

Intention and Motive in Information-System Design: Toward a Theory and Method for Assessing Users' Needs

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Abstract: Design of communication technologies such as our own effort to develop a youth-services information system for a local community, present practical problems in the collection and interpretation of data on users' needs and the development of design specifications responsive to these needs. Activity theory provides a conceptual framework for such a design effort by explaining how users' conscious intentions and unconscious or partially conscious motives can be inferred from their activities. Methodologies such as focus-group and participatory-design meetings provide appropriate means of collecting data on users' activities. Further development of conceptual categories for users' activities and for the development of design specifications will be necessary, however, to fully operationalize the theory.

1 Introduction

In its narrow sense, design is simply a model, representing a solution to a problem, as in *a design*. Mansell [21, p23-27], however, argues that design also encompasses an intention or purpose that guides the development of a model. This notion of design as intention or purpose is especially important for studies of communication technologies that encompass the creation as well as the use of these technologies, situated in their organizational and social settings and emerging and changing in space and time [20, p195; 25, p159-160]. Studies of communication technologies currently in use or after they have been in use for some time — including many studies of the Internet and the World Wide Web — focus their attention, quite reasonably, upon how users have *actually* used these technologies [11, 16, 22, 24, 26]. Research of this kind employs data-collection methods such as content analysis, surveys, questionnaires, and interviews, which provide direct reports of users' experiences [11, p353-356; 16, p333; 22, p411-415; 24, p297-299; 26, p20]. In addition, this research also employs focus-group or ethnographic methods to elicit more detailed accounts of these experiences [11, p 353; 22, p411-413].

In contrast, study of a communication technology still in process of development necessarily focuses upon how users expect or *intend* to use the technology. Such research will employ data-collection methods that seek to elicit users' expectations or

intentions for a technology that they have never actually used and in some cases may not even have envisioned.

Activity theory provides a theoretical framework for such a study by distinguishing intentional actions from motivated activities, experienced at varying levels of consciousness and evident in the rules and conventions and the divisions of labor upheld within particular communities of users [3, 4, 5, 6, 7, 8, 9, 18, 19]. In addition, data-collection methods such as contextual inquiries, participatory-design sessions, focus-group meetings, and ethnographies permit more or less direct access to users' activities and experiences [1, 2, 10, 15, 17]. Guided by these theoretical and methodological perspectives, researchers may find that users' needs are more readily evident in their activities or in their accounts of their activities than in their explicit statements, especially with respect to a technology that the users have never actually encountered or even envisioned. However, even from these perspectives, users' needs will not be immediately intuitive or self-evident to researchers but will have to be inferred from users' accounts of their activities — thus adding to the challenge of data collection the further challenge of data analysis and interpretation.

We have drawn upon these perspectives in our efforts to develop a youth-services information system — called Connected Kids — for our own community of Troy, New York. We hope that our study of this system-in-use will contribute to the development of both a more fully functional system and a set of theoretical and methodological tools to support the *design* (as well as the *use*) of information systems and other communication technologies currently in process of development.

2 The Connected Kids Youth-Services Information System

The Connected Kids youth-services information system emerged from our efforts to develop an online community for the City of Troy, including both the technical and social infrastructures that we believed would be necessary to sustain such a community [13, p257-266; 14, p204-212]. A growing and increasingly sophisticated body of literature has established the close connection between online and offline communities as a correlative relationship that enhances both [11, p346-351, 365-368; 16, pp327-330, 339-342; 22, p410-411, 420-422; 23, p148-180; 24, p297-320; 26, p18-19, 26-31; 27, p2031-2033]. Putnam [23, p148, 166] traces a general decline of “social connectedness and civic engagement” in the United States in the last quarter of the twentieth century but views telecommunication as the most important counterbalance to this trend. But observable increases in social ties seem to depend upon a reciprocal relationship between online and offline communities rather than any characteristics of the medium as such. Wellman [27, p2032] observes that the development of online communities is not destroying but extending and transforming other types of communal association. Quan-Haase and others [24, p320] state simply: “Rather than weakening other forms of community, those who are more active offline are more active online — and vice versa.” The result appears to be a net increase in social ties. Matei and Ball-Rokeach [22, p406, 420] claim a “the more, the more” relationship between online and offline social ties, and they find, moreover, that this relationship holds across differences in gender, income, age, education, and ethnicity. But the direction of this relationship is not yet clear. Kavanaugh and Patter-son [16,

p340] refer to it as a “basic chicken or egg problem”: Are social ties a prerequisite to or a consequence of the development of online communities? Or do they depend upon “a latent capacity for civic engagement in every community” [16, p340]?

