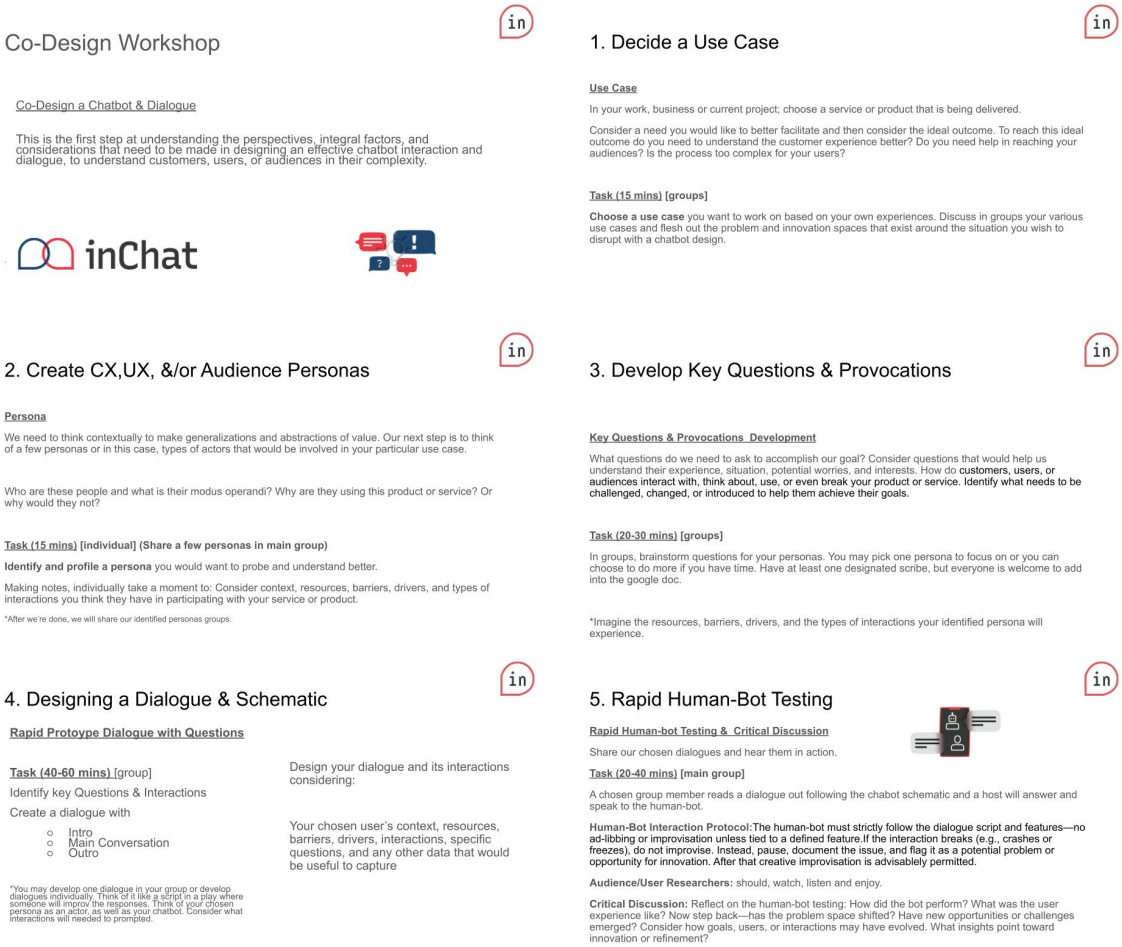


Figure 30. Hector M. Fried, 'inChat's Co-Design Workshop' a guide to run the workshop, Image, 2025.

3. Bot-Think

'Bot-hhink' refers to a methodological lens that situates the chatbot within its operational, social, and cultural context. It emphasizes the careful consideration of anthropomorphization, user expectations, and the ethics of machine-human interaction. Although it's advisable to present a chatbot transparently as a non-human agent, bot-think supports intentional design decisions that foster trust, relatability, and user engagement. It is especially valuable when chatbots are introduced into sensitive or unfamiliar contexts, where relational cues, tone, and perceived agency play a critical role in shaping participant interaction (see Figure 30).

Figure 31. Hector M Fried, 'Bot-Think' a practical guide to branding chatbots, Image, 2025.

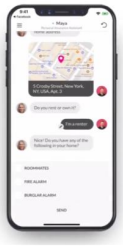
4. Visual Styling Cues

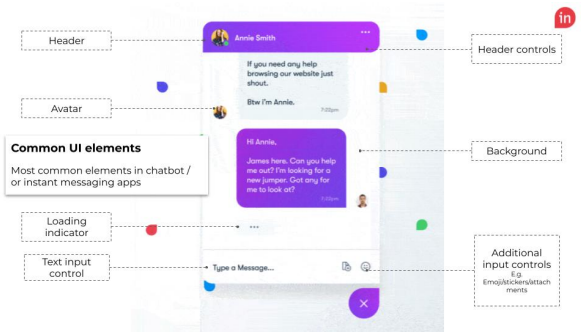
This method addresses the aesthetic and branding dimensions of chatbot design. By developing visual identities tailored to stakeholder or client preferences, the chatbot becomes more than a functional tool—it becomes a recognizable, engaging interface that signals tone, purpose, and organizational identity. Visual styling includes the design of icons, names, colour palettes, and user interface elements, all of which contribute to enhancing audience engagement and trust. These stylistic decisions also help position the chatbot as an approachable, intentional presence within its digital environment (Figure 31).

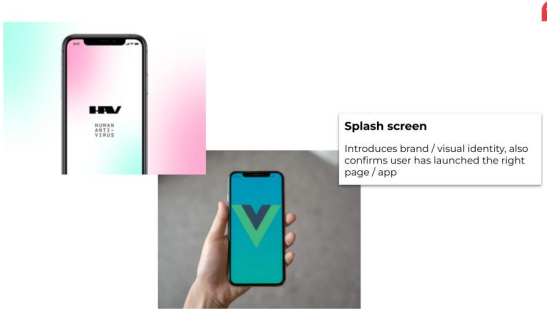
Chatbot UI & Visual Definition Framework

Contents

- Breakdown & definition of user interface elements
- User interface controls & usage
- Instructive examples
- Identification of visual asset requirements

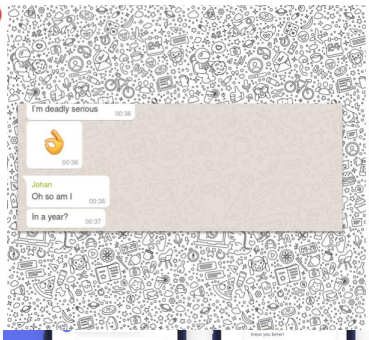






Splash screen

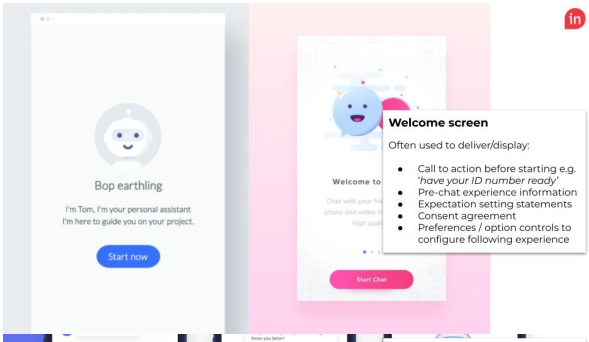
Introduces brand / visual identity, also confirms user has launched the right page / app



Background

Left: Whatsapp background

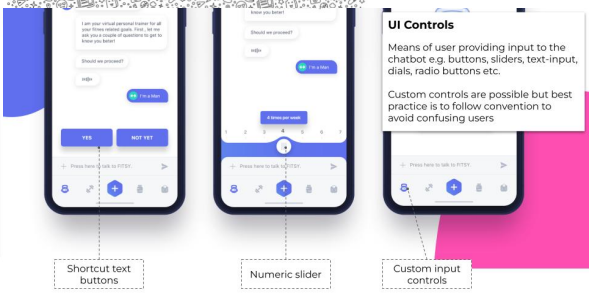
Much like the splash graphics, demonstrates brand / visual identity, & confirms user has launched the right page / app



Welcome screen

Often used to deliver/display:

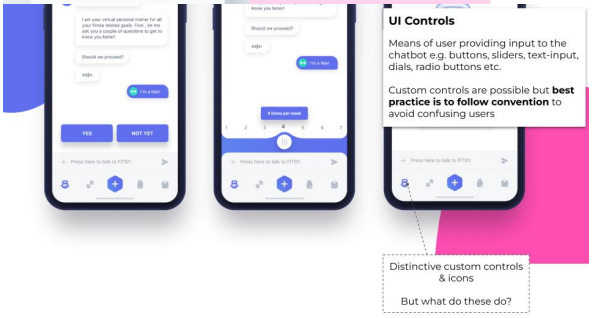
- Call to action before starting e.g. *'have your ID number ready'*
- Pre-chat experience information
- Expectation setting statements
- Consent agreement
- Preferences / option controls to configure following experience



UI Controls

Means of user providing input to the chatbot e.g. buttons, sliders, text-input, dials, radio buttons etc.

