

a (x 4): a user-centered method for designing experience

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Perhaps these possibilities seem too good to be true - a slightly unreal world that we are unlikely ever to live in . . . The question is not that such futures are difficult to achieve; it is whether designers are prepared to use scenario-building strategies to help them envisage such futures and then go on to design for them.

Bill Moggridge (1993)

This article describes the on-going development of a new research and design method called *a (x 4)*. As reported elsewhere (Rothstein 2000), *a (x 4)* was conceived to provide designers and educators with a tool to develop design scenarios about user experience.

The purpose and basic structure of *a (x 4)* has not changed. However, development of the method has significantly deepened and expanded, particularly in the following areas:

- understanding how *a (x 4)* supports the shift in contemporary business from the marketing of individual products and services to the marketing of unique user experiences.
- understanding the relationship of *a (x 4)* to methods found in the social sciences, business and design.
- understanding more fully how *a (x 4)* can be applied in the scenario-building process (from exploratory field research to the final fabrication of scenarios and stories).

In addition, the effectiveness of *a (x 4)* has been evaluated by studying a group of undergraduate students enrolled in a special-topic course dealing with the design of user experience. The students' observations and experiences have greatly added to understanding how and why *a (x 4)* and the design of experience are useful in contemporary design education.

PART ONE

The Importance of Experience Design

A New Economic Offering

One of the most significant developments in contemporary business and design is the growing recognition that the design of user experience can and should precede the design of products and services. There are, no doubt, a variety of factors fueling this development, including: the dematerialization of human/artifact interaction (made possible by digital technologies and internet-based communication channels) and the emergence of a genuinely global marketplace and new economy (Nussbaum 1999, 17).

However, the factor most directly impacting the shift from artifacts to experience is *commoditization*. As noted elsewhere (Hirasuna, O’Leary, and Lawrence 2000), the battle over quality in the product and service arenas has largely been fought and won. Though still not universally achieved, quality has nonetheless become a common expectation among consumer groups and is, in fact, often times delivered. The result is that quality now characterizes a large number of product and services categories making it difficult, if not impossible, to significantly differentiate between offerings. With the elimination of quality as a differentiating factor, companies are often left with cost as the sole means to compete with one another. This, of course, is the origin of “price wars.”

According to some, however, the commoditization of products and services should not be regarded as a limitation to succeed in a market economy. Joseph Pine and James Gilmore (1999), authors of *The Experience Economy*, note that commoditization occurs with all types of economic offerings (i.e., commodities, products and services) and that it is part of an “evolutionary” process which they refer to as “the Progression of Economic Value” (Pine and Gilmore 1999, 22). In fact, they argue that the commoditization of product and service offerings has opened the door to the emergence of a new, distinct economic offering - namely, experience. This offering focuses on engaging individual consumers in unique, personal and memorable ways (Pine and Gilmore 1999, 3). Citing a variety of examples (e.g., the Disney phenomenon, the contemporary “coffee experience,” and staged birthday parties), Pine and Gilmore assert that the design of experience has become a major part of the new economy and a significant source of economic value. Their argument can be summed up as follows:

Experience represents an existing but previously unarticulated genre of economic output. Decoupling experiences from services in accounting for what businesses create opens up possibilities for extraordinary economic expansion - just as recognizing services as a distinct and legitimate offering led to a vibrant economic foundation in the face of a declining industrial base” (Pine and Gilmore, p. x).

Even in the design professions, where one might expect a rebellion against the devaluation of designing artifacts, there is a growing recognition that the design of experience is a major challenge in the twenty-first century. In the inaugural issue of *Gain: AIGA Journal of Design for the Networked Economy*, the AIGA (American Institute of Graphic Arts) contends that the design of experience is, in fact, emerging as a new design discipline.

Experience design is a discipline created by the reality of communication today, when no point of contact has a simple beginning and end and all points of contact must have meaning embedded in them . . . Each of the professional disciplines included in this practice was once considered a discrete competency. Now they are all involved in designing a customer experience through the use of cross-disciplinary teams. These professions need to use a range of skills that stretch the preconceptions of “design”: user research and marketing, behavioral sciences, creative process diagramming, information

and interaction design and story-telling. One cannot underestimate the importance of this final skill, since experience is about a journey occurring over time.” . . . ” (Greffe, 2001).

