

Designing for Dynamic Family Structures: Divorced Families and Interactive Systems

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ABSTRACT

While the HCI community has long investigated issues of designing for family and the home, very little attention has focused on the lives of divorced families and the ways in which interactive systems might be better designed to address the very real and growing issues they face. In this paper we present an overview of related research on divorce and families. We then report field evidence from 13 in depth interviews conducted with families of parents and children in joint custody situations, and unpack key emergent problems and tensions. We conclude with a discussion of the design implications and opportunities that give shape to how the HCI community may be able to have a positive effect on this set of potential users. The overarching goal of this research is to better understand how the HCI community might begin to approach designing for this alternative family.

ACM Classification Keywords

H.5.2 Information interfaces and presentation: Prototyping

Keywords

Divorce, Family, Domestic Design, Ubiquitous Computing

INTRODUCTION

For over a decade, there has been growing interest in the design and HCI communities on how technology can improve the lives of families. Researchers have explored a range of issues such as the coordination and scheduling of domestic activities [e.g. 5, 10, 12, 17, 26, 30, 37], the work of families to creatively design their own routines and support tools, and the ways in which these processes shape social organization and ideas of family and home [e.g. 36, 39, 40], how familial relationships and structures are supported across distances [e.g. 3, 22, 40, 41], and the ways in which technology could be better designed to support the values of families [e.g. 3, 6, 13, 29, 39, 42]. This research, and the work of many others, highlights key contributions to understanding and designing for the various aspects of family life and illustrates the expanding breath of domestic issues pertinent to the HCI community.

Nonetheless, this body of work has focused nearly entirely

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on understanding and designing for intact families. Broadening our understanding of what it means to design for ‘family’ remains relatively unaddressed [22, 29]. Little work to date has investigated the home life of divorced families. Yet millions of families are affected by divorce, and in the US alone, 40% of all marriages end in divorce, over half of which have children [38]. Children from divorced families are often divided between two households. They face a variety of personal and familial challenges to overcome [2]. Unfortunately for these children, divorce coincides many negative outcomes such as a poor self-concept and poor academic achievement [1]. However, related research has shown that when both parents participate in the parenting process following divorce, these negative outcomes can be mitigated [2].

The reality of divorce presents an opportunity for the HCI community to investigate the ways technology might improve the quality of life for these families. As a first step, we conducted in depth interviews with 13 divorced families in joint custody relationships. We discovered that technology plays a key role in supporting and complicating the lives of divorced family members. It affects how co-parenting relationships are maintained, how single parents work to make a family, and how children attempt to construct a sense of identity across differing domestic environments. We present a series of resulting design opportunities targeting the range of practical and social challenges faced by family members in joint custody situations. Our overarching goal of this research is to better understand how the HCI community might begin to approach designing for this alternative family.

In this paper we present an overview of related research on divorce and families; details of our fieldwork including our rationale, methods, and findings; and a discussion of the design implications and opportunities that give shape to how the HCI community can have a positive effect on this set of potential users.

RELATED WORK

Divorce and Co-parenting

The lives of millions of families are affected by divorce. Today, 32% of children in the United States live away from one of their parents, often due to divorce or separation [38]. Children who grow up without a father in the home — because of divorce or for other reasons — are significantly more likely to get pregnant, commit suicide, drop out of school, abuse drugs, or go to jail [37]. In divorced families,

parents face a range of functional and social challenges associated with adapting to their new lives; however, the children are most at risk for critical problems associated with adjusting to a post-divorce reality [1]. Growing up in a divorced family has been shown to have negative impacts on academic achievement, psychological adjustment, self-concept, and on social relations [1].

When a family divorces, they often suffer an economic downturn, as they must bear the cost of maintaining two homes; however, it is the breakdown in parent-child relationships that appears to have the most negative impact on children [2]. Research shows that co-parenting, where parents seek consensus on child raising issues and where they appear as a united front to their children in the work of raising the children, can mitigate the negative outcomes associated with divorce [7, 2, 19]. Researchers have specifically noted the benefits of behaviors that reinforce family integrity and behaviors that indicate parents are united with respect to “corrective action” [25].

Behaviors that undermine co-parenting include covert communication between one of the parents and a child; children witnessing inter-parent conflict; parents using their children to pass messages in order to avoid direct communication with the other parent; and a parent disparaging the other parent in front of a child [25, 2]. Co-parenting can be difficult to achieve or maintain because the divorce process can exacerbate the underlying hostility that lead to the divorce in the first place [2]. Often, parents intentionally undermine one another’s authority in reaction to the hostility, preventing co-parenting from happening [2].

Recent research in the HCI community [41] has indicated that technologies such as mobile phones and computers emerge as the primary mediums through which divorced parents communicate; however little is known about how these technologies complicate or support co-parenting practices in divorced families.

