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Agentive Overviews for Family Coordination

Designing Calm, Glanceable, and Portrait-Based Systems for Parents of School-Age Children

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Författare

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Titel

Agentiva översikter för familjekoordinering: Design av lugna, lättöverskådliga och porträttbaserade system för föräldrar till skolbarn

Engelsk titel

Agentive Overviews for Family Coordination: Designing Calm, Glanceable, and Portrait-Based Systems for Parents of School-Age Children

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Sammanfattning

För att hantera den ökande mängden information i föräldrars vardag krävs nya sätt att förstå och interagera med digitala kalendrar och kommunikationsverktyg. Idag har föräldrar ofta svårt att skapa en sammanhängande bild av veckan, då fragmenterade kanaler, stora mängder notifikationer och informationstäta gränssnitt tävlar om uppmärksamheten snarare än att stödja den. Denna uppsats undersöker hur en agentiv översikt kan minska den upplevda fragmenteringen och ge en lugnare förståelse av familjens vardagskoordinering. Med utgångspunkt i *Concept-Driven Interaction Design Research* (CDIDR) har ett koncept utforskats iterativt. Utforskandet, som grundats i teori och kvalitativa intervjuer med åtta föräldrar i två faser, belyser hur användare i första hand söker övergripande, socialt meningsfulla ledtrådar snarare än exakta data, och hur abstraktion hjälper dem att bedöma om vardagspusslet går ihop. Konceptet har gestaltats i en konceptprototyp som definierar en ny designrymd för agentiva översikter. Prototypen använder generativ AI för att aggregera fragmenterade kalenderhändelser och presentera dem som porträttbaserade, ambienta representationer av familjens vecka i hemmiljön. En utvärdering med två familjer genom en *technology probe* bekräftade att den visuella signalstrategin var lättförståelig och pekade ut nya designmöjligheter, däribland konfliktdetektering och tidsmässig närhet. Uppsatsen bidrar med empiriska insikter kring familjekoordinering i hemmiljö, en femdimensionell designrymd, en utvärderad konceptprototyp, samt designprinciper för hur agentiva, lugna och lättöverskådliga system kan utformas.

Ämnesord

Familjekoordinering, Calm technology, Agentiva system, Concept-Driven Interaction Design Research (CDIDR), Ambienta representationer

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Abstract

To manage the increasing amount of information in parents' everyday lives, new ways of understanding and interacting with digital calendars and communication tools are required. Today, parents often struggle to assemble a coherent picture of the week, as fragmented channels, high-volume notifications, and information-dense interfaces compete for attention rather than supporting it. This thesis examines how an agentive overview can reduce perceived fragmentation and provide a calmer understanding of family coordination. Methodologically grounded in Concept-Driven Interaction Design Research (CDIDR), a concept was explored iteratively. The exploration, drawing on theory and qualitative interviews with eight parents across two phases, highlights how users primarily seek coarse, socially meaningful cues rather than precise data, and how abstraction helps them judge everyday feasibility. The concept has been materialized in a concept prototype that defines a new design space for agentive overviews. The prototype uses generative AI to aggregate fragmented schedule signals and present them as portrait-based, ambient representations of the family week in the domestic environment. An evaluation with two families via a technology probe confirmed that the visual signalling strategy was easily understood and pointed out new design directions, including conflict detection and temporal proximity. The thesis contributes empirical insights into domestic coordination, a five-dimensional design space, an evaluated concept prototype, and design principles for how agentive, calm, and glanceable systems can be designed.

Keywords

Family Coordination, Calm Technology, Agentive Systems, Concept-Driven Interaction Design Research (CDIDR), Ambient Representations

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Introduction

Families coordinate everyday life through situated and embodied practices that are distributed across social interaction, routines, and the material environment. Rather than relying on complete or centralised information, coordination is accomplished through ongoing negotiation, mutual adjustment, and lightweight cues such as brief verbal updates, shared rhythms (e.g. mornings, pickups, evenings), and visible artefacts placed in meaningful locations (e.g. notes, lists, calendars on the fridge, or other places where family members pass frequently). Computer-supported cooperative work (CSCW) has shown how coordination in complex settings is similarly sustained through subtle, peripheral awareness and locally produced cues rather than formalised procedures (Heath and Luff, 1991), while domestic studies highlight how household organisation depends on pragmatic workarounds, with shared calendars that become outdated, verbal reminders layered onto morning routines, and the ongoing maintenance of an everyday infrastructure that only becomes visible when it breaks down (Grinter *et al.*, 2009). This positions family coordination as a socio-material accomplishment, something achieved not simply through information alone, but through the interplay of social routines and the physical environment in which they unfold.

To support everyday coordination, families rely on a growing constellation of digital tools: shared calendars, school communication platforms, messaging applications, and location-sharing services (Neustaedter, Brush and Greenberg, 2009). Information that supports planning remains distributed across these apps, chats, and platforms, each with its own interaction logic and notification regime. Rather than providing a coherent sense of the week, this fragmentation forces parents to actively search, recall, and stitch together information across channels. The mismatch reflects a broader socio-technical gap, where systems designed to manage information struggle to accommodate the informal, negotiated nature of everyday coordination (Ackerman, 2000). For families with school-age children, the coordination burden intensifies as extracurricular activities, school platforms, and social logistics multiply. The week functions as the primary temporal unit around which these commitments are organised, yet no single tool provides an

integrated view of it. Building on CSCW studies of domestic technologies that show how householders collaboratively organise and coordinate everyday routines (Grinter *et al.*, 2009), domestic life represents a particularly acute instance of this gap, where coordination responsibilities are distributed unevenly among family members with differing needs, schedules, and levels of engagement with digital tools.

Apps such as Cozi and FamilyWall represent a category of family hub applications that attempt to address this challenge by consolidating shared calendars, to-do lists, and messaging into unified platforms (Cozi, no date; Family Wall, no date). Whether oriented toward clarity through structured calendars and lists like Cozi, or toward relational awareness through activity feeds and location sharing as FamilyWall, these tools remain embedded in an app-centric paradigm that requires active engagement rather than supporting peripheral awareness. They address fragmentation by adding another destination with a centralised hub, rather than by reshaping how families' distributed coordination is made. The problem centres on whether coordination information demands focused attention or can be a part of the existing environment.

As digital coordination becomes distributed across multiple channels, it also becomes increasingly interruptive. Notifications arrive continuously, often detached from the moment in which they are relevant. Research on interruption and task switching shows that frequent alerts increase stress, accelerate task switching, and reduce users' sense of control over their attention (Mark, Gudith and Klocke, 2008). Even when interruptions do not cause errors, they impose a cognitive recovery cost, as users must reconstruct context after each disruption (Iqbal and Horvitz, 2007). In family contexts, this contributes to a situation where tools intended to support coordination instead compete for attention, fragmenting focus rather than clarifying the week ahead.

An alternative paradigm for designing interactive systems has existed since the early visions of ubiquitous computing. Rather than demanding focused attention, calm technology aims to support awareness by allowing attention to move smoothly between centre and background of attention as needed (Weiser and

Brown, 1996). This perspective emphasises abstraction, rhythm, and peripheral cues as opposed to detailed, interruptive displays. By supporting awareness without continuous engagement, calm technologies seek to align more closely with how people naturally manage attention in everyday life (Hallnäs and Redström, 2001).

While calm technology offers a compelling alternative to interruptive systems, applying its principles to family coordination presents a specific challenge. Recent advances in generative AI create new possibilities for addressing this challenge (Amershi *et al.*, 2019). Calm technology defines the design orientation as peripheral, ambient, non-interruptive. AI provides the mechanism for aggregating fragmented schedule data from multiple sources and re-presenting it as a coherent, glanceable overview without requiring families to compile it themselves (Noessel, 2017; Holter and El-Assady, 2024). The information families need to make sense of their week includes school schedules, extracurricular activities, work commitments, and shared logistics. This information is not held in any single system. It is distributed across calendars, messaging threads, school platforms, and informal agreements, each with its own structure and granularity. Making this information peripherally available requires not only aggregation but abstraction: presenting commitments at a level where a glance is sufficient to assess the state of the week, without demanding that family members actively retrieve and compile information themselves. Research on family awareness has shown that families orient around a small set of recurring needs: knowing where members are, what they are doing, whether they are available, and what is coming up (Khan and Markopoulos, 2009). Yet when technology probes have been placed in family homes, they consistently reveal a desire for shared, at-a-glance representations that current tools do not provide (Hutchinson *et al.*, 2003). More recent work on situated displays for family coordination confirms that this gap persists: families benefit from peripheral representations of shared commitments, but few domestic technologies offer them (Kuzminykh *et al.*, 2024). This suggests a role for what has been termed agentive technology, systems that act on behalf of users by monitoring, aggregating, and preparing information for human judgement, rather than requiring explicit queries (Noessel, 2017).

This thesis therefore asks: How can an agentive overview of family commitments be designed to reduce perceived channel fragmentation and notification overload for parents of school-age children?

A secondary question examines the role of AI: In what ways might AI summarise and re-present distributed family schedule information to support quick, shared decisions without requiring focused engagement?

This work is exploratory and aims to inform the development of an early design concept. It does not evaluate a finished system or measure usability outcomes.

Key Concepts

This chapter defines eight terms that recur throughout the thesis. Where terms have established definitions in the literature, those definitions are adopted and cited. Where terms are used in a sense specific to this project, that usage is made explicit.

Glanceable refers to the quality of a display that allows a user to extract meaningful information quickly, with minimal cognitive effort, and without interrupting an ongoing activity . A glanceable display does not require focused attention or deliberate navigation, instead it supports comprehension in passing. Throughout this thesis, glanceability is treated as an interaction quality rather than a technical property, describing the degree to which the ambient display can be understood at a single glance.

Calm technology describes systems designed to move smoothly between the periphery and centre of a user's attention as needed, without continuously demanding focus (Weiser and Brown, 1996; Matthews *et al.*, 2006). Rather than maximising engagement, calm technology preserves attentional balance by keeping most information peripheral and allowing it to move to the centre only when the situation requires it. The term is used throughout this thesis to characterise the design orientation of the ambient display, which aims to inform without interrupting.

Ambient display refers to a situated, always-visible representation of information designed to be encountered peripherally rather than consulted deliberately (Pousman and Stasko, 2006). Ambient displays are typically positioned in shared or domestic spaces and communicate through visual properties such as colour, density, or movement rather than through text or data. In this thesis, the term refers specifically to the portrait-based screen placed in a shared domestic space.

Peripheral awareness refers to the capacity to maintain an ongoing sense of others' activities, availability, and state without direct communication or focused attention (Heath and Luff, 1991). In domestic contexts, peripheral awareness is sustained through environmental cues, shared artefacts, and incidental observation rather than through explicit information exchange (Neustaedter, Brush and Greenberg, 2009). The concept grounds the thesis's argument that family coordination does not require precise data but rather sufficient ambient signal.

Agentive technology refers to systems that act on behalf of users by monitoring, aggregating, and preparing information for human judgment rather than requiring explicit queries (Noessel, 2017). The degree to which a system takes initiative has traditionally been described as a continuum from full human control to full machine autonomy (Parasuraman, Sheridan and Wickens, 2000). However, this single-axis framing obscures systems where automation and human control operate at different layers simultaneously. Holter and El-Assady (2024) offer a more precise lens by separating agency, interaction, and adaptation as independent dimensions of human-AI collaboration. In this thesis, the concept refers to a system that is fully automatic at the information layer, aggregating, classifying, and generating portrait representations without user input. At the same time, it remains fully manual at the decision and action layer, where family members claim events and exercise judgment. This layered architecture is a deliberate design choice: automation reduces retrieval burden while manual handling preserves the negotiated, socially meaningful character of family coordination.

Claimed and unclaimed are terms introduced in this thesis to describe the coordination state of a family event. An event is unclaimed when no family member has indicated responsibility for handling it. An event becomes claimed

when a family member accepts responsibility, signalling to others that it is handled. The distinction draws on research showing that family coordination depends on shared understanding of who has taken responsibility for a commitment, rather than on comprehensive knowledge of its details (Grinter *et al.*, 2009; Neustaedter, Brush and Greenberg, 2009). Claiming is understood here as the outcome of implicit or explicit negotiation between family members, producing a shared understanding that a commitment has been acknowledged and assigned (Grinter *et al.*, 2009; Neustaedter, Brush and Greenberg, 2009).

Technology probe refers to a simple, functional artefact deployed in a real-world setting to gather data about use, test a design concept in context, and inspire new design directions (Hutchinson *et al.*, 2003). Unlike a usability study, a technology probe evaluation is exploratory rather than evaluative; it seeks to surface unanticipated uses and reactions rather than to measure performance.

Portrait-as-state is a design concept introduced in this thesis to describe the use of a photorealistic portrait as a dynamic coordination signal. Rather than functioning as a static image, the portrait changes its visual attributes, clothing, objects, colour tone, to reflect the coordination state of the family member it represents. The portrait-as-state draws on Laurel's (1991) theatrical metaphor, in which computational agents function as characters whose attributes communicate context as costume and props do on stage, and extends Mynatt et al.'s (2001) Digital Family Portrait paradigm from elder care monitoring to active family coordination.

Related Work

This review is organised around three theoretical perspectives that converge to form the basis for concept generation in the Concept-Driven Interaction Design Research (CDIDR) framework adopted by this study. The first concerns family coordination as a socio-material practice, drawing on CSCW research that characterises domestic scheduling as negotiated, distributed, and dependent on lightweight environmental cues rather than centralised information systems. The second concerns peripheral awareness and calm technology, which together offer

an alternative to interruption-driven design by foregrounding ambient representations that support awareness without demanding attention. The third concerns the emerging role of AI as a mediating layer that can aggregate and represent fragmented information while preserving human judgment and interpretive control. Each perspective is reviewed below, followed by a consolidated theoretical position that forms the starting point for concept generation.

Family Coordination

Coordination in everyday life has long been described as a socio-technical challenge. Ackerman (2000) characterises this tension as a persistent socio-technical gap between what technical systems can represent and what social situations require. The difficulty is not a lack of information, but that collaborative activity involves interpretation, negotiation, and situational judgment, all practices that cannot be fully captured in structured data or predefined workflows.

In domestic settings, this gap becomes particularly visible. Studies of home life show that families rarely lack information about schedules or commitments but instead engage in continuous work to keep routines aligned. Grinter et al. (2009) describe domestic coordination as an ongoing process of maintenance and repair, where household infrastructures are adapted, patched, or bypassed to fit the realities of everyday life. This perspective is rooted in foundational HCI theory, particularly Suchman's (1987) distinction between plans and situated actions. Suchman argues that plans are not rigid scripts that govern behaviour, but rather abstract resources used to navigate in-the-moment situations. In the context of domestic life, a calendar entry serves merely as a plan, while the actual coordination requires ongoing, situated adjustments to accommodate the shifting realities of family routines.

