Community Information Needs and Practices of Families

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ABSTRACT

Many government agencies have dated, underused websites that suffer from an overabundance of information. This makes it difficult for people to find and view the information that is relevant to them. To help address this problem and better understand people's *actual* community and government interests, we present the results of a diary and interview study that explores what community information people are interested in or need to know about, how and when they acquire this information currently, and what challenges they face in doing so. Our results show that contextual information often triggered people to become more aware of their community while pre-contextual information was desirable to help with planning family activities. Our analysis suggests design opportunities to support the digital curation of traditional print news media and online news media to support the interactions between family members. We also suggest considerations for location-based experiences within communities.

Author Keywords

Community; digital technology; social media; e-government; domestic computing; family communication

ACM Classification Keywords

H.5.3 [Information interfaces and presentation]: Group and Organization Interfaces - *Computer Supported Cooperative Work*

INTRODUCTION

Government organizations at municipal, provincial or state, and federal levels have more recently begun to consider how digital technology can improve public sector administration, offer online services, and provide a communication channel in which people can connect with their government agencies [3,4,6,8]. Such agencies are also looking at digital tools in which people are encouraged to participate and maintain a sense of interest within their communities, whether it is via government websites, social media tools, or mobile applications.

As the demand for online government information and services increase (e.g., online payment of property taxes,

permit applications, and licence renewals), all levels of government are struggling to keep pace with the changing technologies [13,21]. The interconnections between the various levels of government have led to the publishing of large amounts of information online, resulting in people struggling to find and retrieve their specific topics of interest [22]. Government agencies need to consider what types of information is of interest to people within their community, how such information should be presented digitally, as well as how users should be able to interact with the information through technology. Though research in the area of digital government is scarce [20], prior work has considered accessibility and usability within e-government [24,16,22]. However, little work has been done to understand how people navigate, find, and engage with community information sources and what information is most needed.

Our overall research goal was to understand what types of *local community information* and services people want or need to know about and how this information should be presented to them. By 'local', we refer to the municipalities in which one lives or visits as a part of everyday domestic life. By 'community information', we refer to information such as bylaw documentation, community or municipal events, elections, traffic, construction, etc. While described here, we were largely interested in having participants define this type of information as part of our study. Specifically, we wanted to explore when, where, how, and why such information or services were sought out and what challenges people faced in performing these activities. To explore this problem, we conducted a diary and interview study with eighteen people.

Overall, our results show that people often want to know about contextual information relating to locations that they pass by or see throughout their day. They also value what we call pre-contextual information, knowledge of upcoming events and happenings that they use to plan family activities. People routinely refer to multiple sources of tangible and digital community information to discover this information (*if* they are even able to discover it) and rarely does this involve visiting government sites, be it on the web or via social media. These findings show that government systems should be designed to support information sharing amongst family members and to surface relevant information both pre-contextually and location-specifically. We explain this further in our paper.

First, we outline related work on the existing challenges with e-government websites and government social media usage. Second, we describe our study methodology. Third, we outline our results and then conclude with a discussion of our findings and what they mean for the design of digital technologies to connect people with their community and government agencies.

RELATED WORK

e-Government Websites

Government websites are often poorly designed and information-heavy, typically providing an overwhelming amount of information that is difficult to navigate [22]. In addition, these sites are designed primarily with a focus on information dissemination, where users are expected to search through thousands of pages to find the relevant pieces of information. Studying the underuse of government websites has seen a recent incline globally. Al-Khalifa completed a heuristic evaluation of 14 Saudi government websites and revealed the need to conduct testing with users to understand key usability problems with government sites [2]. Golubeva evaluated 11 Russian government websites on the basis of their 'public value concept', comprised of public services, public policy outcomes, and public trust [14]. The study revealed that the sites needed to improve in their public value offering according to a number of indicators, including transparency and interactivity [14]. Al-Hassan et al. [1] suggest a framework (Pe-Gov) for delivering personalized services to design government websites with a user-centric approach. Specifically, such an approach would extend existing personalized services that require static customization to a more intelligent system that would automatically provide users with services relevant to their needs.

Such past work has shown that government websites struggle in attracting and retaining user interaction and engagement [1,2,14,22]. People may also wish to engage with the city by reporting real-time incidents, such as traffic, road potholes, or graffiti [11,19]. However, people often do not have the channels to do so with dated government sites that are not optimized for mobile consumption. Therefore the expectation is for users to either navigate a poorly designed website on their mobile device or remember to contact their government agency using traditional methods of communication when they have the time to do so (e.g., in person, telephone, email).