Custom controls are possible but best practice is to follow convention to avoid confusing users



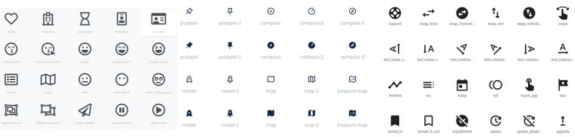
UI Controls

Means of user providing input to the chatbot e.g. buttons, sliders, text-input, dials, radio buttons etc.

Custom controls are possible but **best practice is to follow convention** to avoid confusing users

Icons

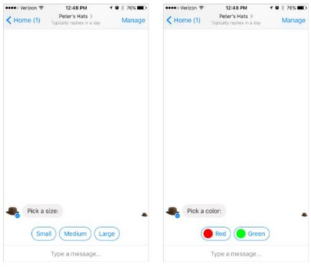
Some examples of openly licensed icon libraries available for commercial use...



Fontawesome library
https://fontawesome.io

Remixicon library
https://remixicon.com/

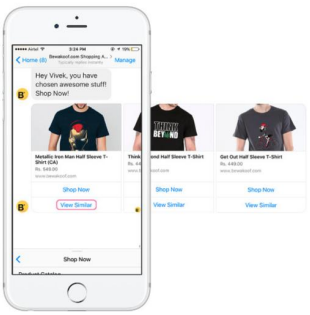
Material design library
https://material.io/



Quick replies & buttons

'Quick replies' are buttons that give the user a means to quickly reply to the bot. Best reserved for when there are a likely set of responses.

Alternatively, the appearance of response buttons can coincide with hiding / disabling text input



The 'Carousel'

User can scroll horizontally through similarly structured images & text with options

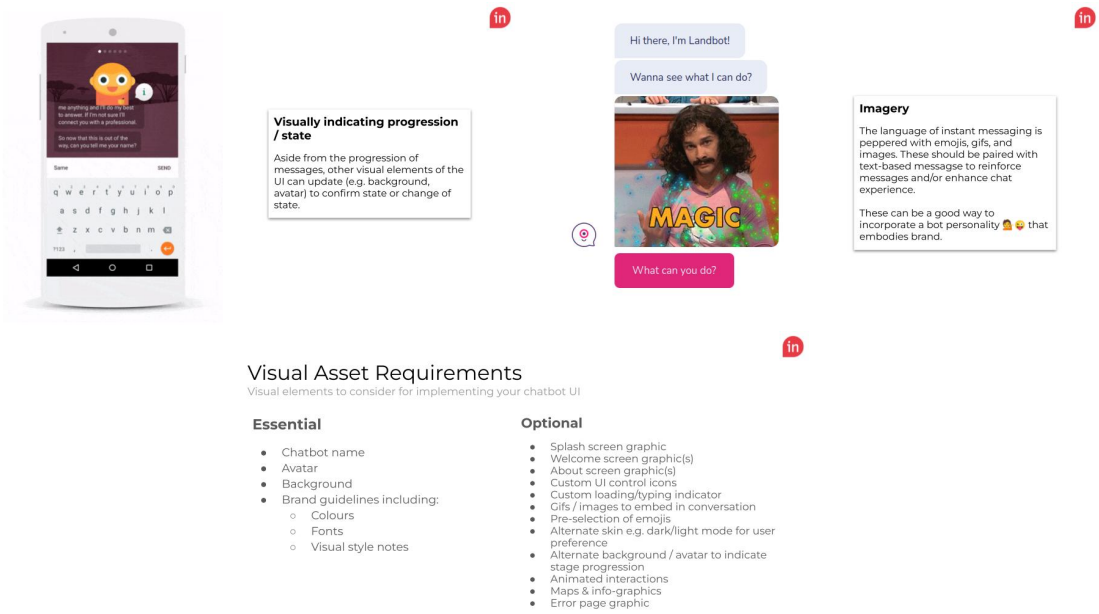


Figure 32. inChat, 'inChat's Visual Style Guide', Image, 2020.

5. No-Code Chatbot Platform

The development of the inChat no-code platform represents a pivotal advancement in the operationalization of ethnographic chatbot design. Originally developed to reduce the time required to program a chatbot intervention, it inadvertently facilitated a rapid turnaround in chatbot development, particularly when following rapid prototyping processes emerging from co-design workshops. The platform enables users to transition seamlessly from participatory concept development to functional chatbot deployment, often within hours. This capability significantly lowers the technical barrier to entry, allowing individuals without programming expertise to construct, test, and manage chatbots with ease (Figure 32).

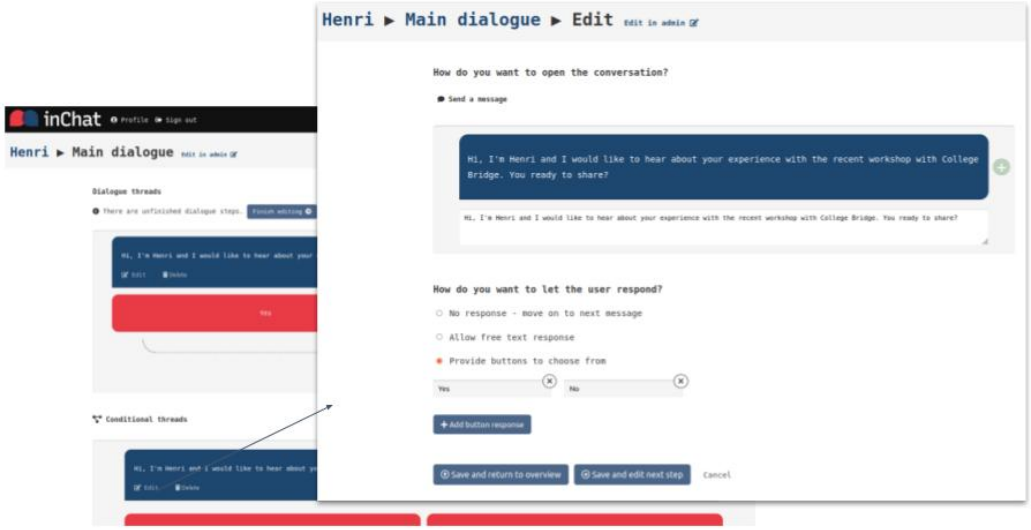


Figure 33. Hector M. Fried, 'Editing Dialogue and Basic Flow' an example of users customizing the chatbot using editor features in No-Code platform, Image, 2020.

The platform's most transformative contribution lies in its capacity to democratize chatbot development. Researchers, designers, and practitioners who may have previously regarded computational tools as inaccessible are now able to engage meaningfully in the creation of conversational agents. By facilitating direct input from non-technical stakeholders, the platform aligns with broader movements toward inclusive design and participatory technology development (Simonsen and Robertson 2012). In addition to the design, the deployment functions were designed to be automated with the production of a QR code and internet link (Figure 33).

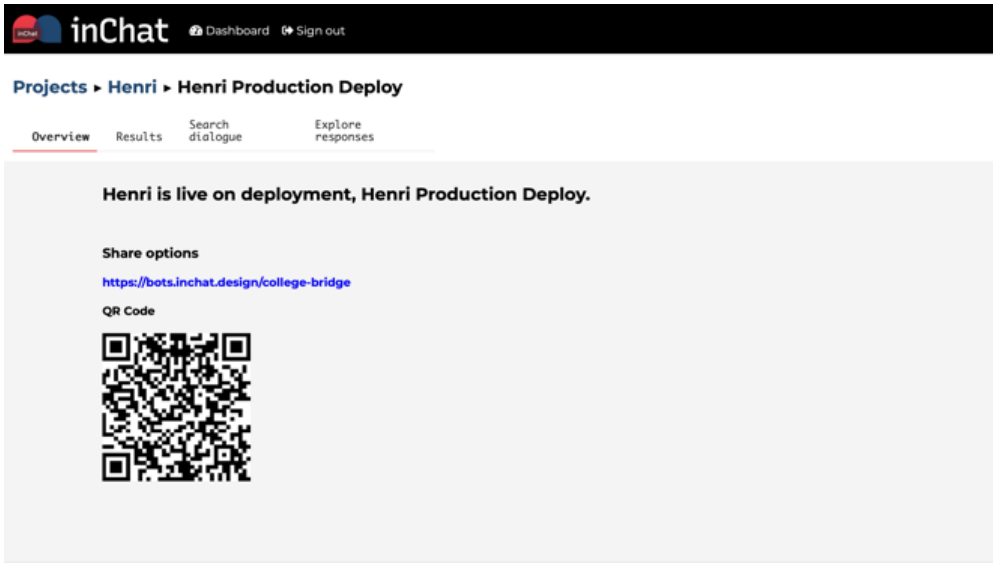


Figure 34. Hector M. Fried, 'Automated QR Code and Internet Link' for deploying chatbot fee in no-code platform, Image, 2020.

The platform includes integrated tools for real-time chatbot management and iterative refinement, as well as remote deployment. Central among these is the Ethnoreader, a bespoke analysis module that aggregates and interprets user-chatbot interactions. The Ethnoreader allows for the identification of emergent themes, behavioural patterns, and contextual insights within the dialogue data—supporting both formative evaluation and post-deployment analysis (Figure 34).