Classic work on collaborative activity highlights that coordination does not rely solely on explicit communication. Heath and Luff (1991) show how controllers in the London Underground maintain awareness of colleagues' activities by overhearing conversations and peripherally monitoring actions, enabling them to

adjust their own work without direct negotiation. While their study concerns a professional setting, the underlying observation is that coordination can be sustained through indirect, peripheral awareness rather than explicit information exchange and has formed subsequent work on peripheral displays in both workplace and domestic contexts.

The above work suggests that systems intended to support family coordination must accommodate negotiation, interpretation, and existing routines rather than impose rigid structures. They must also account for the peripheral and ambient ways in which families already sustain awareness of each other's activities and availability. Research on family awareness needs confirms that families orient around a small, recurring set of concerns, knowing where members are, what they are doing, and what is coming up, rather than seeking comprehensive detail (Khan and Markopoulos, 2009). Frameworks for human-centred AI emphasise that increased system capability should be accompanied by maintained human oversight and control (Shneiderman, 2020), a position particularly relevant in domestic contexts where meaning is negotiated rather than fixed.

Within this broader understanding, the family calendar has received sustained research attention as a coordination artefact. Neustaedter and Brush (2006) conducted a participatory design study with families to develop LINC, an inkable digital calendar, and found that calendar use is not merely a scheduling activity, but a social practice embedded in domestic routines: calendars are placed in visible locations, annotated informally, and consulted peripherally rather than deliberately. Their subsequent study of 44 families (Neustaedter, Brush and Greenberg, 2009) confirmed that families vary significantly in how coordination responsibility is distributed among household members. They identified three coordination styles: monocentric, pericentric, and polycentric, reflecting how responsibility is distributed among household members. Crucially, they showed that the calendar functions less as a precise scheduling tool and more as an awareness artefact that family members consult to gain a quick sense of the week rather than to extract exact times or details. This finding, that calendars support awareness rather than precision, provides empirical grounding for treating

abstraction, rather than detail, as the appropriate level of resolution for family coordination displays. This finding aligns with Hutchins (1995) account of distributed cognition, showing that cognitive processes are spread across people, artefacts, and environments rather than contained within individual minds.

Despite two decades of research on digital family calendars, the fundamental tension between detailed information and at-a-glance awareness persists. Digital tools have multiplied the channels through which coordination information flows, but none has resolved what Neustaedter, Brush and Greenberg (2009) identified as the core challenge: making the shape of the family's week visible at-a-glance, in a shared location, without requiring each member to actively compile information from multiple sources.

Awareness and Peripheral Presence

Sustaining awareness does not require continuous or detailed information. Dourish and Bly's (1992) Portholes system demonstrated that periodic, low-resolution images were sufficient to support coordination in distributed workgroups. Rather than demanding attention or action, these lightweight cues allowed participants to maintain a sense of who is present and available, enabling timely and confident coordination.

Observational studies of collaborative work further support this view. Heath and Luff (1991) show how coordination in control rooms relies on peripheral information, such as glances, movements, and ambient cues, rather than explicit verbal communication. These cues allow participants to adjust their actions continuously without interrupting ongoing tasks.

Early work in context-aware computing sought to make systems responsive to situational relevance rather than exhaustive data capture. Schilit et al. (1994) introduced context as information that could shape behaviour implicitly, while later frameworks formalised elements such as location, identity, and time (Dey, Abowd and Salber, 2001). Importantly, these approaches emphasised selective presentation of information, aligning system output with users' situational needs.

Although much of this work emerged from workplace and technical contexts, the underlying principle transfers to domestic life, as demonstrated by domestic technology probes that emphasise lightweight, ambient information in home settings (Hutchinson *et al.*, 2003). Family coordination similarly depends on knowing enough to judge availability and whether planned commitments can realistically be met. This is a need that Hutchinson et al. (2003) found often expressed through preferences for ambient, indirect cues rather than explicit updates.

Efforts to formalise the design space for such systems have produced complementary frameworks. Pousman and Stasko (2006) propose a taxonomy of ambient displays organised around four design dimensions: information capacity (the volume of data a system conveys), notification level (how aggressively it demands attention), representational fidelity (how literally or abstractly data is rendered), and aesthetic emphasis (how central visual quality is to the design). Their taxonomy provides a vocabulary for characterising systems that operate at the boundary between awareness and distraction and distinguishes ambient displays from notification systems on principled grounds rather than merely by degree. Bakker and Niemantsverdriet (2016) extend this perspective by proposing the interaction-attention continuum, arguing that interactive systems should not be designed solely for focused or implicit interaction, but should facilitate fluid shifts between focused, peripheral, and implicit modes of engagement. Their framework positions peripheral interaction as a distinct design objective rather than a diminished form of focused use and emphasises that systems embedded in everyday routines must accommodate varying levels of attention across contexts and over time.

The Cost of Interruption and Notification Overload

A substantial body of research demonstrates that frequent interruptions impose significant cognitive and emotional costs. Mark, Gudith and Klocke (2008) found that interruptions increase stress, accelerate task-switching, and reduce users' sense of control, even when overall task performance does not decline. These

findings suggest that systems optimised for immediacy may succeed operationally while undermining users' subjective experience of work.

Interruption costs extend beyond the moment of disruption. Iqbal and Horvitz (2007) show that recovering from interruptions requires users to reconstruct mental context, a process that fragments attention and increases cognitive load over time. As interruptions accumulate, users experience their activities as increasingly disjointed rather than continuous.

Beyond documenting costs, research has sought to classify how interruptions can be managed. McFarlane and Latorella (2002) propose a taxonomy of interruption coordination methods: immediate (forcing instant attention), negotiated (allowing the user to choose when to attend), mediated (delegating timing decisions to a system), and scheduled (delivering at predetermined intervals). Their framework suggests that the disruptive quality of notifications is not inherent but depends on how coordination is handled. Systems that rely exclusively on immediate interruption impose the highest cognitive cost, while negotiated or scheduled approaches may better preserve ongoing task focus. This distinction opens a design space for pull-based, rhythmic alternatives to push-driven, stochastic notification regimes.

In family contexts, the effects of interruption are often intensified by overlapping roles, time pressure, and divided attention. Notifications related to school, work, and family logistics compete within the same channels, making it difficult to maintain a coherent sense of the week. Rather than supporting coordination, these push-driven notification regimes risk fragmenting exactly the peripheral awareness that families rely on.

Calm Technology and Peripheral Interactions

The vision of ubiquitous computing, first articulated by Weiser (1991), imagined technology that would "weave itself into the fabric of everyday life". Calm technology offers an alternative paradigm for how interactive systems relate to human attention. Weiser and Brown (1996, p. 79) describe calm systems as those that "move easily from the periphery of our attention to the centre, and back,"

informing users without continuously demanding focus. Rather than maximising engagement, calm technology aims to preserve attentional balance by shaping how and when information is presented.

Importantly, calm technology does not remove decision-making from users. Instead, it reshapes information so that judgments can be made with less cognitive effort. By keeping most information at the periphery and allowing it to move to the centre only when needed, calm systems support situational awareness without imposing constant interruption.

Matthews et al. (2006) define glanceable displays as those that allow users to quickly comprehend information with minimal cognitive strain and without interrupting their primary activity. This term is adopted throughout the thesis to describe the interaction quality the design aims to achieve.

Hallnäs and Redström (2001) extend such a perspective by introducing slow technology, arguing that slowness can be a deliberate design resource. Rather than prioritising immediacy, slow systems invite reflection and engagement over longer timescales. This perspective challenges the assumption that timely information must always be delivered instantly, opening space for designs that align with rhythmic patterns of everyday life.

Dourish (2001) argues that interaction is fundamentally embodied and grounded in skilled, situated practice rather than abstract information processing. This perspective reinforces the calm technology proposition: an ambient display in the home supports coordination not by presenting data for deliberate consultation, but by becoming part of the environment through which family members perceive their shared situation.

More recent work has translated these ideas into practical design principles. Case (2015) outlines patterns for calm interaction that emphasise minimal demand on attention, predictable behaviour, and user control of information flow. These principles demonstrate how calm technology can be operationalised in contemporary systems rather than remaining a speculative vision.

One of the earliest attempts to apply these principles to domestic awareness is Mynatt et al.'s (2001) Digital Family Portrait. Designed to provide peace of mind for adult children monitoring an elderly parent living alone, the system used a familiar household object, a picture frame, populated with iconic imagery summarising 28 days of sensor-derived activity data. Rather than presenting numerical readings or event logs, the portrait conveyed qualitative patterns of daily life through visual density and colour. A year-long field trial confirmed that even without critical events, the display provided sustained awareness and emotional reassurance (Rowan and Mynatt, 2005). The Digital Family Portrait demonstrates that portraiture as a display paradigm can support peripheral awareness in domestic settings. However, its scope is limited to a single individual in an aging-in-place context, and its visual content is derived from environmental sensors rather than from schedule or coordination data.

The choice of portraiture as a display paradigm carries implications beyond ambient awareness. Odom et al. (2012) observe that digital possessions in domestic settings are intertwined with identity, memory, and control, shaping how people relate to shared information. A portrait on the wall is not a neutral display; it is a domestic artefact that signals belonging and familiarity. This suggests that the communicative qualities of a coordination display are inseparable from its identity as a household object.

Contemporary products increasingly experiment with calm interaction patterns through features such as bundled notifications or subtle peripheral cues (Apple, no date). While often limited to individual use, these artefacts suggest a broader shift away from constant alerts toward more deliberate information rhythms.

Agentive Systems and AI-Mediated Attention

Fundamentally, intelligent agents are structured around a continuous loop of sensing the environment, deciding on a course of action, and acting upon it (Russell and Norvig, 2021). In human-computer interaction, this capability is increasingly applied to domestic contexts, where agentive technology can mediate fragmented schedule data.

AI creates opportunities for systems that aggregate and reinterpret information across multiple sources (Amershi *et al.*, 2019). This capability is increasingly reflected in the industry shift toward 'generative UI' paradigms e.g. Leviathan et al. (2025), where interfaces are not statically predefined but rather dynamically assembled in real-time to reflect user context and intent. In domestic contexts, this raises the possibility of using such dynamic generation to mediate fragmented schedule data into more coherent, situationally relevant representations. At the same time, increasing system autonomy without careful design risks undermining user understanding and control (Shneiderman, 2020), particularly in contexts where meaning is negotiated rather than fixed (Messeter *et al.*, 2004).

Messeter et al. (2004) argue that interactive systems should remain user-configurable and preserve interpretive agency, particularly in contexts where meaning is negotiated rather than fixed. In family coordination, where plans are fluid and responsibilities are shared, maintaining such interpretive control is essential. This perspective positions AI not as a decision-maker, but as a mediator that reshapes information while leaving judgment with users.

Shneiderman (2020) formalises this position through a framework for human-centred artificial intelligence that rejects the assumption of a trade-off between automation and human control. His two-dimensional model argues that systems can simultaneously achieve high levels of automation and high levels of human control, provided that the system remains reliable, safe, and trustworthy. For domestic coordination, this framing suggests that AI can perform substantial aggregation and summarisation work while keeping the resulting representations transparent and modifiable by family members.

More recent work has sought to characterise the design space for such systems with greater precision. Holter and El-Assady (2024) propose a unified framework for analysing human-AI collaboration along three dimensions: agency (the degree of initiative each party holds), interaction (how information flows between human and system), and adaptation (how each party learns and adjusts over time). Their framework is useful for distinguishing between systems that actively steer users toward particular decisions and those that present information for human

interpretation without prescribing action. This is a distinction that general guidelines for human-AI interaction have emphasised as foundational (Amershi *et al.*, 2019).

Together, these perspectives define a mode of AI mediation where systems gather scattered signals into calm, interpretable representations while keeping humans in control of judgment and interpretation. Whether such mediation can meaningfully support family coordination has not been empirically examined. This is a context where information is fragmented across channels, responsibilities are negotiated rather than assigned, and awareness must be sustained without continuous engagement.

Consolidated Theoretical Position

The three perspectives reviewed above converge on a set of compatible propositions. From family coordination research, the key insight is that domestic scheduling is a socio-material practice sustained through negotiation, environmental cues, and peripheral awareness rather than through centralised information systems (Ackerman, 2000; Grinter *et al.*, 2009; Neustaedter, Brush and Greenberg, 2009). From calm technology and peripheral awareness research, the key insight is that awareness can be sustained through ambient, low-resolution representations that remain available for glancing without demanding focused engagement (Dourish and Bly, 1992; Weiser and Brown, 1996; Mynatt *et al.*, 2001; Matthews *et al.*, 2006). Together, these perspectives suggest that a coordination display in the home functions not as an information source to be consulted but as part of the environment through which the family perceives and acts on its shared situation.

From research on AI-mediated interaction, the key insight is that system autonomy must be carefully bounded: AI can aggregate and re-present fragmented information but should preserve interpretive control and remain legible to users (Messeter *et al.*, 2004; Shneiderman, 2020). Parasuraman, Sheridan and Wickens (2000) define ten levels of automation ranging from full human control to full

machine autonomy. This framework provides a scale for positioning where AI-mediated systems intervene in human decision-making.

These three positions are compatible because they share a common orientation: all privilege human judgment over system automation, ambient availability over interruptive delivery, and sufficient abstraction over exhaustive detail. Taken together, they define a theoretical space in which coordination information is aggregated from distributed sources, abstracted to a level sufficient for judgment, and presented ambiently in a shared domestic setting, without automating decisions or demanding continuous engagement. This consolidated position forms the theoretical starting point for concept generation, as described in the Method section (Wiberg and Stolterman, 2010).

Research Gap

The three perspectives reviewed above share compatible theoretical commitments, yet they have largely developed in isolation. Family coordination research has documented the negotiated, distributed nature of domestic scheduling but has primarily examined existing tools such as calendars and messaging (Neustaedter, Brush and Greenberg, 2009). Calm technology and peripheral awareness research have demonstrated that ambient, low-resolution displays can sustain awareness without demanding attention but has predominantly addressed workplace settings or individual monitoring such as elder care (Dourish and Bly, 1992; Mynatt *et al.*, 2001). Research on AI-mediated interaction has articulated principles for bounded system autonomy but has not examined how these apply to the specific challenge of aggregating fragmented family schedule data into shared, ambient representations.

