Visual Storytelling: a design method to capture and validate experience in the early stages of the design process

By

Sara Salevati

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Abstract

The early stages of the design process are often ambiguous and complex. In this phase designers discover, learn and gather much information about the audience, culture and the context they are designing for. Through the synthesis of data their goal is to learn as much as possible about all stakeholder perspectives, activities and constraints involved in the design situation in order to identify and prioritize design problems.

This paper examines the value of visual storytelling methods in the early stages of the design process to enhance the identification of design opportunities, validate assumptions and improve design decision-making when designing for an optimal user experience. To help evaluate the potential benefits of visual storytelling methods a case study has been conducted with fourth year Interaction Design students at Emily Carr University involved in designing a patient tracking system using radio frequency identification technology for the BC Children's Hospital Emergency Department.

This research explores storytelling as a visualization tool for translating, interpreting, verifying and communicating data collected from diverse user communities to build a better understanding of the context and circumstances surrounding complex design challenges involving multiple stakeholders.

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Acknowledgements

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Dedications

To my best friend, my mom

Introduction

Inspiration

My background in Interaction Design has provided me with the opportunity to explore people's interaction and experiences with products, services and environments that inhabit our world. My design practices have always evolved through a process of discovery grounded in research, beginning in qualitative observations and have taught me to look beyond the surface of human behavior to find deeper clues to help foster the creation of more meaningful experiences. My process involves a Co-Creation methodology, which includes active participation and collaboration with end-users.

Two years ago, I began my graduate education in Interaction Design research. I immediately became involved in a research initiative undertaken in conjunction with the BC Children's Hospital and Emily Carr University Design faculty to identify and document priority areas within the hospital that could potentially benefit from a design intervention.

During the completion of the formal requirements analysis supported by an in-depth precedent study in collaboration with other designers, I became aware of some of the challenges we encountered. As designers with little or no experience in healthcare we were overwhelmed with the scope of the project and the amount of information we had to research, discover and learn. We had to consider the many different points of view of everyone involved in healthcare and understand their experiences, ie: patients, parents, nurses, doctors. We also had to identify and prioritize potential design opportunities and document and communicate our decision-making process to all stakeholders involved in the project.

Shortly after, I became very interested in the ambiguous early stages of the design process where designers learn about their users, the physical context and explore and discover opportunities for a design intervention to improve or enhance the current situation.

I began to reflect on my past design practices and carefully examine my own design process. The value of narrative and human experience was evident as the commonality in my

process.

I investigated how my projects were shaped and progressed within each iteration of the design process by comparing the initial ideas with the end product. During this process, I noticed that the documentation of my projects did not always communicate the synthesis of the data collected in the front-end of the design process as clearly as I might have liked. As a result it often required further discussion to justify and validate my design decisions and showcase the development of my design thinking throughout the design process.

These explorations inspired me and led me to questions how designers validate their discoveries and findings in the early stages of the design process and how this information gets synthesized and filtered in leading them to identify the right design problems. Further, I wondered how designers communicate this decision-making process to fellow designers, users and other stakeholders involved.

I began to research the role of narrative and visualization techniques used in different stages of the design process and became particularly interested in their application within the uncertain front-end of the design process as tools to translate designers' research data through the experience and point of view of the users. Through this paper I hope to encourage other designers to utilize their visualization and storytelling skills in the early stages of design process to not only share and communicate their mental models and design decisions, but also to validate their synthesis of gathered data.

Overview

Experiences are multifaceted. It is important for designers to consider the different perspectives and learn about everyone's roles, expectations and relationships in the early stage of their design process. The front-end of design process is fuzzy, thus designers utilize different methodologies to discover and gather as much information as they can about the design context and the people they are designing for. This upfront research helps steer the design in the right direction by enabling designers to

better assess the design situation and to define and prioritize the right design problems.

It is difficult for designers to explain and communicate their decision-making throughout the design process particularly in the ambiguous front-end. They can describe the various methods they used in the early stages of the design process such as observations, interviews, probes and workshops, however, it is often unclear how the information and insight gathered through these approaches gets filtered through to the next stages of the process and leads designers to positive outcomes (see Figure 1). My research concentrates on the front-end of the design process, primarily on how designers synthesize and communicate research data to frame problems and identify design opportunities.

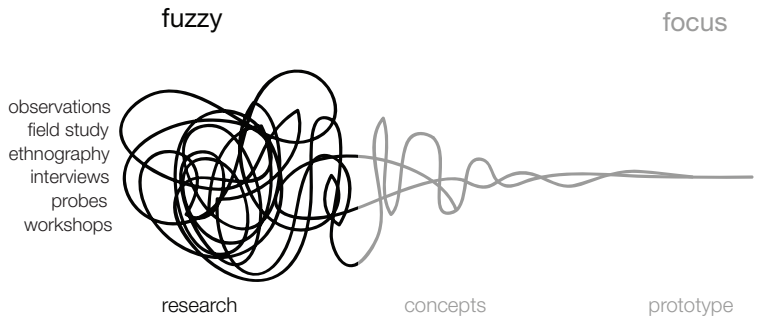

Figure 1. Methods used in the fuzzy front-end of the design process based on Sanders (2008)

Designers take different approaches to design and see design situations differently. It is important for them to be able to share their design process, thinking and knowledge through a dialogue understood and accessed by all. Designers are visual thinkers and communicators and should utilize their visualization skills throughout the design process, particularly in the front-end to synthesize and communicate their gathered data in order to enhance the identification and validation of the right design problems. Visual stories act as a common language for designers in communicating their mental model and understanding of a design situation and decision-making to all perspectives involved in designing for experiences. My research

has generated evidence that the application of visual stories helps clarify the front-end of design process by acting as a validation tool. Designers produce these stories by translating and interpreting their gathered raw data and walking in their user's shoes by visualizing and narrating their experiences (see Figure 2). These stories invite everyone involved in the design (ie, other designers, users and stakeholders) to confirm designer's understanding of the design situation and also to pin point their gaps in knowledge.

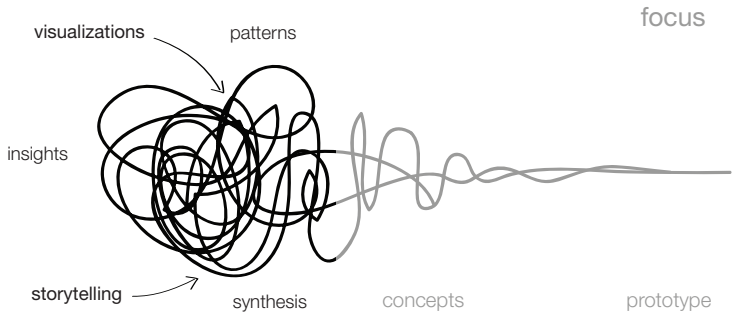

Figure 2. Application of visual tools and storytelling in the fuzzy front-end of the design process to synthesize and validate qualitative research based on Sanders (2008)

This thesis focuses on the application of the visual storytelling methods in the Interaction Design process and how those methods can effectively complement other front-end methods to support designers' research, vision and understanding when designing for experiences involving multiple stakeholders.

The content of this document is organized through the following sections.

The *Introduction* section describes my background and my primary focus in this particular research area. It is a general guide for the structure of this thesis and examines my research objectives and questions.

The *Design Review* section provides an overview of design literature and theory significant to my research. It examines the

evolution of different design disciplines that influenced the shift in designers' focus from object centered to experience centered design. This section closely looks at the evolution of Human Centered Design, Interaction Design, Co-creation, Design Thinking and Service Design.

The *Visualization Techniques* section describes the different visualization techniques used throughout the design process to support designers' vision and understanding of the design context and the people they are designing for. This section focuses on Sketching and Drawing, Data Visualization, Persona and Sketching User Experience.

The *Storytelling* section outlines the role of narrative in design and its significance in capturing user experiences. It closely examines Scenarios, Storyboarding as Narrative and Storytelling to Capture Experiences.

The *BCCH Case Study* section presents the investigations of the visual storytelling method in the front-end of design process through a case study conducted with a fourth year Interaction Design class involved in the design of a radio frequency identification system in the Emergency Department of the BC Children's Hospital.

The Visual Storytelling Method section identifies the opportunities to leverage visualization and storytelling techniques to help clarify designers' vision and understandings at the front-end of the design process. It also reveals the values of the visual storytelling methods that have resulted from the field-testing.