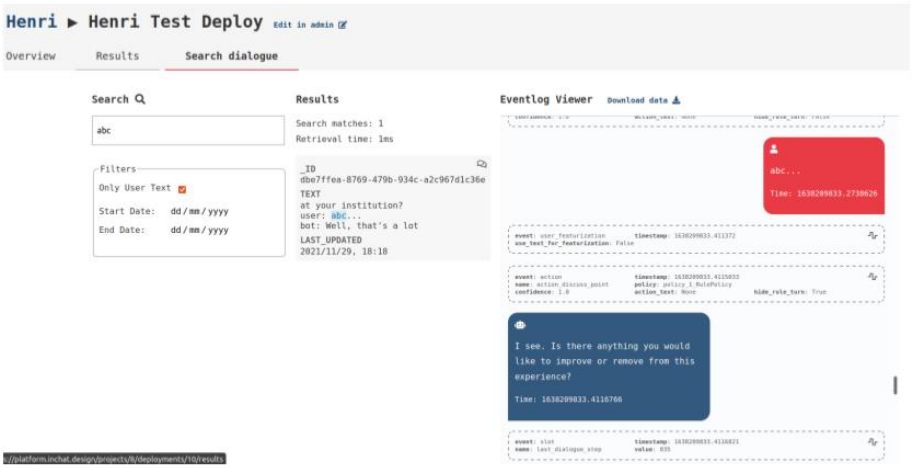


Figure 35. Hector M. Fried, 'Ethnoreader', Image, 2023.

Crucially, the platform is designed to extend the outcomes of the co-design workshop, which remains the most impactful methodological contribution of this research. The workshop provides a participatory structure through which dialogue flows, key questions, and design intentions are collaboratively generated. The no-code platform then serves as the technical infrastructure through which these schematics are implemented. This integration ensures that chatbot systems reflect the ethical, contextual, and interactional values defined during the design process, making the platform not only a tool for development, but also a vehicle for enacting inclusive, reflective, and context-sensitive research.

The Co-Design Workshop an asset for Design Ethnography and Design Thinking

The co-design workshop developed over the course of this research emerged as both a methodological innovation and infrastructural asset, serving as a catalyst for participatory engagement and as a repeatable design practice that informed the iterative development of the Ethnobot. Drawing on principles from research through design (Frayling 1993; Gaver 2012) and participatory design traditions (Bjerknes,

Ehn, and Kyng 1987; Sanders and Stappers 2008), the workshop evolved in a series of deployments, each contributing to its refinement and operational maturity. The initial version of the workshop emerged unintentionally during the 'Ethnobot as a Cultural Probe' case study with Edinburgh City Council's Public Art Strategy. At the time, the session was framed as a playful and exploratory exercise—more akin to a 'design-in-play' approach than a formal co-design method. However, it proved instrumental in clarifying the contextual aims and responsibilities of the intervention, inadvertently shaping the design of the Ethnobot itself. By the time of the Edinburgh Living Lab Alfred the Owl project, the term 'Co-Design Workshop' had been adopted, marking a shift toward formalizing the session as a core methodological step. From that point forward, the workshop was iteratively refined across projects and became the preferred entry point for initiating any Ethnobot deployment or chatbot design process. Its adaptability, participatory ethos, and capacity to generate context-specific dialogue systems positioned it as a cornerstone of both the research methodology and the inChat consultancy model.

Workshop Methodology and Structure

The workshop was deployed in both remote and in-person formats, tailored to project needs and stakeholder availability. This flexible delivery model supported inclusive participation across a range of sectors—including public service design, education, banking, and urban research—and involved a diverse mix of participants: clients, artists, policy officials, service users, and academic collaborators. Each session emphasized contextual specificity while maintaining a structured approach to co-design.

The co-design workshop employed a structured, multi-stage methodology aimed at facilitating the participatory development of ethnographic chatbots. Within this framework, the chatbot—or Ethnobot—was framed as a co-produced design challenge, with each stage contributing to the creation of a contextualized, user-centred conversational system. The process began with the identification of use cases, in which participants defined the specific contexts in which the chatbot would operate. These scenarios were grounded in participants' lived experiences, institutional priorities, or community needs, ensuring contextual relevance and applicability. Following this, participants collaboratively developed user personas to surface emotional, behavioural, and environmental factors likely to influence user interaction. These fictional but plausible characters helped to anticipate user goals, challenges, and expectations.

In the next stage, participants formulated key questions and speculative provocations to shape the chatbot's inquiry logic. Through guided brainstorming, they explored the resources, drivers, and barriers relevant to each persona's journey, framing the types of insights the chatbot should elicit. Building on this foundation, participants co-authored dialogue flows that considered tone, empathy, and narrative coherence. Drawing from ethnographic interviewing traditions, these dialogues were designed to be both functionally robust and emotionally attuned. The workshop then moved into rapid human-bot testing, in which participants enacted real-time roleplays of their scripts—one acting as the bot and the other as the user. This technique enabled the early identification of interactional breakdowns, logical gaps, and tonal

misalignments. Finally, a collective critique and iteration session invited participants to assess the dialogues' clarity, usability, and ethical implications. Feedback gathered during this phase informed revisions, supporting an iterative and user-driven design process.

Workshop Benefits

This workshop methodology reframed chatbot scripting as a collaborative, situated act of storytelling rather than a purely technical exercise. Drawing on cultural probes (Gaver, Dunne, and Pacenti 1999), diary methods, and theories of situated action (Suchman 1987), the workshops emphasized the dialogic, emotional, and temporal dimensions of interaction. By foregrounding ‘dialogue as design’, the sessions created space for participants to explore the narrative dynamics of conversational interfaces. As a participatory design approach, the workshop proved effective in engaging stakeholders and community members early in the design process, thereby mitigating common communication breakdowns. Its exploratory structure enhanced project alignment by clarifying real user needs rather than relying on assumed preferences.

The integration of rapid human–robot interaction testing helped to surface practical constraints, aligning design goals with feasible outcomes. Moreover, the workshop functioned as an efficient alternative to more time-intensive research methods such as traditional ethnography, desk research, focus groups, or one-on-one interviews. By convening domain experts, stakeholders, end users, and potential disruptors in a shared design space, it enabled both the expansion of conceptual scope and the focused identification of problem areas and innovation opportunities. The inherently playful and performative nature of participation further encouraged open exploration and grounded ideation.

Workshop Outputs and Integration with inChat

The workshops produced three core outputs: (1) base dialogue flows that could be directly implemented or revised, (2) modular, template-based scripts adaptable across future use cases, and (3) critical insights into the limitations and affordances of chatbot-led engagement. These outputs were both practical and generative, supporting immediate implementation while informing the ongoing evolution of chatbot design strategy. By embedding the workshop process into a standard method for designing Ethnobots it became a repeatable and scalable model. Dialogue systems co-designed in the sessions were easily uploaded and customized using a visual scripting interface, enabling clients to maintain, modify, and redeploy bots with minimal developer intervention. This integration also ensured continuity between research and application, translating design insights into sustainable, real-world implementations.

Research and Design Implications

As a research contribution, the co-design workshop illustrates the generative potential of hybrid methodologies that integrate participatory design with ethnographic inquiry. Rather than functioning merely as a facilitation tool, the workshop operates as a dynamic site of research, where chatbot dialogues are collaboratively conceptualized, tested, and critically examined with prospective users. This approach aligns with broader movements to humanize algorithmic systems through inclusive, situated, and reflective design practices (Simonsen and Robertson 2012).

In addition, the workshop serves as a translational mechanism, bridging abstract research aims with practical, context-sensitive outputs. It enables the creation of conversational agents that are not only technically functional but also socially meaningful, culturally responsive, and ethically grounded. In this way, the workshop has become central to the identity of the Ethnobot—not as a fixed technological artefact, but as an evolving, co-constructed research instrument embedded within diverse epistemic and institutional contexts. Importantly, the methodological value of the workshop extends beyond chatbot design. Even when the technological outcome is set aside, the structure can be repurposed as a practical framework for exploring problem spaces, generating research questions, and provoking critical reflection across a wide range of design or ethnographic interventions.

From Workshop to Platform

The co-design workshop not only functions as a participatory design method but also serves as a foundational data-generation mechanism for constructing ethnographic chatbots. Each workshop session produces key artefacts—use cases, personas, dialogue flows, and tested interaction scripts—that directly inform the design and configuration of Ethnobots. These artefacts easily feed into inChat's no-code chatbot platform, where they are translated into deployable chatbot interfaces. This seamless pipeline—from participatory design to technical implementation—ensures that chatbots are both methodologically grounded and practically executable.

The introduction of inChat's no-code platform represented a significant advancement in the democratization of chatbot development in our practice, as well as for our clients and academic partners. By eliminating the need for programming expertise, the platform enables researchers, practitioners, and community stakeholders to participate directly in the creation and deployment of conversational agents. This expanded access to tools that were once restricted to technically skilled developers, aligns with broader efforts to reduce barriers in digital research and innovation, but is also designed so that an ethnographer, social scientist, or other non-programming researcher is empowered by research tools. The platform includes a range of features that support both the lifecycle and analytical utility of chatbots. Users can deploy, manage, and modify chatbot instances through an intuitive

interface, allowing for real-time updates and iterative testing. A key component of the platform is the Ethnoreader, an integrated analytics module designed to aggregate and interpret conversational data. The Ethnoreader facilitates the identification of emergent patterns, user sentiments, and thematic trends within the dialogue logs, offering a structured means of engaging with qualitative insights at scale. Furthermore, each chatbot deployment is tracked and updated in real time within the Ethnoreader, and the conversational data can be exported in .json format, allowing for easy integration with a wide range of analytical tools.