Our work on Connected Kids does not attempt to answer these questions. Rather, it assumes a reciprocal relationship between online and offline communities, now well documented in the literature, and explores this relationship through an activist research agenda that seeks to design and implement and at the same time also to study both the technical and social components of an online/offline community. Our work began with our efforts to develop a World Wide Web presence for the City of Troy, called TroyNet (<http://troynet.net/>) [13, p257-258, 262-264; 14, p204-212] and became more focused and specialized as we became more aware of the special needs of particular segments of our community. Troy is a relatively small community with three colleges but also with relatively low levels of income and education within the general population. We initially envisioned TroyNet as a general-purpose information system serving this general population, including City and County government, City residents, tourists, students and their families, and not-for-profit organizations, among others. Thus we developed online resources such as planning and zoning ordinances, a directory of tourist information, accounts of local history, displays of local architecture, and the like. Largely as a result of an increasingly close partnership with the City of Troy, however, we soon became aware of special problems and needs such as the need to market tax-foreclosed properties and the City’s new Historic Artist District (a revenue-generation issue) and the need to serve underserved and underprivileged segments of our population (revenue- and resource-allocation issues). TroyNet is helping to address the first of these needs, Connected Kids the second.

The Connected Kids information system (<http://troynet.net/connectedkids/> and <http://www.troyny.org/>, under Other Community Resources) was initially proposed by the Mayor of Troy as a computer-based information resource for youth-services organizations, parents, and children [12]. It is currently being developed as a multipurpose database and World Wide Web interface by computer-science and communication faculty and graduate students at Rensselaer Polytechnic Institute and the University at Albany, SUNY, with funding from the 3Com Urban Challenge Program and the National Science Foundation and with support from the City of Troy, Rensselaer County, Rensselaer Polytechnic Institute, and numerous youth-services organizations. The information system will serve City, County, and public and private youth-services administrators, school officials, teachers and counselors, parents and children within this community and beyond. Our challenge is to design, develop, implement, and maintain a system that meets the needs of these diverse user groups, including the government sponsors who will administer the system, the youth-services managers and staff (sometimes the same person) who share decision-making responsibility for system components and contents and who will be responsible for entering their own and retrieving others’ data from the system, and the various constituencies they serve.

3 Activity Theory as a Framework for Assessing Users' Needs

Activity theory provides a conceptual framework for situating the design of communication technologies — such as our Connected Kids information system — in time and space [3, 4, 5, 6, 7, 8, 9, 18, 19]. In its temporal dimension, design is a collaborative process in which participants from a diversity of perspectives question and analyze a problematic current practice; construct, examine, and implement a model solution to the problem; and evaluate and consolidate the outcomes of the process in new and stable forms of practice [5, p383-384; 8, p64-65]. This process is necessarily iterative and cyclical [3, p11-21] and encompasses a wide range of activities, from relatively simple purchasing decisions and procedural changes [5, pp. 385-402] to the most complex design activities [7, p327-370; 8, p67-77; 9, p139-147]. Engeström and Escalante [7, p338-370] demonstrate, however, that such processes can fail if designers are insufficiently attentive to the perspectives of both organizational service providers and the people who use their services.

In its spatial dimension, design is a complex set of technical and social components and relationships that together constitute “an activity system” [3, p22-42; 4, p29-32; 6, p73-91; 7, p365-370; 8, p61-64; 18, p34-37]. This activity system situates individual participants or subjects in relation to the objects of their activity, the artifacts that mediate that activity, and the communities, the rules and conventions, and the divisions of labor that both constrain and enable that activity. Within such a system, a design is complex, elusive, and constantly changing. Nonetheless, for our Connected Kids work this design is crucially important since it is precisely this design — this object — that we seek to identify and describe in our research. Activity theory tells us, however, that we should seek this object not in our users' conscious and articulate *intentions* but in their unconscious or partially conscious *motives* [4, p22-25; 6, p65-70; 7, p360-362; 8, p60-61; 9, p134-139; 18, p30-34; 19, p22-28], which are best reflected in their activities rather than their explicit expressions of goals.