Coordination and Scheduling

The lives of busy, dual-income families have been characterized as a state of constant “rush hour” [16]. As they address the many responsibilities of work, school, home, family, and enrichment activities, families can experience shifting feelings of both *being controlled* by their schedules and of being *out of control* when breakdowns occur [5, 10, 16]. Dual-income parents, particularly those with young children, consider a successful day to be one they simply survive [5]. These busy families are aggressive adopters and experimental users of technology that can help them manage their logistical challenges [10, 16]. In addition, they have expressed a desire for new technology that can help them feel more *in control* of their lives [11].

The HCI community has recently had a focus on how technology can help busy families manage their responsibilities and gain more flexibility. Researchers have looked at reminder systems at key locations in the home

such as the front door [20], at reminder systems that trigger when you are in a specific place [24], and at reminder systems integrated into the artifacts used for different activities, such as a child’s activity bag that can sense its contents and communicate when something is missing [30]. They have also investigated how digital calendars offer an improvement over the traditional kitchen calendar, allowing members to access the information at various locations both in and out of the home [26]. They have speculated on systems that can learn the routines of busy families in order to provide more support for planning and improvisation around deviations in routine [12]. Finally, they have investigated interactive systems that help families construct their identity [42].

On the surface, it seems obvious that the scheduling and coordination challenges divorced families face would be much more difficult than those faced by intact families. First, more detailed planning needs to take place as children move from home to home in order to make sure the equipment needed for an activity moves with a child. Second, the ability to react to unfolding situations has often been addressed by improved communication; however, in divorced families, parents often attempt to limit direct communication as it can lead to hostility [2]. There may be an opportunity in divorced families for new kinds of coordination devices and applications that are sensitive to their conflicts and that connect scheduling with parental responsibility and with transportation of children and equipment.

Identity and Place

People develop attachments to the places they inhabit. People most often perceive the home as the most significant place [31, 9] where family life unfolds, grows, and is nurtured [15]. For children, the place with the strongest attachment is most often their bedroom [8]. In their bedrooms, children surround themselves with their most precious possessions, representing a material infrastructure where they can experiment with their identity through their display of self to their parents and friends [33]. One important way they do this is through their access and display of media such as music, movies, celebrities, etc., using this as a way of owning their space and communicating their values and desires [23].

However, virtually no research exists on bedroom culture for children in divorced homes, and little is known about how they make sense of and exert control over the different domestic settings they inhabit. What is clear is that a child cannot easily move all of their possessions between two homes each time they move. At the same time, digital media, online communication and interactions with digital technologies and systems have become a pervasive part of the everyday lives for youths in the United States and well-established fixtures of their culture [18]. This potentially raises a number of interesting questions for HCI researchers. In what ways do children in joint custody situations perceive differences between their personal

places across two domestic environments? How might interactive systems be designed to support children in the construction of a *sense of place* across two domestic environments?

HCI Community and Divorce

While the HCI community has explored a variety of issues related to designing for intact families, very little attention has focused on the issues faced by divorced families and the factors that might shape how technology could be designed to improve their lives. One example is the work by Yarosh et al. [41], which describes how technology could be used to improve communication between a distributed parent and children in divorce settings. Our research advances this work and the emerging research space by exploring a range of topics related to the challenges divorced families with joint custody arrangements experience with respect to (i) inter-parent social interactions surrounding co-parenting, (ii) details of scheduling and coordination, and (iii) the need for children to construct a cohesive sense of place across the domestic environments they continually transition between. A key contribution of this paper is providing a deeper understanding of the everyday lives of divorced families with joint custody arrangements in the service of opening up broader opportunities within the HCI research and design space. Moreover, we present implications and opportunities for designing for a type of family that presents markedly different social relationships and structure in comparison to previous family-oriented research in HCI.

FIELD STUDY METHOD

We recruited 13 divorced families from a mid-sized Midwestern city in the United States. Participants included one parent and one or more children from each family. We interviewed a total of 13 parents and a total of 46 children whose ages ranged from 10-17. The occupations of parents ranged from secretary to school teacher to IT project manager to hotel manager. All families had joint custody arrangements; 11 families' children typically spent equal time at each parent's home. We chose to limit participation to families in joint custody relationships where children spend time with each parent as these situations have been shown to produce beneficial lasting results for all members and researchers have speculated these kinds of arrangements will become an increasingly prominent form of divorced family relationships [4, 28].

Interviews were conducted in participants' homes and lasted between 1.5 to 2.5 hours. They began with parents and children together to collect basic information such as the ages of the children, the number of years since the divorce, and the general visitation models. We then split up and interviewed the parent and participating child (or children) separately. We chose to separate the parent and children so they would feel free to share details and raise issues and concerns they may have been uncomfortable speaking about in front of each other.