The *Conclusion* summarizes key findings from the study identifying the effectiveness of visual storytelling when designing for experiences and promoting its application in the early stages of design process. It also discusses the future directions for this thesis.

Research Questions

This research is intended primarily for designers designing for experiences involving multiple stakeholders, as it examines the value of the visual storytelling methods used in early stages of the design process. These methods help designers to visualize and synthesize research data, frame design problems, optimize design decision-making, understand the complexity of service experience as well as facilitate communication and collaboration amongst team members and stakeholders involved in the design project.

This research specifically aims to address the following questions:

How can the visual storytelling methods used in early phases of the design process help designers validate their research data by presenting the research data in a way that can be quickly and clearly communicated to all stakeholders involved in designing experiences?

How can the visual storytelling methods used in early phases of the design process help designers to understand the complex scope of design problems, identify design opportunities and optimize design decision-making?

How can visual storytelling methods help designers to visualize, express and choreograph better experiences that include multiple perspectives?

Design Review

Human Centered Design

The evolution of Human Centered Design has shifted designers' perspective from looking at objects and focusing primarily on form to looking at people and focusing on human experiences. Over the past two decades designers no longer try to design only for aesthetic and usability values, but to design for an overall experience. This emergence has resulted in a change in the role of the designer from that of a master to that of a facilitator.

The Human Centered Design theory stems from the field of User-Centered Design (UCD) rooted in the mid-eighties. UCD was instrumental in the establishment of the field of Human Computer Interaction (HCI), which focuses on the development of technology. In the book *Design of Everyday Things*, Donald Norman uses the term 'User-Centered Design' to describe design that primarily focuses on end-users' needs and wants and their involvement in the design process. Norman makes recommendations to place the user at the center of the design by "facilitating tasks for the user and making sure that the user is able to make use of the product as intended and with a minimum effort to learn how to use it" (Norman, 1988). UCD has since evolved to a broader perspective - Human Centered Design - that not only encompasses the active involvement of end-users throughout the design process but also focuses specifically on the human behavior, emotional responses and experience.

Human-Centered Design has become a foundation of research and practice in other design disciplines such as Industrial and Interaction Design. This approach is iterative and "begins with the person - […] her goals, what she does, what she wants to achieve, [and] what she experiences"(Evenson, 2008).

Over the past few years designers no longer try to design only for aesthetic and usability values, but to design for an overall experience. Bill Buxton the author of *Sketching User Experiences* argues that designers are experiencing a shift from "object-centered to experience-centered design"(Buxton, 2007).

He explains, "It is not the physical entity or what is in the box (the material product) that is the true outcome of design. Rather, it is the behavioral, experiential, and emotional responses that come about as a result of its existence and its use in the real world" (Buxton, 2007). However, experience is a subjective phenomenon. You cannot design experiences because each experience is unique. User participation and collective creativity are a much-needed assistance in designing for an experience, so that the products, interfaces, spaces and services that are designed will act as a platform to help ordinary people create their own experience.

My research is based on the human-centered model in enhancing the designer's understanding of their users' interactions and relationships with products and services in order to design for better experiences.

Co-creation

The Human Centered Design revolution has made designers rethink the design process and their relationship with the people they are designing for. As designers "we are no longer simply designing products for users. We are designing for the future experiences of people, communities and cultures who now are connected and informed in ways that were unimaginable even 10 years ago" (Sanders, 2006). This has resulted in the emergence of Participatory Design or Co-Design culture, which supports the involvement and collaboration of everyday people in the design and development process. The role of "consumers" in this space has changed into a role as "creators" (Sanders, 2008).

Liz Sanders is a pioneer in the use of Participatory Design and Co-creation research. She is a founder of MakeTools, a company that has developed a series of generative tools for collective creativity. She has created tools such as the Say, Make, Do methodology that allows designers to access people's experiences and learn from their memories. She believes that through the Say, Make, Do methodology "we can listen to what people say, […] interpret what people express, […] watch what

people do and […] use, [and thus] uncover what people know and […] reach toward understanding what people feel and […] appreciate[ing] what [they] dream" (Sanders, 2002). By Say she refers to methods such as contextual interviews, focus groups and surveys. Do, refers to what researchers learn by observing what people do, through a variety of ethnographic methods. The Make portion of Sander's method is about what people make, through the workbook, the collaging, and the Velcro prototyping (Sanders, 2002). In this new space, designers can access and understand the needs and dreams of people and create scaffolds that help people realize their dreams. Many leading designers, design firms and design educators have adopted and integrated variations of these methods into their everyday practice.

Through my research I am exploring how the visual storytelling method can add to these Co-creation method to capture these 'stories' in the early stage of the design process.

Interaction Design

The Interaction Design discipline has matured in the 21st century and focuses on the design of people's interactions with technology, products, services and environments. Interaction Design has gained ground within Human Centered Design and focuses on the involvement and participation of end-users throughout the design process. Interaction Designers examine and explore people's behaviors and relationships through a set of methodologies (such as observational studies, user research, workshops, etc.) that support their vision and understanding of their users in different stages of the design process. The emergence of this field has provided designers with a set toolkit that allows them to design for the behavioral, experiential, and emotional responses.

Bill Moggridge in his book *Designing Interactions* focuses on people's adaptation with technology and discusses Interaction Designers not being concerned about objects that are beautiful, but designing people's interactions with these objects (Moggridge, 2007). Jon Kolko goes further in his book

Thoughts on Interaction Design saying that "Interaction Design is the creation of dialogue between a person and a product, system or service. This dialogue is both physical and emotional in nature, and is manifested in form, function and technology" (Kolko, 2007). According to Moggridge and Kolko Interaction Designers shape human behavior with their designs. Because "[h]uman behavior is innately poetic [and] natural," the world of Interaction Design focuses on the dialogue between people and things, and brings humanity to the design of technology (Kolko, 2007).

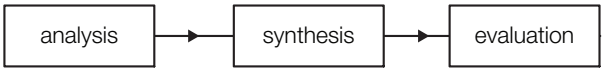

Figure 3. A representation of the design process based on Jones (1992)

Interaction Design focuses heavily on process rather than outcome. The traditional design model depicts the process as linear involving three main parts: analysis, synthesis and evaluation (see Figure 3). The analysis phase involves the exploration of design situations and the identification of design opportunities. During the synthesis phase the designer typically moves toward generating design solutions. Finally, within the evaluation phase the designer refines design solutions against framed problems.

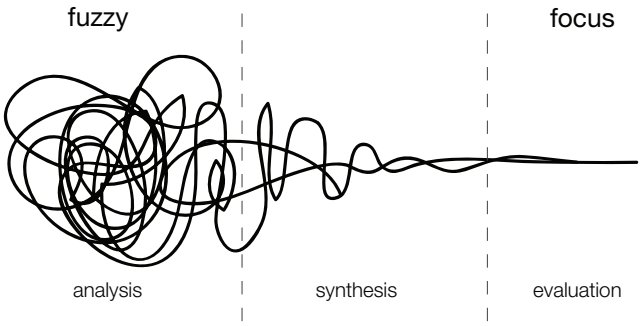

Figure 4. A representation of the design process based on Sanders (2008)

However, the Interaction Design process is non-linear (see Figure 4) as it contains feedback loops between the parts of the process, as one part may affect the other. Interaction Design toolkit is full of methodologies that support the non-linearity of this process and the involvement of people throughout the design development. Interaction designers are "concerned with describing how people might interact with and experience the products, services and environments that inhabit their world." Being able to "effectively tell a story, […] is an important part of any Interaction Designer's skill set, and proves useful at many different points of the design process" (Fullerton, 2009).

"Löwgren and Stolterman (2004) describe the design process through three levels of abstraction: the vision, operative image, and specification." They believe that "vision emerges when the designer first confronts a design situation." The initial idea is internal, "often fuzzy [and] intuitive" but crucial in aiding the designer to "understand the situation" they are working in (Hegeman, 2008).

The fuzzy front end refers to the ambiguous early stage of the design process. "Formerly called "pre-design", the front end describes the many activities that take place in order to inform and inspire the exploration of open ended questions" (Sanders & Stappers, 2008). Designers in this phase use different methodologies to gather information about the people, culture and the context they are designing for. "In the fuzzy front end, it is often not known whether the deliverable of the design process will be a product, a service, an interface, a building, etc. Considerations of many issues and concerns come together in this increasingly critical phase , e.g., understanding of users and contexts of use, exploration and selection of technological opportunities such as new materials and information technologies, etc" (Sanders & Stappers, 2008). The exploration in this phase enables designers to ideate and identify design opportunities.