In one of the founding texts on activity theory, Leont'ev [19, p22-28] distinguishes human activities, which are oriented toward objects and energized by motives; from actions, which are directed toward goals and guided by conscious intentions; and from operations, which are dependent upon specific conditions. According to Leont'ev [19, p22], the object of an activity may be either material or ideal but in either case is motivated by an unconscious desire or need. The goal of an action, in contrast, is guided by a conscious intention — “a conscious motive that is converted into a *motive-goal* precisely because it is conscious” [19, p25]. This conscious goal is the “intentional aspect” of an action [19, p26].

In activity theory, a design is not a conscious goal or aim, not even a singular object, but an ensemble of elusive and constantly changing objects, both material and ideal [7, p360-362; 9, p137-139]. Engeström and Escalante [7, p. 360] explain that design objects, and especially those related to trade, administration, or scientific research, are “slippery and multi-faceted,” “constantly in transition and under construction,” and thus always potentially different for different participants. Their study of the design of an electronic kiosk for the delivery of postal services shows how such a design object may become very different ideal objects for different participants, at once both a mundane tool and an object of affection [7, p325, 365-370]. Similarly, Foot's [8, p68-69; 9, p139-141] studies of the development of a post-

Soviet ethnic-conflict-monitoring network show how another such design object may at once embody two different motivating ideals: the ideal of monitoring ethnic relations and providing early warning of potential conflicts and the ideal of building a community of expertise on post-Soviet ethnic relations. Engeström [6, p65-70, 73-82] finds the source of such differences in the larger social context of participants' activities and in the development of communities, each with its own rules or conventions and divisions of labor and each replete with contradictions, usually as a result of these divisions of labor. Despite such difficulties, participants' motives are nonetheless evident in their activities and in the larger social system in which these activities are embedded.

4 Methodologies for Collecting Data on Users' Activities

Methods of collecting data on users' needs—their expectations, intentions, and motives—thus focus upon their experiences and activities rather than their explicit statements and especially upon their collective experiences and articulations of these experiences. Proponents of data-collection methods such as contextual inquiries, participatory-design meetings, and focus-group meetings reaffirm these basic principles [1, 2, 10, 15, 17]. Holtzblatt and Jones [15, p182] maintain that data-collection methods such as surveys, interviews, and focus groups have limited utility for designers because they seem to depend upon what people say they want and need rather than what their work activities reveal about what they really want and need. In their work processes and in their use of computer tools, in particular, “people are engaged in doing work; they are not simultaneously reflecting upon their experience of doing work” [15, p182]. Holtzblatt and Jones [15, p181-199] therefore recommend their method of “contextual inquiry” — direct observations of workplace practices and structured interviews based upon these observations — as the best means of determining what users really want and need. Proponents of participatory-design methods likewise advocate direct observation of users' real-life or simulated work situations as the best means of determining users' needs [1, 2, 10]. Bødker and Grønbæk [1, p199-200] recommend their method of “cooperative prototyping” by which both designers and users participate actively and creatively in design processes by engaging users in fluent work-like activities with possible future computer applications, in either simulated or real-use situations, as a means of revealing otherwise unarticulated aspects of their work.

Proponents of these data-collection methods recognize also that both users' experiences and activities and their articulations of these experiences are often collective and collaborative [2, 10, 17]. Drawing upon Engeström's model of the activity system, Bødker and Grønbæk [2, p140-151] develop variations on the method of cooperative prototyping that engage designers and users in collaborative activities in both simulations of future work situations and explorations and investigations of future technological possibilities and current workplace practices in which users articulate their work tasks rather than actually doing them. Grønbæk, Grudin, and others [10, p80] note, furthermore, that these design activities always occur within particular socioeconomic systems, each with its own practices and rules and its own structures and processes for distributing labor and negotiating differences.

Krueger [17, p19-20, 34-36, 45] likewise notes the collaborative nature of focus-group discussions, which he claims can produce more useful information than individual interviews because they place participants in natural, life-like situations in which they both influence and are influenced by others. Krueger [17, p100-103] notes, however, that these group discussions depend for their success upon the guidance of a skillful and sensitive moderator.