We used a semi-structured interview approach. Questions for parents were designed to elicit reflections about how their lives changed since the divorce, the routines that now characterize their everyday lives, how they communicate with their children (when together and separated), how parents coordinate with each other and with children, how children's living conditions were perceived to be different in each home (e.g. bedroom and rules), and the key things children typically took when they moved between homes. Interviews with children usually took place in their bedrooms with the aim of developing a better understanding of their everyday lives, experiences of transitioning between homes, common activities, cherished physical and digital possessions, technology usage trends, and key differences between the social and material arrangements of both homes.

We videotaped the interviews and took field notes, capturing reflections of the individual interviewees. Interviews were transcribed and thematically organized. We coded the textual documents and field notes using methods modeled after [34]. These methods involve identifying key themes in the data and creating models to illustrate relationships among emergent themes in the data. In addition, we created affinity diagrams using sticky notes to find unexpected connections across participants.

FINDINGS

In what follows, we present several examples taken from field observations with families, which we feel capture the core themes emerging across our interviews. We refer to participants by their role — Mom, Dad, S (Son), D (Daughter) — followed by a number indicating the family. In the case of children, the reference includes a second number indicating the child's age. For example D2-10 would stand for a 10-years-old daughter from family 2.

Communication and Coordination

In nearly all of the families we interviewed, parents avoided verbal communication as it often resulted in conflicts and uncomfortable social exchanges. One example we observed of this was when Mom2 proudly stated that after 15 years of being divorced, she still did not know her ex's phone number. In some cases, parents attempted to communicate co-parenting issues through the children, which was generally reported to be unsuccessful. However, in 2 of the families (F2 and F4) the paternal grandmother played the role of mediator, almost always stepping in for the Dad in communications with the Mom. In fact, for F4, when Mom4 initially separated from Dad4, she moved with the children into her mother-in-law's home.

Still, parents had to maintain some form of communication in order to manage their joint custody arrangement. Participants most often use text messaging and emails. The asynchronous nature of these textual exchanges appeared to mitigate some of the problems associated with verbal interaction to varying extents. We found that most parents used text messaging largely for improvisational purposes,

for example if an immediate schedule change arose that could not be anticipated and the other parent's need to be reached. Emails emerged as the main form of textual communication. It had two main purposes — planning the logistics of children's everyday lives, and discussing broader issues, such as longer allocations of time a parent wanted to schedule with children (e.g. vacations) and decisions affecting a child's future requiring consensus from both parents. In general, our interviews with participants all either explicitly or implicitly suggested the coordinated work of successfully completing mundane logistical tasks was essential in constructing a scaffolding to support parents' higher-level work of developing consensus related to the long term goals of their children.

Benefits and complications of shared digital calendaring

In addition to emails and texts, all families used some form of calendar to structure and schedule their lives. Parents' lack of co-location, shifting schedules, and often-strained social interactions collectively complicated the use of paper calendars. With the exception of F1, all other families in our study reported using shared digital calendars. These presented a series of benefits and complications to co-parenting. Several participants reported how collaboratively coordinating weekly events opened a space to build consensus on deeper issues. For example, consider Dad11's reflection, "*Recently we had to figure out the dates of a music camp my son wants to go to this summer and once we did, we started thinking together about whether he's spending too much time playing the drums and not enough time on school, because he hasn't been doing great. ... We decided to let him go to the camp over the summer if he pulls his grades up.*"

We also encountered several instances in which participants' observations of their ex-spouse's planning efforts played a subtle yet important role in shaping perceptions of their collective investment in the co-parenting relationship, "*...I feel like in some ways it helped build trust between us ...because I can see when he also updates it ...and it doesn't usually mean I have to do anything but I like knowing about it because it makes me recognize we're both doing things to make it work*" (Mom10). Dad13 similarly describes this unobtrusive emergent value, "*we didn't talk at all at the time... it helped send signals that we're both trying to do our part of the arrangement.*" These observations and instances highlight ways that shared calendars provide motivation for consensus on parenting.

Participants also revealed several ways in which shared calendars complicated their work, particularly when private information was accidentally shared. For example, Mom9's ex-spouse's Alcoholics Anonymous meetings and dates with his new partner mistakenly appeared on the calendar in Mom9's home. This mismanagement of information eventually led to him permanently refusing to use the shared calendar, which has resulted a significant setback in co-parenting relations and, "*the kids missing things they*

didn't before because it's easy to get everything confused again." (Mom9) Similarly, Dad6's ex-wife shared her private events, such as dates with a new partner unknown to all other members, by mistakenly labeling them as the son or daughters' events. Since then, "*... it's taken a long time for her to rebuild trust between us.*" (Dad6) These instances reveal how problematic situations can arise when information about a parent's post-divorce identity collides with a shared space in which they are continuing to enact their ongoing role as parent.