Industrial design has also been steadily recognizing the importance of designing experience. During the past ten years, articles and essays have been appearing regularly in the IDSA's (Industrial Designers Society of America) *Innovation* magazine relating to issues and topics closely linked to the design of user experience. The 1996 summer edition, for example, focused on the emergence of anthropology as a valuable tool to study daily experience from a user's point of view. That was followed a year later (in fall 1997) with an edition devoted to the role of design scenarios in helping development teams explore and communicate a user's experience with new products and services. Based on these examples, it seems clear that the industrial design community is fully aware of the emergence of user experience as a critical design challenge for educators and practitioners in the twenty-first century.

New Approaches and Methods

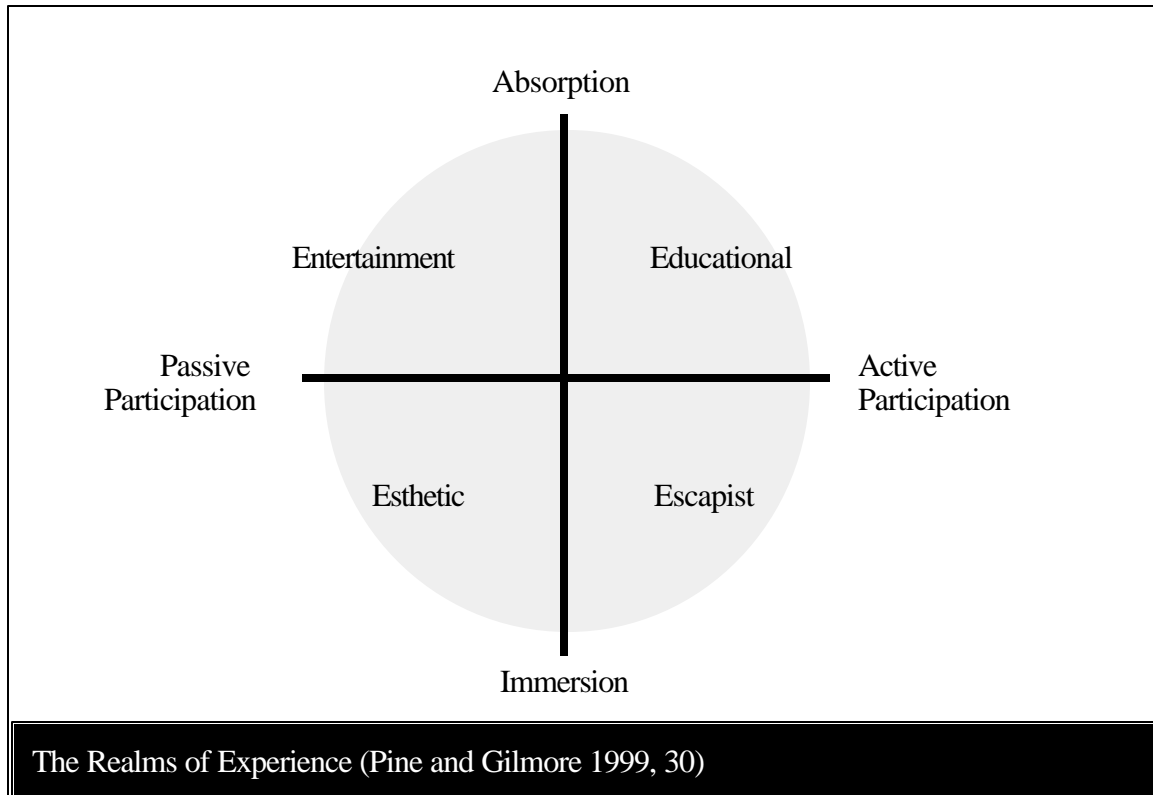
There is a growing awareness of the value of designing experience in all of the major disciplines related to new product and service development. Business, design and other related fields (i.e., human factors) have come to understand that a careful consideration of user experience should precede the design of specific products or services. This compels development teams to explore and specify the *effects* that a new product or service is intended to create prior to considering the actual design of artifacts. This shift in emphasis - from artifacts to experience - ushers in a fresh way of thinking about the value and purpose of design while also creating opportunities for the development of entirely new design/development methods and processes.