This separation means that a significant design space remains unexplored: systems that operate as a low-attention layer on top of existing coordination tools, aggregating distributed signals into calm, interpretable overviews without demanding continuous interaction. Such systems would address a challenge that is not merely technically unresolved but socially persistent. Families continue to experience fragmentation and retrieval effort despite two decades of digital

calendar research (Neustaedter, Brush and Greenberg, 2009). Addressing this gap, the present study explores how a glanceable overview of family commitments can be designed to support shared coordination while preserving user judgment and interpretive control.

Method

Research through Design

This study adopted a Research through Design approach, treating design work as a means of generating knowledge through making (Frayling, 1993). Rather than just applying theory to produce a solution, the design process itself becomes a way of inquiry where new understanding emerges through making, reflecting, and iterating (Zimmerman, Forlizzi and Evenson, 2007). The artefacts produced are not endpoints but vehicles for knowledge production. They embody theoretical positions, expose tensions, and surface questions that purely analytical work cannot reach.

Within this tradition, the study follows Concept-Driven Interaction Design Research (CDIDR) as its methodological framework (Wiberg and Stolterman, 2010). CDIDR is particularly suited for this project because it starts from a theoretical concept rather than an identified user need, and explores what that concept implies through design, theoretical analysis, and critical reflection. The framework positions concept development as the central research activity, where the concept both guides and is refined by the research process. Although CDIDR is concept-driven rather than user-centred, Wiberg and Stolterman (2010) note that concept exploration may draw on varied methods, including empirical inquiry. In this project, qualitative interviews with parents were used not to identify user needs as a starting point, but to explore and refine a theoretically generated concept through confrontation with lived coordination practices.

The Concept-Driven Interaction Design Research Framework

Wiberg and Stolterman (2010) propose concept-driven interaction design research as a methodology in which a theoretical concept, rather than an identified user need or technical opportunity, serves as the starting point for design inquiry. The framework is rooted in the premise that design can generate knowledge by articulating, manifesting, and critically examining concepts that do not yet exist as designed artefacts. Where user-centred approaches begin from empirical observations of problems, CDIDR begins from a theoretically grounded proposition about what could exist, and uses design work to explore, test, and refine that proposition.

The framework is organised around seven methodological activities:

1. Concept generation, where a theoretical concept is articulated from existing theory.

2. Concept exploration, where the concept's implications are investigated through sketching, prototyping, theoretical analysis, or empirical inquiry.

3. Internal concept critique, where the researcher evaluates the emerging concept against its theoretical foundations.

4. Design of artefacts, where the concept is instantiated in a concrete design.

5. External design critique, where the concept and artefacts are exposed to outside evaluation.

6. Concept revision, where the concept is refined considering critique and new insights.

7. Concept contextualisation, where the concept is positioned in relation to existing work.

These activities are not strictly sequential; they overlap, recur, and inform one another throughout the design process. Wiberg and Stolterman (2010)

acknowledge that few projects complete all activities fully and emphasise that what matters is that each activity is accounted for and that the researcher is transparent about how far the work has progressed.

Application of the Framework in This Project

This section describes how the CDIDR method is operationalised in the project, outlining how each methodological activity is instantiated in practice. The guiding concept for this project, an agentive overview for family coordination, is articulated from the theoretical position described in Consolidated Theoretical Position. That position, described in the Consolidated Theoretical Position section, identifies a convergence between three research streams: family coordination as socio-material practice, calm technology and peripheral awareness, and AI-mediated interaction. The literature review argued that these three perspectives, when combined, could address the specific challenge of family coordination across fragmented digital channels.

The project began with concept generation, where the core idea was articulated through engagement with theories of calm technology, peripheral awareness, and AI-mediated attention. These theoretical foundations, outlined in the Related Work chapter, informed the initial framing of the guiding concept.

This was followed by *concept exploration*. Six qualitative interviews were conducted with parents and guardians to ground the concept in lived experience. Sketch-based probes were used to explore qualities such as glanceability, temporality, and ambient placement. Through this process, a five-dimensional design space was articulated to structure and compare emerging variations of the concept.

Throughout the project, *internal concept critique* was maintained in an ongoing design log (Appendix. Design Log). The log documented iterative reflections from early sketches to prototype development. Each design decision was assessed in relation to the underlying theoretical foundations, and tensions, contradictions, and revisions were explicitly recorded.

The *design of artefacts* operationalised the concept. Initial ideas were expressed through low-fidelity sketches and gradually developed into a prototype. In parallel, technical feasibility was explored through a pipeline architecture connecting data sources to portrait generation, ensuring that the conceptual proposition could be meaningfully instantiated.

An *external design critique* was conducted through the deployment of a technology probe with two families over a limited period of time. Participants' experiences were captured through semi-structured interviews and analysed using thematic analysis. This phase allowed the concept to be examined in a situated context.

Subsequently, *concept revision* was undertaken. Insights from the literature review and internal critique were revisited to identify potential misalignments between the concept and existing research. The theoretical foundations were re-examined and refined accordingly.

Finally, *concept contextualisation* positioned the developed concept within the broader design landscape. By mapping it against related work and identifying dimensions of variation, the project articulated how the concept both relates to and departs from existing approaches.

Beyond this procedural sequence, several methodological decisions shaped how the framework was interpreted in practice. The most significant methodological decision was to combine concept exploration with empirical inquiry. Rather than developing the concept purely from theory and then testing it, qualitative interviews with parents were used both to explore the problem space and to refine the concept's theoretical foundations. As part of this exploration, sketch-based probes inspired by Gaver et al. (1999) and Hutchinson et al. (2003) were developed. They were open-ended visual artefacts designed to surface values, preferences, and interpretations that direct questioning may not reach. This approach follows Wiberg and Stolterman's (2010) observation that exploration activities may draw on varied methods, including empirical work, if the concept

remains the organising principle. Similarly, internal concept critique occurred throughout the design process rather than as a discrete evaluation event.

External critique, within the CDIDR framework, was carried out through two complementary activities. Design supervision sessions provided expert feedback on visual and interaction decisions throughout the process. The technology probe deployment, in which families encountered the prototype in a domestic context, served as the primary external critique activity and is described in the section Technology Probe Deployment and reported in the Results chapter.

Empirical Inquiry

The empirical component of this study served as the concept exploration activity within the CDIDR framework. Its purpose was to investigate how parents currently coordinate family commitments, to surface frustrations and preferences related to digital coordination tools, and to use sketch-based probes to explore reactions to alternative forms of ambient information display.

Participants

Six parents and guardians of school-age children (ages 6–18) participated in the study. Participants were strategically selected to represent variation in gender, household arrangements, number of children, and self-reported comfort with digital tools. Specifically, the sample included both single-parent and dual-parent households, parents who described themselves as digitally confident alongside those who reported low comfort with technology, and families with between two and four children spanning primary and secondary school ages. All participants were responsible for coordinating everyday family logistics. This purposive sampling aimed to surface a range of coordination practices and frustrations rather than to achieve statistical representativeness. Further participant details are provided in: Appendix. Participants.

Interviews

Data were collected through semi-structured interviews lasting 25–40 minutes, conducted via video call or in person. Interviews focused on time use, notification

practices, coordination behaviours, and the digital tools participants relied on. In addition, participants were asked about their experiences with generative AI, their attitudes toward AI as a potential collaborator in family coordination, and their expectations and concerns regarding productivity and acceptable system behaviour. The interview guide is provided in: Appendix. Interview guide - Empirical Inquiry.

Ethical Considerations

Participation in this study was voluntary and based on informed consent. Participants were informed that they could withdraw at any time, that recordings would be deleted after project completion, and that findings would be reported using pseudonyms. Further details are provided in: Appendix. Interview guide - Empirical Inquiry.

Sketch-Based Probes

Three sketch-based probes were presented during each interview (see Appendix. Interview guide - Empirical Inquiry). Participants were first shown each probe without explanation and asked to describe what they saw and what they thought the display communicated. Follow-up questions explored whether something like it would fit into their home, what information they would want or remove, and how it compared to their current tools. The order of presentation was kept consistent across interviews to allow comparison.

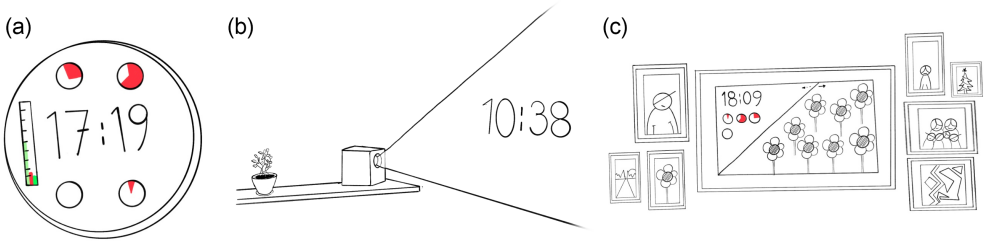

Figure 1: Three sketch-based probes used to explore glanceability.

Interview Analysis

Interviews were transcribed and analysed thematically following an inductive approach (Braun and Clarke, 2006). Initial coding identified recurring patterns in

how participants described their coordination practices, the tools they used, and the frustrations they encountered. These codes were iteratively grouped into broader themes through comparison across interviews. The analysis focused on three areas: (1) how parents described fragmentation and retrieval across channels; (2) what forms of awareness they found sufficient or desirable; and (3) what interaction qualities they associated with calm or stressful coordination. The coding process is documented in: Appendix. Thematic Analysis.

Technology Probes and Further Interviews

To complement the interview-based concept exploration with external design critique, the prototype was deployed as a technology probe (Hutchinson *et al.*, 2003) with two families over a period of two days. Each family was given access to the technology probe, which they configured with their own family members and upcoming commitments through the conversational interface during the deployment period.

The probe served three purposes aligned with Hutchinson et al.'s (2003) framework: to gather data about how families interpreted and engaged with the overview in a domestic context, to test the underlying concept of portrait-based peripheral awareness in a real setting, and to inspire new design directions based on unanticipated use. Following the deployment, semi-structured interviews were conducted with each family to capture their experiences, interpretations, and suggestions. These interviews were analysed using thematic analysis (Braun and Clarke, 2006).

Results

Interview Findings

Five themes emerged from the interviews, characterising how parents might coordinate across fragmented channels. A further set of codes was related to participants' attitudes toward technology and AI, although these did not form a distinct theme. The themes and attitudes are documented in: Appendix. Thematic Analysis.

Fragmentation and Retrieval Effort

The interviews surfaced a recurring pattern of fragmentation. Information relevant to family coordination was distributed across school apps, messaging channels, email threads, and shared calendars. Parents described searching for the same piece of information multiple times or relying on memory because locating the original source required too much effort. Notifications were often experienced as noise rather than signals, arriving frequently but rarely at the time when the information was needed.

Desire for Overview Without Depth

A second theme concerned the desire for overview without requiring deep engagement. Parents expressed wanting *one place* to understand the week, not to centralise all details, but to reduce the cognitive effort of consulting many sources. The goal was a quick sense of who was doing what, when, and whether the week was manageable. Several participants explicitly rejected interfaces that required navigation through menus or apps. They wanted something that could be checked at-a-glance. The frustration was not with individual tools, but with the effort of assembling information across them.

Sufficiency of Coarse-Grained Cues

A third theme involved comfort with approximate rather than precise information. Phrases such as on the way home, still at school, or free later were described as more useful than exact locations or timestamps. What mattered for coordination was whether a plan was feasible or whether someone was available, not specific coordinates or arrival times. Exact detail was sometimes described as unnecessary, and occasionally as intrusive. This suggests that situational judgment, rather than data precision, is central to everyday coordination.

Preference for Predictable, Bundled Updates

A fourth theme concerned the timing and rhythm of information. Parents valued predictable, low-frequency updates, morning summaries, pre-evening check-ins, or a consolidated view, over constant micro-notifications. Older, slower forms of communication were referenced positively: paper schedules on the fridge, weekly

planners, or routines of checking in at specific times. These were described as establishing a shared temporal rhythm that current digital tools disrupt rather than support.

Degree of Agency

A fifth theme emerged from participants' attitudes toward technology and AI in a coordination context. Two participants expressed clear interest in AI that performed administrative tasks on their behalf; handling cancellations, or suggesting new times, provided they retained final confirmation. Others expressed the opposite concern that automated planning would erode their cognitive capacity with increased digital complexity. Several participants preferred manual tools such as paper calendars, valued device longevity over smart features, and described wanting fewer digital demands rather than more. One participant described significant stress around digital systems altogether. The pattern suggested a narrow band of acceptable system agency: participants wanted help that reduced retrieval and coordination effort, but not at the cost of feeling that decisions were made for them.

Table 1 summarizes individual coordination profiles across participants, structured around two analytical dimensions: primary friction and key desire. While the themes above describe recurring patterns across interviews, the table illustrates how these patterns manifested differently in specific domestic contexts.

Table 1: *Participant coordination profiles.*

ID & Context	**Primary friction**	**Key desire**
IP1 (Dad, 3 kids)	**Fragmentation:** Too many channels (Teams, WhatsApp, school apps). Hard to recall *where* a message was sent.	**Pull-based awareness:** Wants to check info when needed, not be interrupted.

IP2 (Dad, 2 kids)	**Retrieval:** Difficulty locating specific details (phone numbers, codes) buried in emails.	**Contextual relevance:** Just-in-time reminders rather than constant data streams.
IP3 (Mom, 2 kids)	**Overload:** Carries 90% of the coordination burden; dislikes digital intrusion.	**Weekly Overview:** A simple, low-tech view of the week without manual entry.
IP4 (Mom, 3 kids)	**Cognitive Mismatch:** Plans mentally; found partner's ad-hoc style stressful.	**Ambient cues:** Gentle, non-intrusive signals (light/warmth) over loud alerts.
IP5 (Mom, 3 kids)	**Ad-hoc Chaos:** Family is "unplanned"; relies heavily on live location (Find My).	**Abstraction:** Wants status (e.g., "on the way") without invasive tracking.
IP6 (Dad, 2 kids)	**Tech Stress:** Low tech-confidence; overwhelmed by logins and complex platforms.	**Clarity:** Simple, visual answers to "Where is everyone?" without navigation.

What is notable across these profiles is that the frictions point toward different sources of difficulty; too many channels, buried details, uneven responsibility, mental load, unpredictability, and digital overwhelm. Yet the desires converge toward less detail, more peripheral availability, and lower interaction cost. No participant requested more comprehensive data or more powerful filtering. Where participants had attempted to manage notification overload through filtering, these strategies were described as unreliable and effortful in themselves.