Together, the co-design workshop and the inChat platform establish a closed-loop system for Ethnobot development: one that begins with collaborative inquiry and culminates in scalable, analysable digital interventions. This framework supports not only the creation of context-sensitive chatbots, but also a reflexive, data-informed approach to understanding the social and cultural dynamics within which these technologies operate.

Reflections on Design Tools as Research Outputs

This research, evolving from the Smart Transactions in Public Spaces (STiPS) initiative to the formation of inChat, has produced a cohesive and replicable framework for the design, deployment, and analysis of ethnographic chatbots. What began as exploratory design work in public events and cultural consultations matured into a set of structured methods, each developed through iterative fieldwork, interdisciplinary collaboration, and context-sensitive application. The resulting toolkit not only advances chatbot development practices but also reimagines how conversational agents can function as research instruments within participatory and ethnographic inquiry.

At the core of this contribution are five integrated methods: the chatbot development process, co-design workshop, ‘bot-think’, visual styling cues, and the no-code chatbot platform. Together, these elements form a closed-loop methodology, beginning with collaborative ideation and culminating in scalable digital interventions. Each method was refined in real-world deployments across public sector, cultural, educational, and civic contexts, underscoring their adaptability and value beyond academic research. The chatbot development process provides an end-to-end framework for constructing chatbot services, anchored in transparency, shared planning, and stakeholder alignment. It foregrounds the importance of mapping problem spaces, defining dialogue goals, and structuring workflows for implementation and iteration—particularly through a software as a service (SaaS) model that fosters accountability and clarity throughout the design lifecycle. The co-design workshop represents the most transformative methodological output of the research. Drawing on traditions of participatory design (Bjerknes, Ehn, and Kyng 1987; Sanders and Stappers 2008) and research through design (Frayling 1993; Gaver 2012), the workshop evolved from a playful exploratory session into a formalized, reusable format. Initially piloted during a cultural policy project with Edinburgh City Council, it became the foundational method through which all subsequent Ethnobot interventions were shaped. The workshop methodology follows a six-stage process: identifying use cases, developing personas, formulating key questions, designing dialogue, conducting rapid human-bot testing, and refining

through critique. Its structure invites participants to approach chatbot scripting not as a technical task but as a form of situated, co-authored storytelling, emphasizing empathy, tone, and temporal context in dialogue design (Gaver et al. 1999; Suchman 1987).

One of the workshop's distinctive features is rapid human-bot testing, a lightweight UX testing technique that simulates chatbot interaction through human roleplay. This method lowers technical barriers and surfaces conversational breakdowns before deployment, making it especially effective in engaging communities typically excluded from AI design processes. The 'bot-think' framework adds a layer of ethical and contextual sensitivity to the design process. It encourages the intentional use of anthropomorphization and emotional tone while maintaining transparency about the chatbot's non-human status. 'Bot-think' supports trust-building and improves user engagement, particularly in emotionally or culturally sensitive contexts. Visual styling cues further enhance the chatbot's reception by aligning its aesthetic identity with stakeholder goals. The design of names, icons, colour palettes, and tone all contribute to framing the chatbot as a purposeful, approachable presence—reinforcing its role as a social actor and signalling its function within the broader system of interaction.

These methods are operationalized through the inChat's no-code platform, developed to translate workshop outputs directly into deployable chatbot interfaces. The platform enables users—regardless of technical background—to build, manage, and test chatbots efficiently. Most critically, it extends the inclusivity of the co-design process by allowing users to implement prototypes without programming skills, thereby democratizing access to AI-driven tools. The platform includes the Ethnoreader, a bespoke analytics module that aggregates and analyses conversational data, revealing emergent themes, affective responses, and usage patterns. This capability supports ongoing refinement, accountability, and insight generation at scale. Taken together, the co-design workshop and no-code platform form a pipeline for chatbot development that is participatory, adaptable, and analytically robust. The workshop generates contextual, value-driven design artefacts, the platform operationalizes them as functional tools, and the Ethnoreader closes the loop by producing insight for further refinement. This integrated system ensures that chatbots are not only technologically effective but also ethically attuned, socially grounded, and accessible to non-specialists.

Ultimately, the research contributes to a broader rethinking of how conversational technologies are designed and deployed. It demonstrates that chatbots—when co-developed with users and embedded in participatory processes—can serve as instruments for inclusive inquiry, reflective engagement, and situated knowledge production. Moreover, even beyond chatbot development, the workshop structure itself offers a reusable format for exploring problem spaces, generating research questions, and designing interventions across a wide range of disciplines and contexts.

5.9 Conclusion

This chapter has traced the transformation of chatbot ethnography from its inception in traditional fieldwork at public festivals to its refinement through iterative, design-led deployments. Anchored in the Smart Transactions in Public Spaces (STiPS) project and extended through the development of the inChat platform, the research presented here reframes the chatbot not simply as a data collection device but as an ethnographic actor—a co-ethnographer embedded within participatory systems. Across a diverse set of contexts, from agricultural shows and Christmas markets to public art consultations and mental health interventions, the Ethnobot was incrementally shaped by a research through design (RtD) methodology and co-design practices.

Each deployment contributed unique insights into the chatbot's dialogic affordances, emotional tone, and ethical positioning, sharpening its function as a tool for situated inquiry. In these real-world settings, the chatbot demonstrated its capacity to capture temporally proximate, affectively rich data while minimizing observer effects, broadening participant reach, and lowering barriers to engagement. The introduction of co-design workshops proved transformative, positioning dialogue creation as an inclusive, reflexive, and collectively authored process. These workshops not only generated user-centred dialogue flows but also instantiated new ways of conceptualizing chatbot design as a cultural and ethical practice. Rapid human-bot testing, iterative feedback, and visual styling decisions further localized and humanized the chatbot experience, ensuring its relevance across institutional and community settings.

The final methodological contribution of the inChat no-code platform operationalized these research insights into an accessible, scalable infrastructure. By enabling the seamless translation of co-designed schematics into deployable chatbot systems, the platform democratizes chatbot development and supports real-time management and analysis. The Ethnoreader analytics module completes this closed-loop system, offering tools for reflective insight and continuous iteration grounded in lived user experience. Taken together, these tools and processes offer a comprehensive framework for chatbot-mediated ethnography. More than methodological innovation, they represent a paradigmatic shift: a move toward ethnographic systems that are participatory, empathetic, and algorithmically enabled. The Ethnobot emerges not as a replacement for the ethnographer, but as a designed companion capable of extending ethnographic sensibility into contexts where traditional fieldwork may be constrained.

As this chapter has shown, the integration of RtD, co-design, and inclusive digital tooling allows for a reimagining of ethnographic practice—one in which chatbots serve not only to collect data, but to mediate conversations, provoke reflection, and embody shared research values. In doing so, they open new pathways for inclusive, reflexive, and scalable forms of qualitative inquiry attuned to the social, ethical, and technological realities of contemporary research environments.

Chapter 6: Being There

6.1 Introduction

This chapter returns to the central provocation: *can Hector be replaced by a chatbot?* In design ethnography, where empathy, contextual understanding, and co-creation are central, this question prompts critical reflection on what aspects of the ethnographic task can be augmented—or even performed—by machines. Rather than treat the chatbot as a mere data collection interface, this research conceptualizes it as a potential co-ethnographer, capable of engaging in empathetic dialogue, generating context-aware insights, and mediating between users, systems, and cultural narratives. The chatbot, operationalized as an Ethnobot, is assessed not just by its technical functionality but by its ability to uphold the methodological and ethical commitments of design ethnography: reflexivity, empathy, human-centredness, and cultural sensitivity. Drawing from contemporary debates across anthropology, design, and human-computer interaction, this chapter argues that while Hector cannot be wholly replaced, many of his tools—and perhaps even aspects of his empathetic stance—can be replicated and reimagined within digital systems.

The chatbot was programmed to mirror key ethnographic functions, including prompting elaboration, facilitating storytelling, and responding to emotional or thematic cues. In doing so, it functioned not merely as a survey tool but as an instrument of empathetic encounter and challenges the assumptions underlying human-centred ethnographic praxis by asking whether computational agents—specifically, chatbot interlocutors—can meaningfully replicate or supplement the anthropologist's interpretive role. Drawing from experiments with the Ethnobot system, this chapter considers how digital and analogue tools were designed to support the collection, co-curation, and analysis of field data. It interrogates how these systems reconfigure the roles of observer, participant, and data itself, while also reflecting on how the anthropological tenet of 'being there' is reshaped. This section begins by examining whether a chatbot can function as an ethnographer. It then expands the discussion to consider how AI systems may contribute to a broader network of co-ethnographers, encompassing humans, algorithms, and material agents. Ultimately, it returns to the central provocation of this chapter: whether Hector, as a human ethnographer, can be replaced by a chatbot, and then considers who can make an Ethnobot and the consideration that that might make the data problematic in interpretation and production.