But how can something as elusive as experience be designed? Fortunately, a fairly large and diverse variety of groups and individuals have been exploring answers to this basic question for the past couple of years. The following examples, drawn from business, design and human factors literature, represent some of the answers.

Examples from Business

In *The Experience Economy*, Joseph Pine and James Gilmore present a compelling argument that the design of experience is increasingly determining success or failure in a large number of economic sectors. Some of these are fairly well-known, such as the theme parks designed and produced by Disney. Others, however, are less stereotypic. They note, for example, that the design of a user experience is a significant concern for leaders in the airline, computer and retail businesses. They note, for example, that Andrew Grove, Chairman of Intel, declared in 1996 that “We need to look at our business as more than simply the building and selling of personal computers. Our business is the delivery of information and lifelike interactive experiences” (Pine and Gilmore 1999, 6). They also reference comments and examples from British Airways, a variety of retail outlets and business-to-business ventures, each of which includes a noticeable emphasis on providing a memorable user experience as a core part of a business offering.

In their book, Pine and Gilmore present a strategy for designing experience along with a variety of key suggestions and recommendations. At the heart of their proposal is a framework called *The Realms of Experience* (Pine and Gilmore 1999, 27-43), which is used to help development teams create experiences that *engage* customers in memorable ways. Pine and Gilmore describe the framework with the following diagram:

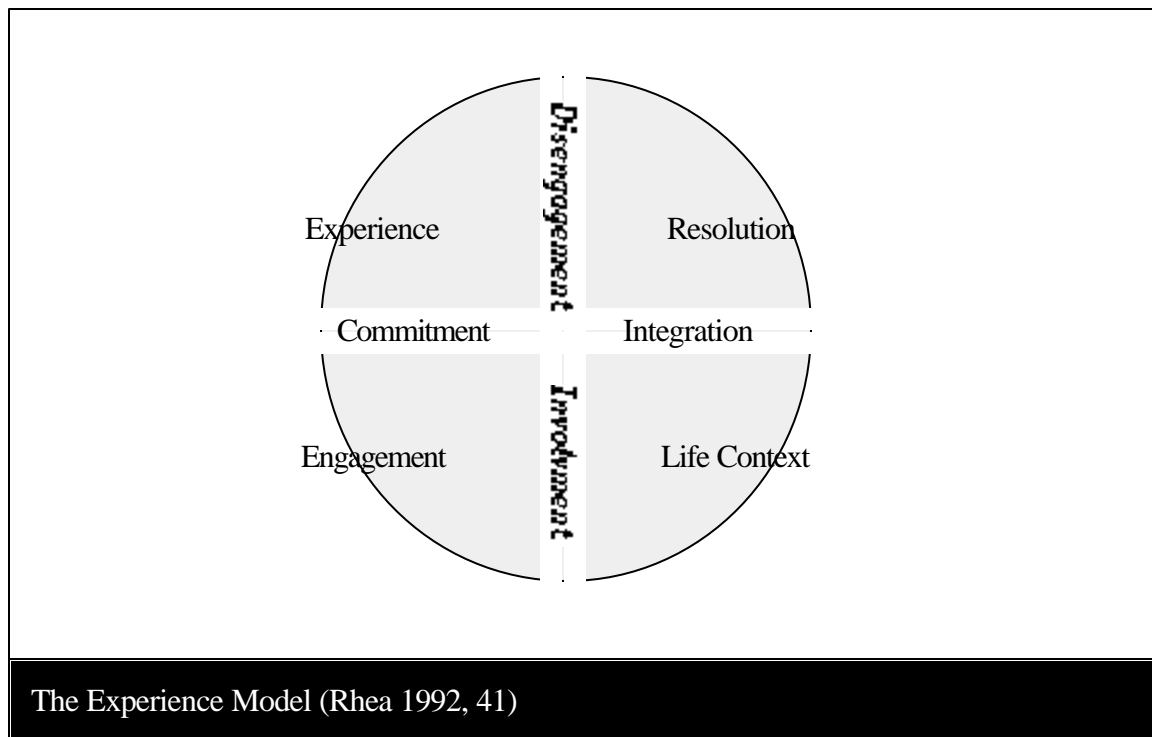


The key point for development groups to consider, according to Pine and Gilmore, is that engaging experiences often include parts from the entire framework. In other words, successful experiences are often a creative combination of education, entertainment and escapism, all of which is wrapped into a memorable aesthetic form. “The coupling of these dimensions,” Pine and Gilmore write, “defines the “four” realms of experience . . . mutually compatible domains that often commingle to form uniquely personal encounters” (Pine and Gilmore 1999, 31).