The front-end of the design process is uncertain and complex. In this stage designers "discover or construct many different variables" in order to frame and define the right design problem (Schön, 1988). In identifying these problems designers

"set boundaries, select particular things […] and impose on the situation a coherence that guides subsequent moves" (Schön, 1988).

My research lies within this fuzzy front-end of the design process. I am exploring how visualization combined with narrative can support the designers' vision and understanding of the design situation through the point of view of and stories of their users.

Design Thinking

Tim Brown, the CEO and president of the world renown creative firm IDEO, focuses on design thinking and the culture of innovation. In *Harvard Business Review* he talks about design and integrative thinking, which is balancing desirability: what people need, what society needs and feasibility: what is technologically possible, with viability: what makes business sense, what is sustainable (Brown, 2008). According to Brown, Design Thinking can be considered a design discipline that uses a designer's sensibility in designing products, services and environments. He goes further by borrowing from Peter Drucker, "design thinking converts need into demand" (Brown, 2008).

Design thinking is necessary in designing for experiences. It allows the designer to imagine the multiple perspectives involved- those of the design team, clients and users and take into account the multiple demands – those of business, technological and environmental sensibility. It also provides designers with new and creative ways of approaching potential problems, thinking blue-sky (outside of the box) ideas and problem solving in new directions. According to David Kelly from IDEO designers have started to become self-reflexive and identify "[themselves] as design thinkers [who possess] a methodology that enables [them] to come up with a solution that nobody has before" (as qtd. in Tishler, 2009).

Design thinking is about embracing the ambiguity of design and combining tacit knowledge, critical thinking and creativity in the design process. It can be considered "a dialectic, or a

conversation [because it] involves design wisdom, judgment, and knowledge" (Hegeman, 2008).

According to Schön, design thinking occurs in the design world, the space and state of mind into which designers enter while designing. In this space designers shape their design knowledge over an understanding of the design situation through what Seymour Papert calls "things to think with" (Schön 1988). These are tools that allow designers to understand, strategize and visualize a particular design situation and conduct a dialogue with that situation (Schön 1988).

Although it is very natural for designers to enter a design world and use design thinking and reasoning to realize design opportunities and solutions, it is often difficult to share and communicate this process with others involved in the project. It is therefore necessary for designers to be able to exploit different methods to explain their design decision-making process prior to their arrival at the design solutions.

Design worlds are constructed "not only through the shaping of materials but through interlocking processes of perception, cognition and notation"(Schön 1988). My research suggests that narrative and visual techniques can act as a window to the design world by showcasing design thinking in a way that is understood by everyone involved.

Service Design

Service design is an emerging discipline that has received much attention in the past few years with the advent of the first service design conference organized by Carnegie Mellon School of Design in 2006. It is influenced heavily by Human Centered design, Interaction Design process and methodologies and Design Thinking. "Service design is a discipline that is influential in innovation processes, in business and technology development, as well as in deployment of technology" (Moritz, 2005). Services are experiences that become apparent "through a variety of messages, products, performances, and processes co- produced by client(s) and service personnel" (Evenson, 2008).

Service design is multifaceted; it encompasses multiple perspectives - those of consumers, employees and stakeholders - and addresses social, economical and technological needs within a broader spectrum. Sangiorgi and Pacenti (2008) define three main emerging practices for service design: service interactions, co-creation within complex systems, and platforms for participation (Sangiorgi and Pacenti, 2008).

Shelly Evenson of Carnegie Mellon describes service design as bringing people together in conversations. "These are conversations among the design community, among the business community, conversations with the technologist and with the people that are living and breathing the service" (Evenson, 2008).

She says that designers need to see the big picture, the overall context for designing service. Evenson mentions that service experiences are multi faceted and co-produced. Every time we engage in a service experience- the people who are around us are having an impact on that service- everyone is participating, from the customer to the employee. She goes further, saying that when we are designing for service – we are coproducing the coproducing – people who are participating in the design of the service will be co-producing the service as they deliver it; and the experience itself is co-produced.

She describes 6 types of conversations: understand, accept, integrate, attend, explore and envision (Evenson, 2008). Service design is non-linear as it is made up of several interactions through a range of touch points over time and involves multiple perspectives. To design for a service experience, designers must have a clear understanding of everyone's specific roles involved in that service, from the customers to the employees. The outcome of design here is not a product, but the overall experience across all touch points, interactions of people with products, spaces and other people.

Service design is in a state of flux, it is ongoing and never a finished product that is being consumed. It is always changing and shaping the behavior of its consumers. The complexity of service design moves beyond the part experienced by customers and employees, to its existence within a broader

world of an economic structure. "Service designers view their design object as events and performances in interaction and co-creation between humans, supported by other means" (Segelstrom and Holmlid, 2009).

Service designers "visualize, express and choreograph what other people can't see, envisage solutions that do not yet exist, observe and interpret needs and behaviors and transform them into possible service futures, and express and evaluate, in the language of experiences, the quality of design"(Service Design Network, 2005). When designing for a service experience, designers need to utilize different methodologies to help them clearly understand and communicate the multi-layered nature of the service experience. "Visualization techniques can be claimed to be one of the fundamentals of service design" (Segelstrom and Holmlid, 2009).

In this thesis I am exploring how visualization and storytelling methods can support the service conversations described by Shelly Evenson and the intangible and complex nature of service performance by capturing the interactions of everyone involved with each other and with the service event.

Summary

The evolution of Human Centered Design, Interaction Design and Co-creation methodologies have provided designers with the options to not just design products for people but to design experiences with people. This shift has brought to focus the importance of design process and the involvement and participation of users throughout.

Designers, through an iterative process, discover, learn, and immerse themselves in the world of their users, to better understand the different perspectives and factors of the design challenge in the early stages of design process.
The front-end of the design process is uncertain and ambiguous. In this stage designers "discover or construct many different variables" in order to frame and define the right design problem (Schön, 1988). In identifying these problems designers "set boundaries, select particular things […] and impose on the

situation a coherence that guides subsequent moves" (Schön, 1988).

Through design thinking and problem solving designers become aware of how their decisions and designs not only affect one individual, but influence systems and society as a whole. More and more designers are taking the responsibility to slow down their design process and utilize various methodologies to understand their users and the design context before jumping into solutions.

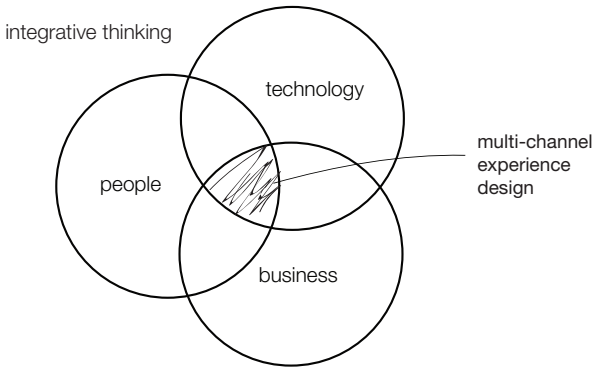

Figure 5. A representation of the design thinking model based on Brown (2008)

This integrative thinking (see Figure 5) has resulted in the emergence of new practices such as service design, which addresses business and social challenges. The scope of design has become more complex - designers have moved from designing products, to technology, experiences, environments and more recently services. In this domain of intricacy, designers need to adopt new methodologies in the front-end of design process to validate their research and understanding of their users to support the design of multi-channel experiences. Design solutions within these complex contexts are not always tangible; they could be systems of thinking or organizational models. Therefore, it is necessary that designers spend time in the early stage of their design process to learn and analyze the design circumstances accurately and to eliminate any assumptions and preconceived notions through validation of their research data with their users.

This literature review highlights the progression in the scope of design, its implications, and the need for the exploration of more holistic approaches to leverage designers' understanding of these complex problems. Furthermore it identifies the need for designers to validate their research and vision in the early stages of the design process to support the plural perspective in designing for multi-channel experiences.