5 Methodologies for Collecting Data in the Connected Kids Project

Based upon these theoretical and methodological perspectives, we developed a series of activities to involve our various users in the design of our proposed Connected Kids information system. These activities included focus-group meetings, participatory-design meetings, and user tests with representatives from youth-services organizations, parents, and children. For organizational users, we conducted focus-group meetings to develop system specifications, participatory-design meetings to elicit organizational users' perspectives on the design and operation of the system, and on-site user tests to check the WWW interface. For parents and children, we conducted focus-group meetings with different socioeconomic groups — including both low- and middle-income groups — to further refine the system specifications and to explore design possibilities for the WWW interface. We developed a protocol for each of these meetings, with a different set of “prompts” or illustrations and different kinds of questions for each group.

We suspected that many of our users would not fully understand the potential of an information system of the kind that we envisioned, and we therefore included prompts such as working illustrations of system capabilities and solicited responses to these illustrations from our users. For the focus-group meetings with organizational users, we developed a mock-up of our proposed information system. For the participatory-design meetings, we developed both a paper-based model of the system as a whole, based upon our users' responses to the initial focus-group meetings, and a functional online model of the data-input functions to permit hands-on experimentation with the system. For the focus-group meetings with parents and children, we presented a variety of working illustrations, including both search and browse operations for parents and dynamic and interactive WWW interfaces for children, selected by the children themselves.

We also developed different kinds of questions for each of these meetings. For most of the meetings, we asked questions designed to elicit users' responses to the prompts or illustrations that we had developed for each meeting. We expected that these responses would take the form of descriptive accounts or scenarios of our users' experiences or activities. At the initial focus-group meetings with organizational users, to elicit response to our mock-up of the proposed system, we asked, for example:

So now, in looking at this, think about, say, the end product of what RPI would develop and that you would go to a terminal somewhere, and the organizations have already input their data, and you would come to something like this. How can you see something like this benefiting—two-part question—benefiting the different

organizations that are involved, and what concerns might your organization or other organizations have about this project?

For the participatory-design meetings with organizational users, however, we also asked some more direct questions to determine whether we had correctly understood our users' responses to the system mock-up presented at the initial focus-group meetings [12]. We asked, for example:

How do you see these database operations supporting the needs of your organization? Based upon what we heard you tell us in the focus groups, we are planning to provide information about your organization, its programs, and its events. Does this work for you?

At the focus-group meetings with parents and children, we presented a variety of working illustrations and asked questions designed to elicit users' accounts of their activities as information seekers and as computer users. We asked parents, for example:

What are the kinds of organizations, services, and activities in the Troy and Rensselaer County area that your children or other children you know are involved with now? How do you find out about the organizations, services, and activities that the Troy and Rensselaer County community has to offer for your children? Where do you get your information? How do you decide on the kinds of organizations, activities, or services your children will get involved with?

As expected, we received response in the form of descriptive accounts or scenarios of our users' activities. Even at the participatory-design meetings for organizational users, although we expected, and in fact received, direct answers to our direct questions, we also received descriptive accounts of the same kind that we received at the other meetings. We have previously presented a summary of our findings from the participatory-design meetings with organizational users [12]. Currently, we are transcribing the focus-group meetings with parents and children and developing descriptive categories for our analysis of the transcripts, based upon the theoretical and methodological considerations presented above. In the process, we have recognized that our analysis of these transcripts may not be as direct and straightforward as we had initially supposed since it will depend not only upon our categorization of certain kinds of activities but also upon our analysis and interpretation of the meanings and implications of these activities for the development of our information system. We have recognized, that is, that we will have to draw inferences that permit us to translate our users' descriptions of their activities into specifications for our design team, that our task is complicated by our users' sometimes conflicting accounts of their activities, and by differences in our own interpretations of these accounts. Below we present examples illustrating the difficulties of categorizing and analyzing the responses of each of two user groups: organizational users and parents.

6 Assessing Intentions and Motives in the Connected Kids Project

The responses of our organizational users focused largely upon the structure of relationships both between and within organizational units — reflections of their divisions of labor — and upon the representation of these structures of relationships to the organizations' constituents, in their roles as information seekers. The responses of parents focused upon their sense of responsibility as parents to provide positive activities for their children, with discernable differences, however, in the rules of behavior that operate within different socioeconomic groups. In both instances, users' accounts of their activities suggest a need to develop both online and offline communities of users, both the technical and the social dimensions of our information system. But these accounts do not convey our users' needs in the form of explicit design specifications. Rather, we need to infer these specifications from our users' descriptive accounts of their activities.