The consistent preference was not for better push systems but for pull-based alternatives where information remains available without demanding attention. At the same time, the relationship between friction and desire is not always straightforward. The participant carrying the heaviest coordination burden requested a weekly overview yet also resisted any tool that required manual input,

suggesting that visibility alone does not address the underlying asymmetry in coordination labour. In another family, where ad-hoc routines made structured calendars impractical, abstraction served a different function: representing activity types rather than precise locations preserved privacy and provided a sense of the family's state without imposing a structure the family could not sustain.

These tensions between wanting awareness and resisting the effort or structure required to produce it recur across profiles and directly informed the design space's emphasis on abstraction over precision, ambient availability over active retrieval, and AI-mediated aggregation over manual compilation.

The Concept and Its Design

From Themes to Design Space

The five interview themes identify what families experience; the design space identifies what can be designed. Translating between the two required identifying, for each theme, the underlying design variable. It is the axis along which a system could be positioned differently from current tools. This translation was carried out through a structured synthesis in which interview excerpts and thematic codes were mapped against theoretical constructs from the related work; calm technology's periphery to centre model, Holter and El-Assady’s agency dimensions, and Neustaedter, Brush and Greenberg’s coordination typology, to identify recurring design-relevant tensions. Each theme was iteratively refined into a dimension that captured the range of possible positions a system could take. Table 2 summarises the result below.

Table 2: *The design space for family coordination.*

Dimension	Theme	Current Applications	Proposed Concept
Modality & Placement	Desire for overview without depth	Deep app (buried inside phone; requires unlocking/navigation).	Ambient (on the wall / shelf; always visible; peripheral).
Abstraction of Status	Sufficiency of coarse-grained cues	Precise data (exact times, locations, GPS coordinates).	Coarse cues (at school, On the way, Free).
Temporal Scope	Preference for predictable, bundled updates	Daily / snapshot (what is happening right now or today).	Family rhythm (the "shape" of the week, longer horizon).
Interaction Posture	Fragmentation and retrieval effort	Push / interrupt (notifications that buzz you).	Pull / glance (you look when you want; it doesn't shout).
Degree of Agency	Degree of Agency	Manual / raw (user digs for data) OR Autonomous (AI decides for you).	Summarising (AI aggregates and re-presents for judgment).

The design space for family coordination maps five dimensions along which an agentive overview differs from current coordination tools.

Modality and placement ranges from deep app interfaces that are buried inside a phone, requiring unlocking and navigation, to ambient displays positioned in a shared domestic space. The proposed concept occupies the ambient end: a display on a well, shelf, or counter, that is visible in passing and accessible to all household members simultaneously.

Abstraction of status spans from precise data, with exact times, GPS coordinates, detailed event descriptions, to coarse-grained cues that communicate status categories such as “at school”, “on the way”, or “free later”. The proposed concept positions itself toward the coarse end: attributes on the portrait communicate activity type and general state rather than detailed schedules, supporting feasibility judgement over precise planning.

Temporal scope ranges from daily snapshots showing only the present moment to longer planning horizons spanning weeks or months. Between these, systems may offer fixed weekly overviews or rolling windows such as "today + next 3 days", each shaping how families anticipate and adjust plans. The proposed concept adopts a weekly rhythm, rendering the week as a shifting foreground–background composition that makes its overall shape visible.

Interaction posture spans from push-driven systems that interrupt through notifications to pull-based designs where information remains available without demanding attention. The proposed concept favours pull-based glancing: visual cues on the ambient display invite rather than demand attention. Active engagement occurs through the companion app when the user chooses.

The *degree of agency* ranges from manual retrieval, where the user locates and interprets all information, to autonomous action where the system makes the decision on the user’s behalf. The proposed concept positions itself as a summarising agent: it aggregates distributed data, categorises events, and re-presents them for human judgement, but initiates no action and infers no intent.

Across these five dimensions, the design challenge becomes shaping a low-attention interface that sits above existing tools, enabling families to maintain shared awareness without adding complexity. The following section presents the concept that occupies this position in the design space.

The Concept

The design space described above maps the dimensions along which an agentive overview for family coordination may vary. This section presents the guiding

concept, the theoretical proposition within the CDIDR framework serves as both the starting point for the design and the object of ongoing critique and revision (Wiberg and Stolterman, 2010).

The concept is an agentive, glanceable overview for family coordination: an ambient display that represents each family member through portraits and attributes shifted to reflect the week's commitments. When an event requires attention, the portrait signals this through a visual cue. Action, claiming or responding to events, is handled through a companion mobile interface. The concept draws on the consolidated theoretical position articulated in the Consolidated Theoretical Position section: family coordination sustained through peripheral awareness and negotiation (Neustaedter, Brush and Greenberg, 2009), ambient representations that support awareness without demanding attention (Weiser and Brown, 1996; Mynatt *et al.*, 2001), and AI mediation that preserves human interpretive control (Messeter *et al.*, 2004; Shneiderman, 2020).

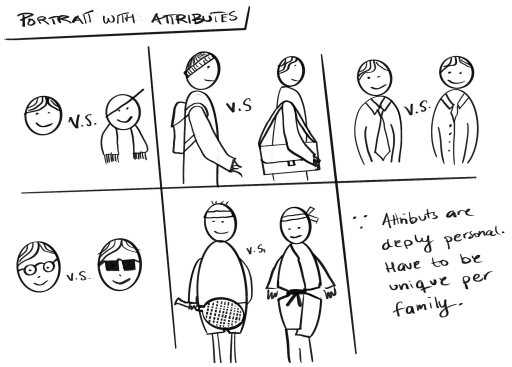

Figure 2a: Portraits with attributes.

Figure 2b: The family weekly.

A week in the Lindgren household

The Lindgren family, Sara, Erik, and their children Minou (14) and Olle (9), rely on a shared calendar, a school communication app, a football club chat, and a family group chat to coordinate their week. On Sunday evening, Sara opens the companion app and speaks to it as she would to a family member: “Minou has a maths exam on Wednesday, Olle has football practice Tuesday and Thursday at five, and I’m travelling to Gothenburg on Thursday.” Erik adds: “I have a late meeting on Tuesday. Free otherwise.” The system parses these statements into

structured events with participants, activity type, date, and whether the event requires someone else's involvement.

By Monday morning, the ambient display on the kitchen wall shows four portraits. Minou's portrait foregrounds a school desk, signalling the approaching exam. A football, small and distant, sits in the background. Thursday's practice is still days away. Olle's portrait shows football gear prominently; his first practice is tomorrow. Sara appears in work attire, her week still calm. Erik's portrait is neutral; nothing demands attention yet. The family glances at the display over breakfast without stopping to read anything. The shape of the week is visible: a busy middle stretch is approaching.

On Tuesday morning. Olle's portrait now foregrounds the football attribute more prominently; practice is today. A faint reddish tint on his portrait signals that the event is unclaimed: no one has confirmed who handles pickup. Sara notices the tint as she passes through the kitchen. She picks up her phone, opens the companion app, and taps to claim the event. The tint clears. Olle's portrait returns to its warm, neutral tone. Erik, seeing the display later, registers that the pickup is handled without needing to ask.

By Wednesday, Minou's exam dominates her portrait. Olle's football has receded after yesterday's practice; Thursday's session begins to move forward. Sara's travel attribute, a suitcase, starts to emerge in the background of her portrait. The display communicates the week's rhythm: midweek intensity building toward Thursday's convergence of travel, practice, and Erik's solo parenting evening.

On Thursday morning, Sara's portrait foregrounds the suitcase, she is travelling. Olle's portrait again shows football prominently and again carries a reddish tint. Pickup is unclaimed. Erik sees two things at once: Sara is away, and Olle needs pickup. He claims the event from his phone. The display updates. By Thursday evening, Erik's portrait appears alongside Olle's at home. Sara's portrait carries the travel attribute but remains calm. Her trip is underway, nothing requires action.

Approaching the weekend, the portraits settle. Exams and practices recede. Next week's commitments begin to appear faintly in the background, a birthday party for Olle on Saturday, a dentist appointment for Minou on Monday. The week's visual density decreases, communicating a calmer period ahead. The family does not receive a notification announcing this. The shift is gradual, visible to anyone who glances at the display in passing.

Concept Summary

The concept operates along the five dimensions identified in the design space. It abstracts coordination data into coarse-grained attributes rather than precise schedules. It renders the week's temporal scope as a shifting foreground-background composition rather than a daily snapshot. AI functions as a summarising agent that aggregates and categorizes without making decisions. The display is ambient, positioned in a shared domestic space rather than inside a personal device. And the interaction posture is pull-based: the family glances when they choose to; the display does not interrupt.

The Prototype

The prototype realises the concept as a working system composed of four elements: visual representation through portraits and attributes, temporal layering that reflects the week’s rhythm, a family view that composes individual portraits into a shared display, and an AI pipeline that translates coordination data into visual form.

Throughout this description, attributes refer to the visual elements layered onto portraits: clothing, objects, environmental details. These attributes function as cues when their position, prominence, or colour signals coordination-relevant information: a football moving to the foreground cues that practice is approaching; a reddish tint cues that an event is unclaimed.

Visual Representation with Portrait and Attribute

The core visual strategy separates identity from context. Each family member is represented as a stable portrait figure that serves as a consistent visual anchor

allowing immediate recognition. Layered onto this portrait are variable attributes such as clothing, objects, accessories, and environmental elements; that communicate situational meaning without requiring text or numerical data.

This design reflects the interview finding that coarse-grained cues are often sufficient for coordination. A tennis racket signals sports practice; a school desk signals homework or exams; a packed bag signals travel. These visual cues operate at the level of feasibility judgment rather than precise scheduling. The question the display answers is not "What time does football start?" but "Is this a football day?"

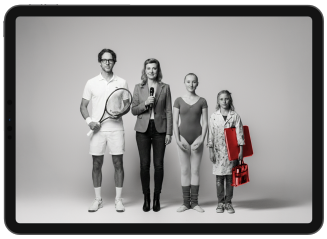

Figure 3a: Portraits with attributes where the event is unclaimed.

Figure 3b: Portraits with attributes where the event is claimed.

Figure 3c: Portraits with attributes indicating new activity.

Critically, the attributes must be family-specific rather than generic. A football icon carries different weight in a family where one child plays competitively than in one where football is an occasional activity. The visual vocabulary emerges from the family's own coordination practices, routines, and recurring commitments. This aligns with research on domestic coordination showing that meaning is locally produced rather than universally defined (Grinter et al., 2009). Configuring these attributes becomes part of the system's setup, establishing a shared visual language that family members can interpret at-a-glance.

Laurel (1991) offers a useful framing here. Computational agents can be understood through theatrical metaphor, functioning as characters within a representational space. The family member portraits are not data visualisations but characters whose attributes communicate context much as costume and props do on stage. This theatrical framing suggests that recognition and interpretation

operate differently than reading a calendar, engaging perception and pattern-matching rather than sequential information processing.

Temporal Layering

The ambient display creates visual depth across the week through a foreground-background model. Immediate activities and commitments appear in the foreground, rendered prominently and attached closely to the portrait based on upcoming events and their attributes. Approaching events, those coming later in the week, appear in the background or periphery, smaller or more distant, gradually moving forward as the week progresses.

For example, on Monday, a child's portrait might show a school desk prominently in the foreground. There might be exams this week, with a football placed small and distant in the background, indicating weekend practice. As the week progresses, the school desk recedes (exams completed or approaching completion) while the football moves forward, growing larger and more central as Saturday approaches. By Friday evening, the football dominates the foreground while next week's commitments begin to emerge faintly in the background.

This gradual transition model connects to Hallnäs and Redström's (2001) concept of slow technology and Weiser and Brown’s (1996) principle of moving information from centre to periphery. Rather than discrete changes or interruptions, the display operates on a longer timescale, making the family’s rhythm visible as an integrated whole. A busy midweek giving way to a calmer weekend, or vice versa.

The Family View

A parent glancing at the display can see at once that one child has a visually dense week with multiple attributes, another has a calm appearance with few commitments, one parent is travelling, shown with an airplane, while another is doing voice work.

This collective view supports the coordination judgments described above. Can we manage Wednesday? Who is free to handle pickup? Is this a week where we

need extra support? The visual composition provides the raw material for such judgments to be made quickly and collaboratively.

The shared, ambient placement is equally important. Unlike phone-based apps that are accessed individually, the display is positioned in a common domestic space, a wall in the kitchen, a shelf in the hallway, a counter where family members pass. This positioning transforms coordination from an individual information-retrieval task into a shared peripheral awareness. Family members do not need to ask, "What's the week looking like?" because the answer is visible in passing. This aligns with the calm technology principle of moving information from centre to periphery, allowing attention to engage when needed rather than demanding it continuously (Weiser and Brown, 1996).

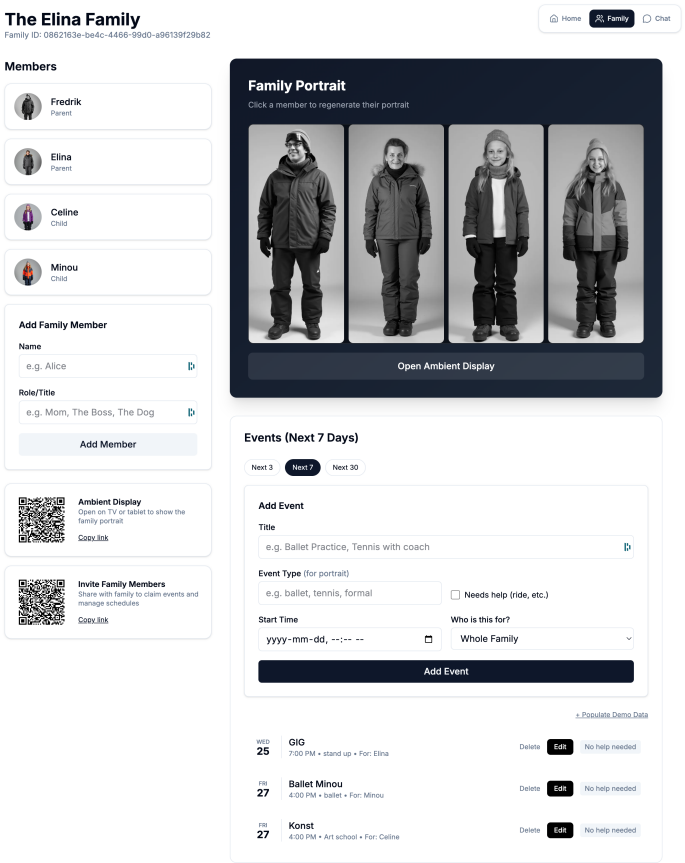

Figure 4: The companion application. Family members manage events and members here; the ambient display (opened via "Open Ambient Display") shows the portrait view in a shared domestic space.