Visualization Techniques

Sketching and Drawing

Designers are visual thinkers. Sketching and drawing are fundamental skills for designers and enable them to express and communicate their mental models of problem situations, ideas for solutions and rational for decision-making in different stages of their design process. Sketches and drawing support the fluidity and non-linearity of creative process, through which designers can discover and explore ideas and realize their thinking. The non-permanent nature of sketches allows for experimentation and play throughout the design process, providing designers with an opportunity to fail and learn. Bill Buxton in his book *Sketching User Experiences* describes sketching in the Interaction Design process as "quick, timely, inexpensive, disposable, plentiful, and ambiguous" (Buxton, 2007). Thus, sketches are not prototypes and should dominate in the early ideation stage as they are cost effective and disposable. Prototypes are more refined, take longer to build and occur in the later stages of design process. Where "sketching is about asking questions, prototyping is about suggesting answers"(Buxton, 2007).

Buxton believes that ambiguity is one of the main attributes of sketches: "If you want to get the most out of a sketch, you need to leave big enough holes" (Buxton, 2007). Their ambiguous nature supports the uncertain and fuzzy front-end of design process as they suggest, propose, and question. In the early stages of design process designers can use sketching and drawings to discover, frame out early ideas and brainstorm. Sketches support the flexibility of ideas in the uncertain front-end of the design process by enabling designers to easily produce an extensive range of alternatives. Sketching and drawing support the iterative nature of design. Sketching and drawing can be used for different purposes in different phases of the design process. They can be used as brainstorming tools, such as ideating and conceptualization, usually in the front-end of design process; as a testing tool such as prototyping, towards the end of design process; and also as a communication tool such as renderings at the very end of design process. Designers

can carry sketches through to different stages of their design process and build upon them. More refined sketches and drawings are used in the prototyping stage of design process. Many Interaction Designers use drawings and paper prototyping as preliminary user testing tools in designing interfaces and web applications. Designers also use more refined sketching and drawing in the final stages of their process as aides for communication and formal presentation.

"Sketches are social things" (Buxton, 2007). Sketching is an activity among designers and sketches facilitate collaboration with all stakeholders involved in the design project as they invite others to comment, suggest and criticize. Sketching and drawing also acts as a dialogue for designers when communicating their mental models and understanding of a design situation to designers and non-designers involved in the design project.

"Sketches are an essential designer's tool for capturing preliminary observations and ideas" (Verplank, 2003). Sketches can act as a tool for designers to tune into their initial understanding of a design situation, to problem solve and ideate through visualization. Sketches in the early stage of a design process can quickly represent the overall context and culture of the design situation and make apparent all the constraints and activities involved. Designers, through the act of sketching, can express what they know, what they think and how they imagine.

My research focuses on the potential to utilize these visualization skills in the front-end of design process to enable designers to capture their understanding of a design situation, to recognize the gaps in their knowledge and define and prioritize the right design problems through the translation of their research data.

Data Visualization

Is a picture really worth a thousand words? We understand and make sense of our world mainly through our eyes. We learn, remember, communicate and express ourselves through visual language. There is extensive research that supports the effect of

understanding, synthesizing and remembering of visual data versus text alone. According to New York University psychologist Jerome Bruner "people only remember 10% of what they hear and 20% of what they read, but about 80% of what they see and do" (Lester, 2006).

We are surrounded by data visualization in our everyday life, from images to charts to diagrams and graphs. "Graphs were invented to bring meanings in quantitative data to light, which could not be discerned from a table of numbers" (Few, 2006). Visualization is an important tool for designers, not only to translate and interpret their collection of raw data but also to understand and synthesize that information visually.

Through a storyboard, the combination of visual representation of a narrative with short descriptive text, the designer is able to effectively communicate and see the meaning of their gathered data. As the researcher and academician Edward R. Tufte has observed, "to envision information […] is to work at the intersection of image, word, number, [and] art" (Tufte, 1990). Color, characters, setting and other details of these stories serve this purpose by adding another dimension to the effective communication and visualization of data.

We not only better perceive and understand visual language, but as designers we think visually. Visual tools such as drawings, sketches, concept maps, models, etc, are crucial in design thinking and process. Visual tools allow designers to make sense of the world of their users. Through visual models designers, understand interactions and relationships, problem solve and predict. They are "especially important in interaction and service design [because of their ability to] bridge the gap between observing and making and as such between [the] research […] and design communities" (Dubberly, 2008).

"Designers are usually unable to say what they know, to put their special skills and understanding into words" (Schön, 1988). As the description of the design process is often difficult for designers to communicate to others, it is necessary for them to adopt new methods of documenting, sharing and communicating their process so that their design process and

tacit knowledge is made explicit and accessible. Through the tangibility of this knowledge, everyone is able to recognize and access the designer's thinking, reasoning and problem solving.

Visualizations in the front-end of the design process helps designers to replace the written synthesis of their contextual research such as interviews, which allows them to better understand and communicate the experience and emotions of the people they are designing for. Visualizations can be quickly accessed by designers and others, such that the written form of data synthesis cannot.

Persona

How well do personas represent the real users? Alan Cooper defines "personas as the hypothetical individuals that take on the characteristics of real users" (Kolko, 2007). A persona is usually created in the early stages of the design process to visualize and remind designers of who their users are throughout the design process. It is typically expressed in "the form of several paragraphs of text, followed by images that illustrate lifestyle choices, brands and other physical embodiments of values" (Kolko, 2007).

Personas are mostly stereotypical and generic. They "attempt to capture individual nuances and peculiarities yet blend these nuances into a single individual" (Kolko, 2007). The representation of users through a picture and set of characteristics does not fully capture the complexity of the real users.

Personas, when created successfully, need to extend outside of the given problem space and also be based on the data gathered from user research. "Unsuccessful design often comes from the assumption that users like what [designers] like" (Fritsch, Judice, Soini, & Tretten, 2007). A persona focuses on the individual user and supports the design project through its perspective. However, it is static and does not portray its relationships with other people, things and places.

When designing for experiences, designers not only need to understand and learn about their users (their needs, wants and

expectations), but also be able to walk in their shoes, feel their emotions and study their actions and reactions in different situations. They also need to consider the relationships and points of view of all key players involved.

Visualizing user's experience through a set of events supports the complexity of designing for experiences in a way that static and stereotypical personas do not. By translating qualitative data through visualizations, designers can display the multiple perspectives involved in a multi channel experience in a compressed form. As such, they can portray the relationship of all the characters and convey their individual point of view in an integrated fashion versus the individual personas whose interactions have to be interpreted by the designer.

Sketching User Experiences

There are many methodologies designers use in this fuzzy front end to gather data through contextual research such as user observation, probes, interviews, workshops, etc. However, there is no model for how the information and insight gathered through these approaches is filtered through to the next stages of the process to help lead designers to positive outcomes. Bill Buxton the author of *Sketching User Experiences* promotes sketching as a creative approach in the design process and talks about how the design process is about "getting the right design, and then getting the design right" (Buxton, 2007). By the right design he refers to the ideation process, the generation of many ideas and variations, reflection and choice followed by iteration and development. He goes further discussing design as a choice, the creativity that designers bring to enumerating meaningful distinct options from which to choose and the creativity they bring to defining the criteria, or heuristics, according to which they make their choices (Buxton, 2007). Methods such as sketching support the designer's vision in the front-end of the design process to "get the right design". The main goal in this early stage of design "is to develop a unique propriety understanding of who the [users] are what they want and need, to identify the right problems to solve, and to identify

the right questions to ask" (Rhea, 2003).

One of the ways for designers to identify design opportunities is to diverge their thinking before converging onto a specific problem; to not only focus in on the pixels, but on the big picture. Looking at the broad overview of the design situation enables them to understand the whole system, allowing them to not follow and "track existing conditions and assumption and to break out of the current-mindset" (Rhea, 2003). In this phase, it is about discovering and learning information and utilizing the right tools to support the communication of these new insights to the key players involved in the design project. Designers in this phase need to identify what is important, what aspect of information is missing, where they see a design opportunity and forecast a change through synthesis of their gathered data.

Modeling experiences can "explore the emotional benefits and psychological satisfactions of a product or service [and] define the necessary ingredients [for] a successful user experience". It also enables them to pick "which part of the user experience to focus in on to enhance (to delight users), and which aspect [to] minimize (to reduce irritation or inconvenience)" (Rhea, 2003).

Designers model experiences typically through various concept mapping techniques and journey frameworks. Concept maps are "a type of model [that] are used to explore and learn about complex information spaces. By showing everything—the forest and the trees—in a single view, concept maps help people create mental models and clarify thoughts"(Dubberly, 2009). They are mainly used by designers as a communication tool to share their understandings and vision with peers and clients. Concept maps typically include short text and arrows with minimal visual elements; they represent relationships and relativity of key information and highlight the main issues and opportunities of user experience.