A well-designed mobile system can possibly be the link between government information and community engagement as it provides immediate access for people to retrieve, capture and share information. Supported by Ganoe et al. [11] and Kim and Kleinschmit [19], such participatory channels can support active community improvements while encouraging the use of digital government services. Our work explores how users currently access and use community and government information, both at home and on a mobile device.

Social Media Use

In addition to government sites, people may also turn to social media (e.g., Facebook, Twitter, etc.) to maintain an awareness of community activities (e.g., traffic, community events, or upcoming housing developments) as well as to share their views and/or interact with their community.

Gharawi et al. [12] describe the growing interest in adopting social media tools in government. Through workshops, interviews, and content analysis of government social media policies, their findings suggest challenges hindering government agencies' adoption of such tools, including the lack of staff resources, legal and regulatory ramifications for inappropriate use and information overload [12]. Jaegar et al. [17] also recognize that social media usage can support opportunities for government-citizen interactions, including reaching members of the public, extending government services, and engaging residents in civic efforts. However, the lack of governance policies and concerns about the privacy of citizen information, security of government information, and intellectual property has limited government agencies' active participation with social media [17]. As a result, people who are accustomed to immediate and interactive dialogue with social media tools become disengaged and gradually abandon the use of these channels of communication.

Despite the above concerns, government organizations will indeed need to leverage social media to improve services and communication with people within their community. This is evidenced by Kavanaugh et al. [18] who focused their study on understanding social media use in crisis situations, from routine conditions (e.g., traffic) to critical (e.g., emergency disasters). Their interviews and questionnaires with government officials found that local governments used social media without knowing their actual audience or the effect their social media communications had on the public [18]. Findings also pointed to the critical need to help government and citizens navigate the large amounts of data being generated, especially for crisis situations [18]. Our study extends this work by examining people's perspectives and expectations of social media interactions with their government agency.

STUDY METHODOLOGY

We conducted a three-stage diary and interview study of people who lived within multiple suburbs within a large, metropolitan area in Canada to understand their community interests and current interactions with their municipal government.

Participants

We recruited eighteen people (ten female) through snowball sampling, word-of-mouth, and by posting ads on an online classified advertisements forum, Craigslist. The median age of participants was 42; ages were spread across the following age groups: (six) 30 to 39, (seven) 40 to 49, and (five) 50 to 59. Table 1 shows the demographic breakdown

for our participants including the number of years they have been a "Resident" of their city and family composition (for children still living at home). All participants resided within the same urban area in Canada. Participants were all fluent in English and frequent users of technology, including desktop computers and mobile smartphones. We were specifically interested in families where one or more adults had full time jobs, potentially children, and, if so, a variety of activities to coordinate and manage. As such, our participants had diverse full-time professions, including work as stay-at-home parents and employment in the public sector, technology and sales industries. Participants were each entered into a draw for one of four gift cards (valued at $50 each) as compensation for their participation in our study.

#	Gender	Age	Status	Resident of City	Family Composition
P1	M	57	Married	23 years	Live w/spouse, 2 kids (26, 23)
P2	M	56	Married	47 years	Live w/spouse, 2 kids (20, 16)
P3	M	42	Married	10 years	Live w/spouse, 2 kids (6, 4)
P4	M	38	Divorced	32 years	Live alone, no kids
P5	F	42	Married	15 years	Live w/spouse, 2 kids (12, 10)
P6	M	53	Married	6 years	Live w/spouse, 2 kids (27, 25, 23)
P7	F	52	Married	6 years	Live w/spouse, 2 kids (27, 25, 23)
P8	5	43	Divorced	8 years	Live alone, 1 kid (19)
P9	F	34	Married	4 months	Live w/spouse, no kids
P10	F	31	Married	4 years	Live w/spouse, 3 kids (7, 5, 8 mths)
P11	F	50	Divorced	5 years	Live alone, no kid
P12	F	40	Married	26 years	Live w/spouse, 2 kids (12, 10)
P13	F	33	Married	6 years	Live w/spouse, no kids
P14	M	44	Married	15 years	Live w/spouse, 2 kids (12, 10)
P15	F	32	Married	3 years	Live w/spouse, 1 kid (10 mths)
P16	M	40	Married	7 years	Live w/spouse, 2 kids (6, 4)
P17	M	34	Divorced	8 years	Live alone, no kids
P18	F	42	Married	42 years	Live w/spouse, 2 kids (6, 2)

Table 1: Participant demographic details

Stage 1: Online Survey
Participants completed an online survey that gathered basic demographic information, such as age, gender, education, and profession. Survey questions also explored participants' current living situation (e.g., homeowner, home renter, shared accommodations, etc.) and how connected participants were with their community and its politics. We asked participants to briefly describe what types of community and government information they were most interested in knowing. For example, questions included, *"Describe what types of community and government information you are most interested in"* and *"Describe how you currently source information about your community and services offered by your government agency"*.