6.2 Can a Chatbot Be an Ethnographer?

To consider whether a chatbot can act as an ethnographer, we must first clarify what ethnographers do. At its core, ethnographic practice involves sustained observation, empathetic engagement, cultural interpretation, and the co-construction of meaning through situated interaction. In this light, a chatbot can perform some—but not all—of these tasks. The Ethnobot serves as an automated interlocutor or co-ethnographer designed to facilitate structured dialogue, capture participant narratives, and generate data-rich 'curated moments'. These interactions are stored in a digital repository, the Ethnoreader, which allows researchers to analyse insights at scale. By consistently prompting users, recording responses, and avoiding the bias introduced by live researchers, the chatbot offers both standardization and neutrality in data collection. Its capacity to operate across multiple contexts without fatigue makes it an effective tool for gathering wide-ranging perspectives. However, this efficiency comes with limitations. The Ethnobot cannot interpret cultural nuance, respond to affective cues, or adjust its position reflexively within dynamic social contexts. It lacks the embodied empathy and intuitive sensitivity that human ethnographers draw upon to recognize discomfort, build rapport, or shift inquiry based on subtle social signals. As such, the scripted and rule designated chatbot does not easily replace the ethnographer, but it can be augmented in design to better reach those goals in context specific applications, which we see headway with the growing use of LLM-based chatbots.

Chatbots offer significant potential as co-ethnographic agents and interlocutors, particularly in their ability to generate and structure fieldnotes. While design ethnography prioritizes time-sensitive immersion and rapid insight for user-centred interventions, there remains limited methodological guidance on integrating ethnographic fieldnotes into design workflows (Taylor et al. 2018). Traditional fieldnotes—described as shorthand reconstructions of events, conversations, and impressions (Sanjek 1990; Emerson et al. 2011)—are shaped by audience, purpose, and interpretive stance. While invaluable for 'thick description', they are inherently subjective, fragmented, and dependent on the ethnographer's situated experience. To adapt field note practices for digital and collaborative settings, the Ethnobot was developed to co-curate conversation logs that serve as contextualized, multimedia fieldnotes. Drawing on Taylor's argument that fieldnotes should reflect the researcher's impressions, affective responses, and positionality—not just transcripted speech—this method integrates real-time data across modalities (Taylor et al. 2018). The chatbot's ability to gather video, text, audio, and images facilitates a broader sensory field, enabling the researcher to reconstruct interactional contexts through layered representations. These conversational logs, or 'curated moments', are generated through branching dialogues designed around key research themes. Each session produces a traceable, participant-driven narrative that can be archived, reviewed, and analysed using the Ethnoreader. The result is a hybrid form of fieldnote production that aligns with Geertz's (1973) conception of 'thick description', reinterpreted through the affordances of digital systems, redefining 'being there'.

Clifford Geertz emphasized that ethnographic understanding relies on being physically present in the field, enabling researchers to observe, engage, and interpret cultural life (Geertz 1988). However, the rise of digital technologies and algorithmic systems necessitates a rethinking of what 'being there' means in contemporary ethnography. The Ethnobot introduces a new mode of presence—mediated, distributed, and algorithmically structured—while still anchored in the

values of reflexivity, empathy, and situated inquiry. As Haraway (1988) and Ingold (2011) remind us, knowledge is always partial and embodied. The chatbot cannot embody in the human sense, but it can facilitate embodied narratives, evoke affective responses, and record rich ethnographic traces. In this sense, it does not replace the ethnographer's presence but expands its reach. Through co-ethnography—between people, algorithms, and material systems—the chatbot helps reimagine what ethnographic engagement can look like in digitally mediated contexts. It makes possible a new kind of 'being there', one grounded in co-creation, ethical attunement, and algorithmic empathy.

6.3 Multiple Co-Ethnographers and Expanded Modes of 'Being There'

The deployment of an Ethnobot does more than position the chatbot as a co-ethnographer—it opens a broader network of agents, including human participants, algorithms, and material devices, all of which contribute to the ethnographic process. This expanded field of inquiry reflects a growing methodological openness in ethnography, where multiple actors collaboratively generate knowledge through their entangled presences and practices. Involving human participants as co-ethnographers represents a shift toward participatory and reflexive ethnography, emphasizing shared authority and situated engagement. This approach aligns with Luke Eric Lassiter's call for collaborative ethnography, foregrounding a plurality of voices in the co-construction of cultural meaning (Lassiter 2005). Participation is not limited to feedback or consultation; rather, it involves the active inclusion of participants in framing questions, collecting data, and interpreting findings (Cornwall and Jewkes 1995). This model challenges traditional researcher-subject hierarchies, promoting epistemic justice and democratizing the ethnographic process. Reflexivity plays a central role in this configuration. As Charlotte Aull Davies argues, reflexive practice demands critical awareness of the researcher's positionality and the co-constructed nature of knowledge (Davies 1999). By inviting participants into this reflexive loop, ethnography becomes a space for mutual interpretation and learning. Donna Haraway's concept of 'situated knowledges' further supports this distributed model of ethnographic authority, underscoring the partial, context-bound nature of all perspectives and the need to foreground diverse, situated accounts (Haraway 1988).

In digital ethnography, algorithms function not only as analytical tools but as entities that shape the conditions of participation, visibility, and representation within digital cultures (Murthy 2008). Their ability to parse vast datasets, identify patterns, and generate insights offers new forms of 'being there' particularly in environments where traditional presence is limited or impossible. However, this also raises ethical and epistemological questions. Drawing from science and technology studies, particularly Burno Latour's actor-network theory, algorithms are recognized as non-human actants embedded with social values and political agency (Latour 2005). Their contributions to ethnography must therefore be critically examined for embedded biases, opacity, and power differentials (Mittelstadt et al. 2016). Algorithmic co-ethnography can be structured around several emerging methodologies: computational ethnography, participatory algorithm design, and

critical algorithm studies. The first involves the use of computational techniques—such as natural language processing or clustering algorithms—to support large-scale cultural analysis while remaining attentive to interpretive nuance. The second, participatory algorithm design, invites communities into the development of algorithmic tools, ensuring cultural specificity and ethical sensitivity. The third approach critically interrogates the role of algorithms in knowledge production, highlighting how technical systems can reify inequalities or shape epistemic frameworks (Dourish 2016).

A third axis of co-ethnography emerges from the perspective of 'things' or material entities. Rooted in material culture studies, actor-network theory, and object-oriented ontology, this perspective recognizes the agency of objects in the mediation of social life (Miller 1998; Latour 2005; Harman 2009). Material entities such as smartphones, sensors, and wearables are not passive conduits of culture—they are actively involved in shaping relationships, structuring experiences, and generating meaning. From this vantage point, 'being there' also includes the presence and participation of objects, whose affordances, histories, and trajectories intersect with ethnographic narratives. Igor Kopytoff's biographical approach to things and Daniel Miller's ethnographies of consumption provide methodological tools for tracing how objects accumulate cultural value and mediate social dynamics (Kopytoff1986; Miller 1998).

These three co-ethnographic positions—human, algorithmic, and thing-based—each offer unique vantage points into the systems and structures being studied. When brought together, they reveal not only distinct layers of insight but also interdependencies. Human-centred perspectives illuminate lived experience, algorithmic perspectives offer systemic views, and material perspectives underscore the embodied and infrastructural dimensions of culture. A holistic approach to 'being there' must acknowledge the interplay between all three. Recognizing multiple co-ethnographers expands the ontological and methodological boundaries of ethnography. In a world increasingly shaped by digital systems, algorithmic infrastructures, and ubiquitous computing, the ethnographer is no longer alone in the field. Ethnographic practice must now account for entanglements between humans, machines, and things. By embracing this expanded notion of 'being there', researchers can more fully engage with the complexity of contemporary life—honouring the plural, situated, and relational nature of knowledge production in the twenty-first century.

6.4 Can Hector Be Replaced by a Chatbot?

So, can Hector be replaced by a chatbot? …. YES!, well no, but in a way totally.

On one hand the answer is no, because the ethnographer brings interpretive depth, moral responsibility, and cultural intuition that no chatbot can replicate. The human ethnographer embodies empathy, negotiates ambiguity, and adjusts with reflexive awareness—skills that remain uniquely human. But on the other hand

yes—if we redefine what it means to ‘be there’, and what ethnographic tools can look like in the age of digital mediation. The Ethnobot is not Hector, but it can perform some of Hector’s roles. It can collect data, facilitate dialogue, evoke empathy, and scale qualitative insight. It is not a replacement, but a transformation. Through a pragmatic, ethically attuned design, the chatbot becomes not a proxy for human absence, but a co-actor in ethnographic presence. It offers a glimpse into the future of qualitative research—one where empathy is distributed, mediated, and sustained through collaboration between humans, algorithms, and things.

Recent design research has called for an expanded view of empathy, one that includes non-human actors, sensory environments, and algorithmic systems (Lupton and Pink 2017). Just as designers now create ‘empathetic objects’ and ‘responsive cities’ (Kitchin 2014), ethnographers must consider how presence and understanding might be extended through digital proxies. The Ethnobot engages this idea directly. As an interface that interprets environmental data, personal stories, and algorithmic logic, it aligns with Goto’s work in creating sensory interfaces that evoke emotional connection. It operationalizes empathy not through embodiment, but through relational design—a choreography of inputs, responses, and mediated presence. Following Tim Ingold (2011), empathy is not abstract perspective-taking, but a felt, lived experience. While the chatbot cannot *feel*, it can *evoke*—guiding users into a reflective space where meaning emerges through interaction. Empathy in design ethnography is not simply an emotional stance—it is methodological. It requires immersive experience, reflexivity, and sustained attention to context (Battarbee 2004; DiSalvo et al. 2002). Yet it also demands practicality: designers must synthesize insights quickly, iterate prototypes, and translate stories into interventions.