Other groups in business have also developed methods and processes for designing experience. John Cain (1998), for example, describes a process he and others developed at E-Lab called *Experience-Based Design (EBD)*. “The idea,” according to Cain, “is to make great design a more frequent and predictable outcome by rigorously understanding everyday use and experience, and to connect that understanding to the business goals that companies have in making products and services” (Cain 1998, 11). The process involves studying, quantifying and, ultimately, integrating criteria from a business point-of-view with the everyday life experiences

of users or customers. Cain asserts that EBD enables practitioners to shape business goals and, eventually, design concepts based on “an understanding of what happens to those products and services once they are handed over to real people” (Cain 1998, 12). Like Pine and Gilmore, Cain emphasizes the critical importance of shaping businesses, products and services according to the experiences user’s expect or demand in their everyday lives.

Darrel Rhea, president of Cheskin + Masten and author of “A New Perspective on Design: Focusing on Customer Experience” (1992), describes another specific process for designing experience. Arguing that organizations need to “shift their focus from designing products to designing a cycle of customer experiences (Rhea 1992, 40), Rhea describes a model he uses to develop customer-centered design solutions emphasizing a successful experience with a new product or service. As shown below, “The Design Experience Model” is comprised of four stages that interact dynamically and which, Rhea asserts, must be considered carefully in the design process. As the model suggests, Rhea contends that user experience is more than direct interaction with a product or service. Equally important, it includes a “Life Context” component, some type of engagement and a resolution to the experience.



The importance of these, and other examples in business literature (Ireland and Johnson 1995), cannot be underestimated. At the very least, the literature suggests three important points:

- that the traditional economy comprised of discrete products and services, and often developed in isolation of a deep understanding of user’s everyday experience, is rapidly being replaced by an emerging user-centered experience economy.

- that the design and delivery of user experience is increasingly a source of economic value and competitiveness in a global marketplace.
- that there is a need for developing detailed frameworks, models or processes for designing successful user experiences.

Examples from Design and Ergonomics

In design and human factors, there has also been considerable work conducted to define methods for exploring user experience. Interestingly, scenario-building or storytelling has emerged as one of the most common methods designers and human factors specialists use to investigate this topic. This should not be surprising. Storytelling has, in fact, been a part of design and human factors for many years. Industrial designers, for example, have traditionally used storytelling as a core part of their development process by imagining users or consumers interacting with a new concept or idea.

The prevalence of scenario-building in industrial design is evidenced in an interesting study conducted by Gulay Hasdogan in 1991. Documented in an article titled “The Role of User Models in Product Design for Assessment of User Needs,” Hasdogan described a research project he conducted to study the working habits of design practitioners in England and Wales. He was particularly interested in identifying the models, methods and processes these practitioners employed to connect with the activities and needs of consumers or users. Hasdogan concluded that the most common method designers employed to make this connection was, in fact, the development of scenarios. “The results of the investigation,” Hasdogan writes, “indicated that, in contrast to the low employment of empirical models, most designers actually employed scenario-based models in their design process” (Hasdogan 1996, 32).

He identified two key reasons for this: first, scenarios help designers empathize with a user’s activities, needs and expectations; and, second, scenario-building enables a designer to visualize new and innovative concepts or ideas. With scenario-building, Hasdogan concludes, “the investigator can have a prospective approach and can imagine all sorts of events with many alternative interface ideas” (Hasdogan 1996, 31).