6.1 Example 1: Assessing Organizational Users' Intentions and Motives

On the basis of our meetings with organizational users, we developed the initial specifications for the Connected Kids information system and then confirmed and revised them as necessary. We had at the outset envisioned a system that would provide information about organizations' events and activities, with the capability to search for these events [12]. In our initial focus-group meetings with organizational users, however, we learned — and we believe that many of them also learned in the course of their discussions — that their more pressing expectations and needs were not so much to present information about events but to communicate their organizational identities and information about their programs and services, both among themselves and among their constituents. One participant presents a descriptive scenario in which the traditional structure of relationships among youth-services organizations has broken down since representatives from separate organizations, each with its own mission and purpose, no longer communicate with or even see each other:

You would know more, about all of this, but it seems to me that when we did—and I used to be a part of it—but I used to see a lot of you a lot more frequently, and everybody would know what's going on, and everybody would be given [a word or two inaudible] money from the City to deal with youth. Now, I don't know how any of the [a word inaudible] here feel, but I mean we're dealing with youth, but yet we're the City of Troy and, and there isn't anybody to deal with youth, except separate organizations. There is no . . . we never have a meeting, I mean, I mean altogether, except for this, in years—at least eight to ten years. You're the County Youth Bureau, but I don't, I don't see you. Maybe you see my superior, but . . . on that level the people, the youth, the organizations—recreation especially—we deal with youth all year round. You [gesturing to another participant] deal with youth all year round. You [gesturing to a different participant] deal with youth all year round. But I never see any of you. You never see me.

This scenario suggests a need for more face-to-face communication among youth-services organizations. Another participant maintains, however, that the more immediate goal of these organizations should be to help us to define the information system. This participant suggests that goal of such a system should be to provide information not about organizations but about their programs and services:

We wish that we could do that, but . . . so I don't actually think we need to know each other's missions, and I'd just as soon that we focus on the specifics of this task, which is really *defining* what it [the information system] needs to be because I don't think it's organizational as much as it is programmatic, you know, information about programs and activities, and that's what I think we should agree upon, and then perhaps, perhaps, this can be a catalyst for a forum, but I don't think we should mish mash one project from an ongoing . . . collaborative or group.

If we recall Leont'ev's [19] distinction between goal-oriented actions and object-oriented motives, then we might suppose that in this case the explicit goal of providing information about organizational programs and services does not seem to correspond (and the second participant suggests that it may actually conflict) with the underlying motive of helping organizations to communicate more frequently and more effectively among themselves — an apparent contradiction. These organizational users recognize their divisions of labor, their competition for funding, and their occasional “turf” battles, but they also recognize that they share a common mission of serving our area's young people, and they recognize as well a need to communicate more frequently among themselves. They do not seem to recognize, however, that the immediate goal of developing a youth-services information system and the underlying motive of improving communication among themselves complement rather than compete with each other. As we now know from the literature on online/offline communities cited above [11, 16, 22, 23, 24, 26, 27], the more people communicate online, the more likely they are to communicate offline, and vice versa. Such, at least, is the inference that we are inclined to draw from our organizational users' somewhat conflicted and uncertain discussion and from the results of numerous studies on the development of online/offline communities. But how should we translate such an inference into a set of design specifications? Should we build into our technical/social information system an email function? a bulletin board? a forum for face-to-face communication? all or some combination of the above?

In these same focus-group meetings, we also learned of our organizational users' need for a customizable WWW presence for their organizations, including a stand-alone presence for smaller organizations and an integrated presence with links to existing webs for larger organizations. In subsequent participatory-design meetings, we emphasized that we had heard our users' expressions of their need for an information system that provides information about their organizational identities, programs, and services, as well as their events, and that also provides a customizable WWW presence for their organizations. At these meetings, we provided both a paper-based model and an online prototype illustrating various components of the system, with emphasis upon the data-input functions. We then asked our organizational users whether we had understood correctly what they had told us at our earlier meetings. In response, they typically offered direct and explicit confirmations that we had correctly understood their initial descriptions of basic system contents and functions. But they

almost immediately began to create descriptive scenarios depicting how the system might work for them. These scenarios apparently helped them — and also helped us — to understand how the various components of the information system mapped onto the complex structures of relationships — the divisions of labor — within their organizations. One participant from a large organization, for example, confirms that we share the same understanding of system contents and functions and then immediately attempts to envision how the system would represent the structure of relationships between his organization and his individual unit:¹

I think it will work well because I think in terms of an agency like [My Organization] where it is so large, and a lot of times, well just in terms of [My Unit] and some of the services that we offer, people just think [My Organization] and have to surf through a number of different links just to get to [My Unit], so it would be nice if we could have a direct link, as well as link back to the whole agency-wide site where you know they can gain more information and stuff like that, but it would be nice if we could have that link just so they could know what we're doing in terms of youth programming.