Breakdowns during transitioning: children and their things

Despite many planning and coordination efforts, we observed it was occasionally hard for divorced parents to know who was responsible at any given time. Families described several instances in which their kids had been forgotten at school, sports camp, or other events such as birthday parties. Mom9 describes the kids being stranded at school, "*We both expected the other to pick them up. This never would've happened before. ... We don't want to know everything about each other but sometimes you can end up not knowing what you're supposed to be doing. ... It makes me feel like I'm not doing my job as a parent.*" These breakdowns led to substantial conflicts between parents and produced further barriers to co-parenting and consensus seeking interactions.

The most common breakdown all families reported involved moving objects between parents' homes. Children often forgot to take long-term homework projects, which typically started in one home, but needed to be finished or turned in from the other. Other forgotten items included children's personal possessions used on a daily basis (e.g. iPod, backpack), activity specific clothing (e.g. swimsuits) and activity specific equipment (e.g. golf clubs). In particular, several participants reported that children having shared activities across both homes (e.g. biking in the neighborhood, camping in the backyard) provided parents with a shared set of experiences, which could serve as productive framing mechanisms for social exchanges. For example, Dad13 reflects on how the kids' practice of occasionally biking at both homes helps facilitate social exchanges with his ex-wife, "*Having something the kids do at both of our homes is good. It makes it easier to start out. ... Sometimes we do end up talking for a little while. It's good for us to start to get back on the same page.*" However, these kinds of artifacts appeared particularly prone to being forgotten as they were uncomfortably situated outside of the core set of everyday equipment transitioning with children across homes, while at the same time often used in impromptu ways that did not necessitate the scheduling of a 'formal' event. In general, the breakdown in transitioning any artifact caused problems for parents, requiring them to make repeated trips between homes, if the artifact could be located at all. Many parents reported breakdowns leading to ongoing conflicts with their ex-spouse, "*sometimes we get into fights because the kids' stay at their Dad's gets disrupted by a missing charger or last month it was a thumb drive, and he holds me*

responsible because the kids get upset and it affects his time with them. ...but I can't keep track of everything" (Mom9). Breakdowns also further magnified the differences between parents' homes, which in some cases caused children to call the other parent, pleading to return back to her or his home.

We observed families adopting several different strategies to address this issue. One coping approach was to purchase multiple versions of the same item. For example, in F5 and F11 the children had almost all the same toys and books at both homes, including expensive toys such as bicycles. F2 represented an extreme case where D2-17 was not allowed to move her clothing between the two homes. When she arrived at her paternal grandmother's home (the home where her father resides), she was expected to immediately change into clothes for that home. In general, this coping strategy appeared to correlate with the quality of the parent's relationship. For example, in F8, where the parents consider each other to be friends, the daughter was often forgetting things at each home, but had no duplication of items she used other than personal grooming items such as a toothbrush. Nonetheless, the duplication approach presents obvious limitations financially as well as materially.

Another strategy we observed was parents' creation of organizing spaces to stage key objects needed to support children's inevitable transition. While they varied in content and location, these organizing spaces were areas in which artifacts that transitioned with children were informally stored and cataloged. Oftentimes these areas had lists posted that were used in part to help make kids responsible for keeping track of their own personal possessions, which also served as rough checklists for parents as kids entered and exited the home. In addition to their utility, these spaces also supported important social rituals for parents as they prepared their children for the next few days before they left or caught up with them when they returned. However, parents reported these staging rituals were often disrupted as they rushed to find objects that were missing.

Negotiations in making a home following a divorce

A key challenge parents reported was dividing up domestic possessions; sentimental artifacts owing to children's lives often emerged as the most contentious issue. In some cases parents had come to consensus through negotiation of who would receive which artifacts. However, in most families, one parent typically retained the vast majority of these kinds of possessions, which were often prominently on display around their home. These imbalances often magnified children's perceived differences between parents' homes, which could fuel further conflict between parents. S10-13, who splits time equally between households, describes this distinction in relation to his Dad's home, *"there's nothing that makes me think of home there. ...like there's nothing of us ...around or on the walls."* Mom10 has no intention of giving up these things in spite of the emergent tensions with her ex-husband, *"he*

doesn't like it now but he didn't want anything when we got divorced and now they're part of my home ...I can't just split them up now." In an extreme case, parents in F11 had been unable to come to an agreement and resigned to rotate precious artifacts, such as the children's artwork, on a bi-monthly basis. Parents would often archive new objects made by their children by taking digital photos, and in some cases, they reported emailing copies to the corresponding parent.