The journey framework is a method that analyzes a step-by-step journey of users through the main touch-points of their experiences. Through the journey framework designers highlight the key areas of the user experience with photographs and

populate each section with questions from the different stakeholders involved. This method is typically used to verify designers' proposed solutions within each stage of user experience by addressing the questions they may have.

My research proposes that visual tools in the front end of the design process can be used to support the designers' divergent and convergent understanding of the design situation and allow them to quickly and clearly communicate their contextual research to others, as well as frame and prioritize potential problem areas. Visualization helps designers to identify the principles for design success and the appropriate metrics for assessing the effects and quality of their designs by validating their contextual research and understanding early on. This enables them to easily recognize reoccurring design problems through multiple iterations. Visualization of research data provides the design team with a framework to keep them solving the right problems, by revealing the problems they want to solve and highlighting the basic criteria for success. Ultimately, this facilitates their vision for possible solutions.

Summary

As visualizations are a natural extension of designers' skills, it is ideal for them to utilize these techniques to document the fuzzy front-end of their design process. Through visualization, designers can analyze the scope of complex design situations by recording current situations and identifying the missing information, which engages them to investigate further.

Designers can use visual tools in the early stages of the design process to better understand the context and culture of the users and their interactions by synthesizing their research data through the visualization of the user's experience. Visualizations support many points of view by displaying the models of experiences of all key players involved in the design situation. Through these various perspectives, designers can easily distinguish patterns of common design problems, which optimizes their design decision-making process. Visualizations also support the iterative nature of design process as they are

flexible, modifiable and can built upon.

Further, designers can use visualization as a communication tool as they are able to share their vision and understanding through a dialogue understood and accessed by all. Visualizations allow designers to clearly and quickly explain and share their mental models with users and other stakeholders involved in the design project.

Storytelling

Scenarios

Stories are one of the earliest forms of communication in oral history. We learn, understand, share, remember and speak through stories. Storytelling is innately human and can take many forms: oral, textual or visual. Narratives paired with visuals are one of the most effective tools for communication.

Scenarios are powerful tools used in film and design to map out and explore a specific circumstance. As Schön describes, scenarios in design are "framed experiments, enacting a possible outcome based on observation and conceptualizing of the design situation" (Schön, 1983). Scenarios are very important in the design process as they provide a vision of the design situation. John M. Caroll talks about five reasons for scenario-based design (Caroll, 1995):

1. Action versus reflection: vivid descriptions of end-user experience evoke reflection about design issues
2. Design problem fluidity: scenarios concretely situate interpretation and solution but are open-ended and easily revised.
3. External factors constrain design: scenarios anchor design discussion in work, supporting participation among stakeholders (designers and user) and appropriate design outcomes.
4. Scientific knowledge lags design application: scenarios can be abstracted and categorized to help design knowledge cumulate across problem instances.
5. Design moves have many effects: scenarios can be written at multiple levels, from many perspectives, and for many purposes.

Scenarios are often used in the evaluative phase of the design process, allowing the designer to situate their design solution within the context of use. Scenarios help the designer to validate their designs in the real world by illustrating how it may function or how it might change a situation for the better. Through scenarios designers "establish context, illustrate a

problem and propose a new solution" (Pruitt and Adlin, 2006).

Designers are often envisioning new-to-world products, services and environment. Scenarios allow them to predict and explore the future use of their designs and the problems they solve. It can also "help designers to uncover and refine understandings of the potential uses, attitudes, and interactions that new products, services, virtual and physical spaces need to support" (Jonsdatter and Gregory, 2006).

Designers use scenarios to display a functionality of their products, and how users interact with them. Mapping of user experience is popular amongst designs that involve HCI (human-computer-interaction). Designers use scenarios as a walkthrough of possible interactions and to assess usability of complex systems and interfaces.

Through stories and scenarios designers get a better understanding of the user's schema - their mental framework and pattern of thought organized within a specific situation. The psychologist Frederick Bartlett describes schema as an "active organization of past reactions or of past experience…" (as qtd. in Madej, 2007). It is helpful for designers to be aware and learn people's knowledge, perception and reaction in different circumstances and to facilitate a seamless adjustment with their new and future designs. Schema theory is especially important in designing new experiences as the "more familiar and richer the schema [a designer] brings to a situation the easier it is [for people] to understand, engage, and learn from" (as qtd. in Madej, 2007).

By using narrative in the front-end of the design process the designer is able to enter their user's current world and immerse in their experiences. Storytelling creates empathy for the designer as they can cognitively and effectively connect with their users.

Storyboard as Narrative

Narrative is one of the ancient ways of communication. Polkinghorne describes narrative as a "fundamental scheme for linking individual human actions and events into interrelated

aspects of an understandable composite" (Polkinghorne, 1988).

In film, narrative is typically constructed from the interactions between the story, its characters and their environment. The development of narrative is attained through a fluid exploration of characters in their environment, with dialogue added as the characters come to life. Narrative consists of two main factors, plot and story. Plot is the presentation of the narrative events and the story is the relationship and connection of these events.

Storyboards play an essential role in film and television production as they support a director's vision through a sequence and continuity of actions, relationships and emotions. These storyboards showcase the flow and development of the story by displaying the setting, characters and their relationships, conflict and resolution of the story. Like film, design is based on narrative. Designers are storytellers. Design process is an ongoing story that gets built upon. Through the design process designers understand their characters; recognize the conflict in their story and work toward a resolution.

Storyboarding in film is widely used as an exploration of possibilities - it is not based on data, but on fictional situations. In contrast, my research explores the role of storyboards as a validation tool for designers' understanding of stakeholders' experiences, and the methodical use of storyboards in the early stages of design process to capture the current experience of users through translation of contextual research.

Storyboards support well-crafted stories, which include context, facts, characters, plot and resolution. Good stories are short and have just the right details: "too little detail and story loses authenticity; too much and it gets overloaded with information and loses its clarity" (Pruitt and Adlin, 2006). Storyboards do not have to be refined to be able to communicate the story clearly. In fact in *Understanding Comics*, Scott McCloud talks about drawing comic book characters. He says that the less realistic the drawing style the easier it is for the audience to identify with the characters.

Storyboards are both affective and effective tools in design. They allow designers to enter the world of their users and

experience situations from their point of view. In film storyboards are often fiction and act as a pre-visualization of a storyline to be played and constructed by actors and props. However my research specifically investigates storyboards as a non-fictional tool in design process. Using storyboards in the front-end of design process helps to document the reality, the experiences of people through factual events to better understand their interactions and relationships.

Storytelling to Capture Experiences

When designing for multi-channel experiences it is crucial to utilize many methodologies in the early stages of the design process in order to fully grasp the complexity of the design scope and understand the many people, activities and constraints involved.

It is valuable to use a variety of techniques to map out the different points of view such as the customer and employee journeys throughout a service experience. Mapping, shadowing, and ethnography can be used to understand and experience the customer and employee journey, in the way they would. In addition to other techniques storytelling can be used to support these multifaceted experiences on various levels.

Stories can display the customer or employee's step-by-step journey through a service experience through concise narrative. They can be short and detailed and communicate the different conversations involved in a service. They can be manifested with quotes from the customers and employees and can clearly highlight problems, opportunities and what is most valuable in a service.

Service experiences are about relationships and dialogues between customers, employees and other stakeholders involved. These relationships and dialogues can only become evident through narrations. "Services are heterogeneous, meaning that they are hard to standardize and that they are variable in performance, due to their dependence on human judgment and interaction" (Segelstrom and Holmlid, 2009). Stories showcase the codependence of service production and

consumption, as "a service is not pre-produced and sold off-the-shelf, and [its] value is co-created in the service experience by the producer and the consumer" (Segelstrom and Holmlid, 2009). Storytelling promotes ease of design knowledge transfer through an informal dialogue, which can be accessed by everyone involved in the experience.

Designers have the task of designing the "overall experience, as well as [the] constituent parts" of a service. The service is a constantly evolving experience "mediated by people and technology, and […] made manifest through a variety of messages, products, performances, and processes co- produced by client(s) and service personnel" (Holmlid and Evenson, 2007). Narratives reveal the different experience of all key players involved in the design situation. Comparative stories can be used in conjunction to display other perspectives. These stories are rich with details and represent the enactive and depictive nature of the service process. Service experiences are not physical objects, they are mostly intangible; most of them cannot be touched or felt before they are experienced. The multi-layered nature of stories supports the tangible and intangible (activity and process) parts of the service experience.