Stage 2: Three-Week Diary Study
Over a period of three weeks, participants were asked to maintain an online diary about any points of community interest they encountered during their regular daily routines. Participants were setup with a private Twitter account that we asked them to use to record their thoughts using any form of post (text, links, photos, videos, or re-tweets).

We chose the above experience sampling method [5,15] in order to reduce the need for participants to recall their practices; instead, participants were able to capture their current activities, thoughts, and feelings in-the-moment with their mobile phone. Twitter was chosen as our data collection tool as it offered privacy settings (where only we, the researchers, could view their posts), location-tagging, photo, and video abilities. This gave participants a variety of capture and recording options. Twitter was also available for multiple platforms (e.g., Android, iPhone, BlackBerry, Windows).

We asked participants to post a minimum of four weekly posts (> 1 per week), though more frequent posts were encouraged. We sent a weekly reminder email to encourage participants to continue posting throughout the week and to notify them of how much time was remaining for this stage of the study.

Participants were instructed to look for and capture any points of interest within their environment, whether it was in the form of physical objects, places, billboards, public notices, or any socially-related interests, such as instances of homelessness, vandalism, or crime. Participants were also able to record their thoughts as it related to any ideas or concerns surrounding their community, thoughts on becoming involved and interacting with others, or searching for information online about their city. We expected that allowing multi-media formats within the diary method would enable us to understand both the actual point of interest and the surrounding environment, e.g., a person could post a picture of the location containing the information that they were interested in.

Stage 3: Semi-Structured Interviews
Following the diary period, we conducted a semi-structured interview (that lasted between 30 and 60 minutes) with each participant individually in-person or over Skype. Interview questions explored participants' daily routines and interactions with their local community and government. For example, questions included, *"Describe your commute to and from work"*, *"Describe how you currently use your city's website"*, and *"Tell me about the last time you shared information from your government site with a family member"*. Questions also sought to understand participants' community interests by reviewing their posts from their diary and asking them to further elaborate more about their thoughts at that time. This process helped us understand

what it was they were specifically interested in and why they were interested in that particular aspect of their community. We also asked participants how they retrieved such information, and how they managed and shared such information with their social network.

Data Collection and Analysis
All interviews were audio-recorded and transcribed. We also kept typed notes for interviews and downloaded all online entries from each participant's private study Twitter account. Using open, axial, and selective coding, we completed a thematic analysis on the survey, diary, and interview data. We also analyzed a total of 293 textual posts and 67 photo posts as part of the diary stage. Overall, we uncovered several themes that illustrate people's community information needs and routines for accessing such information.

Our results first discuss the general themes we drew from our participants' online diaries, including what types of community information they were interested in and their sources of such information. We then discuss how they retrieved such information and the interesting attributes surrounding these routines.

COMMUNITY INFORMATION NEEDS
Participants' posts included a combination of photos, re-tweets, and textual descriptions. Within the diary posts, we found seven themes that formed the following categories of community information people recorded as being of interest to them: administrative, maintenance, recreational, legal, traffic, community, and environment. Table 2 provides a list of all the categories of community information and a sample participant post for each.

Category	Participant Post
Administrative	*"Need to pay utility bill. Can I do that on the City website?" – P1, Male*
Maintenance	*"Couldn't find any info on the roadwork at Kensington overpass this morning. Need more info!" – P9, Female*
Recreational	*"Had my first look at the new Edmonds Community Centre in Burnaby. What a great place to spend spring break. Lucky Burnaby residents." – P2, Male*
Legal	*"Must call 311 for #noisebylaw to issue fine, hit 'em where it hurts" – P4, Male*
Traffic	*"Can't the city road division find out if there's an accident close by prior to setting up a road closure that clogs all traffic detours?" – P8, Female*
Community	*RT @vanhappenings: The St. Patrick's Day parade takes place this Sun. in downtown #Vancouver as part of @CelticFestVan – P13, Female*
Environment	*"Passed by development at cambie n marine, not sure how i feel about this new community yet, not looking all that attractive yet" – P4, Male*

Table 2: Categories of community information and sample participants' posts

We defined a post to be 'administrative' when it related to the more task-related act of paying bills, property taxes, or applying for licenses and permits. A 'maintenance' grouped post surrounded thoughts or ideas requiring services from local government, such as garbage collection, roads maintenance (e.g., construction, potholes), and parks maintenance (e.g., cleanliness). 'Recreational' posts involved activities in parks, trails, or community centers. Posts about noise bylaws and building permits were categorized as 'legal'. 'Traffic' posts surrounded thoughts on traffic conditions and regulations. 'Community' posts were any inquiries surrounding events in the area or ways to become involved with others on a specific initiative. Finally, 'environment' posts were related to any developments within the community (including rezoning applications), and sustainability practices. At a surface level, the diary posts demonstrate thoughts about general community information during participants' daily activities.