Data-to-Portrait Pipeline

The pipeline follows a sense–decide–act structure common to agent architectures (Russell and Norvig, 2021): the system senses coordination data through conversational input, classifies and selects relevant events, and acts by generating updated portraits. Generative AI operates as infrastructure within this design, not as a visible agent. The technology probe translates coordination data into visual form through a three-stage data-to-portrait pipeline.

1. Input: Family members add events through a conversational interface. Natural language statements such as "Minou has soccer practice Thursday at 5" are parsed into structured data: participant, activity type, time, and whether assistance is needed. The interaction feels like describing plans to another family member rather than filling out a form.

2. Classification. Each activity is assigned an event type; such as sport, school, travel, or work. It could either be entered by the family member or inferred from the event description. These types map directly to portrait attributes: a sport event produces athletic attire, a school event produces a desk or books.

3. Portrait synthesis: When the technology probe generates a portrait, it queries upcoming events for that family member and selects the most temporally relevant. A reference photograph provides facial identity; the event type provides context. The generative model produces a new portrait that combines recognisable likeness with contextual dress, and the same person is visibly prepared for what comes next.

AI operates as a mediating layer that makes the week visible by reshaping fragmented data into a coherent, glanceable representation, supporting human judgment rather than replacing it.

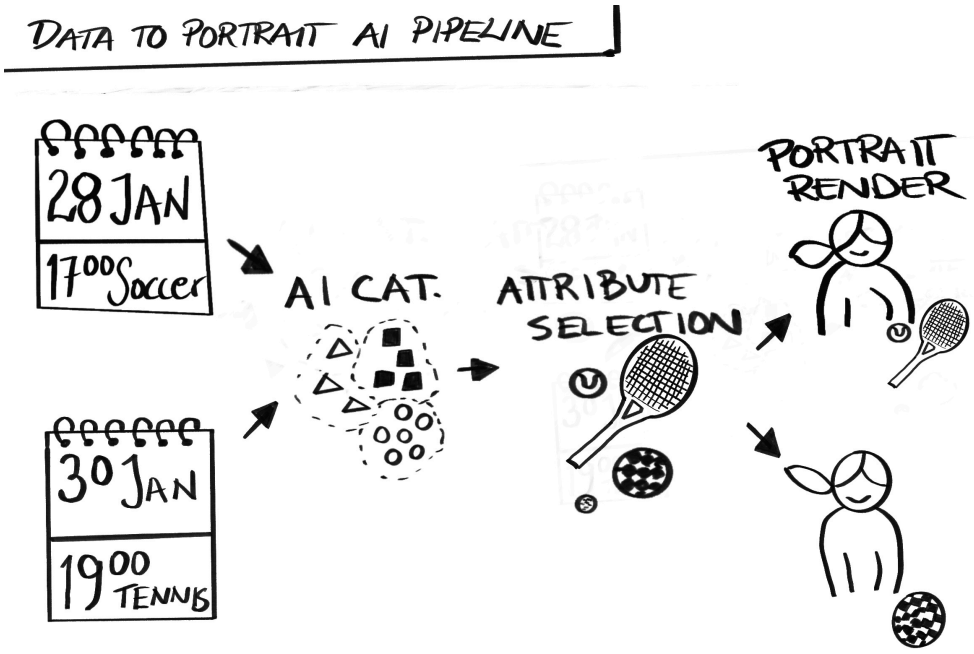

Figure 5: The data-to-portrait pipeline.

Design Constraints

The concept proposes a family group portrait where each member's attributes shift to reflect the week's activities. When an event has not yet been acknowledged by a family member, it is unclaimed: no one has indicated responsibility for handling it. When someone accepts responsibility, the event becomes claimed and resolves visually in the portrait. This claimed–unclaimed distinction serves as the primary coordination cue.

The technology probe implements a simplified version of this concept. Each family member is represented as an individual portrait rather than as part of a group composition. Attributes in the foreground-background were replaced by a colour overlay system: a neutral tone when all events are claimed, and a reddish tint when something requires attention. The conversational input interface was retained, allowing family members to add events through natural language as a complement to structured forms.

These simplifications reflect implementation constraints rather than design choices. The full concept, group composition, attribute shifting, foreground-

background temporal layering, remains the target design proposition. The probe tests whether the core idea holds even in reduced form. Can an ambient, agentive overview of family members support shared awareness without demanding attention? The gap between concept and probe is documented in the design log (Appendix. Design Log).

Technology Probe Findings

Two participants tested the technology probe over 48 hours in February 2026. IP7 is a married father of three children (ages 11, 7, and 1) who relies on multiple digital calendars across work and private life. IP8, who also participated in the empirical inquiry as IP3, is a cohabiting mother of two children (ages 14 and 11) who primarily uses a paper calendar and does not share a digital calendar with her partner. Both tested the probe individually without involving other family members during the evaluation period.

The technology probe interviews were analysed thematically alongside each other rather than as separate cases. Five themes emerged, each of which is discussed below.

Legibility of Visual Signalling

Both participants found the red colour overlay for unclaimed activities immediately understandable. IP7 described it as *very clear* and noted that it made visible which activities had not yet been acknowledged by a family member. IP8 connected the red signal to temporal proximity, observing that items became red when they were imminent: “if I used it all the time, I would notice that something is happening today, because it is red.” For IP8, the red tint on an event provided a concrete example of how the system could surface an activity that might otherwise have been forgotten.

The portrait attribute changes were also legible, though with varying success across family members. IP7 found the portrait changes engaging and described the calendar as feeling “more alive” when portraits updated to reflect upcoming activities. IP8 reported that the youngest daughter's ballet outfit was clearly recognisable, but that other family members' activity-based clothing was less

distinct: “one had a white ballet dress... but the other didn't get dance clothes that were obvious.”

Both participants noted that the quality of the reference photograph affected the portrait likeness. IP7 observed that “the better the photo was, the more realistic the avatar became.” IP8 found that some family members' portraits had disproportionate body shapes and did not look sufficiently like themselves, noting that if the display were to function as a permanent fixture in the home, “you would want to look more like yourself.”

Overview and Temporal Orientation

Both participants valued the concept of a consolidated family overview, though they articulated this need differently. IP7 described the probe as “a very easy way to see the whole family's agenda in an overview” and contrasted it favourably with his current experience of fragmented calendars: “my problem with calendars is that unless my wife invites me and I have it in the calendar, which happens maybe 30% of the time we have an activity, it is easily forgotten.” For IP7, the probe addressed a retrieval problem across multiple digital tools.

IP8 framed the value differently. Since her family lacks any shared calendar, either digital or physical, the probe represented a potential first shared coordination surface. She emphasised that recurring children's activities are already well-known to the family and that the real value lies in surfacing irregular changes: “I think what the others would benefit more from is when I work evenings and when I am travelling.” She suggested that the display should show a full seven-day overview so that family members could scan the week and identify when someone would be absent.

IP8 also articulated a desire for the system to detect scheduling conflicts. She described a scenario where she might be working in Gothenburg, her partner attending a concert, and a child needing a ride to a performance on the same evening: “then it should really light up red and say, now you have a conflict.” This extends the red signalling concept from unclaimed activities toward collision detection between overlapping commitments.

Portrait Engagement and Identity

The AI-generated portraits elicited strong reactions from both participants. IP7 found the portraits engaging and described them as making the coordination display more interesting to look at compared to a conventional calendar: “the activity itself is not super exciting to stare at, but the individuals become very fun.

IP8's experience was more complex. She initially received a male portrait because she had not specified her gender in the profile, assuming that identifying as *mother* would be sufficient. This highlighted a gap in the onboarding process where the system did not infer gender from the family role. Once corrected, the portraits were recognisable but not entirely satisfactory: “you can see that it is us, but they change a little all the time.” She also observed that the portraits changed clothing and appearance several times without any input from her, which she found confusing.

Both participants expressed that the portrait concept would need higher visual fidelity and consistency to function as a permanent display in the home. The current level of variation would need refinement before sustained domestic use in their respective homes.

Onboarding and Input Friction

Both participants encountered friction during setup, though the nature of the friction differed. IP7 found the initial configuration process unclear and expressed a preference for a guided onboarding flow: “I would rather have had it take me through different steps, like when you set up your new iPhone.” He also misinterpreted the ten-second portrait generation delay as a bug, not realising the system was processing his request.

IP8 experienced technical friction with image uploads, as her iPhone's HEIC format was not supported. This required multiple attempts and slowed her setup process. She also did not discover the chat-based input method for adding activities and instead used only the form-based interface. When informed of the chat option, she responded: “oh, I did not notice that.” This suggests that the dual input paradigm (form and chat) needs clearer visual aid.

Both participants found the actual activity entry process straightforward once the initial setup was complete. IP8 noted redundancy in the form fields, where she had to enter the activity name twice (once as a title and once as a description), and suggested consolidating these into a single field.

Placement and Domestic Integration

Both participants had clear ideas about where the display should live in the home and how it should be encountered. IP7 noted that the concept worked better on a larger screen than on a mobile phone, where the layout felt “quite cramped”. He expressed willingness to adopt the concept if it could synchronise with his existing calendar infrastructure: “if it could pull from Gmail, Outlook, and whatever else, so you get all your calendars right into it.”

IP8 suggested placing the display in the hallway rather than the kitchen, reasoning that “it is where you are on your way somewhere” and where coordination reminders would be most actionable. She described a scenario of glancing at the display while leaving and being reminded that a child has ballet and needs their clothes. She also suggested using a laptop screensaver as an alternative display surface, since her laptop with Spotify is always open at home.

Both participants spontaneously connected the concept to their frustration with existing calendar fragmentation. IP7 described moving between family, private, and work calendars as something that “becomes a lot of jumping around.” IP8 emphasised that her family's lack of any shared calendar made the need for a unified overview even more acute. Neither participant raised concerns about the display being intrusive nor adding to notification overload. IP7 explicitly stated he had no such concerns, while IP8 noted that the concept would need calendar integration to avoid the burden of manual data entry.

Summary of Probe Findings

The technology probe evaluation surfaced several key findings that both validate and extend the design concept:

The binary claimed/unclaimed signalling via red colour overlay was immediately legible to both participants and understood as an indicator of items requiring attention. That legibility depends, however, on a prior shared understanding of what claiming means within the family; an understanding that is negotiated rather than given, and that the system supports but cannot replace. This validates the claimed = handled design principle that emerged through the design process.

Portrait-based representation created engagement and a pull toward the display that conventional calendar interfaces lack. However, portrait likeness, consistency, and the relationship between reference photographs and generated output require refinement for sustained domestic deployment.

The two participants represent different coordination archetypes: IP7 coordinates across too many digital calendars (fragmentation), while IP8 coordinates with essentially no shared digital infrastructure (absence). Both found the concept valuable, suggesting that the design addresses a need that spans different levels of digital calendar adoption.

New design directions emerged from the probe, including collision detection for overlapping commitments (IP8), notification badges with temporal proximity information (IP7), and hallway placement as an actionable coordination surface (IP8). These extend the design space beyond the current prototype and point toward future development.

Onboarding friction was the primary barrier to engagement. Both participants needed clearer guidance through the setup process, suggesting that a stepped onboarding flow and better error communication would be necessary for any future deployment.

Concept Revision

The technology probe evaluation and the design process leading up to it prompted several revisions to the concept. Some revisions were made during iterative design work prior to the probe deployment, while others are motivated by findings that emerged from the probe sessions. This section documents both.

Revisions Made Through Design

The most significant revision during the design process was the shift from a single group family portrait to individual portraits per family member. The original concept envisioned a composite image where all family members appeared together, resembling a traditional family portrait whose attributes changed to reflect the week's activities. During implementation, the gap between conversational AI image generation and API-driven generation proved substantial. Three approaches to group composition were attempted and abandoned: direct API rendering of a multi-person scene, separate renders composited together, and body rendering with face-swapping over generated backgrounds. None achieved the compositional coherence that the chat-based interface could produce.

This constraint forced a conceptual re-evaluation. Individual portraits, each occupying their own space on the ambient display, opened design possibilities that the group portrait had obscured. Per-person colour tinting became feasible to signal individual coordination states without affecting the entire display. The claimed/unclaimed indicator could be applied per portrait rather than embedded in a shared scene. Families of different sizes could be accommodated by adding or removing portrait slots rather than re-composing a group image.

The second revision concerned how unclaimed activities are signalled. Early sketches explored several visual approaches: coloured outlines around attributes, pulsing movement effects, opacity fading, and small badge indicators. Internal critique against calm technology principles ruled out movement and strong colour outlines as too reminiscent of notification language. Opacity fading, while calm, was judged too subtle for peripheral reading at a distance. The design landed on a red colour overlay on the activity attribute itself, a signal that was legible at-a-glance without introducing a separate UI layer on top of the portrait. This created a two-state model (handled versus needs attention) rather than a graded urgency scale, reflecting the empirical finding that parents preferred binary feasibility judgements over detailed precision.

The third revision was the introduction of a chat-based onboarding interface alongside the form-based input. Recognising that configuring family members'

profiles, activities, and attributes involves conversational complexity (describing appearance, listing recurring commitments, specifying coordination needs), the design added a conversational interface where parents could describe their family in natural language and have the system populate the configuration accordingly.

Revisions Motivated by the Probe

The probe evaluation surfaced findings that point toward further concept revision, though these have not yet been implemented.

Both participants validated the red colour overlay as an effective signal for unclaimed activities. However, IP7 suggested that the signal could carry additional information: a count of unclaimed items and an indication of temporal proximity. The difference between an activity that is unclaimed but a week away and one that is unclaimed and two hours away matters for how urgently a parent needs to respond. This suggests that the current binary model may benefit from a lightweight temporal dimension, not a return to graded urgency, but a distinction between distant and imminent unclaimed items.

IP8 articulated a coordination need that the current concept does not address conflict detection. She described a scenario where three family members have overlapping commitments on the same evening, with a child needing transport that neither available parent can provide. She proposed that the system should signal when commitments collide, not just when individual activities remain unclaimed. This extends the signalling model from per-person state toward inter-person dependency, a revision that would require the system to reason about relationships between events rather than treating each activity independently.