Designers, with these stories, are able to immerse and participate in their users' world, grasp and touch it and not just view it from a distance. These stories can use anecdotes and data from the research and help designers experience an idea from the inside, not just as a collection of facts; they become the "voice of the user". ."(Pruitt and Adlin, 2006).

Design is a social process and involves many players. Storytelling allows designers to quickly and clearly communicate their area of focus to other members of the design team and external stakeholders. These stories promote collaboration and innovation by engaging and involving people of different backgrounds and expertise - from customer to employee - in the design process. In his article "Design as Storytelling", Tom Erickson (1996) defines a good story as one in which "people have been engaged, drawn into discussion of ideas about which - before the story - they would have had nothing to say." These stories allow the key players involved in the service experience

to understand, explore new ideas and possibilities and instigate their point of view about the proposed design concepts. Through these stories the designer creates a vision of their user's world and invites others to enter it" (Pruitt and Adlin, 2006).

Summary

Through contextual research designers understand the setting of their story, through observation they get a sense of what their character does or says, through different dialogues with the users they have a better understanding of their character's thoughts and feelings and their relationships to other characters, and through the stories' conflict they identify design opportunities.

The multilayered nature of storytelling enables designers to take a holistic approach to understanding and clarifying the fuzzy front end. Narrative enables designers to realize many conversations, attend to different voices and immerse themselves in different experiences. This allows them to view the complexity of the design situation from the point of view of different stakeholders, thus helping designers to uncover and prioritize a range of design factors to focus on, such as, emotional, physical and social.

Storytelling facilitates communication amongst all the stakeholders involved. This knowledge-sharing tool can confirm designers' understanding of users' experience through an informal dialogue. Stories also encourage collaboration by engaging everyone in the design team to learn, discover details, question and compare different vocalized experiences.

Case Study

BC Children's Hospital Study

I conducted a case study with a third and forth year Emily Carr University Interaction Design class (INDD 316/416) involved in a service design project for the BC Children's Hospital (BCCH). This study involved 14 interaction design students investigating the application of the radio frequency identification technology (RFID) patient tracking system to enhance the patients' and hospital staff's experience in the ER. The goal of this study was to validate the potential value of visual storytelling techniques suggested through my theoretical design research.

Figure 6. Storytelling Workshop 1 (Photo by author, ECUAD 2009)

My study took place in four different phases in the front-end of the design process undertaken by the students in an 8-week course. My data collection methods included observations, multiple workshops and a feedback session.

During phase 1 of this study, I engaged the students in creating visual stories (storyboards) of the patient's journeys within the ER department based on their exposure to the tour of the ER department. These storyboards were to showcase the step-by-step process of patients through admission, diagnosis and release within the ER department.

Through a workshop, the students described their storyboards and engaged other students by discussing the details of their scenarios (see Figure 6). These storyboards were detailed and represented different points of view: children's, parents and staff's. After the students described their stories, I asked the students to mark the gaps and holes in their stories with a different colored post-it note, marking the areas that were ambiguous and required more information to better understand the process (see Figure 7).

Figure 7. Marked-up storyboards during workshop 1 (Photo by author, ECUAD 2009)

The different colors represented the unknown information from different perspectives and were marked mostly with questions such as what happens if people leave the ER without telling anyone? Or what happens if a child walks into the ER department without a guardian? These marked questions from different perspectives became the bases for the interview questions for patients and hospital staff and allowed the students to recognize reoccurring patterns, which made it easy to identify the unknown parts of the Emergency Department journey.

During phase 2, through a set of structured questions produced collectively amongst the class, the students

conducted interviews with parents and children. This series of questions aimed to discover new information about the patient's experience within the ER department at the BCCH.

The second set of storyboards was produced based on the new knowledge gained from the interview sessions. These storyboards were done from the child and parent's points of view and displayed their detailed experiences and emotion. These stories were also shown to the interviewee to validate the designer's understanding and vision of their journey.

The second set of storyboards was produced based on the new knowledge gained from the interview sessions (see Figure 8). These storyboards were done from the child and parent's points of view and displayed their detailed experiences and emotion. These stories were also shown to the interviewee to validate the designer's understanding and vision of their journey.

Figure 8. Storytelling Workshop 2 (Photo by author, ECUAD 2009)

During *phase 3*, the students conducted interviews with the hospital staff including a Triage Nurse and Doctor through a structured and uniform questionnaire produced collectively by members of the class. Another set of storyboards was produced to showcase the point of view of hospital staff and their experience in the ER.

During phase 4, each student pinned their three sets of storyboards on the wall and through a feedback session, explained their process of understanding in developing each storyboard. Through comparison each student was able to identify their increased awareness of the service experience and its effect of different key players involved.

The analysis of this study included pattern recognition of students' increased knowledge and awareness of different user perspectives through the sequential set of visual stories produced. A feedback session was also held at the final phase of this study to gather insights from students about their experience with the methodical use of visual stories in the front-end of their design process.

Feedback from the Study Participants

The findings from the study confirm some of the advantages of the visual storytelling method determined in my research. In capturing the current design situation through the first set of stories, the students were able to easily and quickly recognize the gaps in their knowledge and identify patterns of the areas with missing information such as the admission process within the ER. The different colors also made it clear who they needed to approach to gather more insight. As one of the participating students noted "gathering information is one of the most important abilities of a designer and the interviews and storyboards helped me to improve this ability" (Andreas Stroebel). These patterns became the basis for prioritization and framing of their interview questions and how they approached their interview sessions to help them discover the unknown.

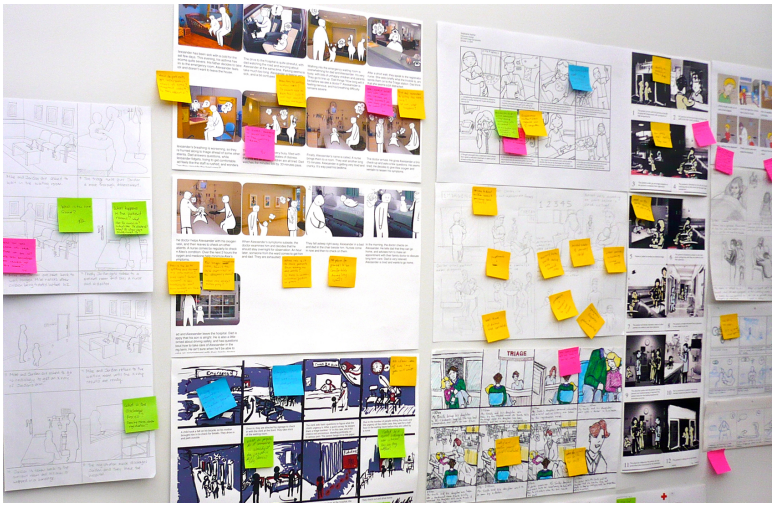

Figure 9. Marked-up storyboards during workshop 1 (Photo by author, ECUAD 2009)

Having their story and its missing details in mind helped them to think about the ER experience as a story in a comprehensive way. This allowed the students to tailor the interview questions accordingly and to gather specific details about everyone's experiences to formulate a richer and more complete story for the second and third storyboards. Students noticed that the process "helped [them] to evaluate [any] preconceived notions about the hospital experience, [and gather information through speaking] to friends and family informally about their visits to the emergency room" (Rachel Simpson).

> "The first storyboard acted as an anchor to compare later iterations against. That is, my team storyboarded our pre-conceptions about the hospital environment only to later discover that there are some distinct differences in addition to the similarities between our notions and actual fact. This exercise helped to organize our thoughts on design opportunities" (Ryan Nussbacher).