When acquiring information from these different categories, we found that participants would often perform direct web searches for specific information that they wanted to know about. For example, if they wanted to know how to purchase a dog license, they would do a web search for this information rather than use their local government site. This was because searching was thought to be easier than browsing government website pages.

Yet beyond this basic pattern of information acquisition, a deeper analysis revealed interesting additional routines around how people gathered community information, when and why people thought about community information, and how such information was shared with family members or friends. We now detail each of these practices.

CONTEXTUAL INFORMATION
First, we found there was a large amount of *contextual information* that participants wanted to know about within their community and local surroundings, yet they often did not know about this until they saw something that triggered an interest. We refer to it as contextual information because it was tied to specific locations in one's neighborhood or city. A common type of contextual information that surfaced across many of our participants was thoughts surrounding *traffic* and road construction (*maintenance*) within their community. Participants expressed frustration with encountering road closures, construction zones, and traffic during their commute. Other types of contextual information included knowledge about services offered by local government, such as garbage collection (*administrative*), concerns with park services or facilities (*community, environment*), and items related to by-laws (*legal*).

For example, P3 included a post in his diary about seeing construction occurring at a busy intersection on his commute to work, but did not know much more than what was indicated on the sign.

"whatsgoingon@ NE corner of lougheed&willingdon? Theyre building smething,be nice if they posted sketch pic of what wehave to look forward to!" – Tweet by P3

He explained that he was curious about the development as it looked to be a large-scale project that would span multiple years. He wanted to know more about the impacts of the construction and traffic. Other participants reported similar interests as P3, with a large number triggered by signs or sightings while driving or walking. Thus, rather than learning about local happenings from a government website, our participants told us that they were often made aware of upcoming city developments within their environments only after passing by and seeing a large billboard.

This contextual information often triggered people to do more in their neighborhood or learn more about a situation. For example, P8 described seeing a physical notice at his neighborhood park he routinely visited that identified the date of the last car break-in. This cued him to remember to lock up his own car and hide any valuable items. This also suggests a shared sense of community amongst park visitors to improve the security of fellow park patrons.

In other situations, participants talked about wanting to find out more information related to what they saw in their community. For example, P7 would routinely walk her dogs in various parks throughout her city. One day she encountered a development sign (Figure 1) in the middle of the park. Seeing the sign prompted her to visit her city's website to find out more about the project. However, this was not without its challenges. Because she was walking her dog, it was not convenient for her to look up information on her phone about the sign. Instead, she had to remember to look online for information once she returned home.

Figure 1: A participant (P7)'s post about a parks development project sign

"I'm out there with the dog, the cyclists, the walkers and I'm always thinking of ideas. I saw this sign and then went to the city website and saw they actually have a forum for me to voice my opinion about parks development. I don't think a lot of people even know what kind of information is on the city site. Sometimes the layperson doesn't know what to search." – P7, Female, Age 52

Most participants in our study were not as successful as P7 in finding more details about the community aspects they were interested in. Gathering the knowledge about contextually-specific information was often difficult because signs contained minimal descriptions. This meant it was necessary for people to search online to find out more information. Yet knowing where to look was especially challenging and there were no way to 'link' from content on a physical sign or occurring in a physical location to content on the web. As a result, many participants were not able to surface more information about an interest they had. Some simply did not try because they felt it would be 'too difficult', while others would forgot to do so when they returned home.

For example, P13 posted several times in her diary about the traffic encountered on her commute to and from work (Figure 2 shows an image from a tweet). Further discussion about her posts revealed that despite large signs that warn of upcoming construction dates, she would usually forget about them until she hit traffic. Thus, the information was present in the location, but difficult to remember when back at home or planning her next commute.

Figure 2: A participant (P13)'s diary post about traffic and construction in her neighborhood

PRE-CONTEXTUAL INFORMATION

In contrast to the contextual information that we just described, we also found that participants were very interested in what we call *pre*-contextual information. We define this as information that is needed 'before-the-moment' so one could plan activities based on it or around it.

First, the most common type of pre-contextual information related to *community* events and *recreational* activities for families. This information was needed to inform adequate household planning. For example, family members liked to know about swimming lessons that they could sign their children up for, upcoming community events related to holidays, etc. Many participants had a weekly routine and planned their activities ahead of time. Weekly schedules typically included working full-time during the day, with evenings and weekends dedicated to time with the kids, household chores, or routine errands. Participants with

children also described the importance of knowing the schedule for recreational activities weeks or months in advance in order to plan for holidays and school breaks.