When describing other ways in which domestic artifacts and spaces differed in parents' homes, shifts in content of domestic photo displays emerged as a key theme. Nearly all parents reported that they did not display photos that exclusively featured their ex-spouse (although most reported they still retained possession and had buried them away in boxes and closets). In general, photo displays had nearly exclusively migrated to focus on children, and to a lesser extent friends and relatives of the parent. Interestingly, many parents did display photos of their kids engaged in activities that their ex-spouse had organized; some of which even contained the ex-spouse. These included images of vacations, baseball games, and even backyard events.

Displaying these photos in parents' households was generally viewed as a productive, unobtrusive way of projecting support for children across homes. For example, Mom7 reflects on her photo display that prominently features her kids in a range of activities, *"my ex is in some of them, he even took some of these [photos]. ...He has some of me too. ...Our connection is the kids, so it's ok to see him like this. ...[The kids'] lives are different enough between our places, and we want to support them, so this is some way of trying to do that."* When parents were probed about how they obtained these photos, oftentimes they reported a similar type of photo exchange had emerged through email. Dad13 describes the value of these exchanges, *"every once in a while I would send a photo of the kids as a gesture, and get one back here and there. ...It ended up being something we could do that didn't have all the stress of getting through the next week associated with it. ...it was something positive we had to relate to."* These kinds of photo exchanges emerged as subtle non-verbal practices that offered potential to help facilitate productive interactions between parents not explicitly focused on the logistics of coordination and scheduling.

Children's work to construct identity

A key problem faced by children in joint custody families is they do not have access to the same resources and spaces in one home as compared to the other. This can include differing technological setups, the absence of cherished possessions, and even the absence of a bedroom.

Children's bedrooms revealed a range of physical objects valued as deeply significant. A sample of these included: photographs of family and friends, artifacts created by other friends (e.g. pillowcase signed by friends), self-made artifacts (e.g. pottery), mementos owing to various trips,

and objects symbolic of personal achievement (e.g. trophies, scout badges). Children expressed strong conflicts over only having access to these things when in one location, which further highlighted differences between their parents' respective domestic environments. For example, D11-14 describes a bulletin board of memorabilia owing to her friends in her bedroom at Dad's place, "*It's something I love. It reminds me of all my friends and I look at it and add things to it. It's a relaxing thing I do. ...At Mom's I can't. My room there isn't so comfortable, no one else stays there but it doesn't feel like mine. ...I want to see [Mom] but I'm also usually wanting to get back [to Dads]. ...I wish I could bring it over to my room there but there's no way.*" Similar to D11-14, most children expressed a desire to carry these objects across both domestic settings, but obvious physical constraints made this largely impossible.

Mobility, photo archives and digital copies of physical things
An overarching theme across all interviews is children's perception of personal digital devices being their most significant possessions. The majority of children participants owned personal camera phones, iPods and thumb drives. Several owned digital cameras and some had access to personal laptops. These devices typically traveled with them nearly everywhere they went, and they were always kept close.

We found children appropriated their various personal devices to mobilize extensive archives of digital photos, which included images of friends and family, vacations, popular culture, as well as digital copies of cherished physical possessions. In some cases, archives of photos had been curated in their mobile form in and across several devices for years as participants had been transitioning between homes. In an extreme case, D10-15 reported having over 400 images of school friends on her phone. Many participants reported having over 100 digital photos in the collections that moved with them between homes. For example, D8-15 reflects on the importance of her mobile archive, "*I have to have them, like not even if I'm looking at them. ...I like just knowing that they'll be there if I want them. [They're] something I can count on.*" D2-17 described dependence on her archive simply as, "*If I lost them I would die.*" In general participants deeply valued having archives near them, even when not in use.

We observed several instances in which participants leveraged the immediacy of these photo archives to cope with some of the emergent differences they experienced between homes. For example, Dad9's home had very few family photos, which his children brought up as a key distinction between F9's respective homes. S9-12 and S9-14 described several instances in which they used their iPods to make digital photos present to Dad9, "S9-14: [Dad's] house doesn't have any of the old photos of us. ...Mom has them all. In books and in our home. ...I took some [pictures] of them on my phone. S9-12: And I have some [photos] from our trips [with Dad] on my iPod. S9-

14: *We started looking through them and talking about places we've been. ...We didn't used to because I guess we didn't think about it. ...like over at Mom's [house]. ...Now we do it each time we go over there.*" These acts opened a space for collective reminiscence about different pre & post-divorce trips they had taken. Several participants also reported printing digital photos of friends in attempts to make bedrooms at separated parents' homes, as D10-15 describes it, "*more of my own place.*"

Children described using their devices to make digital copies of precious physical objects, which were often constrained to the bedroom of one parent's home. Several participants described making these copies present at the separated parents' home. For example, S9-14 describes digitizing his latest lacrosse award, "*I've been playing lacrosse for a long time and I've won some trophies. Like I got best defenseman. ...[Dad] doesn't go to many games and you know doesn't come over here. I didn't know if he knew I won. ...I took [a picture] on my phone to show him.*" We observed several other instances in which objects symbolic of personal achievement, such as trophies (S5-10, S9-12, S10-13) and scout badges (S11-15), had been digitally copied and made visible to a parent as a matter of implicitly receiving recognition.