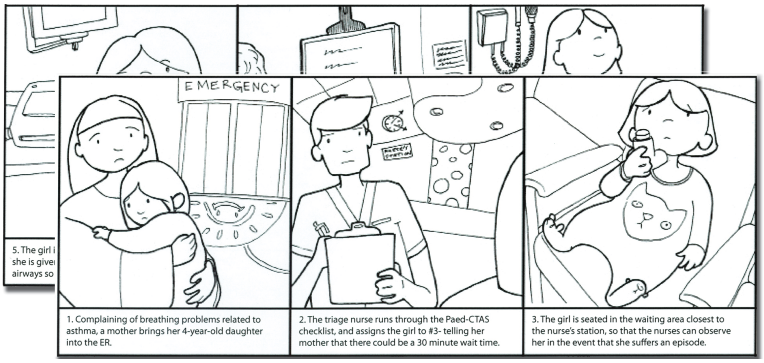

Figure 10. Storyboard 2: child's perspective (Stephanie Vacher, ECUAD 2009)

The second and third stories were very detailed and more sympathetic as they were informed by specific interview questions identified during the first storyboard workshop session and allowed the designers to understand the Emergency Room Experience more in depth and from different perspectives. They were very insightful as they revealed specific information about personal experiences that otherwise could have been overlooked. For example one of the students' storyboard captured a shot of a parent driving their child to a hospital (see Figure 11), which provoked a dialogue about parking at the hospital, prompting a discussion of parents' distress while driving their kids to the ER where finding parking is often an issue. It was great to see discussions happening over secondary details that were missing from the first set of stories and had the potential of producing a big impact on someone's experience.

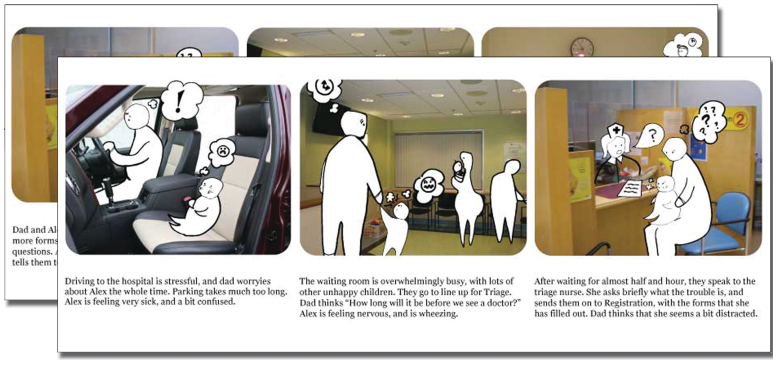

Figure 11. Storyboard 2: parent's perspective (Rachel Simpson, ECUAD 2009)

Students commented that their second storyboards "were more humanistic than the first after conducting the patient interview by highlighting and capturing the emotional responses of children during the ER experience. The second was more comprehensive, detailed [and] from a patient's perspective" (Andrew Sui). This process allowed their "understanding of the ER experience [to become] more complete and more in depth" (Caylee Raber).

The storyboard exercise supported the iterative design process. The second and third storyboards acted as a validation tool to the first story crafted. Through this comparison, the students were able to recognize the growth of their knowledge, confirm their understanding and evaluate their preconceived notions. For instance, through patient's stories the students identified the lack of toys in the waiting area, which was not only less inviting and accommodating to children but also a concern for parents waiting long hours in the ER and unable to engage their kids. Through hospital staff stories they discovered that the toys were eliminated from the waiting area due to the spread of germs.

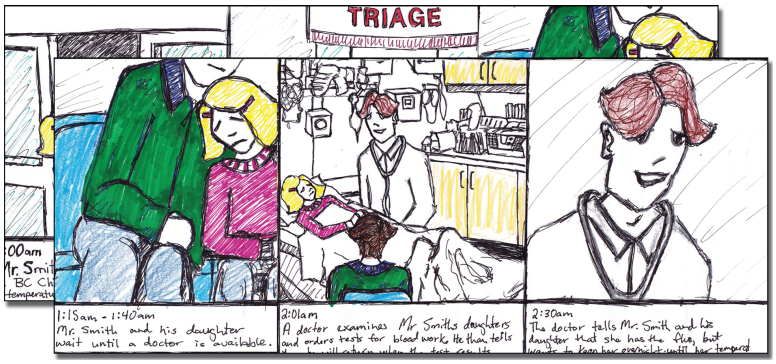

Figure 12. Storyboard 3: doctor's perspective (Stephanie MaCarty, ECUAD 2009)

> "The second set has a more clear delineation of the overall hospital timeline and process. Because I had a more complete understanding, I was able to include key details, which were relevant to my project. Dealing with the patient and the staff's relationship with the data flow within the hospital were important, so having an understanding of

patient reactions to staff dealing with their (the patients') information was essential" (Rachel Simpson).

The comparison between the second and third storyboards also allowed the students to step back and recognize the reoccurring patterns within their three sets of storyboards as well as other students' work, which verified their problem identification and optimized their design decision-making. The organized and visual structure of the storyboards made it easier for the students to quickly recognize the reoccurring problems experienced through different stories and points of view. For instance, the students discovered that patients are typically unaware of wait times at the ER, which adds to their distress, and some get agitated and leave without informing the staff. Students were able to identify the same problem from the hospital staff point of view, as they were unable to keep track of everyone in the waiting area and often reported missing patients without knowing the reason for their disappearance. The patients had either left the ER due to long waits or wondered off to different parts of the hospital.

The creation of the storyboards slowed the students' design process and they were able to pay closer attention to details by revisiting their gathered information and understanding the ER experience more thoughtfully through different points of view. Through the visual interpretation and translation of raw data into a narrative, they paid more attention to details and became more immersed in the experiences of their users. The slower pace of the process allowed the students the time to reflect on their stories, share, compare different experiences and contemplate identified problems.

"I was initially more concerned about improving efficiency and processes after the first storyboard but the second storyboard was more a sympathetic look at what patients go through. It also helped fill little details and gaps that I would have never considered and note minor changes that could significantly change the experience of a patient/parent visiting the hospital" (Andrew Siu).

Through the storyboard workshop the students were able to see each other's visualization techniques and perspectives. The workshop allowed them to view their team member's understanding of their design situation and translation of gathered data through their choice of visual language. They recognized which stories presented and communicated the user's voice and experience effectively and were most easy to relate to. This provided them with an opportunity to learn from one another and improve their storyboarding skills and make them stronger.

> "Getting several patient perspectives from the other designers helped diverge my thinking about different user experiences. It was helpful to note consistent issues among all patient experiences and interesting to see how each one differed. This helped prioritize what needs we had to focus on more. Seeing what went well in each of the scenarios also helped note what should be left unchanged in our design proposals" (Andrew Siu)

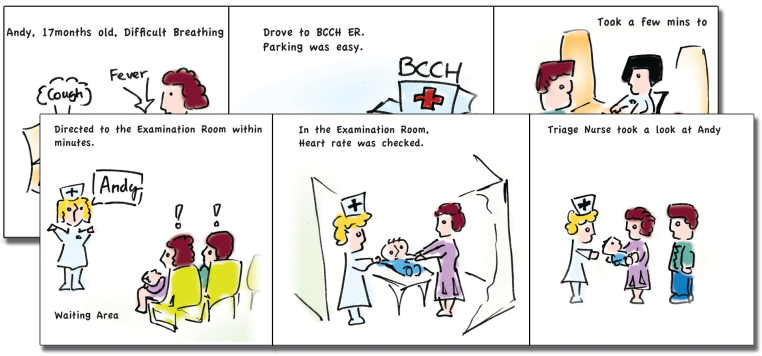

Figure 13. Storyboard 2: parents' and child's perspective (Jacky Ling, ECUAD 2009)

The design students involved in the study were able to visualize their gathered raw data from observational studies, user research and interview sessions through these storyboards. The translation of data through visual narratives allowed designers to clearly and quickly communicate their findings through the voice of their users. The designers were also able to verify the accuracy of the stories by showing these storyboards

to the users themselves, which allowed users to become more involved and facilitated an event for further knowledge sharing and collaboration. After interviewing a parent, one of the students' visual stories displayed how that parent had used Google Map to write down the directions to the BCCH. After showing this story back to them, the father quickly recognized missing information and added that he first used Google to check the symptoms that his son was experiencing to see if it was an emergency but was overwhelmed with the amount of information. He then checked the BCCH website to find directions and map but did not succeed. This exercise allows the designer to not only validate their understanding but also become aware of minor details that they could have missed through an interview session alone.

> "The storyboard is a good way to summarize the information gathered through an interview. It is a good tool to clarify your understanding...and could be shown to the interviewee to clarify that you have the correct vision or understanding of their journey. The storyboard is also very helpful when working on a group project because it helps to ensure that both partners are on the same page" (Caylee Raber).