"My husband and I work full-time, so if we want to take a family vacation we need to plan for it at least 6 months ahead of time. We also have to think about kids' school days off, holidays, and summers, and what to do with them then." – P5, Female, Age 42

"We will rarely do any type of community event unless we plan for it weeks in advance. For example, the farmer's market… I only found out about it the weekend it was happening. We would've only gone if we had planned to go." – P9, Female, Age 34

Sometimes family activities even involved planning or coordinating with people outside of the household. For example, P3 described attending an annual event with his family, including his children's grandparents and how they coordinated it.

"The last time I shared community information was the Hats Off Day Parade that happens every year. I usually go with the kids. So I sent it to my parents so they can mark it on their calendar to come with us… it's coming up soon." – P3, Male, Age 42

P18 discussed a family schedule that intertwined with her sister's family schedule to coordinate shared family outings and dinners.

"My sister and I coordinate our family's dinner outing every week with our parents. It used to be a big organizing challenge, getting three parties to agree to one place at a certain date and time. But over the years we've set up this spreadsheet that we share with each other. It keeps us more in the loop of what's happening with each of our families." – P18, Female, Age 42

Unlike the contextual information from the previous section, this type of pre-contextual information was not location-dependent in terms of where the activity or event would eventually occur. That is, participants described wanting to know about it when they were at home, rather than the location that the event would happen at. For example, it was important for a family to learn about upcoming swimming lessons when they were at home and could also look at their family calendar, rather than when they happened to visit the local swimming pool.

Second, *traffic* information was also described by participants in a way that made it pre-contextual. Many participants expressed frustration when caught in the middle of a construction zone or a traffic jam. In this case, people expected to become aware of this information before heading in that direction. In most cases, this meant learning about traffic conditions when at home or at work, in order to pre-plan routes and commute times.

"My city traffic post…I was frustrated. The city needs a setup that keeps an eye on the grid, like if there's a major accident. There just needs to be some sort of interaction between the police, traffic, construction, and city to let us know." – P8, Female, Age 43

Traffic information differed from recreational and event information because it needed to only be known a day ahead of time, or sometimes several hours; this contrasts the weeks or months that was necessary for family recreational activities.

Third, *administrative* tasks were also described as pre-contextual activities. Participants revealed that although administrative tasks were recurring, they often only became aware of them when they received a routine invoice, such as a utility bill or property tax bill. Upon receiving the invoice, participants would often mark the due date on their calendar or to do list. Over time, participants became accustomed to the frequency and time of year such bills were due, but relied on the actual delivery of the bill from their government agency to cue them to the city website to pay. This needed to occur *before* the deadline of the bills, for obvious reasons.

"We've lived here for over 10 years so our property tax bill comes every year around the same time. I usually get the bill and tell my husband about it so he knows the bank account will be short a few thousand [dollars]." – P12, Female, Age 40

Across all of these three situations (*recreational events, traffic,* and *administrative* tasks), there was an expectation by participants that the information related to this information would surface for them and present itself to them. Thus, rather than feel that they needed to go online and actively find the information themselves, in many ways, they expected this information to be 'delivered' or 'presented' to them by some source where someone else or another service would show them what was relevant to them given their location (e.g, where they lived) or their general interests. In the next section we build on this idea by describing curated content.

CURATED LOCAL INFORMATION

It was very clear from our results that our participants wanted to know about community and government information that was specific to them and their immediate family. While perhaps unsurprising, what was interesting was the way in which a large portion of this information came to be known by family members. One might assume that people might search out specific information of family relevance, by, for example, conducting web searches or looking at a government website. Yet, in contrast, people had a more passive consumption model where the information would, in essence, come to them during their everyday routines in somewhat of a curated form.

First, this happened with local newspapers that were delivered to homes at least once per week. Many participants relied on them as their main source of community-relevant information. It was not the case that

participants went out of their way to find and retrieve these papers. They were delivered as part of the normal newspaper delivery system and brought local community information *to* the participants. Participants would then skim the headlines within the newspapers to understand what might be of local relevance to them and to then read further on these items. Not everything in the newspapers mattered, but what participants found valuable was that all of the contents *could* matter. Thus, it was worth their time to quickly go through it. Because the newspaper was targeted at local happenings, participants knew that the likelihood of something being relevant to them was high. In this way, the editors of the newspaper were curating content of local relevance for our participants.

"We get a paper delivered weekly to our house that my husband skims. It just keeps us updated on things happening around our city. It's different from going online and reading about other parts of the world." – P5, Female, Age 42

Thus, local newspapers offered a wealth of local community information (from nearly all of the categories of information that we presented), including details on *maintenance* activities, *recreational* opportunities for the family, issues pertaining to *legal* happenings and bylaws, *traffic* happenings, *community* events, and sometimes *environmental* concerns.