However, Hasdogan also noted that the way in which designers developed scenarios was often flawed and imperfect. Most designers, he discovered, created stories based on an intuitive approach in which the designer was often the main character. “It was usually done by a designer putting himself in somebody else’s situation and writing a story about how his design would be used” (Hasdogan 1996, 29). Though arguably effective, this instinctive approach lacks the rigor and reliability that typically characterizes a respected method or process. At the very least, it limits the ability to communicate with others, since the story may be highly personal and idiosyncratic and, therefore, not be entirely useful or convincing in the interdisciplinary context in which most contemporary product development occurs.

Examples from Industrial Design

Today, Hasdogan would likely revise his conclusions about the reliability and robustness of scenario-building as a method in design. This would be due to the fact that a variety of practitioners in design and ergonomics have developed storytelling into a well-articulated methodology. This was clearly demonstrated in 1997 when an entire edition of *Innovation* was devoted to expanding awareness about the importance and application of scenarios in contemporary industrial design. Bruce Hannah, guest editor, introduced the edition by focusing on the value of scenarios in connecting designers to users. He stressed that scenarios are valuable tools for discovering user-centered design solutions. "In the writing of stories," Hannah noted, "concepts and ideas seem to flourish. The scenario demands that designers think about what people actually need or want, by writing stories about what people do or might do. Scenarios inevitably make designers think about those elusive users" (Hannah 1997, 19)

The remaining articles in the edition highlight real-world examples of how designers and design groups are applying scenario-building to explore and define user experience. An analysis of all of the articles reveals an interesting development: namely, that designers are developing scenarios with a new sense of rigor and a greater appreciation for the potential of storytelling. Phillip Joe (1997), for example, author of "Stories for Success," describes how he and a group of interaction designers develop scenarios by coupling storytelling activities with field research and evaluation techniques borrowed from ergonomics and cognitive psychology. Kate Welker, Elizabeth Sanders and James Couch, authors of an article titled "To Understand the User," describe how scenario-building is one of the most effective tools designers and researchers can employ to provide holistic design solutions. They note that a well-researched and well-crafted scenario is ". . . the form of design representation with the most potential to tie together users, events and designed objects" (Couch, Sanders, Welker 1997, 26). These examples, and others included in the edition, strongly suggest that scenario-building in industrial design has matured and that it is being applied in a variety of ways to help designers and development groups visualize user experience.

Interestingly, as scenario-building matured in design, it was also attracting attention in other design-related fields, particularly ergonomics. A good example of this can be found in an article authored by Jane Fulton Suri and Matthew Marsh (2000) and titled "Scenario Building as an Ergonomics Method in Consumer Product Design." In it, Suri and Marsh present a clear rationale for why scenario-building is important in ergonomics along with a detailed description of their process for creating stories. Their method includes research, character development, identification of seminal activities and tasks, and scenario-building. It is a well-defined and robust method which stands in stark contrast to the highly internalized and loose method employed by the practitioners Hasdogan studied, and clearly demonstrates the degree of development that has occurred with scenario-building in the past decade.

Analysis - General Conclusions

The design of user experience has clearly emerged as a critical factor in business and design. A review of the literature relating to this topic strongly suggests that the design of user experience is, above all else, a challenge with significant economic implications. Pine and Gilmore argue persuasively that an “experience economy” has, in fact, already emerged and that the design of experience will increasingly be the measure by which many companies succeed or fail in an ever more complex global marketplace.

Individuals within the industrial design community, and other groups associated with design, have responded over the last decade by developing scenario-building. This method has proven to be highly effective in helping designers and development teams explore and specify user experience.

At this point in time, a variety of patterns and themes have emerged in regards to the relationship between scenario-building and experience design. Some of the most important of these are as follows.

1. Scenario-building: descriptive and prescriptive

Design, business and other groups are using the design of experience for a variety of reasons. In the broadest sense, design strategy consultants (like Sapient and Doblin Group) focus on user experience as a primary criteria for developing user-centered business goals and objectives. In a more narrow sense, design and ergonomic groups study experience as a means to visualize the key interaction that occurs when people interact with new products, services and environments. This qualitative difference should not be surprising, since the concerns of a business are almost always more complex and multidimensional than the issues facing those involved in the design of a discrete artifact.