A participant from a small organization similarly confirms our shared understanding of the system and then immediately creates a descriptive scenario depicting the structure of relationships within her own organization and between her organization and the information system as a whole:

I would say yes. I mean I don't have a website, I don't have the means to you know make a web page, I don't have the computer or staff to do that, to be my own person employed under this, so if there was one and you could connect it and then I could get up my own web page eventually, you could click on here so to speak and then get to my site as well, I mean you might get dual information though, I mean, you could stay with Connected Kids and work within [My Organization] it could have a site there, then if you want to go over to another one, out of it, could click over, you could click over, and then open up a whole, uh, [My Organization] itself.

In both instances, the participants attempt to depict the interrelationships of the various units within their organizations and to imagine how the information system will represent these interrelationships to their constituents. Their representations do not conflict and in fact appear to be complementary since the information system will include a WWW interface suitable for both large and small organizations. But how should it represent these organizations and the complex interrelationships of their respective organizational units? The two descriptive scenarios present a problem and a challenge rather than a solution, in the form of a set of design specifications. How should we translate these scenarios into a set of specifications that our designers can actually use to build the interface?

¹ In the following selection from one of the transcripts, we delete the names of the participant organizations and replace them with “My Organization” and “My Unit” [in brackets] to protect the identities of the organizations and to preserve the distinction between the larger organization and the smaller unit, which in this case actually has its own organizational identity. In subsequent selections, we similarly delete the names of participant organizations.

6.2 Example 2: Assessing Parents' Intentions and Motives

In our focus-group meetings with low- and middle-income parents, we sought to further refine the system specifications, especially the specifications for the search functions, and to explore design possibilities for the WWW interface. Like our organizational users, parents in both low- and middle-income groups typically responded with descriptive scenarios — but scenarios depicting not structures of relationships — divisions of labor — but rather parental responsibilities as defined and constrained by the rules or expected patterns of behavior that operate within each group. One parent from a low-income group, for example, describes the challenge of finding and accessing positive activities for her daughter, due to difficulties with transportation:

Moderator: Are there other activities outside of Troy or Rensselaer County that your kids participate in?

Female Parent 1: The Girl Scouts.

Moderator: Where are they?

Female Parent 1: They're in Albany . . .

Moderator: Oh, They're in Albany.

Female Parent 1: . . . on western Avenue [several words inaudible] . . . I use bus after bus after bus . . . four buses. But it's only one day out of the week, you know . . .

Later, she describes other kinds of activities and then—with encouragement from the moderator and another parent—reveals the unspoken rule or pattern of behavior that explains why she is willing to make such an effort to help her daughter to find appropriate activities:

Moderator: What do you want to happen? What are the activities that you want . . . ?

Female Parent 1: Well, ah, you know, regular . . . baseball, basketball, some girls things, jump roping, ah, the girls like to, ah, . . . volleyball . . . I loved volleyball . . . you know, ahm, anything for the kids to do, like have plays and stuff like that . . .

Moderator: OK.

Female Parent 1: . . . that they could sign up for . . . talent shows . . . give them something they want to do with themselves, you know . . . maybe if they have a play to get ready for, you know . . . they'll practice . . . or have something to look forward to . . .

Female Parent 2: Your daughter's very talented.

Female Parent 1: . . . because, and I know, my daughter's one, she needed things to do . . . she was having really bad problems in school . . . her days wasn't going too good . . . she had too much energy for the little bit of time she had . . . and she's still bubbling with energy [a few words inaudible] . . . OK, let's color or, you know, let's go to the park [a few words inaudible] . . . she don't even want to go outside because there's nowhere to take her . . . she rides her bike . . .