Both participants expressed a strong desire for calendar integration, where the system would pull events from existing calendar services rather than requiring manual entry. IP7 mentioned Gmail, Outlook, and work calendars. IP8, who does not use digital calendars, nonetheless recognised that manual entry creates a barrier that limits the concept's usefulness for families who would most benefit from it. This points toward a revision where the data-to-portrait pipeline begins with automated calendar aggregation rather than conversational input alone.

IP8's suggestion to place the display in the hallway rather than the kitchen introduced a spatial consideration not previously explored. Her reasoning was that the hallway is where family members are in transition, about to leave the house, and where a coordination reminder would be most actionable. This challenges the assumption of a kitchen- or living-room-based ambient display and suggests that placement should be tied to the moment of action rather than the moment of planning.

Finally, both participants noted that portrait fidelity and consistency need improvement for sustained domestic use. The probe-level quality, while sufficient for evaluation, would not satisfy families who expect the display to function as a permanent visual element in their home. IP8 noted that she would not want the current portraits displayed as a fixture, stating that if it were a permanent display, the family would want to look more like themselves. This revision is less about the concept and more about the maturity of AI portrait generation as a medium for domestic interfaces.

Discussion

Concept Evaluation

The concept of an agentive overview for family coordination was generated from the convergence of three research streams: family coordination as socio-material practice, calm technology and peripheral awareness, and agentive AI systems. Having developed the concept through empirical inquiry, iterative design, and technology probe deployment, it is now possible to evaluate how well the resulting artefact addresses the theoretical propositions from which it departed.

From family coordination research, the key claim was that domestic scheduling is sustained through negotiation and peripheral awareness rather than centralised systems (Grinter *et al.*, 2009). The probe findings support this framing. IP7 described the display as an easy way to see the whole family's agenda at-a-glance, valuing it because it consolidated fragmented information without imposing a shared workflow. IP8's household, which lacks any shared calendar, found the

concept valuable as a first common coordination surface rather than a replacement for an existing system. Notably, IP8 emphasised that recurring activities are already well-known within the family and that the real coordination needed lies in surfacing irregular changes, such as a parent working evenings with irregular intervals. This aligns with Khan and Markopoulos's (2009) finding that families orient around a small set of recurring awareness needs rather than seeking comprehensive detail. IP8's request for collision detection, where the system would signal when multiple family members have conflicting commitments on the same evening, further suggests that coordination value lies in revealing dependencies between commitments, consistent with Grinter et al.'s (2009) characterisation of domestic coordination as ongoing repair work.

From calm technology, the claim was that ambient, low-resolution representations can sustain awareness without demanding attention (Weiser and Brown, 1996). The portrait-based ambient display was legible to both probe participants without instruction. The red colour overlay for unclaimed activities was immediately understood as indicating items requiring attention, and both participants distinguished it from the greyed state of future activities without prompting. IP7 described the portrait changes as making the calendar feel *more alive* and noted that the portraits themselves created a pull toward the display. This suggests that the portrait representation achieves what Bakker and Niemantsverdriet (2016) describe as fluid shifts between peripheral and focused engagement: the display sits in the periphery until a visual change draws the viewer's attention. Both participants noted that the concept worked better on a dedicated screen than on a mobile phone, reinforcing the ambient display framing over a mobile application model. IP8's preference for hallway placement, where family members encounter the display while in transition, suggests that the display's value is tied to moments of departure rather than sustained attention, echoing Weiser and Brown's (1996) characterisation of information that moves to the centre of attention only when the situation demands it.

From research on AI-mediated interaction, the technology probe can be evaluated along Holter and El-Assady's (2024) three dimensions. Along the agency

dimension, the prototype positions initiative primarily with the user: the system aggregates and displays information but does not initiate action. This limits the system's agentive capacity to reshaping what the family already provides, rather than surfacing what they might otherwise miss. Along the adaptation dimension, the system supports incremental configuration: information flows bidirectionally between family members and the system. Events are entered through the conversational companion app, and the ambient display re-presents them as portraits. However, the system does not currently integrate with external sources; calendars, school platforms, messaging services, which would introduce machine-to-machine data flows. In its current form, all information originates from family members rather than being aggregated automatically across services. This limits the system's agentive capacity to reshaping what the family already provides, rather than surfacing what they might otherwise miss.

The probe evaluation reinforced and complicated this positioning. Both participants independently identified the lack of calendar integration as the concept's primary limitation. IP7 described moving between family, private, and work calendars as fragmented and wanted the system to pull directly from existing services. IP8, despite primarily using a paper calendar, recognised that manual entry creates a barrier that limits the concept's value for families who would most benefit from it. This suggests that moving along Holter and El-Assady's (2024) agency dimension, from user-provided input toward automated aggregation from external sources, would be the most impactful revision for sustained domestic use. However, such a move would introduce new design tensions: automated aggregation risks surfacing information that family members have not chosen to share, potentially conflicting with the interpretive control that Messeter et al. (2004) identify as essential in domestic contexts.

Reflections on Concept Driven Interaction Design Research

Wiberg and Stolterman (2010) acknowledge that few projects complete all seven activities fully. This section reflects on how the framework was applied and where its boundaries were encountered.

The consolidated theoretical position provided a clear generative starting point, and the combination of interviews with sketch-based probes allowed the concept to be tested against lived coordination practices early in the process.

Internal concept critique was sustained throughout and documented in the design log. Key revisions included the shift from notification filtering to weekly overview, from multi-level urgency to binary states, from generic icons to family-specific attributes. Each emerged from confrontation between the concept and either empirical or theoretical insights.

External design critique was more limited. The technology probe deployment provided two families' responses over two days, offering situated feedback but not the longitudinal engagement that a full deployment study would require. Despite its brevity, the probe surfaced findings that internal critique alone could not, including the need for collision detection between family members and the discovery that hallway placement better supports coordination than kitchen or living room placement.

A significant methodological reflection concerns the late introduction of generative AI as a core material in the design process. Initially, the theoretical concept focused primarily on peripheral awareness and ambient display. However, as the prototype was being instantiated, AI emerged not merely as a technical enabler, but as a fundamental characteristic required to make the concept viable. Within the CDIDR framework, this highlights how the *design of artefacts* activity can recursively force a profound *concept revision* late in the process, shifting the design space from notification filtering to AI-mediated aggregation.

Concept contextualisation remains partial. The five-dimensional design space positions the concept relative to existing tools, but a fuller contextualisation would require comparing it against other ambient domestic displays beyond Mynatt et al.'s (2001) Digital Family Portrait.

Neustaedter, Brush and Greenberg's (2009) typology of family coordination styles, monocentric (one person manages), pericentric (one person manages with

input), and polycentric (distributed responsibility), acts as a lens for evaluating the concept's assumptions. The prototype implicitly supports a polycentric model, making all family members' commitments visible to all. Yet the interviews revealed that most participating families operated pericentrically, with one parent carrying primary coordination responsibility. This raises a design question: does a shared ambient display redistribute coordination awareness, or does it primarily serve the already-responsible parent by making their existing work visible?

The Portrait as Coordination Artefact

Mynatt et al.'s (2001) Digital Family Portrait demonstrated that portraiture as a display paradigm can support ambient domestic awareness. However, that system monitored a single elderly individual through environmental sensors. The present concept extends the portrait paradigm in three ways: from individual to family group, from sensor-derived activity to schedule-derived coordination data, and from elder care to active family coordination.

Where Mynatt's portrait conveyed qualitative patterns of daily life through visual density, the family coordination portrait conveys the shape of the week through attributes layered onto recognisable family members.

The technology probe participants' responses support this extension. IP7 noted that while individual activities were not interesting to look at, the portraits themselves created engagement, suggesting that the portrait format carries communicative qualities beyond its informational content. IP8 observed that if the display were to become a permanent fixture, the family would want to look more like themselves, reinforcing Odom et al.'s (2012) point that domestic digital artefacts are bound up with identity rather than functioning as neutral displays.

The shift from abstract iconography to photorealistic portraiture carries additional implications. As Odom et al. (2012) observe, digital possessions are intertwined with identity, memory, and control, shaping how people relate to shared information. A family portrait on the wall is not a dashboard. It is a domestic artefact that signals belonging, familiarity, and shared life. In family contexts, this suggests that coordination tools are not neutral containers of data, but part of how

responsibilities, trust, and expectations are negotiated. This positions the prototype not merely as an information display but as a coordination artefact embedded in the social and material fabric of the home.

The dynamic nature of the portrait-as-state also aligns with recent industry trajectories toward 'generative UI' (Leviathan *et al.*, 2025). Rather than relying on static, predefined interfaces, generative UI proposes interfaces that assemble themselves contextually based on user intent and real-time data. The prototype instantiates a highly constrained, ambient version of this concept: the interface—the portrait's attributes and clothing—is dynamically generated on the fly to reflect the family's current coordination state, offering a calm alternative to conventional screen-based layouts.

Laurel's (1991) theatrical metaphor offers a complementary lens where family member portraits function as characters whose attributes communicate context much as costume and props do on stage. The temporal layering, where attributes shift gradually across the week, mirrors dramatic structure with rising and falling action rather than discrete state changes. This framing suggests that the display engages perception and pattern-matching rather than sequential information processing, which may explain why participants responded to the portrait format more readily than to calendar-like representations.

Design Principles

Three design principles emerged from the interplay between empirical findings, concept development, and theoretical reflection:

Design for judgment, not precision

The empirical findings consistently showed that parents assess feasibility rather than exactness. The prototype's use of coarse-grained attributes over detailed schedules reflects this, aligning with calm technology's emphasis on abstraction (Weiser and Brown, 1996) and Neustaedter, Brush and Greenberg's (2009) finding that calendars function as awareness artefacts rather than precise scheduling tools. It also resonates with perspectives on embodied interaction (Dourish, 2001) and distributed cognition (Hutchins, 1995), where artefacts in the environment

become integral to how groups perceive and act within shared situations. IP8 confirmed this orientation in the technology probe, noting that she already knows when recurring activities happen and that the value lies in surfacing exceptions and conflicts rather than replicating a full schedule. By supporting in-the-moment feasibility judgments rather than dictating precise schedules, the design treats family plans as flexible resources for situated action (Suchman, 1987).

Use AI to reshape information, not to control decisions

Participants valued assistance that clarified rather than automated. The prototype positions AI as a mediating layer that aggregates and re-presents without inferring intent or making scheduling decisions, consistent with Shneiderman's (2020) framework for maintaining high human control alongside system capability and Messeter et al.'s (2004) emphasis on preserving interpretive agency operating at the lower levels of Parasuraman, Sheridan and Wickens' (2000) automation scale; aggregating and presenting rather than filtering or executing, which is consistent with Shneiderman's (2020) emphasis on maintaining human control. Both technology probe participants valued the system's role in re-presenting information visually but did not expect or want it to make scheduling decisions on their behalf.

Support shared rhythms through ambient placement

The preference for predictable, bundled updates and the positive response to ambient placement suggest that coordination tools benefit from operating on domestic temporal rhythms rather than stochastic notification regimes. Positioning the overview in a shared space transforms coordination from individual retrieval to collective peripheral awareness. IP8's preference for hallway placement and IP7's observation that the display worked better on a dedicated screen than on a phone both support this principle, suggesting that the ambient quality depends on physical positioning within domestic routines.

Limitations and Future Work

This thesis has several limitations that qualify its contributions. The empirical foundation rests on six interviews and a technology probe deployment with two

families, all within a Swedish context and a specific demographic of parents with school-age children operating relatively conventional weekly schedules. The concept should not be generalised beyond this scope: blended families, collective households, and arrangements involving extended networks of grandparents or shared custody present coordination dynamics the current concept does not address. The technology probe deployment was brief, offering no longitudinal data on whether the display sustains its value over time or fades into ignored background. The prototype's pipeline currently relies on conversational input rather than full API aggregation with existing calendar and messaging services; the concept promises broader integration than the technology probe delivers. Finally, this work is exploratory rather than evaluative: it does not measure actual coordination outcomes such as reduced missed events or lower perceived stress but instead contributes a design concept and the empirical and theoretical reasoning behind it.

Future work could address these limitations through longer deployment periods, broader demographic and cultural contexts including diverse family structures, and technical integration with real calendar APIs. Of particular interest would be examining how families negotiate shared control of the display over time, whether the overview redistributes coordination awareness or reinforces existing asymmetries, and how the visual vocabulary evolves as families configure it to their own practices.

Conclusion

Parents of school-age children navigate a steady flow of information spread across calendars, school platforms, chats, and notifications. The issue is not a lack of data, but the effort required to assemble the data into a coherent sense of the week. Drawing on literature in family coordination, calm technology, and agentive systems, and through six qualitative interviews with sketch-based probes, I explored how families assess feasibility, maintain awareness, and manage interruptions. The findings show a consistent preference for abstract cues, predictable rhythms, and a low-attention interface that reduces cognitive effort.

From these insights, I outlined a design space for agentive weekly overviews along five dimensions: abstraction of status, temporal scope, degree of agency, modality and placement, and interaction posture. These dimensions frame how an overview can remain peripheral, contextual, and supportive without becoming intrusive. I then introduced a concept, realised through a technology probe, that aggregates distributed signals into a high-level weekly view and uses generative AI to classify, aggregate, and re-present coordination data as portrait attributes. The concept illustrates how a system can help families judge feasibility at-a-glance while avoiding over-automation or excessive inference.

This work contributes empirical grounding for the concept through eight interviews across two phases, a five-dimensional design space for an agentive overview concept, a prototype evaluated through technology probe deployment, and a set of design principles for agentive, glanceable systems aimed at reducing perceived fragmentation and notification overload. The findings indicate an opportunity for ambient displays that help families see their week not in greater detail, but with greater clarity.

References

Ackerman, M.S. (2000) ‘The intellectual challenge of CSCW: the gap between social requirements and technical feasibility’, *Human-Computer Interaction*, 15(2–3), pp. 179–203. Available at: https://doi.org/10.1207/S15327051HCI1523_5.

Amershi, S. *et al.* (2019) ‘Guidelines for human-AI interaction’, *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. Glasgow Scotland Uk: ACM, pp. 1–13. Available at: https://doi.org/10.1145/3290605.3300233.

Apple (no date) *Summarize notifications and reduce interruptions with Apple Intelligence on iPhone*, *Apple Support*. Available at: https://support.apple.com/guide/iphone (Accessed: 26 June 2025).

Bakker, S. and Niemantsverdriet, K. (2016) ‘The interaction-attention continuum: considering various levels of human attention in interaction design’, *International Journal of Design*, 10(2), pp. 1–14.