In spite of this difference, the use of scenarios to visualize user experience is common in both design and business. The reason for this is that scenarios are highly effective in focusing development teams on how people’s everyday experiences can generate innovative strategies, concepts and ideas. In fact, the development of scenarios serve a dual purpose. On the hand, the field research scenario-builders conduct results in a rich description of real people, activities and artifacts. In this sense, scenario-building serves an important *descriptive* function. On the other hand, composing stories about the future engages development teams to contemplate and specify new concepts and ideas, no matter how broad or narrow the scope. Therefore, scenarios also serve an important *prescriptive* function. The combination of the two - description and prescription - explains why scenario-building is so useful in the design of experience and it is so widely applied in different disciplines and professions.

2. A Maturing Methodology Based on User-centered Research

During the last few decades, scenario-building has developed from a poorly defined activity to a more rigorous and defined methodology. Though still somewhat embryonic, there is clear evidence that a wide assortment of individuals and groups have developed storytelling into a

method that is as defined as other types of established exploratory approaches. Most of the scenario-building methods include a common set of activities. Interestingly, most start with a phase involving comprehensive research into people and their everyday lives. As illustrated by examples provided earlier in this article, along with other notable examples (Schwartz 1991), deeply understanding the “life context” of users is seen as a necessary initial step in the development of meaningful and exciting scenarios. In this regard, field research is identified as the foundation upon which to build scenarios and design experience. By conducting field research, designers and researchers “contextualize” the targeted users and learn key details about behavior patterns, cultural attitudes and values. Once armed with this information, it becomes easier to visualize and design future experiences that are consistent with the needs, wants and expectations of real people. In a sense, the proponents of scenario-building and experience design argue that visions of the future are best built upon knowledge of the past and present.

3. Relevant Benefits

In business and design, specific methods and approaches are employed only if they produce successful results. By all accounts, scenario-building has passed this “acid test.” It is widely employed because it is effective in assisting business groups in making strategic decisions and in helping design groups visualize innovative user-centered concepts.

Scenario-building also provides other key benefits to business and design groups:

(a) Scenario-building Encourages a Holistic Understanding

Individuals and groups involved in developing scenarios gain a holistic understanding of everyday experience. Their work results in alternative stories that involve a complex mix of people, motivations, activities, environments and artifacts. Being able to grasp and respond to this complexity is, of course, necessary in a complex economic environment where business strategy, branding, advanced technology, design and everyday experience are fully integrated. Equipped with a holistic understanding, development teams are better able to contend with the rich complexity that lies at the heart of many of today’s most interesting and significant business and design problems.

(b) Scenario-building Facilitates Interdisciplinary Interaction

One of the first challenges confronting interdisciplinary teams is to identify a common focus and a process for working together. With interdisciplinary teamwork as a norm in contemporary business and design, resolving these issues quickly and successfully is critical. Practitioners of scenario-building have found that constructing stories helps teams work together effectively in a number of important ways:

- scenario-building promotes equality among team members. Though some will likely possess special skills and knowledge (e.g., relating to research or visualization), all members will be

able to construct stories and, thus, contribute to the process. When managed properly, scenario-building establishes a sense of equality that facilitates productive interaction.

- scenario-building focuses an interdisciplinary team on exploring and resolving issues relating to users and their everyday experiences. By providing this common focus, scenario-building helps interdisciplinary development teams overcome the problems associated with competing ideas about the goals and purpose of a project.
- scenario-building is based on a defined process that involves readily understandable steps or phases. As such, individuals from different disciplines, who may or may not be familiar with one another, can begin working together quickly and with a minimum of debate regarding tasks, sequence and purpose.

(c) Scenario-building Enhances Communication

Effective communication is an on-going challenge for all disciplines involved in new product and service development. The issue is how best to translate research findings, analysis and conceptual solutions into a form that others can easily digest and remember. Though important, highly detailed reports, filled with statistical data and dry conclusions and recommendations, are of questionable value in today's hectic business and design environments. Scenarios have emerged as a form of communication that successfully addresses this challenge. It does so by translating data and information into a narrative, often accompanied by visual material. A narrative, of course, provides an audience with something they are accustomed to remembering - namely, stories about characters, activities and events. As Suri and Marsh note, “. . . scenarios convey . . . issues in a way which is engaging, digestible and compelling and that enables people to readily grasp subtle and complex points” (Suri and March 2000, 154).

