# Using Service Blueprinting to Identify UX Design Opportunities: A Case Study on Engaging Participants in Autism Research

**Gabriela Marcu**
College of Computing and
Informatics
Drexel University
Philadelphia, PA 19104, USA
gmarcu@drexel.edu


**Karina Caro**
College of Computing and
Informatics
Drexel University
Philadelphia, PA 19104, USA
karinacaro@drexel.edu

## Abstract

We present a case study of designing at the intersection of user experience and service design: improving coordination of human subjects research on autism spectrum disorders. We frame this type of research as a service because (1) participants are provided with a screening, assessment, or intervention, and (2) improving the service quality of a research process could reduce burden and risk on participants while supporting rigor of the research. We apply service design as a lens to critically examine the process of research from the perspectives of participants and researchers; followed by user experience design to facilitate phases of the research process such as recruitment, enrollment, consent, and data collection. We use the service blueprinting technique to outline the stages of human subjects research as a sociotechnical process. We then discuss design opportunities that could promote and protect the interests of both participants and researchers, by enhancing rigorous coordination of human subjects research.

## Author Keywords

Organizational information systems; computer-supported cooperative work.

## ACM Classification Keywords

H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work

## Introduction

Human subjects research on autism spectrum disorders can be framed as a service when it involves screening or assessment toward obtaining a diagnosis, or when it provides a therapeutic intervention. Individuals and families can benefit from participation in these types of studies. However, participation in studies presents an added burden in the lives of families with young children, one or more of whom may be displaying signs of developmental delays. Whether or not participants can potentially benefit directly from a study, research activities must be designed to ameliorate burden and protect their interests. Quality in human subjects research is also important from the perspective of researchers, who need to ensure rigorous adherence to a study protocol developed for ethical conduct and to produce high quality research data.

In this paper, we critically examine the research process as a service, and participant engagement as a user experience. In service design, mapping experiences is used to improve service quality [7]. Service design breaks down a service as a process through techniques such as service blueprinting, which *"can facilitate the detailed refinement of a single step in the [participant] process as well as the creation of a comprehensive, visual overview of an entire service process"* [5]. We draw from these techniques to examine coordination of research as a sociotechnical process, involving social interaction (*e.g.,* face to face activities with participants) and technological artifacts (*e.g.,* a consent form, a spreadsheet tracking phone calls to participants, a database of survey data).

*Case Study*

Active engagement of participants in research on autism spectrum disorders typically includes play activities with toddlers, social interaction with children, and questionnaires administered to parents, teachers, and pediatricians. These types of participation are required, for example, in validating new screening or assessment methods that can help with early diagnosis of autism spectrum disorders [14]. Through human subjects research, CHI researchers have also investigated topics such as interventions, home and school contexts, and quality of life. CHI contributions to this research area have included participatory design, applying novel interaction paradigms, studying collaboration and social skills, and balancing multiple stakeholder needs.

Given the strong history of CHI research on autism spectrum disorders, as well as an increasing interest in engaging vulnerable populations in research, **are we doing as much as we can to facilitate equitable coordination of human subjects research?** Ackerman describes the challenge of understanding the gap "between what we know we must support socially and what we can support technically" [1]. We discuss how we (1) used a service design lens to examine the process of human subjects research in order to identify aspects of the process we can support technically, and then (2) applied user experience (UX) design to explore design opportunities for improving the experience of participants, researchers, or both.

*Applying the Service Blueprinting Technique*

Service design promotes an understanding of how an experience unfolds over time through interactions at many different touchpoints. The term touchpoint refers to all of the contact points between the customer and the service provider, which involve an interaction with a human

need at a specific time and place [13]. For our case study, we chose the service blueprinting technique in order to hold the process of human subjects research to a high standard of service quality with regard to participant experience and satisfaction. By viewing the participant as a customer, we argue that studies could be designed to improve their experience in significant ways that would hold benefit for both participants and researchers.

We collaborated with a university-based autism center that takes a public health approach in its research. Together, we focused on understanding information needs related to coordination of research, exploring how existing information systems were not meeting their needs, and identifying opportunities for design. We conducted contextual inquiries [4] with 22 members of the center's research staff involved in handling participant data, across three different areas of research. Through inductive thematic analysis, we identified challenges at each touchpoint, and together brainstormed design opportunities and validated them through iterative prototyping [11]. Based on these activities, we began developing a service blueprint. Service blueprinting is a technique for representing the activities, relationships, and interdependencies of a service process [5]. We describe how we were able to use a service blueprint to identify touchpoints that hold opportunities for UX design.

## Components of the Service Blueprint
This section breaks down the process of human subjects research through components of a service blueprint [5].

### (Potential) Research Participant Actions
All steps that research participants take are presented chronologically to drive a human-centered design approach. Making participants central to the process of research can help to address the challenges of recruiting and engaging vulnerable populations in research, by leading with empathy toward their needs. From the first touchpoint at which a potential participant learns about a study and the researchers–to an informed consent process that is easy to understand–adequate, accessible, and credible information is critical. However, it is not clear how that information should be presented, and sometimes the structure of the research process and documentation can be detrimental to the participant experience.