Braun, V. and Clarke, V. (2006) ‘Using thematic analysis in psychology’, *Qualitative Research in Psychology*, 3(2), pp. 77–101. Available at: https://doi.org/10.1191/1478088706qp063oa.

Case, A. (2015) *Calm technology: principles and patterns for non-intrusive design*. O’Reilly Media.

Cozi (no date) *Cozi features overview*. Available at: https://www.cozi.com/feature-overview/ (Accessed: 2 February 2026).

Dey, A.K., Abowd, G.D. and Salber, D. (2001) ‘A conceptual framework and a toolkit for supporting the rapid prototyping of context-aware applications’, *Human-Computer Interaction*, 16(2–4), pp. 97–166. Available at: https://doi.org/10.1207/S15327051HCI16234_02.

Dourish, P. (2001) *Where the action is: the foundations of embodied interaction*. The MIT Press. Available at: https://doi.org/10.7551/mitpress/7221.001.0001.

Dourish, P. and Bly, S. (1992) ‘Portholes: Supporting awareness in a distributed work group’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM, pp. 541–547. Available at: https://doi.org/10.1145/142750.142982.

Family Wall (no date) *Family wall: happy family organization*. Available at: https://www.familywall.com/ (Accessed: 2 February 2026).

Frayling, C. (1993) ‘Research in art and design’, *Royal College of Art Research Papers*, 1(1), pp. 1–5.

Gaver, B., Dunne, T. and Pacenti, E. (1999) ‘Design: cultural probes’, *Interactions*, 6(1), pp. 21–29. Available at: https://doi.org/10.1145/291224.291235.

Grinter, R.E. *et al.* (2009) ‘The ins and outs of home networking: the case for useful and usable domestic networking’, *ACM Transactions on Computer-Human Interaction*, 16(2), pp. 1–28. Available at: https://doi.org/10.1145/1534903.1534905.

Hallnäs, L. and Redström, J. (2001) ‘Slow technology – designing for reflection’, *Personal and Ubiquitous Computing*, 5(3), pp. 201–212. Available at: https://doi.org/10.1007/PL00000019.

Heath, C. and Luff, P. (1991) ‘Collaborative activity and technological design: task coordination in london underground control rooms’, in L. Bannon, M. Robinson, and K. Schmidt (eds) *Proceedings of the Second European Conference on Computer-Supported Cooperative Work ECSCW ’91*. Dordrecht: Springer Netherlands, pp. 65–80. Available at: https://doi.org/10.1007/978-94-011-3506-1_5.

Holter, S. and El-Assady, M. (2024) ‘Deconstructing human-AI collaboration: agency, interaction, and adaptation’, *Computer Graphics Forum*, 43(3), p. e15107. Available at: https://doi.org/10.1111/cgf.15107.

Hutchins, E. (1995) *Cognition in the wild*. Cambridge MA USA: MIT Press.

Hutchinson, H. *et al.* (2003) ‘Technology probes: inspiring design for and with families’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 17–24. Available at: https://doi.org/10.1145/642611.642616.

Iqbal, S.T. and Horvitz, E. (2007) ‘Disruption and recovery of computing tasks: field study, analysis, and directions’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. *CHI07: CHI Conference on Human Factors in Computing Systems*, San Jose California USA: ACM, pp. 677–686. Available at: https://doi.org/10.1145/1240624.1240730.

Khan, V.-J. and Markopoulos, P. (2009) ‘Busy families’ awareness needs’, *International Journal of Human-Computer Studies*, 67(2), pp. 139–153. Available at: https://doi.org/10.1016/j.ijhcs.2008.09.006.

Kuzminykh, A. *et al.* (2024) ‘Co-designing situated displays for family co-regulation with ADHD children’, *Proceedings of the CHI conference on human factors in computing systems (CHI ’24)*. New York: ACM. Available at: https://doi.org/10.1145/3613904.3642812.

Laurel, B. (1991) *Computers as theatre*. Reading, MA: Addison-Wesley.

Leviathan, Y. *et al.* (2025) *Generative UI: LLMs are effective UI generators*. Preprint. Google Research.

Mark, G., Gudith, D. and Klocke, U. (2008) 'The cost of interrupted work: more speed and stress', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. Florence Italy: ACM, pp. 107–110. Available at: https://doi.org/10.1145/1357054.1357072.

Matthews, T. *et al.* (2006) 'A toolkit for managing user attention in peripheral displays', *Proceedings of the 17th annual ACM symposium on User interface software and technology*. Santa Fe NM USA: ACM, pp. 247–256. Available at: https://doi.org/10.1145/1029632.1029676.

McFarlane, D.C. and Latorella, K.A. (2002) 'The scope and importance of human interruption in human-computer interaction design', *Human-Computer Interaction*, 17(1), pp. 1–61. Available at: https://doi.org/10.1207/S15327051HCI1701_1.

Messeter, J. *et al.* (2004) 'Contextualizing mobile IT', *Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques*. *DIS04: Designing Interactive Systems 2004*, Cambridge MA USA: ACM, pp. 27–36. Available at: https://doi.org/10.1145/1013115.1013121.

Mynatt, E.D. *et al.* (2001) 'Digital family portraits: Supporting peace of mind for extended family members', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. Seattle Washington USA: ACM, pp. 333–340. Available at: https://doi.org/10.1145/365024.365126.

Neustaedter, C. and Bernheim Brush, A.J. (2006) '"LINC-ing" the family: the participatory design of an inkable family calendar', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. *CHI06: CHI 2006 Conference on Human Factors in Computing Systems*, Montréal Québec Canada: ACM, pp. 141–150. Available at: https://doi.org/10.1145/1124772.1124796.

Neustaedter, C., Brush, A.J.B. and Greenberg, S. (2009) 'The calendar is crucial: Coordination and awareness through the family calendar', *ACM Transactions on Computer-Human Interaction*, 16(1), pp. 1–48. Available at: https://doi.org/10.1145/1502800.1502806.

Noessel, C. (2017) *Designing agentive technology: AI that works for people*. New York: Rosenfeld Media.

Odom, W. *et al.* (2012) 'Lost in translation: Understanding the possession of digital things in the cloud', *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. Austin Texas USA: ACM, pp. 781–790. Available at: https://doi.org/10.1145/2207676.2207789.

Parasuraman, R., Sheridan, T.B. and Wickens, C.D. (2000) 'A model for types and levels of human interaction with automation', *IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans*, 30(3), pp. 286–297. Available at: https://doi.org/10.1109/3468.844354.

Pousman, Z. and Stasko, J. (2006) ‘A taxonomy of ambient information systems: four patterns of design’, *Proceedings of the working conference on Advanced visual interfaces - AVI ’06*. *the working conference*, Venezia, Italy: ACM Press, p. 67. Available at: https://doi.org/10.1145/1133265.1133277.

Rowan, J. and Mynatt, E.D. (2005) ‘Digital Family Portrait Field Trial: Support for Aging in Place’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. *CHI05: CHI 2005 Conference on Human Factors in Computing Systems*, Portland Oregon USA: ACM, pp. 521–530. Available at: https://doi.org/10.1145/1054972.1055044.

Russell, S. and Norvig, P. (2021) *Artificial intelligence: a modern approach*. 4th edn. Hoboken, NJ: Pearson.

Schilit, B., Adams, N. and Want, R. (1994) ‘Context-Aware Computing Applications’, *1994 First Workshop on Mobile Computing Systems and Applications*. *1994 First Workshop on Mobile Computing Systems and Applications (WMCSA)*, Santa Cruz, California, USA: IEEE, pp. 85–90. Available at: https://doi.org/10.1109/wmcsa.1994.16.

Shneiderman, B. (2020) ‘Human-centered artificial intelligence: reliable, safe & trustworthy’, *International Journal of Human-Computer Interaction*, 36(6), pp. 495–504. Available at: https://doi.org/10.1080/10447318.2020.1741118.

Weiser, M. (1991) ‘The computer for the 21st century’, *Scientific American*, 265(3).

Weiser, M. and Brown, J.S. (1996) ‘The coming age of calm technology’, in P.J. Denning and R.M. Metcalfe (eds) *Beyond Calculation: The Next Fifty Years of Computing*. Springer, pp. 75–85.

Wiberg, M. and Stolterman, E. (2010) ‘Concept-driven interaction design research’, *Human-Computer Interaction*, 25(2), pp. 95–118. Available at: https://doi.org/10.1080/07370020903586696.

Zimmerman, J., Forlizzi, J. and Evenson, S. (2007) ‘Research through design as a method for interaction design research in HCI’, *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York, NY, USA: ACM, pp. 493–502. Available at: https://doi.org/10.1145/1240624.1240704.

Appendix. Participants

IP Code	Age	Family Type	Interview Date
IP1	52	Separated father, three teenagers (16, 17 and18), partly empty nest	2025-11-22
IP2	Early 40s	Separated father, two children (7 and 9) in alternating weekly custody	2025-11-24
IP3	Late 40s	Cohabiting partner, two children (11 and 14)	2025-11-25
IP4	40s	Separated co-parents, three children (3, 7 and 11)	2025-11-30
IP5	50	Married, three children (11, 16 and 17)	2025-12-01
IP6	55	Married, two children (13 and 15)	2025-12-02
IP7	41	Married, three children (11, 7 and 1)	2026-02-20
IP8*	Late 40s	Cohabiting partner, two children (11 and 14)	2026-02-21

**IP8 also participated in the empirical inquiry as IP3, providing a longitudinal perspective from initial needs exploration through technology probe evaluation.*

Appendix. Interview guide - Empirical Inquiry

A. Inledning

Information till deltagaren

1. Syftet är att undersöka hur tid, notifikationer och familjeliv samspelar.
2. Deltagandet är frivilligt, och du kan avbryta när som helst utan förklaring.
3. Alla data anonymiseras, inga citat kopplas till dig som person.
4. Intervjun spelas in för att underlätta analysen. Inspelningen raderas efter transkribering.
5. Materialet används i en magisteruppsats vid Högskolan Kristianstad.
6. Inga känsliga personuppgifter samlas in.
7. Pseudonymer används i analysen.

Samtycke

Är du okej med att jag spelar in intervjun och använder materialet enligt beskrivningen?

B. Intervju

1. Uppvärmningsfrågor:
    a. Kan du beskriva din inställning till notifieringar med tre ord?
    b. Vad var det sista du använde en generativ AI till? Om du inte använt en, vad tror du det skulle innebära?

Bakgrund

2. Kan du kort beskriva din familjesituation?
3. Hur ser era vardagsrutiner ut på en vanlig vardag/helg?
4. Vilken roll spelar teknik i ert sätt att samordna vardagen?

Vardagspraktiker kring tid

1. Hur brukar du och din partner/era barn koordinera tid?
2. Vad fungerar bra i dagens system?
3. Vad skapar stress eller missförstånd?

Friktioner och informationsflöden

1. Finns det situationer där du vill ha mer information?
2. Finns det situationer där du vill ha mindre information eller färre notiser?
3. När känner du att familjemedlemmars behov krockar?

Presentationsdelen med utvalda skisser

En skiss i taget och samma tre frågor för samtliga:

För alla skisser:

1. Vad tror du att den här artefakten försöker kommunicera?
2. Hur skulle den kunna påverka hur du förstår din egen tid och familjens tid?
3. Vilka risker eller oönskade effekter kan du se?

För skiss a specifikt:

1. Hur känns det att se familjemedlemmars "status"?
2. När är det hjälpsamt? När blir det känsligt?

För skiss b specifikt:

1. Hur upplever du en tidsindikator placerad i rummet snarare än på en skärm?
2. När skulle du vilja ha något ambient i bakgrunden, och när inte?

För skiss c specifikt:

1. Om detta hängde i ditt hem, vad skulle du vilja att den inte visade?

2. När ska information automatiskt döljas?

Framtid och acceptans

1. Vad är din spontana känsla kring AI som samarbetspartner i familjens tidsplanering?
2. Vilken nivå av proaktivitet är lagom för dig?
3. Hur skulle en bra notis kännas för dig?
4. Vad får absolut inte hända?

C. Avslutning

1. Vill du lägga till något?
2. Är det okej att jag kontaktar dig om jag behöver förtydliga något under analysen?
3. Tack för att du deltar.

Appendix. Interview Guide - Technology Probe

A. Inledning

Information till deltagaren

1. Syftet är att undersöka hur prototypen fungerar.
2. Deltagandet är frivilligt, och du kan avbryta när som helst utan förklaring.
3. Alla data anonymiseras, inga citat kopplas till dig som person.
4. Intervjun spelas in för att underlätta analysen. Inspelningen raderas efter transkribering.
5. Materialet används i en magisteruppsats vid Högskolan Kristianstad.
6. Inga känsliga personuppgifter samlas in.
7. Svaren pseudonymiseras i analysen.

Samtycke

Är du okej med att jag spelar in intervjun och använder materialet enligt beskrivningen?

B. Konkret användning

1. När lade du märke till skärmen?
2. Minns du en konkret situation när den påverkade något ni gjorde?

Följdfråga:

1. Vad gjorde du direkt efter att du sett den?

C. Överblick och tolkning

1. Vad förstod du direkt när du tittade på den?
2. Gav den dig en känsla av hur veckan såg ut?

3. Behövde du öppna någon annan app för att vara säker?

D. AI och agentivitet

2. Hur kändes det att systemet själv avgjorde vad som var mest synligt?

3. Var det någon gång den representerade något fel?

4. Var går gränsen mellan hjälpsamt och påträngande för dig?

E. Delad medvetenhet

1. Påverkade den hur ni pratade om veckan?

2. Gjorde den planeringen mer gemensam eller inte?

F. Friktion

1. Vad var otydligt eller irriterande?

2. Om den skulle misslyckas – hur skulle det se ut?

3. Hur var det att komma igång med appen?

G. Avslutning

1. Skulle du vilja ha något sådant hemma på sikt?

2. Påverkades din känsla av många appar, informationskällor, eller notiser?

3. Är det något viktigt vi inte har pratat om?

Appendix. Thematic Analysis

The table below documents the coding process from initial codes to the five themes reported in the Results chapter. Codes were developed inductively from transcribed interviews and iteratively grouped through comparison across participants (Braun and Clarke, 2006). The table shows each code, its definition, a representative quote, and which participants it appeared in. A final group of codes that did not cluster into the four primary themes, but informed design decisions is listed separately.