The visual storytelling method supports the complexity of experience design. These stories displayed the integrated relationships and dialogues between all key players involved such as children, parents, doctors, nurses and other hospital staff. The stories also acted as a collaboration tool amongst the design students. They were able to discuss and share their stories with each other and walkthrough and understand the different experiences and emotions of the characters that were displayed visually. The stories facilitated social engagement in their design process as it provoked the element of play by inviting everyone involved in the design project to discover, comment and question.

Figure 14. Storytelling Workshop 3 (Photo by author, ECUAD 2009)

In sharing their storyboards in the workshop, the students were able to view others' understanding and visualization of the same situation (see Figure 14). Storyboards encouraged dialogue amongst the class and lead to new understanding and discoveries. Through these stories the students' mental models became obvious and thus more accessible by the members of their team and other students.

> "I think the most helpful thing that came from the storyboard was actually looking at other people's storyboards. Through the storyboard, conversations were made much easier to understand and thus we were able to have many different points of view."(Andrew Chow)

The application of this method also facilitated communication with non-designers, hospital staff and other stakeholders involved in the project. It helped the students to justify their design decision-making and showcase their design process via visual language, acting as a strong communication tool to share information with others. For instance, some students included these visual stories in their final presentation to the hospital stakeholders to showcase their research and to justify their reasoning for their proposed design solutions.

"The visualization of the process is what makes it evident and concrete- it's especially important in communicating the design development to those who haven't been involved" (Rachel Simpson).

Summary

Throughout the case study it became evident that there was a significant opportunity to leverage both the visualization and storytelling techniques familiar to designers to more effectively document and validate user research in the early stages of the design process.

The methodical approach to developing a sequential set of storyboards that evolved through the study process demonstrates the potential to enhance design decision-making, as it provided the design students with an accessible and overarching view that enabled their identification and recognition of design opportunities. These storyboards acted as early models for understanding, and allowed designers to prioritize their decisions as they framed problems and explored possible solutions based on patient and hospital staff experiences and points of view through visualization and validation of their research.

The case study made apparent the lack of literature available to provide guidance and instruction to designers on how to construct and adapt storyboards to effectively and accurately portray user experiences during the early stages of the design process. The majority of students involved in the study were unsure about how to successfully and clearly document and communicate their findings through visual stories.

The Visual Storytelling Method

The Need for New Methods

The design review section of my research identifies opportunities for designers to adopt new methods within the early phases of the design process:

- To better analyze complex design problems through synthesizing and validating research data to understand multiple perspectives.

- To document their decision-making process and communicate their design thinking.

- To practice a more holistic approach in assessing multi-faceted design situations.

Opportunities to Leverage Visualization Techniques

Based on my exploration of various visualization tools used throughout the design process to support designers' understanding, it is apparent that designers can leverage their visualization skills and sketching in the early phases of the design process:

- As visualization is a natural extension to designers' abilities, it allows designers to quickly translate qualitative research data visually to easily recognize and prioritize design problems.

- Visualization acts as a common language accessible by all stakeholders involved in the design project.

- Visualizations also support the iterative nature of the design process as they can be carried through the different stages of the process and be built upon by adding new knowledge and understanding. They become "thematic systems" for designers to use in

each phase to share and document their thinking and process (Schön, 1988).

Opportunities to Leverage Storytelling

My examination of the role of narrative in design evidences that storytelling enhances designers' understanding in the front-end of the design process:

- Storytelling creates empathy for designers, as they are able to immerse and participate in the world of their users and experience situations from their point of view.

- Narratives support the multi-layered nature of experiences, such as the integrated relationships and various conversations involved within a design context.

- Storytelling facilitates knowledge sharing through an informal dialogue understood and accessed by all.

- Storytelling promotes collaboration by engaging everyone involved in the design project to learn, discover and question

Results from Case Study

The BCCH study verified some of the values of the visual storytelling method in the early stages of the design process.

- Methodical use of visual storytelling acted as validation for design students understanding of patients and hospital staff experiences by assisting them to translate and interpret their observational research and user interviews through visualization and narrative. These visual stories facilitated a dialogue with the users themselves as they were able to view these storyboards and confirm the accuracy of the design students' view.

- The use of visual stories in the early stages of the design provided design students with an overarching view that enabled them to easily recognize gaps in knowledge, misconceptions, and areas that could potentially benefit from design opportunities. The reoccurring patterns within the various storyboards presented from different perspectives optimized their decision making process by helping them prioritize identified design problems.

- These visual stories made accessible the different perspectives involved when designing for service experiences. The students became more aware of the complex nature of experience design and were able to think more holistically and view challenges through different points of view and expectations.

- The visual storytelling method encouraged collaboration amongst the students. They were able to discuss and walkthrough the different experiences and emotions visually displayed. These stories invited everyone to comment and question and also acted as a shared understanding between design students working and focusing on the same areas of the design project.

- This study also revealed the lack of literature available to instruct the students on how to effectively capture user experiences through visual stories.

Conclusion

Concluding Comments

My investigations and research suggest that the visual storytelling method offers significant value in the ambiguous front-end of the design process as it:

- Enables designers to synthesize and communicate research data visually and through the experience and point of view of users.

- Acts as a common language between all stakeholders involved and can be validated by the users themselves.

- Enhances problem identification and optimizes design decision-making, by allowing designers to quickly recognize patterns of reoccurring issues and prioritize problems through different perspectives.

- Supports integrative thinking as it reveals different points of view.

- Facilitates holistic design by allowing designers to step back and have a broader view of the design context and better understand their users' interactions and relationship with other people, products, and places over time. They are able to see how their design not only affects just a detail but a whole system, thus helping designers to create optimal experiences.

- Promotes communication and collaboration and active participation of all the stakeholders involved in the design project.

"Stories are more than scenarios, they are what I call a detailed synthesis of all the project instances, from the users' needs and expectations, to the client's requests and the designer's point of view. The stories can now be used as

> a roadmap for brainstorming and designing new ideas and solutions. Each element of the story represents a crucial or problematic element of the project. Designers can go through each element identifying possible solutions that can later become design principles useful for the whole process" (Zamarato, 2008).

The following are detailed answers to the research questions I set to explore through my thesis.

How can the visual storytelling methods used in early phases of the design process help designers validate their research data by presenting the research data in a way that can be quickly and clearly communicated to all stakeholders involved in designing experiences?

The methodical use of visual stories in the early stages of the design process helps designers to replace the written synthesis of their contextual research, such as interview sessions, with the visualization and stories of the people they are designing for.

These visual stories can be quickly accessed by all stakeholders involved in the design project and can be shown to the users to validate a designer's understanding.

While viewing the stories users can confirm designers' vision, point out any misconceptions and gaps in knowledge, reflect on their experience and provide designers with more detailed insights. The visual storytelling method in the early stage of design process incorporates the importance of participation and collaboration of the people whose experience is being captured.

How can the visual storytelling methods used in early phases of the design process help designers to understand the complex scope of design problems, identify design opportunities and optimize design decision-making?

As the scope of design is changing by including many perspectives and addressing social and business challenges, it is necessary for designers to adopt new methods to improve their understanding in this complex context. The visual storytelling approach provides designers with an accurate and tangible framework that facilitates their integrative thinking and awareness of multiple user communities.

Documenting and communicating research data through numerous visual stories from different perspectives enables designers to quickly distinguish problematic issues and prioritize design opportunities based on different points of view.

How can visual storytelling methods help designers to visualize, express and choreograph better experiences that include multiple perspectives?

By constructing these stories, designers are able to think holistically. They have a better understanding of all interactions via a range of touch-points over time displayed through the journey of multiple perspectives involved. This provides designers with an overview of the design situation and enables them to easily track the effect of their proposed design solution through the various stories presented. These visual stories support the multi-faceted nature of design thinking, thus helping designers to visualize, create and choreograph better experiences. Visual storytelling is an activity that supports human and social interaction in designing for an experience.

Future Directions

As a result of my research and study I am planning and have begun to create a 'How to Guide'. This publication will serve as a learning tool for other designers to help them more effectively construct and adapt the visual storytelling method in their design process through a series of recommendations. This guide is to be used as a workbook for designers as they can contribute to

these elements through their own experience of constructing visual stories. My goal is for this guidebook to become a constantly evolving document updated by fellow designers. The guidebook will not serve as a set of rules, but rather a collection of useful tips, which can be contributed to through different experiences with the application of the visual storytelling method. Essentially, it is to act as a collaborative effort that can be shared amongst designers.

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