### Onstage/Visible Contact Researcher Actions
Researchers responsible for managing contact with participants engage in face-to-face interaction with participants. Informed consent is typically obtained in person, by describing the procedures and risks involved in the study, providing participants with opportunities to ask questions, and making sure they understand the nature of the study. Data collection can also involve face-to-face interaction, for example when the procedures involve interviewing, observation, or collection of a biosample. Researchers are trained to carry out these procedures consistently according to the protocol, but this approach does not always contribute to the participant experience. Qualitative research tends to put more focus on building trust and rapport with the participant in order to facilitate data gathering activities, and these factors can be critical to a successful research study.

### Backstage/Invisible Contact Researcher Actions
Researchers also carry out a range of actions that are not visible to participants. Even researchers responsible for managing contact with participants may do so through phone calls (e.g., for screening, scheduling, or administration of a survey). Other actions that take place "backstage" include setting up of lab materials and environ-

ment before a participant arrives, gathering an audio or video recorder, printing paper artifacts, and other activities researchers perform in preparation for contact with participants.

*Support Processes*
A range of activities in the research process do not involve contact with participants, but are required to support engagement of participants in research. For example, other members of the research team may provide support through designing a survey or other materials, entering data, coding data, anonymizing data, and storing data securely. Even though these activities do not involve direct contact with participants, they affect the participant experience. For example, support processes help to ensure the quality of the study design and materials, and then to protect the confidentiality of a participant's data after they have completed their activities in the study.

*Physical Evidence*
Throughout the research process, participants are exposed to tangible artifacts that facilitate their engagement in the study. From a recruitment flier, to an informed consent form, to an interactive system, physical evidence is critical in shaping the participant's experience. User experience design can be particularly influential in this aspect of human subjects research as a process, because physical artifacts can be designed and evaluated to promote the desired participant experience and engagement.

## UX Design Opportunities
By blueprinting the process of human subjects research, we identified opportunities for user experience design to promote equitable participation in research.

*Recruitment and Enrollment*
Service blueprinting helped us understand how the process of recruiting participants was not efficient. Through the touchpoints of potential participants filling the forms and the researchers accepting the form (Figure 1), we outlined the challenges of researchers finding information that matches their specific participants' requirements within either a mailing system or physical files (forms with potential participants' information)(Figure 1). The information for a potential participant was not consistent, having different levels of granularity, and incomplete information. Additionally, using the blueprint, we discussed with researchers what happened when they identify a potential participant. In that case, the researcher would contact participants (mainly by phone), and make an appointment to start with the consent process. Sometimes, researchers may not hear back from participants and it can be a difficult and time consuming process to successfully enroll the participant in the study.

The challenges of recruiting and enrolling participants over long periods of time pose interesting problems well suited to UX design perspectives. Coordination and monitoring across many clinical encounters over time has been recognized as a unique design challenge [10]. Relevant work that could be applied to this challenge includes: registry of potential participants generated via cross-platform forms and monitoring of eligible potential participants through web-based platforms. In this way, both potential participants and researchers can use web-based platforms to find the research studies that best suit their needs and requirements.

*Data collection and Monitoring*
Once the potential participant is enrolled in a research study, researchers need to be in touch with participants

**Figure 1:** Service Blueprint for engaging participants in autism research.

to collect data (e.g., conduct interviews, surveys, observation). Depending on the nature of the study, some research studies can last weeks or months. Discussing the touchpoints in this phase with researchers helped us to understand the challenges of data collection and in sustaining participants engaged. For example, participants can receive the data collection instrument such as a survey or interview (most of the time is a physical instrument), but sometimes the instrument it is not returned to the researcher. Additionally, as it is shows in Figure 1), researchers remind participants to fill out the data collection instruments (most of the time is by phone), but not always participants follow researcher instructions. After several reminders, some participants drop-off of the research. In addition, researchers explain participants that at the end of the study they will receive a report with the results, but sometimes this is not enough to retain participants and they drop off.

A potential solution for supporting data collection is to employ web-based surveys. Web-based survey administration is increasingly used, allowing UX researchers to contribute investigations of how online survey design affects response rates, completion rates, and data quality. Design decisions such as pagination, navigation, constraints, progress indicators, and login functionality can have important implications for successful population-based data collection. Surveys may also be completed by individuals with autism themselves, providing opportunities for studying universal and inclusion design [3], and assistive technology [6].

In addition, relevant work that could be applied to monitoring and sustained engagement of potential participants over time includes: clinician dashboards for patient management [2], real-time feedback displays [8], information sharing across stakeholders and caregivers [9], and novel approaches of engaging patients during and after clinical encounters [12].

## Conclusion

Given HCI's commitment to vulnerable populations, service design represents a novel approach to improving engagement of vulnerable populations in human subjects research. Human subjects research is not considered a service, and ethical conduct of research could be considered antithetical to comparing research participants to customers. However, we argue that the way user experience in research is practically and ethically distinguishable from customer experience in business suggests a feasible pathway for adapting a service design lens for appropriate use in the context of human subjects research. In this paper, we show how we applied service blueprinting to identify UX design opportunities. Our next steps involve designing and developing a web-based system that incorporates the opportunities we found in our case study.

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