Second, some of our participants used online newspapers or local television news programs to fulfill a similar role. Here participants would turn to online aggregator news sources, such as Google News or Yahoo News, to skim headlines that surfaced articles of potential interest. They might also watch the local news on their televisions. Again, there was a focus on curated local content; that is, content that was specifically placed within a 'local' section of the online news source. Participants recognized that this was the most likely location for them to find out what happenings should be most important to them at a community level.

"I watch CBC or go to Bing or Google primarily. I actually check online several times during the day – once in the morning, and then again at the end of the day." – P16, Male, Age 40

"I don't go to government websites to get information. I get info mainly through online media, and I would say… maybe once or twice a day, I would go to Global Mail or Google News for it." – P15, Male, Age 27

When asked which tools participants used to find and read about this community information online, all of our participants identified a home computer as their primary (and sometimes only) choice. Though participants described frequent use of their mobile phones throughout the day, many did not use it for searching for specific community information. Rather, their mobile phones were used for phone calls, to browse emails, send and receive texts and (rarely) to search for directions using a map

application. What this meant was that our participants were restricting their access of local community information to the context of the home. This was first because the home was the location in which the information was actively thought about and discussed by family members. However, it was also because mobile searching and browsing, especially of local government websites, was thought to be challenging and overly complex.

THE AFFORDANCES OF PRINT-BASED MEDIA

Another significant observation we had was with the affordances of paper-based media, which provided families with unique ways to read, post, and share information about their community. This was much different than the affordances of online media. Print-based media such as newspapers, flyers, or other recreational notices that would arrive at participants' homes would be placed in various locations specifically relevant to the family. For example, one participant told us that her husband placed the local newspaper at her 'spot' at the kitchen table whenever it arrived because he knew she liked to read it to see what was happening in their community. Because it took up physical space, it was easily noticed. For example, when clearing the table for dinner, the physical presence of the newspaper might become an obstacle, but it also meant that it was then seen as something of potential interest.

Print-based community information would move between locations in the home depending on who should see it next or the relevance of the information. If information was relevant to the family's planning of activities it could be easily moved to be on a family's bulletin board, whiteboard, or a 'to-do' pile on the kitchen counter. Some participants noted that a central message board allowed for more free-flow content to be shared and coordinated with other family members. For example, P10 described picking up bills from the mailbox and leaving them on the kitchen table for her husband to pay online.

Participants with children had a strong preference for print-based materials when they wanted to schedule their children's recreational activities. It allowed them to physically manipulate the items to cut out relevant parts or annotate them. These could then be shared with other family members. In this way, one family member often acted as the 'family curator' to discern what was relevant for specific family members from within the already curated information that families received in their local newspaper or other print items arriving at the home. For example, P10 describes her preference for physically marking up (highlighting, bookmarking) pages in order to help decide on which lessons to register her children in, despite the same information being available in a digital format online. Once annotated, the information was shared with her husband.

"It is online, but I like to flip through the pages [of the printed book]. I like to highlight the times that work best. I need to look through the brochure and then go online and

book them. Also, online doesn't have the community activities, like Feb. 14, go to Town Square or every Saturday there's a Farmer's Market." – P10, Female, Age 31

On the other hand, digital media such as content from digital news web sites did not allow family members to easily place it within the home for viewing by other people. They could, however, send it to another person's digital account such as an email address, which would then be viewable by them on their phone or a computer. But the information did not 'get in the way' or become part of what the family members easily noticed in the home. We describe this in more detail in the next section.

TECHNOLOGY-BASED INFORMATION SHARING
In addition to face-to-face interactions that come from living within the same household as well as the sharing of print-based media, participants shared knowledge of community happenings with their immediate family members using several communication technologies. Information shared between spouses included details of administrative tasks (e.g., any items related to bills), community events, recreational activities, and traffic issues. In contrast, information shared with children often surrounded confirmed activities.

"I would share with the kids if I just signed them up for an activity. For example, when I first got my daughter into ballet classes, I had to explain to her that it would be every Saturday morning." – P18, Female, Age 42

Despite prior research that supports the use of social media to improve government-citizen interactions [12,18], common social media tools, such as Facebook and Twitter, did not appeal (for information sourcing or sharing) to the demographic group that participated in our study. Rather, our participants preferred the asynchronous methods of text messaging and email. This was seen to be less intrusive than phone calls, which were only used for urgent situations. Asynchronous methods also served as a way to note and share reminders, either via text or photos. Family members were also cognizant of the technology preferences of others. For example, P2 described how he recognized his children's preference for text messaging.