Theme 1: Fragmentation and Retrieval Effort

Code	Definition	Example Quote	IP
Channel fragmentation	Important information spread across many different channels, making it hard to remember where something was communicated.	"Was it on WhatsApp? Teams? Which organisation on Teams? Or was it an email?"	IP1, IP2
Information retrieval burden	The main effort lies in relocating and retrieving known information rather than obtaining it in the first place.	"It feels more like filtering and finding what's already there than a lack of information."	IP2
Calendar overlap	Need to duplicate or synchronise events across work and private calendars, creating extra admin work.	"I want things in both my work calendar and my private calendar, so I remember them at work as well."	IP2

Notification Overload From Institutions	Excessive emails/notifications from children's activities or external groups.	"I get four emails from the choir… sometimes three times a week."	IP3
Missed-Information	Users frequently misses important info (tests, times) due to scattered or inaccessible systems.	"Vi missar grejer… prov… det stod ju där, vadå liksom?"	IP6
High Coordination Burden	Participants feel responsible for managing all scheduling and oversight for the family.	"Ninety percent of the responsibility lies on me."	IP3
Ad-hoc Communication Reliance	Dependence on chat, quick messages, or spur-of-the-moment checking rather than structured systems.	"Vi kommunicerar mest via familjechatten."	IP5
Calendar Non-Compliance	Family members, especially teens, do not update or maintain calendars.	"Pelle skriver ju inte upp någonting i sina kalendrar."	IP5

Theme 2: Desire for Overview Without Depth

Code	Definition	Example Quote	IP
Desire-for-Simplicity	Users need extremely simple, step-by-step, visually clear systems.	"Gör det stupid simpelt… stora tydliga tecken… nästa steg."	IP6

Location-Awareness	Users need awareness of where family members are and when they arrive.	“Var är barnen?… var är alla?”	IP6
Visual Tools for Children	Belief that visual time/status displays are particularly useful for children.	“For kids, something visual would be very good.”	IP4
Mental Planning Load	Reliance on internal, undocumented planning to manage daily family logistics.	“I plan in my head… nothing is written down.”	IP4
Low-Structure Family Planning	The family operates without rigid schedules or shared calendars.	“Vi är en väldigt oplanerad familj.”	IP5

Theme 3: Sufficiency of Coarse-Grained Cues

Code	Definition	Example Quote	IP
Status Abstraction Preference	Preference for generalised or abstracted status instead of exact coordinates.	"Kanske räcker med hemma eller stan eller skolan."	IP5
Precision-Tracking Discomfort	Discomfort with highly precise location tracking due to privacy and relational concerns.	“Man kan ju stalka sina barn ganska hårt.”	IP5
Inferred Activity Acceptance	Openness to AI inferring activities based on pattern/location.	“Det kanske står ‘fiska’ för han är nere vid Fyrisån.”	IP5

Mood privacy	Resists passive sensing or display of emotional state; preferred moods are shared explicitly.	"I don't think I'd want a system to passively detect and display how someone is feeling."	IP1

Theme 4: Preference for Predictable, Bundled Updates

Code	Definition	Example Quote	IP
Pull-based awareness	Preference for systems where information is available on demand when the user chooses to look.	"Find My and the family calendar don't really stress me – I have to actively go in and check."	IP1
Temporal bundling	Preference for bundled, periodic information instead of many small updates in different systems.	"It was almost easier when the kids came home with one paper for the week that you put on the fridge."	IP1
Notification overload	Notifications experienced as frequent, intrusive and often irrelevant, leading to stress.	"I've tried to remove a lot of notifications… it keeps pinging and I have to drop everything."	IP1
Gentle Notification Preference	Preference for soft, warm, light-based notifications instead of abrupt sounds.	"A good notification should feel like a warm pat… maybe a soft light."	IP4

Ambient-Reminders	Users prefer gentle, environmental reminders instead of phone notifications.	"En liten blänkare på kvällen om att nu lägger vi undan mobilerna."	IP6
Relevant-Notifs	Wants only personally relevant reminders, not sales/material noise.	"Väldigt mycket notiser om sånt man inte behöver… jag vill bli påmind om mina behov."	IP6
Positive Reinforcement Notifications	Enjoys notifications that reward reduced screen time or signify professional opportunity.	"A positive notification would be: You've only been on Instagram 30 minutes this week."	IP3
Desire for disconnection	Wants periods without carrying or checking the phone.	"That bike ride was probably the longest I've been without my phone in years – it felt odd."	IP2

Theme 5: Degree of Agency

Code	Definition	Example Quote	IP
AI as delegated admin	Sees value in an AI agent that does administrative groundwork while leaving final control to the human.	"Do the VAB notification, cancel my meetings and suggest new times – but let me see and confirm."	IP2

Predictive domestic support	Interest in AI that can anticipate practical needs based on patterns over time.	"Give me a heads up that all the winter clothes will be too small next year."	IP2
Skepticism Toward AI Support	Concern that AI planning reduces cognitive autonomy.	"We'll become stupid if we stop thinking for ourselves."	IP3
Tech-Replacement Fear	Concern that AI/robots could replace meaningful human relational labour.	"We risk losing close relationships if robots take over the hard parts."	IP4
Device longevity	Values long-lived, durable devices and is sceptical of smart devices with short lifespans.	"This mechanical watch can last for decades; the smartwatch was basically obsolete after a few years."	IP1
Digital Minimalism Preference	Strong desire to limit screens, apps, and digital demands.	"I want fewer things to look at digitally."	IP3
Manual Tools Preference	Actively prefers analog tools such as paper calendars.	"I like having things manually. I like my paper calendar."	IP3
Tech-Stress	Users experience stress, confusion, or avoidance when interacting with digital systems.	"Jag är otroligt data-analfabet… jag blir stressad av allt med dator och IT."	IP6

Safety-Content-Filtering	Need for strict filtering of inappropriate content.	“Det får inte komma vuxeninnehåll… porr eller nazistpropaganda.”	IP6
Social signalling	Awareness that checking devices in social contexts sends strong signals about attention and priorities.	“Looking at my smartwatch in a client meeting sends the signal that what we’re doing here isn’t that important.”	IP1
Planning-Style Mismatch	Stress and friction caused by differing planning approaches between partners.	“I’m very planning-oriented and he was ad hoc… it caused a lot of stress.”	IP4
Youngest-Child Support Need	Additional coordination and reminders required for the youngest child who struggles with routines.	“Han har svårt att passa bussen… svårt att komma ihåg läxor.”	IP5

Appendix. Design Log

This appendix documents key design decisions and conceptual shifts that occurred during the Research through Design process. The entries are selected from a larger design log maintained throughout the project and represent moments where the guiding concept was substantively revised or where new design knowledge emerged through the act of making. Each entry records the insight and its connection to the thesis.

September 2025: From interruption filtering to family overview

Insight: The theoretical framing had been centred on interruption management: what causes interruptions, how they affect cognitive load, and what should or should not be notified. This framing increasingly felt misaligned with the domestic coordination context. The focus began shifting from understanding interruptions in the abstract toward understanding how families actually coordinate in practice.

Thesis connection: This marks the beginning of the pivot from notification filtering toward weekly overview as coordination support. A reframing that would be confirmed by the interview findings in November.

October 2025: Three sketch-based probes emerge

Insight: Following supervisor feedback to develop more sketch variants, three probes emerged from a broader set of concepts: (a) an augmented clock with family status indicators, (b) an ambient projector casting time-related information onto a wall surface, and (c) a digital ambient screen with portraits and schedule dots. Rather than presenting these as solutions to evaluate, they were used as provocations to surface how families think about shared time and awareness.

Thesis connection: The three probes became the trigger material for the semi-structured interviews, each representing a different position along the dimensions of glanceability, temporality, and ambient placement.

November 2025: Families have already adapted

Insight: The interviews revealed that families had already learned to cope with the volume of digital input. They had developed workarounds and habits. The real patterns were more nuanced than expected. Coordination needs fluctuated with children's ages and activity types. Crucially, participants valued tangible, glanceable cues to understand what was going on. The problem was not too many notifications but the absence of a shared overview.

Thesis connection: This finding fundamentally reframed the design direction from notification filtering toward overview and shared awareness, and produced the empirical foundation for the prototype.

December 2025: Five design dimensions

Insight: The four empirical themes described what families need but not how to design for it. Five design dimensions were developed to bridge this gap: (1) abstraction of status, (2) temporal scope, (3) degree of agency, (4) modality and placement, and (5) interaction posture. Each dimension corresponds to specific interview findings and maps a design decision in the prototype.

Thesis connection: The five-dimensional design space translates qualitative findings into a structured framework for design.

29 January 2026: "Claimed = Handled"

Insight: Designing the data model for coordination events, the initial approach attempted to capture how tasks would be executed (by whom, through what means). This led to unnecessary complexity. The core realisation was that a family member does not need to know how something is handled. Only that it is handled. This reduced the data model to three states: unclaimed, claimed, and resolved.

Thesis connection: This decision directly instantiates the interview finding about sufficiency of coarse-grained cues. Participants described "on the way" and "free later" as sufficient for coordination; the same logic applies here.

31 January 2026: Photorealistic portraits, not illustrated icons

Insight: Early sketches used an illustrated style for representing family members. When the first photorealistic AI-generated portrait was rendered, the prototype shifted in character: from a calendar with icons to portraiture as ambient awareness. The family portrait genre carries different cultural associations: something one would hang on a wall, something guests might comment on, something personal rather than utilitarian.

Thesis connection: This decision instantiates calm technology's emphasis on integration with the domestic environment (Weiser and Brown, 1996). Photorealistic portraiture signals that the display belongs in the home rather than on a productivity dashboard.

1 February 2026: Dots, not calendar grids

Insight: The initial design for the companion app's weekly view used a calendar grid showing events. This recreated the exact problem the design was intended to solve; too much detail requiring cognitive effort to parse. Replacing the grid with a dot matrix (filled dot = claimed, empty dot = unclaimed) allowed the brain to register patterns, a busy Monday or a calm Friday, without reading specifics. The shape of the week matters more than its contents for coordination judgment.

Thesis connection: This extends the interview finding about sufficiency of coarse-grained cues into visual design. The dot matrix is parseable without focal attention, connecting to Weiser and Brown's (1996) model of peripheral awareness.

4 February 2026: Mobile-first action interface

Insight: The system requires two distinct interfaces with different design constraints. The ambient portrait display serves awareness; calm, beautiful, shared, placed on a wall or shelf. The action interface serves coordination; fast, one-handed, personal, on a mobile phone. The interaction flow is: see cue on ambient display, grab phone, claim or respond, done. This separation means the

ambient display never demands action; it invites attention. Action happens elsewhere on the user's terms.

Thesis connection: This reinforces Weiser and Brown's (1996) periphery-to-centre model. The portrait stays peripheral, but when the user chooses to engage, they shift to a focused mobile interface. The design separates awareness from action rather than collapsing both into a single device.

7 February 2026: Colour overlay as coordination cue

Insight: The original plan used icons or emoji overlays to signal unclaimed events on the ambient portrait. These cues broke the calm impression, they felt like notifications imposed on top of the image rather than part of it. A reddish colour overlay proved more coherent: the portrait itself shifts tone when something needs attention, returning to its natural palette when all events are claimed.

Thesis connection: The design must remain coherent with its domestic environment to function as calm technology. An overlay that feels like a notification contradicts the peripheral quality the display aims to achieve.

9 February 2026: From fixed path to testable prototype

Insight: External critique session with supervisor Mattias identified the core limitation of the Figma prototype: it was a fixed path. Regardless of who tested it, they encountered the same family, activities, and portrait. This meant there was nothing to evaluate, the answers were given in advance. For the concept to be critiqued, it must be testable: users should input their own family and see the result. Mattias framed this as the distinction between demonstrating a concept and testing a concept, and introduced the idea of a "demonstration curve". The threshold where enough functionality exists for meaningful critique.

Thesis connection: This maps directly to external design critique in CDIDR. A fixed-path prototype can communicate an idea but cannot generate the questions and tensions that Wiberg and Stolterman (2010) describe as the purpose of

critique. Building a testable version transforms the prototype from illustration into research instrument.

10 February 2026: Compositional figure rendering

Insight: Generating all family members together in a single image created two constraints: regeneration inefficiency (adjusting one person required regenerating the entire scene) and loss of relational control (relative heights between family members could not be reliably maintained). The solution separated concerns into three layers: a figure layer (identity, likeness, clothing generated per person), a scale layer (height relationships, pure arithmetic), and a scene layer (environment and atmosphere, generated independently). Any element can change without affecting the others.

Thesis connection: This compositing architecture enables the ambient display to vary settings while maintaining recognisability and physical realism. From a calm technology perspective, the system can be generative and dynamic while staying visually coherent and reducing the friction of keeping the display alive and fresh.

11 February 2026: From predefined buttons to LLM chat

Insight: The configuration interface was first built as a routed chat using predefined button options. The flow was technically functional but felt cramped, adding an event through a fixed button sequence felt like filling out a form with extra steps. Replacing the routed approach with an actual language model restored the fluidity the design principle demanded. The principle "AI mediates, human decides" had been established weeks earlier, but the first implementation defaulted to conventional UI patterns disguised as chat.

Thesis connection: A telling RtD moment. It took building and experiencing the interaction to recognise the gap between design intent and implementation. The stated principle was right; the initial instantiation contradicted it.

11 February 2026: Scoping down the portrait

Insight: Controlling foreground figure, background environment, and shifting clothing simultaneously proved too demanding for current generative AI tooling. Each additional variable multiplied unpredictability. The portrait was scoped down to what was feasible: generate a consistent portrait per family member and use a colour overlay as the coordination cue. Clothing and attribute shifting, originally central to the concept, became a future possibility rather than a requirement for the probe.

Thesis connection: A "good enough design" decision in Mattias's terms. The demonstration curve is reached when the portrait communicates coordination state (claimed or unclaimed via overlay), not when it also reflects weekly activities through wardrobe changes. The reduced version still tests the core research question.

12 February 2026: From family portrait to individual portraits

Insight: Three approaches to generating a composite family portrait via API were attempted and abandoned. Single-image generation lacked compositional control. Separate renders introduced inconsistent backgrounds and scale. A face-swap pipeline felt assembled rather than coherent. All three shared the same mistake: treating the AI as a raw image source and compensating through post-processing. The pivot to individual portraits, each family member in their own visual space, opened new possibilities: per-person colour signalling, clearer state communication, and scalability across family sizes. A tension remains: individual portraits read more like a status board than a family painting on the wall.

Thesis connection: The distinction between what AI can do conversationally and what it can produce programmatically is itself a design finding. The move from group portrait to individual portraits creates a new position on the design space, finer-grained state communication per person, but at the cost of the holistic family-as-unit quality that grounded the calm technology argument.