Once again, if we recall Leont'ev's [19] distinction between goal-oriented actions and object-oriented motives, we can observe some dissonance between this parent's goal of getting her daughter to Girl Scouts and her underlying motive of keeping her troubled daughter busy with positive and constructive activities — again, an apparent contradiction. This parent's descriptive account of her activities does not help us to

resolve the dissonance. Would she, in one possible interpretation, simply like to find a Girl Scout troop closer to home? Or might she, in another possible interpretation, be receptive to a variety of activities suitable for young girls? In this case, we do not necessarily need to resolve the dissonance and the potential differences in interpretation. Rather, we need to build into our information system a search mechanism that will find *both* Girls Scouts and other appropriate activities. But such a solution to the problem is, of course, quite complex both technically and socially. On the one hand, we will need to develop a *smart* search function that will find a range of activities suited to a user-entered profile, in this case, for a young girl. On the other hand, we will need to develop the social network sufficiently to ensure that we do in fact find — and enter into the system — both the local Girl Scout troop and a range of other activities — for the information system, however technically sophisticated, will be only as good as the social system that supports it.

Parents from a middle-income (and more computer-literate) group apparently have a similar sense of responsibility for their children, defined and constrained, however, by rules or patterns of behavior that require not only that they find and access appropriate activities for their children but also that they carefully assess the *quality* of these activities. Some of these parents describe a word-of-mouth sharing of information that they seem to assume as common practice. Parents looking for information about summer camps for their children informed us, for example, that they were interested not only in what an information system could tell them about the camps but also in what other parents could and would be willing to tell them:

Female Parent 1: I would think that, uhm, comments from other parents would be helpful . . . some sort of reflection on the quality of the program, from their experience . . . because what, I think what parents do is . . . they ask each other . . . [several words inaudible, as several people talk at once] Then you find out. Was it a good experience? There's so many issues related to children being exposed to things that are inappropriate for their developmental level . . . uhm, you know, society is so much edgier, they have so much more access to information . . . a stimulus that really is not acceptable for them to be having access to . . . and so, uhm [several words inaudible] . . . but I think not sometimes, ah, but I think that that's important. What is, what, what is appropriate for what age group might be a good way to screen general [Inter]net, uhm, quality.

Moderator: Uh, huh.

Male Parent 1: I would, I would add to that . . . I agree that, you know, word of mouth seems to be or asking other parents about . . . seems to be important, but I think so much of that is sort of, uhm, is hard to, to sort of qualify because it's sort of like, you, you know, you sort of ask parents who you know maybe have shared the same sort of parenting skills or, or goals that you have, ah, you know, like if you like that camp, then I think it will be good for my daughter because, I know how, you know, I know how you raise your children, so therefore . . .

Moderator: It's pretty subjective . . .

Male Parent 1: Right. It's very subjective, but, I mean, it's sort of like, or, or you, uhm, maybe filter it like if so and so says this about it and, and this one says that about it well, you know, you know, there's issues with this child and parent, there's issues, you know, not issues, but you know, you know what people are like so you

sort of gauge your, your, your responses, so I guess it's difficult to, to maybe quantify that as a sort of hard fact.

These parents seem to be unusually sensitive to issues related to the quality of information accessible via the Internet and also cautious about the quality of information gathered from other parents. They recognize that different parents will have different perspectives on children's pursuits, and they also recognize that some perspectives may be better — for them — than others. In this case, the parents' goal of assessing the quality of the camps from the perspectives of other parents who share the same views of parenting as their own seems to accord with their underlying motive of finding quality activities for their children. But their motives may or may not accord with the motives of camp administrators. In either case, their description of their parenting activities does not translate directly into a design specification for our information system. Would these parents like to have access to a bulletin board or chat space where they could exchange information about summer camps and related activities? Can we build such a capability into our system? Assuming that we can, what will camp administrators think of such a capability? Will they appreciate such a free and open exchange of information about their camps? Will the motives of parents who want the best possible camp experience for their children accord or conflict with the motives of camp administrators to fill their camps and pay their bills — motives that they might not be willing to acknowledge, even to themselves? How should we attempt to resolve these contradictions?

7 Conclusion

We believe that activity theory and the methodologies for collecting and interpreting data that we have described above provide promising approaches to engaging users in the design process and making sense of their activities. But activity theory remains abstract, enriched by numerous case studies but difficult to operationalize in terms that are practically useful for designers. To render the theory operational, we will need to develop a set of conceptual categories for describing users' activities — more detailed and specific than the simple distinction between motives and goals and the broad concepts of divisions of labor and community rules and practices — and probably also a parallel set of categories for translating these categories of users' activities into specifications meaningful to designers. We anticipate that such a development will provide both a useful contribution to the theory and a practical guide for system developers.

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