The Ethnobot is an answer to this dual imperative. It is empathetic not because it feels, but because it is designed to gather insights that reflect participants' emotions, environments, and cultural logics. It is attuned to users not through sentience, but through co-designed scripts and adaptive conversational paths. Moreover, the chatbot makes empathy scalable. Through repeated, consistent interactions across multiple users, it builds a corpus of qualitative data that supports thick description (Geertz 1973), while also being flexible enough to adapt to varying institutional contexts. This pragmatic empathy—structured, iterative, and repeatable—reflects the utilitarian ethos of design ethnography, without abandoning its humanist roots.

6.5 Designing an Ethnobot, but not an Ethnographer?

The prospect of designing a chatbot for ethnographic research purposes without possessing ethnographic expertise raises critical questions about the role of disciplinary knowledge in shaping tools intended for qualitative inquiry. While advancements in natural language processing and AI design enable the creation of increasingly sophisticated conversational agents, the process of designing a chatbot capable of participating in ethnographic work cannot rely on technical proficiency alone. Ethnography is not simply a method for collecting qualitative data; it is a mode

of engagement grounded in interpretive depth, reflexivity, and cultural sensitivity (Geertz 1973; Davies 1999). As such, designing a chatbot ethnographer without a foundational understanding of ethnography risks flattening the richness of ethnographic practice into a transactional or mechanical process. At its core, ethnographic research demands an attunement to social nuance, power dynamics, and the emic perspectives of participants. Designers lacking training in these epistemological and methodological principles may unknowingly encode reductive assumptions into chatbot behaviours—relying, for example, on overly structured questioning, prescriptive conversational flows, or decontextualized data extraction. This risks turning the chatbot into a tool of surveillance rather than a facilitator of insight, undermining the relational and co-constructive ethos of ethnographic research (Lassiter 2005).

Nevertheless, it is feasible to design a chatbot capable of contributing meaningfully to ethnographic inquiry without the designer being a trained ethnographer if certain conditions are met. First, the design process must involve collaboration with ethnographic practitioners or be informed by established ethnographic literature and theory. This collaborative model aligns with participatory design traditions in HCI, where cross-disciplinary knowledge is integrated through co-creation (Suchman 2002; Björgvinsson, Ehn, and Hillgren 2012). Second, the chatbot's function should be framed not as an autonomous ethnographer, but as a methodological instrument: a tool for supporting, extending, or eliciting ethnographic insight rather than independently generating it. This distinction is crucial. Without expertise, the designer cannot expect the bot to embody ethnographic intentionality, but they can design affordances for reflexive interaction, open-ended dialogue, and iterative engagement that facilitate meaningful data collection under human interpretation (Zimmerman, Forlizzi, and Evenson 2007). Third, designing a chatbot ethnographer or co-ethnographer without ethnographic expertise requires critical engagement with ethical frameworks. Issues such as informed consent, cultural misrepresentation, and data ownership are central to ethnographic ethics and must be addressed through the bot's design, interface, and deployment protocols (Mittelstadt et al. 2016; Dourish 2006). Without this awareness, even well-intentioned chatbots may replicate extractive research practices or reinforce structural inequalities.

It is feasible to design a chatbot interlocutor—or Ethnobot—without being an ethnographer, but only if the design process meaningfully integrates ethnographic knowledge. This integration may occur through interdisciplinary collaboration or through a deep, reflective engagement with ethnographic literature and theory. Without such grounding, ethnography risks being reduced to a set of superficial techniques, stripping it of the critical, interpretive, and ethical dimensions that make it valuable as a research practice (Geertz 1973; Davies 1999). To retain its integrity within a chatbot context, ethnography must be approached not merely as a methodological toolkit, but as a situated practice that demands contextual sensitivity, ethical rigour, and methodological humility (Lassiter 2005; Haraway 1988).

This research seeks to democratize ethnographic practice by developing methodological strategies for designing chatbots that can act as co-ethnographers—what we term Ethnobots. One of the central methods we employed was a co-design workshop model, used to collaboratively develop rapid prototypes of chatbots with

stakeholders. Through this participatory framework, together with my co-founder at inChat, I have identified and refined four core methods for building and deploying ethnographic chatbots. These approaches range from targeted, use case-driven deployments to broader, adaptable frameworks that align with ethnographic goals and are grounded in co-design principles. Now established as formal components of both my academic research and professional consultancy, these methods—outlined in Chapter 5—offer a pragmatic foundation for advancing ethnographic inquiry through AI-driven tools.

6.6 Interpreting Data

The integration of chatbot ethnography as research introduces both opportunities and limitations regarding the type, quality, and interpretation of data collected. As conversational agents designed to engage users in structured or semi-structured dialogue, chatbot ethnographers (or 'Ethnobots') have the capacity to generate large volumes of interactional data. However, the value of such data is contingent on several contextual, technical, and epistemological factors that merit careful consideration. One of the most compelling strengths of chatbot-mediated ethnography is scalability. Chatbots can interact with a wide number of participants simultaneously, across diverse temporal and spatial contexts. This capability significantly expands the reach of ethnographic inquiry, enabling data collection from otherwise hard-to-access or geographically dispersed populations (Pérez-Soler et al. 2024). Additionally, chatbots can facilitate consistency in data elicitation, using standardized prompts and conversational structures that minimize interviewer bias and ensure uniform coverage of key themes across interviews (Wei et al. 2024).

Chatbots may also offer increased comfort and anonymity for users, which can foster candid responses, particularly in sensitive research contexts such as mental health, stigmatized behaviours, or marginalized communities (Kovačević et al. 2024). Participants may disclose information more freely when they perceive the chatbot as nonjudgmental or emotionally neutral, a phenomenon supported by prior research on digital self-disclosure (Turkle 2015). Moreover, with advances in natural language processing (NLP) and large language models (LLMs), chatbots are now capable of producing semantically rich dialogues, offering detailed transcripts that can support both qualitative and computational analysis. Despite these advantages, data collected by chatbot ethnographers are not without significant limitations. A primary concern is the lack of contextual sensitivity inherent in algorithmic systems. Unlike human ethnographers, chatbots may struggle to interpret nuance, irony, or culturally specific references—elements central to rich ethnographic understanding (Geertz 1973; Dourish 2006). While LLMs can generate plausible responses, they often lack genuine interpretive capacity and cannot adjust to the subtleties of interpersonal rapport or embodied interaction (Suchman 2007).

Another limitation involves the question of agency and authorship. Data collected through a chatbot are always mediated, both by the design of the chatbot itself and the intentions of its creators. This mediation raises epistemological questions about whose voice is truly being represented and how meaning is co-

constructed in human-machine interactions (Haraway 1988; Bødker 1991). Furthermore, technical constraints, such as limited access to real-time adaptive learning, the risk of misinterpretation, or dialogue fatigue, may impact the depth and authenticity of user responses over time (Sánchez Cuadrado et al. 2024). There are also critical ethical concerns. Chatbots may inadvertently prompt disclosures that are not easily safeguarded, raising issues around data privacy, consent, and emotional well-being. Ensuring informed consent in dynamic chatbot interactions is complex, particularly when the bot mimics human-like communication (Mittelstadt et al. 2016). Moreover, the automated nature of interaction may obscure power dynamics, creating a false sense of neutrality while reinforcing the assumptions encoded into the bot's design.

The use of chatbot ethnographers introduces novel affordances for data collection in ethnographic research, especially in contexts requiring scale, consistency, or anonymity. However, these affordances must be weighed against significant limitations, including reduced interpretive depth, ethical ambiguity, and technological mediation. As with any research tool, the value of chatbot-generated data depends not only on its volume or reach, but on how it is situated within broader methodological and theoretical frameworks. For chatbot ethnography to be credible and ethically sound, its outputs must be critically examined, triangulated with other data sources, and interpreted with an awareness of the limits of machinic understanding.

6.7 Conclusion

This chapter set out to interrogate a speculative yet very literal and pressing question: *Can Hector be replaced by a chatbot?* In doing so, it explored the capabilities and limitations of the Ethnobot as a co-ethnographic agent within the methodological framework of design ethnography. The analysis revealed that while the chatbot cannot fully replicate the reflexive, intuitive, and embodied presence of a human ethnographer, it can perform specific functions that align with the demands of contemporary, digitally mediated fieldwork. The Ethnobot is best understood not as a surrogate for human presence, but as a collaborator—a co-ethnographer capable of facilitating structured dialogue, evoking participant narratives, and generating curated data artefacts. Its design reflects a pragmatic commitment to the central principles of design ethnography: empathy, contextual sensitivity, and iterative co-creation. By translating ethnographic engagement into a conversational, algorithmically mediated form, the chatbot offers a scalable method for producing fieldnotes, surfacing stakeholder insights, and enabling distributed presence in research environments where human immersion may be constrained.

In reflecting on the capacities required to design, deploy, and interpret an Ethnobot, while critically evaluating the strengths and limitations of its outputs—namely, the forms of data it generates as research 'artefacts'—the chapter attempts to revisit and reinterpret the anthropological imperative of 'being there'. Furthermore, it attempts to situate artificial intelligence within a broader network of co-ethnographers that includes humans, algorithms, and material artefacts. This more-

than-human configuration reframes the ethnographic field as a collaborative site of knowledge production, where agency is distributed among technological and human actors. By incorporating participant co-design, participatory algorithmic systems, and the cultural agency of objects, the chapter challenges the anthropocentric assumptions that have traditionally shaped ethnographic practice. It points toward a future where ‘being there’ is no longer a matter of singular presence, but of collaborative entanglement—a methodological choreography among humans, algorithms, and things. Thus, while it does not replace the anthropologist’s interpretive presence, it represents a shift in how presence is defined and with it the evolving nature of human-computer relations. The Ethnobot, in this light, is not a step away from human-centred research but an evolution toward more contextually responsive, inclusive, and ethically aware practices. Thus, the answer to the provocation is both affirmative and cautionary. Hector cannot be replaced in the holistic, human sense, but aspects of his ethnographic function can be distributed across well-designed systems.