"Most of the time it's via email or text message. It's much easier than phoning them [the kids] because they never answer the phone. You can at least see the message on your own time. This applies for my wife as well. She works at a hospital, so she's either not at her desk phone, or she's not allowed to carry her phone in the hospital. And with kids, they would rather anonymously type a message." – P2, Male, Age 56

"How do we share this information? Texting. We text all the time. And email. We probably… between the 3 kids and my husband, I probably text one of them at least once a day. I wouldn't dream of actually calling any of the kids – they're all so technically inclined, it's sometimes easier just to text." – P7, Female, Age 52

We also saw people using images as a way to remember items to share with their family or their community. For example, P1 noted that a photo could be sent to his wife and he would later elaborate further on it in person.

"Capturing images… using it as a reminder, and being able to send it to someone if I needed to, like my wife, and then we could talk about it more when we saw each other later that day. It helps me remember random things throughout the day." – P1, Male, Age 57

As can be seen in the above quote, information exchange and discussion often occurs at two different points in time. There is the act of information delivery where one might send a text message about an event to a family member during the day while they are at work. But then there is the discussion period about the event that happens after this point in time. Community information needs to be able to be shared in-the-moment for knowledge acquisition (one now knows the event is going to occur), but then it also needs to resurface itself at the point when family members are able to discuss it. For example, if a family routinely talks about recreational activities at the dinner table, it may be helpful to have the communication resurface at that point in time. Participants in our study did not use any technology to allow this, so it was often difficult to remember what needed to be talked about when family members were altogether.

In addition to the above, some participants even talked about the desire to connect with people outside of their family and friends in relation to community information. This was seen to be especially valuable in physical spaces, where people might be able connect because of a mutual interest. For example, P7 discussed her ideas for a designated off-leash dog trail at her neighborhood park, but admitted that she had no idea whether others visiting that park shared similar ideas. She wanted new ways to talk to other community members about the park.

"If someone else was feeling the same way, we could join together and form a petition and actually get something done with them. Then maybe we can forward it to the city to get something done about it." – P7, Female, Age 52

DISCUSSION
In our study, we have taken a look at the information needs and practices of families within their local communities. We sought to understand the interactions between family members and their communities, and more specifically, the information-seeking and retrieval behaviors accompanying it.

Prior work has identified the importance of design and usability within government websites; however, our study has shown that such sites and government social media sites were rarely used. Understanding the reasons behind this and the practices people followed for maintaining an awareness of community events provides useful perspectives to consider when designing systems that better support the

sharing of information between places and people. We reflect on our findings and discuss design opportunities next.

Curating Information for Personal Consumption

Participants valued specific community information that was relevant to them and their families. This was seen across all categories of information participants posted about and also when participants described the ways in which they sought information contextually, pre-contextually, and through curated content.

Contextual information was desirable to support awareness within specific locations in people's local surroundings. People expressed frustration with having to first remember to conduct an online search, and, then to actually conduct an online search. For example, a person walking around a neighborhood may come across a rezoning and development billboard, make a note to remember to look it up, and then upon returning home, search online through a content-heavy government website for additional information about the project. This suggests opportunities to present digital information in-the-moment. While we are beginning to see the growing use of QR codes in linking people directly to additional online information, systems should consider how to expand its usefulness by extending its functionality from information display to interaction.

Pre-contextual community information (such as recreational events, traffic, and administrative tasks) was identified by participants as the most valuable in helping plan family activities and routes between work and home. Overall, this suggests that systems can surface information based on patterns of activities. Government agencies can also target various demographic groups with information that may be of relevance. For example, families with young children will likely be interested in information offered in a community recreational guide. There certainly are opportunities to design tools that consider a person's annual, weekly, and daily routines, and then present the activities within their environment and community information accordingly. Of course, this raises privacy concerns related to tracking very specific information about people. This is an important consideration for location-based experiences and such concerns need to be balanced with the technological benefits.

Much of the information people used to maintain an awareness of community happenings was curated in the form of print newspapers, online news aggregators, and local TV news broadcasts. While much of this behavior is passive (e.g. people are skimming headlines to gauge relevance), we can imagine designing systems that consider how this information is presented. For example, systems can highlight news specific to a person's local community. Additionally, news articles have headlines in large print, followed by paragraphs of text and images; this can easily be incorporated into a system's design.

Similarly to findings in Al-Hassan et al. [1], recurring searches for specific information suggests the potential to design a modular system in which people can create a personal account and then customize their experience based on their individual needs and interests. As we found during our study, visits to city websites were very purposeful and rare. As a result, government websites should consider the continual curation of content that would automatically update on their website or through a digital newsletter that includes content specific to the person's historical activities and interests.