Uploading digital copies of precious physical objects to social networking sites also emerged as a theme among children participants, which appeared to result in new value being attributed to these things. For example, D10-15 describes uploading an image of her prized pillowcase, "*All my friends signed it, it reminds me of them. It's a big part of my room [at Mom's house]. ...I don't have anything like it in my room [at Dad's house] and it's too fragile to take. ...I took a picture of it and put it up on Facebook and my friends that signed it commented on it. It's pretty special. ...When I'm [at Dad's] at least I can go there and look at it [online] and see it what they wrote.*" Similarly, 3 children (S5-10, S9-12, S11-15) had digitized objects of personal achievement (e.g. trophies, framed certificate, boy scout badges) and uploaded these photos to Facebook. For example, S11-15 describes frequently updating his photo collection of badges online, "*Each [badge] I earn is another step in getting new skills. I'm proud of them. I hang them up on the wall in Mom's house. ...I don't have them here [Dad's house], but each time I get a new one I take a photo of it. ...I put them on Facebook and keep it on my thumb drive so I can still show them to [Dad].*" Moreover, Dad11 describes an emergent benefit of his son's badges online, "*The kids don't see much of [my ex-wife and I] together. ...even though we're not friends [on Facebook] we could both see his badge photos and congratulate him on the new ones together ...because we're both friends with him [on Facebook]. I think it was good for him, that we could both support him. ...the kids don't get enough of that.*" These instances collectively illustrate how children leveraged their online social networking sites to make digital copies of key possessions accessible across homes and, in F11's case, open a space where parents could

collectively congratulate children on achievements despite rarely speaking.

Anchored social places in transitional circumstances

The majority of children we interviewed described themselves as frequent users of social networking websites, such as Facebook and MySpace. While this is now emerging as a common theme among youth across demographic boundaries [18], what we want to highlight are the ways in which our participants described their relationships with these online places. In particular, an underlying theme in their descriptions owed to the comfort of having some sense of a consistent place in which they could reach family and friends despite their perpetual state of transition between two homes. For example, D11-14 describes the reliability of her Facebook page in contrast to a sometimes unpredictable life of transitions, *“In a way it’s like somewhere that’s always the same...it’s kind of always there and doesn’t change and I can go there when I need it no matter where I’m at, because sometimes our schedule changes and I don’t even know where I’m going to be.”*

The reliability of these online places coupled with the ability to augment them to reflect changes in personal identity and preferences appeared to play a significant role for many of our participants. For example, consider S10-13’s reflection on his relationship with and practices of attending to his MySpace page in comparison to the bedrooms he frequently transitions between, *“I have to take my clothes and things between [Mom and Dad’s] a few times a week so I never put stuff away. ...[the rooms] don’t really feel like mine because I’m not there long enough to make it feel like my own. ...I like my [MySpace] page because I can control the way it looks and change it. If I feel in a different mood ...I can change the music and the colors. I spend a lot of time on it, so what I have on it is important to me and I like I can always find it.”* S10-13’s statement characterizes how several of our participants described valuing the anchored nature of their social networking pages in contrast to their shifting domestic locations.

Collectively, this small sample of comparisons provide insights into how having little material consistency across the physical places children transition between can have a disrupting affect on their processes of adjusting to post-divorce life. These instances illustrate how participants resourcefully drew on social networking website pages in an attempt to assemble some sense of personal cohesion in a virtual place that had the potential to extend across parents’ homes.