This does not dilute the ethnographic project; rather, it reorients it. It invites researchers to reconsider the tools, agents, and ontologies that make ethnography possible in the age of algorithmic culture. It is not just about understanding others, but designing for them—creating systems that respond to their perspectives, needs, and narratives. In this regard, the Ethnobot’s empathetic potential lies in its capacity to perform functional empathy: capturing user stories, generating insight, and informing responsive design outcomes. This constitutes a distinct practice of empathy—a different kind of empathy—one that arises through the embodied design of a chatbot, enabling an alternative way of 'being there' for the ethnographer.

Chapter 7: Reflections and Future Directions

7.1 Introduction

This concluding chapter offers a critical reflection on the contributions, limitations, and future trajectories of the Ethnobot as both a methodological innovation and a technological artefact within ethnographic research. Situated at the intersection of design ethnography, human-centred artificial intelligence, and participatory design, the Ethnobot is not merely a digital tool but a conceptual intervention. It challenges conventional assumptions about ethnographic presence and asks how 'being there' might be reconfigured through algorithmic mediation. The Ethnobot functions as a speculative probe into the evolving relationship between researchers, technologies, and fieldwork practices. It invites reconsideration of who—or what—can act as a co-ethnographer and how such roles are shaped by infrastructures of automation, empathy, and co-creation. This chapter addresses two core concerns: the future development of Ethnobot systems and the challenges introduced by generative AI technologies. In doing so, it critically engages with the ethical, technical, and epistemological implications of automated ethnographic practice, including the complexities of designing for empathy and the ethical cascades that such ambitions may produce. It interrogates the tensions between automation and interpretation, empathy and ethics, and innovation and accountability. Ultimately, the Ethnobot is approached not simply as a tool, but as a platform for reimagining ethnography in a digital and distributed world.

7.2 Future Developments of the Ethnobot

Moving forward, the future of the Ethnobot lies in the development of more adaptive, multimodal, and culturally contextualized agents. While current prototypes rely on pre-structured flows or LLM-guided interactions, future iterations could integrate user-generated ontologies, context-aware decision trees, and more robust mechanisms for participatory feedback. New design tools could support non-experts in building and customizing Ethnobots, democratizing their development without flattening the epistemic complexity of ethnographic engagement (Suchman 2002; Björgvinsson, Ehn, and Hillgren 2012). Moreover, future Ethnobots should support mixed-method research, blending qualitative conversation with embedded sensor data, geolocation, image capture, and even biometric inputs, where appropriate. These affordances could help reconstruct richer 'curated moments' that expand the notion of fieldnotes in line with Geertz's (1973) thick description. They also allow researchers to triangulate data across modalities and co-create ethnographic meaning with participants, algorithms, and environments.

Within the context of my research and industry practice with the startup inChat, the future development of the Ethnobot rests on the continued integration of

generative AI, user-centred design, and ethnographic methodology to create tools capable of meaningful, reflexive engagement. At the heart of this trajectory lies inChat's smart encouragement platform (SEP), a next-generation chatbot designed not only for data collection, but also for promoting self-reflection, mental well-being, and deeper user insight. SEP represents a shift from chatbots as simple survey tools to interactive agents that foster dialogic inquiry across healthcare, education, and corporate wellness sectors .This evolution builds upon foundational work in design ethnography and conversational AI by transforming routine digital interactions into sites of ethnographic meaning-making. Future versions of the Ethnobot will further emphasize metacognitive engagement, enabling users to reflect on their experiences while simultaneously generating rich, qualitative data. These developments signal a conceptual maturation of chatbot ethnography, shifting from reactive question-answer scripts toward generative and self-directed dialogue systems.

From a methodological perspective, the future of Ethnobot design will continue to prioritize participatory and co-design principles. Platforms such as inChat's no-code environment empower researchers and stakeholders to develop customized Ethnobots without extensive technical training, enabling greater inclusivity in research tool creation. These interfaces simplify chatbot deployment while offering advanced options—such as sentiment analysis, real-time analytics, and feedback loops—to refine both the chatbot's design and the insights it elicits. In applied settings, the Ethnobot will expand its reach through strategic integration with existing digital ecosystems, such as WhatsApp, Telegram, Trello, and Notion. These integrations would allow the Ethnobot to enter users' everyday communication environments, increasing ecological validity and user engagement. Additionally, its scalability and asynchronous deployment make it an ideal tool for longitudinal studies, cross-cultural research, and remote fieldwork.

Technologically, the roadmap includes the development of proprietary large language models (LLMs) tailored for reflective and culturally sensitive engagement. Unlike general-purpose AI, these specialized models are designed to align with specific ethnographic goals, such as contextual awareness, emotional resonance, and interpretive depth. Proprietary algorithms will be central to this process, enhancing the bot's ability to surface emergent themes, adapt to user responses, and minimize the epistemic flattening often associated with off-the-shelf AI systems (Buolamwini and Gebru 2018; Shneiderman 2020). Looking ahead, the Ethnobot is poised to redefine qualitative inquiry in digital contexts. Its hybrid identity—as both a methodological probe and a generative interlocutor—positions it at the intersection of AI ethics, design anthropology, and digital ethnography. The ultimate goal is to create systems that are not only technically advanced but also epistemologically grounded, ethically attuned, and socially responsive. As such, the Ethnobot represents a methodological innovation with the potential to reshape how ethnographers engage with cultural complexity in an increasingly algorithmic world.

7.3 Generative AI: Ethical and Methodological Challenges

The integration of generative AI into the development of ethnographic chatbots presents both promising innovations and significant ethical and methodological challenges. As generative models such as GPT-4 and similar LLMs become increasingly capable of producing fluent and responsive dialogue, their use in the construction of chatbot ethnographers—or Ethnobots—invites critical scrutiny.

One of the foremost concerns is the perpetuation of algorithmic bias. While capable of generating coherent, contextually aware dialogue, these systems are prone to reproducing existing biases, eroding interpretive nuance, and masking authorship through algorithmic abstraction that often reflect the structural inequalities embedded in their training data. As Buolamwini and Gebru (2018) demonstrate, machine learning models frequently inherit racial, gendered, and cultural biases, which can result in distorted or exclusionary representations, particularly when used in sensitive research contexts.

This concern is compounded by the epistemic opacity of generative systems. Despite their persuasive outputs, these models lack genuine understanding and instead rely on statistical inference. As Gitelman (2013) argues, data are never raw or neutral—they are always shaped by prior assumptions, framing, and collection methods. Without transparency in how generative models produce knowledge, authorship becomes obscured, and interpretive nuance is lost. Moreover, the abstraction of decision-making processes in AI systems poses significant ethical risks. As Dignum (2019) and Shneiderman (2020) note, the absence of human oversight in automated reasoning may undermine accountability and complicate the ethical responsibilities of researchers. In ethnographic contexts, where reflexivity and contextual sensitivity are core values, these limitations demand careful scrutiny and methodological restraint. As such, ethnographic AI must not only be technically fluent but also accountable—to the communities it engages, the data it processes, and the narratives it helps to shape. Ensuring transparency, consent, and co-authorship will be essential in future iterations of the Ethnobot.

As research by Buolamwini (2016) and Mittelstadt et al. (2016) demonstrates, AI systems trained on large-scale, web-based datasets frequently inherit and amplify systemic social inequalities. When deployed in ethnographic contexts, such biases risk distorting or marginalizing the perspectives of underrepresented communities. The apparent neutrality of AI-generated responses can obscure embedded cultural assumptions, leading to flattened or stereotypical representations of lived experience. Ethnography, by contrast, is rooted in reflexivity, cultural contextualization, and interpretive depth (Davies 1999; Haraway 1988). Generative AI lacks this grounded positionality. While its outputs may be coherent and persuasive, they are generated without a genuine understanding of context or relationality. As Gitelman (2013) reminds us, ‘raw data’ are never truly raw—data are always produced through framing and interpretation.

In this light, the Ethnobot must be designed not merely for interactional fluency but for epistemological transparency and accountability. The ethical implications of generative AI also extend to questions of authorship and representation. As explored in Chapter 6, chatbot-mediated dialogue is inherently co-constructed, emerging from the interplay of users, algorithmic logic, training data, and design intent. This distributed authorship challenges traditional models of ethnographic authorship and demands new frameworks for documenting data

provenance, attributing narrative voice, and facilitating participatory oversight. Future Ethnobot designs should incorporate audit mechanisms that allow communities to review, intervene, and contest how they are represented by AI systems.