Designing to Include Digital Information Sources

Not surprisingly, people visited online news sources or watched the local news on the television to maintain an awareness of events in their surrounding areas. This was often part of participants' daily routines. Participants described sharing links to online news articles to family members if they thought it was of potential interest to them. Yet digital pieces of information accessed on a personal mobile phone or computer can quickly become forgotten if it is not physically visible in the home. On the other hand, print-based media offered unique affordances that digital information did not. For example, people could place it in key locations in the home where others would notice it. This suggests that there may be value in having ways to convert digital online sources into a more tangible presence in the home. The design implication should consider how to provide ways to access information in specific locations as people come across it.

Consideration for Traditional Tangible Media

People also consistently maintained an awareness of their community using traditional methods, such as reading the newspaper, or skimming paper-based recreational guides and brochures. Participants described the conciseness of headlines as facilitating the skimming of content before deciding to read a particular article further. As mentioned, the visibility of these physical artifacts (whether it was delivered to their homes or left on a table by another family member) often served as reminders to take further action. This is similar to the way previous research has reported families placing communication information in contextual locations within the home [6,8]. While the physical act of annotating physical artifacts was a preferred (and common) behavior, certainly over time such items accumulate, take up physical space, and become lost once it is discarded. This type of accumulation has been reported in past research along with family routines for managing it [6,8,26].

We feel this suggests opportunities for easily converting physical forms of relevant information into digital form. Other researchers have explored the role of paper versus digital artifacts in office environments to find that paper-based documents are valuable for work in the present, whereas digital documents are most important for sharing information prior to working on it or for archival purposes

[25]. Similarly, within the family context, once in digital form, information can be easily sent to family members who may not be physically present at the same time. It also offers the ability to archive information that may be needed at a later date (e.g., annual tax bills, medical records, etc.).

We also see value in having digitized community information automatically resurface itself at relevant points in time. For example, imagine a parent can digitize a physical notice for a community parade set for the following month and then have it automatically re-appear at a relevant time before the parade. The notice could also be automatically sent to relevant family members, such as both parents. Items could also surface themselves on in-home displays such as a digitized kitchen table if more conversation is needed to plan out an activity.

Tools for Communicating Across People and Places
Our next design consideration is for communication tools that people prefer to use when searching and sharing community or government information. We found that participants wanted to share community information, whether it was with a single person in their family or within their larger social network. A small number of participants also valued having a forum in which they could discuss their community ideas and concerns with others.

Asynchronous communication tools provide a means to delay communication to a time that is convenient for a person (e.g., people read emails and text messages at their convenience). System designs should consider all features of such tools, including how to interface delayed messages to support real-time conversations. That is, email, photo and text messaging can be used as a way to remind others about a particular task or topic. As such, systems may consider ways to foster face-to-face interactions once all family members are collocated in a space. For example, a person may send a quick text message to her spouse; this text message could then surface at a time when both people are at home in order to prompt further conversation. System designs could also consider aspects of location-based services to facilitate the surfacing of information based on the user's location, further minimizing the amount of user interaction required to retrieve information.

Limitations
We recognize that while valuable, our study results come with their limitations. We focused our study on adults who are primarily responsible for a household. Our work should certainly be complemented by additional studies that explore the perspectives and experiences of family members in other age groups. For example, teenagers and young adults (those in their twenties) who may not necessarily have the responsibility of paying property taxes yet may find other facets of community information interesting. We also investigated people who resided in a large metropolitan city, were fluent in English, and were employed in full-time professions. Thus, the communication practices and routines are fairly straightforward and do not consider any cultural implications of remote areas, foreign languages, or income levels. This suggests additional investigations into community information needs and routines of families in smaller towns, with mixed cultures, and diverse income levels. Such studies will enrich our knowledge in understanding the larger representation of people living within a variety of communities. We also note that our study was conducted in Canada. Thus, our results are likely only generalizable to practices within Canadian and American cities (given the relatively similar culture between the two countries).

CONCLUSION
Our paper contributes a study of the community information needs and practices of families. Through a three-stage diary and interview study we found that people often wanted contextual information related to places they would encounter throughout their day, whether on route to work or as part of their daily routines (e.g., dropping kids off at school or walking the dog). People also valued pre-contextual information to help plan family activities. Surprisingly, government websites and social media sites were rarely used to find such information. Rather, people often referred to multiple sources of print and online news sources that were curated based on their relevance to their local community. Our focus on people's interests and location extends findings presented in related work in the areas of digital government and domestic systems. Overall our work suggests that government and domestic systems may benefit from personalized experiences which surface curated information relevant to the person, rather than relying on the person performing searches for routinely accessed information.

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