Children’s projection of information across households

We encountered several instances in which children reported using their Facebook status messages to asynchronously project information about their location and status throughout the day to both parents. Oftentimes this was completed with a combination of messages uploaded from mobile phones and computers. For example, consider D10-15’s reflection, *“My parents, they want to know where*

I’m at and what I’m doing, but they don’t really talk and I can tell it causes problems. They’re both on Facebook, so I started using my updates so they can both know where I’m at and figure things out quicker if the schedule changes. ...It makes me feel good to be helping out. ... and now they’re not always both calling me. I like to post [updates], when I want to.” S11-14 similarly described the virtues of leveraging his status updates to send messages across households, *“Mom would call me to find out where I’m at and she’d be supposed to tell Dad but sometimes she wouldn’t or just forget. ...[Facebook updates] are good because they can both check my page now and I use my phone to update when I’m going places. ...they’ve told me it makes things easier. ... I don’t mind [doing] it.”*

While status updates are a common practice among teenagers on sites like Twitter and Facebook, what we want to draw attention to is the ways in which this form of communication enabled children to play a subtle yet significant role in helping organize family life across settings in which they often felt like they had little control over. Moreover, parents reported recognizing the emergent benefits these instances provided, *“I can find out where she is and see what she’s doing when she’s over at my ex’s house. ...I would never get any of those details from him. ...it’s nice when she’s spending days away from [my] home”* (Mom10). Collectively, these instances are exemplary of how several children appropriated technology to engage with both parents on their own terms, which helped bridge communicative gaps between households often characterized by strained social relations.

DESIGN IMPLICATIONS AND OPPORTUNITIES

Divorce and the many issues that tend to surround it are complex. A key contribution of our study is to present and interpret a range of problems faced by members of joint custody families as well as the emergent strategies and behaviors they employ to cope with them. In this, we have described the ways in which physical and, largely digital, objects play significant roles in these processes.

These findings have several implications for the design of interactive systems for this audience. Our findings show how technology can both support and complicate the work of parents to collaboratively plan their children’s lives and carry on with family life after divorce. We also found that technology played a prevalent role in shaping children’s experiences in the ongoing adjustment to lives characterized by transition between differing homes. All of these issues owe to challenges and circumstances quite different from those experienced by intact families, whose needs and requirements have long been considered in the HCI community. In what follows we present three initial design implications with accompanying opportunities where HCI research and development could positively impact the lives of divorced families with joint custody. These include developing tools to support both family cultures, examining scheduling as an opportunity for co-

parenting, and designing systems to enable management and presence of virtual possessions.

Developing tools to support joint cultures—While parents in joint custody situations may desire to holistically engage in raising their children, it was evident that each home/parent had a distinct culture that children moved between. Given these issues, when considering how to design for divorced families, it may be misguided to force a single culture across the two homes. Instead, focus might be better placed on finding socially appropriate connections between these two different worlds that allow children to more easily move back and forth, and that enables a common context from which parents can engage in co-parenting. For example, while parents reported no longer having photographs exclusively featuring their ex-spouses on display in their homes, several had integrated photographs depicting their children at key events organized by the ex-spouse. In other cases, families exchanged photographs of children at key events that the other parent did not attend. These instances suggest an opportunity around designing socially appropriate digital photo systems that help create common ground around activities children participate in. Some research in HCI has explored the design of smart photo frames to support contextually suitable domestic presentations of digital photos [21], which could be leveraged in future work, as could approaches illustrating how photo displays in the home can serve as rich resources for design [13, 35].

We observed Facebook was appropriated in several ways. In some homes it functioned as an informal platform for parents with strained relations to collectively express positive feedback to their children. It also functioned as a place where children could asynchronously project information across households. In nearly all of these cases parents were ‘friends’ with their children, but not each other. While benefits did arise from these emergent uses, they collectively suggest social networking systems as currently implemented are insufficiently designed to support the complex social dynamics present in divorced families. Their structures of “family” and “friends” do not support the more flexible boundary lines needed for children in divorced families. This suggests an opportunity to advance social networking systems by creating interactions to support more sophisticated sharing of messages and content directly with the child and various family members across both homes. The social processes unfolding among family members following divorce are heterogeneous, unpredictable, and shifting [15]. We imagine a more flexible and socially robust preference system, enabling a deeper degree of choice among who could be selected to receive content would be productive for supporting post-divorce family member interactions as their relationships—and the broader social organization and structure of these families—change over time. Such a system could take on greater significance as parents re-marry, notions of family structure evolve and expand, and perhaps children from other marriages become part of the

home. This direction could build on recent research in HCI calling for more nuanced approaches to designing social networking systems to support complex, shifting social relationships [29].

Examining scheduling as co-parenting opportunity—We found that digital calendaring systems were appropriated by parents as boundary objects mediating conversations about their children’s lives and could lead to ad-hoc co-parenting. This suggests an opportunity for a new kind of calendaring system that more explicitly supports co-parenting through threaded discussions of parenting issues related to specific events. Nonetheless, parents’ use of calendaring systems also illustrated how the emergence of private information within digital spaces viewed by all family members can result in substantial breakdowns in co-parenting relationships. This clearly suggests an opportunity for integrating more sophisticated levels of privacy considerations that enable a divorced parent to better manage the various social roles they enact on any given day. Even simple tools, such as allowing parents to see the other parent’s view before sharing could help avoid these breakdowns. In fact, these tools might be quite similar to the tools mentioned above to improve sharing of information on social media sites.