Privacy and informed consent present additional challenges. Unlike human ethnographers, generative AI systems can be deployed at scale, often operating in opaque or unregulated environments. This raises concerns about surveillance, data retention, and the ethical use of user-generated content. To mitigate these risks, developers must embed ethical safeguards into the chatbot architecture, such as opt-in mechanisms, clear disclosures about data collection and usage, and the integration of explainable AI features (Shneiderman 2020). These measures are essential not only for protecting user rights, but for maintaining trust in AI-mediated ethnographic practice. Thus, while generative AI holds potential for expanding the reach and responsiveness of ethnographic tools, it also demands careful attention to the values, assumptions, and power structures encoded in its design. Without such vigilance, the Ethnobot risks functioning as an extractive instrument rather than a co-creative and ethically grounded methodological partner.

7.4 Problematizing Ethical Futures of AI-Mediated Inquiry and the Endeavour to Design with Empathy

Reflecting across the preceding chapters, this research contributes to a broader reimagining of the ethnographic method—one attuned to the realities of algorithmic culture (Striphas 2016), hybrid human-machine systems (Latour 2005), and the increasing demand for scalable, participatory, and empathetic tools. Through the Ethnobot, I have explored not only what ethnographic AI *can do*, but what it *should* do, grounded in ethical care, disciplinary respect, and a commitment to cultural nuance. The integration of human, algorithmic, and material co-ethnographers (Chapter 6) illustrates how ethnography is no longer the sole domain of the human fieldworker. Instead, we now operate in a distributed field—where ethnography is operationalized through design, presence is mediated through platforms, and thick description becomes a collaborative, multisensory act. While the Ethnobot does not resolve these tensions, it foregrounds them and offers a practical framework for engaging them critically. Designing for empathy in ethnographic and technological contexts requires more than intuitive responsiveness—it demands a rigorous ethical framework. As empathy becomes a normative goal in design ethnography, AI development, and IoT systems, it also raises critical questions about representation, agency, and the boundaries of care. This section explores how empathy, as a design aspiration, must be grounded in ethical sensitivity, contextual awareness, and critical reflection.

This discourse delineates three pivotal contributions. First, it furnishes design thinking with a strategic framework for navigating the IoT landscape, thereby laying a foundation for research. Second, it amalgamates design ethnography and ethnography to forge a methodological and practical base for crafting chatbot ethnographies and the practice of fieldnotes with an emphasis on leveraging AI.

Third, within the scope of service design, the employment and refinement of co-design methodologies for chatbot development not only facilitates the construction of iterative research infrastructures but also enhances service provision through integrated research mechanisms. Moreover, this concept could be extended to co-design engagements with communities, customers, and audiences to elucidate pertinent inquiries for innovation or research challenges, essentially tailoring co-design as a participatory approach for identifying and addressing critical questions at opportune moments.

The research encompassed by this dissertation, spanning projects from 2017 to 2022, encountered limitations in duration and funding, precluding the generation of substantial datasets that might have facilitated a deeper exploration as a cultural algorithm in application, with the end goal of qualitative data analysis at scale in real time. This research primarily concentrated on establishing methodologies for AI-enabled ethnography and developing co-design strategies for creating chatbots adept at research that are capable of yielding extensive data collections. However, constraints related to time, financial resources, and the necessity for continuous application of contexts were recognized as limitations, positioning these endeavours as subsequent steps for inChat's initiative to grow as a business and further chatbot ethnography research practices. In pursuit of a nuanced, real-time cultural analysis, the ambition is to cultivate a cultural algorithm rooted in a more inclusive framework between user-centred design, algorithmic culture and design ethnography, thereby advancing this research to broader applicability for understanding diverse industrial or cultural phenomena.

In design ethnography, ethical sensitivity is not an afterthought but a foundational principle. Empathetic engagement with participants requires designers and researchers to uphold principles such as informed consent, privacy, and psychological well-being throughout the research and design process (DiSalvo et al. 2002). Empathy in this context is not merely emotional attunement—it is a form of responsibility toward others' lived realities. As such, ethical design must incorporate reflexivity about power dynamics, positionality, and the researcher's influence on the data and outcomes. Facilitating empathy across time and space within the realm of design ethnography is envisaged through the enhancement and extension of the anthropological principle of 'being there'. This expansion serves as a conduit for integrating design thinking into the domain of the Internet of Things (IoT), reconceptualizing empathy as a specifically operationalized construct within distinct fields, thereby inviting a reconsideration of empathy from a novel standpoint as a differentiated form of empathy, and more simply as a different kind of empathy. This is an understanding that is supported by the more than human framework, which provides a rubric for 'being there' through a unified multi-perspectives lens that encapsulates anthropological inquiry into empathy, habitus, and imagined communities; the interactions between humans, AI, and things; and computational meaning that can be read in semantics between a crowd, information, and algorithms.

Designing empathetically within the IoT landscape introduces complex ethical considerations. IoT technologies impact not only individual users but also broader societal systems, raising concerns about equity, surveillance, and unintended consequences (Friedman and Kahn 2003). Ethical design in this space must

therefore extend beyond usability to include social responsibility and transparency. Norman (2005) emphasizes the importance of adaptability—IoT systems must respond dynamically to user feedback and behaviours, fostering reciprocal relationships between humans and machines. Cultural sensitivity, too, is vital, given the global deployment of connected devices. Design must account for differing values, norms, and social contexts (Marcus and Gould 2000). Furthermore, efforts to minimize intrusiveness in everyday life aim to ensure that technology supports, rather than overwhelms, human experience (Bellotti and Edwards 2001). Co-creation practices, which invite users into the design process, help ground technological systems in the needs and values of their communities (Sanders and Stappers 2008).

Empathy in ethnography also entails a care ethic directed toward culture itself. Drawing on the principle of cultural relativism, researchers are obligated to interpret practices within the participants' own cultural frameworks rather than imposing external judgment (Herskovits 1948). This orientation demands ethical mindfulness throughout the research, from informed consent to the final representation of findings (Fluehr-Lobban 1994). Importantly, emotional engagement with participants is not ethically neutral. While empathy can deepen understanding, it must be tempered by self-awareness and critical distance (Davies 2008). Reflexive ethnography acknowledges this tension, allowing emotional responses to inform but not distort the interpretive process. The goal is not neutrality but respect: to represent communities in a way that affirms their dignity, complexity, and agency.

The extension of empathetic principles to algorithms introduces both possibility and peril. On the one hand, empathetic algorithms aim to recognize user needs, adapt responsively, and minimize harm. These systems incorporate design features such as transparency, bias mitigation, and user-centred oversight—often through a ‘human-in-the-loop’ model that allows human judgment to guide automated decisions (Dignum 2019; Friedman and Hendry 2019). Crucially, such algorithms must be built with cultural sensitivity and inclusivity in mind. They should reflect the values of diverse users and avoid reifying dominant norms or marginalizing underrepresented communities (Shneiderman 2020). Empathetic AI also depends on ethical data practices: protecting privacy, interpreting data contextually, and avoiding reductionist approaches to human behaviour. Incorporating emotional intelligence into algorithmic responses is a growing area of development, yet it raises further ethical questions about authenticity, consent, and manipulation (Rahwan 2018). Public understanding of algorithms—termed algorithmic literacy—is an additional ethical frontier. Lee (2018) argues that enabling users to comprehend the logic and limits of AI systems fosters more meaningful engagement and helps counteract opacity and misinformation.

Designing for empathy requires more than good intentions. It necessitates a robust ethical architecture that spans research practices, technical development, and cultural representation. Whether working with human participants, designing IoT systems, or programming algorithms, the aspiration for empathy must be grounded in reflexivity, inclusivity, and contextual understanding. Across these domains, the ethic of care must guide not only what we design, but *how* and *for whom* we design.

7.5 Conclusion

This final chapter has examined the evolving role of the Ethnobot as both a technological artefact and a methodological intervention, situated within the shifting landscape of ethnographic inquiry. As ethnography extends into algorithmic and distributed domains, the Ethnobot foregrounds new modes of 'being there'—modes mediated by conversational AI, co-designed infrastructures, and generative models. Rather than displacing the ethnographer, the Ethnobot reconfigures the ethnographic relation, proposing an expanded field in which humans, algorithms, and things co-produce meaning and presence.

The future development of the Ethnobot, as evidenced through inChat's smart encouragement platform, signals a transformative shift from structured data capture toward dialogic, adaptive, and metacognitive engagement. The increasing sophistication of proprietary language models, integration into everyday communication tools, and democratization of bot design through no-code platforms represent both technical and epistemic opportunities. Yet, these developments also demand a renewed commitment to ethical design, cultural sensitivity, and methodological reflexivity. Furthermore, the ethics of designing for empathy must not be reduced to emotional resonance or surface-level responsiveness. Empathy, as argued throughout this chapter, must be situated within a robust ethical framework that spans technical systems, design methodologies, and sociocultural contexts. Whether in IoT, algorithmic decision-making, or ethnographic fieldwork, empathy must be operationalized through inclusive practices, participatory design, and a commitment to care. This also entails recognizing the material, affective, and political dimensions of algorithmic systems and acknowledging their capacity to shape, not merely reflect, cultural realities.

Ultimately, the Ethnobot is not simply a technological tool, but a provocation. It challenges us to rethink the boundaries of ethnographic labour, the nature of collaboration, and the future of knowledge production in increasingly algorithmic societies. Its development, while still emergent, opens critical pathways for co-creating fieldwork practices that are distributed, reflexive, and ethically engaged. As such, the Ethnobot stands as both a methodological prototype and a conceptual lens through which we might imagine an ethnography attuned to the complexities, contradictions, and relational entanglements between humans, objects, and AI.

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