We observed that dramatically reduced communication between parents could create situations in which parents were confused as to which one was meant to *be on duty*. This could lead to several negative consequences such as children being left behind at an event and significant conflict between parents. One opportunity suggested by this issue are mechanisms to help parents know who’s on duty, such as ambient displays in the home, on calendaring systems or mobile devices. Similarly, another opportunity could lie in creating a new kind of calendaring system that allows parents to explicitly note when they are in charge of an event, or aspects of an event such as the pickup or drop-off of a child. Emerging research investigating the design of systems aimed to support dual-income parents handle their responsibilities when they deviate from their routines could be leveraged in the service of this direction [12].

Another major problem all parents faced had to do with breakdowns in transporting equipment and children’s possessions between homes. These breakdowns could lead to increased hostility that undermined parents’ ability and willingness to engage in co-parenting. We see two ways in which technology could improve this situation. First, new calendaring systems could enable family members to associate specific equipment with activities and events. Second, calendaring systems could allow parents of children to pre-propose possible activities that they might engage in following the next transition between homes, helping to ensure the appropriate equipment is available.

Collectively, these opportunities are aimed at enabling co-parental interactions, either by (i) explicitly helping parents’ better manage their post-divorce social roles or (ii) making the everyday scheduling work of parents easier in

the service of building the scaffolding needed to support their higher level work of coming to consensus on decisions affecting their children's lives. These directions could productively expand existing domestic computing research on family accounts [14] as well as family member awareness [26] and negotiation of parental life roles [17] in calendaring systems as the community begins to consider some of the requirements of these alternative families.

Designing systems to enable management and presence of virtual possessions—The division of possessions between two homes emerged as a key issue for parents and children. We found child participants conveyed deep attachment to a range of virtual possessions, such as digital photos, music files, social media sites, etc. In particular, it was important that children felt these types of possessions were immediately accessible, even when not in use. However, the mobile archives we observed were nearly entirely stored on one or across a few personal digital devices that were rarely if ever backed up and susceptible to being lost. These observations suggest one opportunity for better supporting transitional experiences between homes is designing richer cloud computing applications to make virtual possessions more readily available across mobile devices and platforms as well as in multiple locations regardless of specific devices.

Children also described several instances in which they used mobile devices to present digital copies of significant physical possessions to parents in households in which those objects were absent. The presentation of these digital images opened a space to support, among other things, collective reminiscence among family members, parental recognition of children's achievement and to a limited extent children's creation of a more unique and comfortable 'place' of their own within bedrooms and domestic settings in which they attributed little personal attachment and authorship. We also found new value emerged for children in the way digital copies of significant physical artifacts were treated online. Moreover, children appeared to deeply value their personal online *places*, such as MySpace and Facebook pages, in part due to their anchored nature and the ability to return to them no matter their physical location. In general, these instances all seem to suggest there appears to be a much larger opportunity for designing interactive systems that amplify the presence of virtual possessions across children's homes in ways that are more rich and enduring than the temporary appearance on a mobile phone or iPod display. On one hand, amplifying the presence of virtual possessions in children's lives could open a space to support parental or familial rituals tied to physical objects now fragmented across homes. On the other, it could enable children to take a more active role in owning and cultivating domestic space in and across their domestic settings. These emerging design directions could scaffold growing research in HCI investigating the ways in which mobility and technology shape and expand users' perceptions of what might constitute 'home' [32, 40].

CONCLUSION

In this paper, we have explored key challenges faced by divorced families in the service of better understanding how the HCI community might begin to improve the lives of this complex audience. Our fieldwork identified a range of problems members of divorced families face as well as emergent strategies employed to cope with them. We found technology both complicated and supported parents in carrying on with the work of family following a divorce, and shaped children's experiences of and adjustments to transitioning between two homes. Based on these findings, we proposed *designing tools to support joint cultures, exploring scheduling as a co-parenting opportunity* and *designing systems to enable management and presence of virtual possessions* as initial design implications for this audience. We also provided design opportunities to begin to guide future work in this area.

A clear limitation of our study is that all of our participants were members of divorced families with joint custody arrangements. Divorced families take on many other forms, such as single parent households or instances in which one parent is far less involved in parenting, which would undoubtedly present a different set of concerns. More research is required to understand the needs of families existing outside of the social, cultural and legal contexts of the United States. Moreover, most members of families we interviewed were reasonably technologically savvy. Additional research is needed to understand how HCI might positively impact the lives of divorced families in which technology is not as readily available. Ultimately, we hope this study will inspire future research into how technologies might be designed to better support the lives of those living within these kinds of alternative family structures.

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