3(d) Scenario-building Assists in Decision-making

As Peter Schwartz (1991) points out in *The Art of the Long View*, the ultimate purpose of scenario-building in business strategy projects is to help individuals and groups make informed and well-considered decisions. This is equally true with more narrowly focused projects, such as those commonly found in design. Scenarios are effective in the decision-making process because they present a range of alternatives in which the future might unfold, and because they focus on the ways in which a new strategy, product, service or environment will impact targeted users or consumers. Provided with well-crafted and well-researched scenarios, decision-makers in design can focus on what really matters - namely, how new conceptual solutions influence the everyday lives of users.

PART TWO

a (x 4) - a user-centered method for designing experience

Introduction

If observers like Pine and Gilmore are correct, the design of experience will increasingly become a primary challenge for companies and design groups in the twenty-first century. As suggested by the previous examples, a variety of groups and individuals, in both business and design, have responded to this challenge by developing approaches for designing user experience. The work in this area is still arguably embryonic, however. As such, there is still great opportunity for new methods to be conceived and articulated. The remainder of this article details a new approach that has been developed during the past few years at Arizona State University.

(Note: this article presents a summary of the current status of *a(x4)*. For background details and a complete description of the basic structure and purpose of *a(x4)*, see “The Challenge of Understanding and Designing User Experience” (Rothstein 2000).)

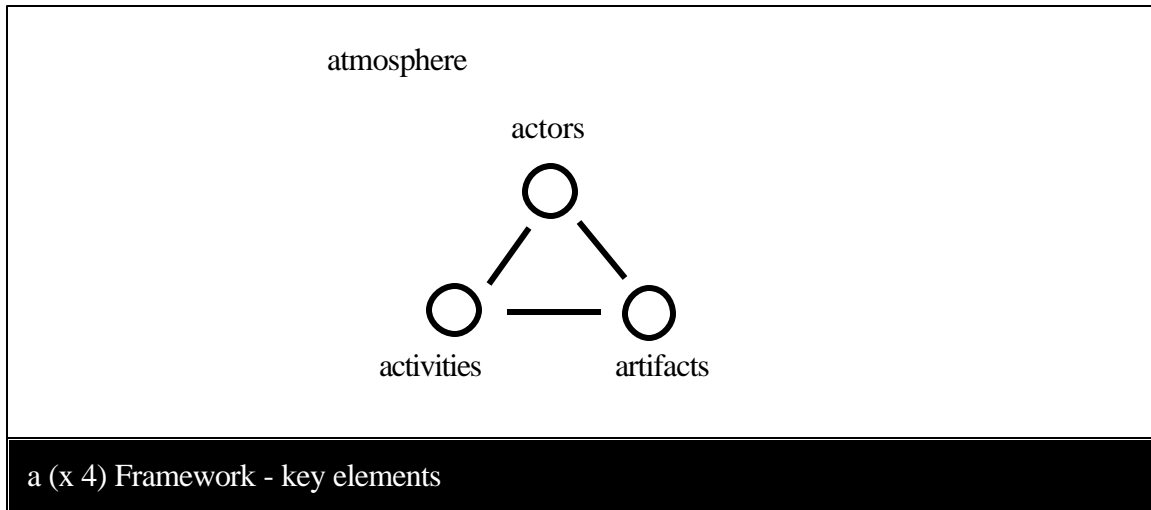
Definition of *a(x4)*

a(x4) is fundamentally a scenario-building tool. It is loosely based on a definition of scenario-building provided by Suri and Marsh:

By “scenario-building” we mean the development of a series of alternative fictional portrayals - stories - involving specific characters, events, products and environments, which allow us to explore product ideas or issues in the context of a realistic future” (Suri and Marsh 2000, 152).

Specifically, *a(x4)* is structured around the “. . . characters, events, products and environments” that Suri and Marsh refer to in their definition. This particular quartet of elements is, in fact, identified by other individuals (Hasdogan 1996) though often defined with other words. Christopher Ireland and Bonnie Johnson, for example, authors of “Exploring the Future in the Present,” define the quartet as “. . . people, places, things and processes” (Ireland and Johnson 1995, 59)

As shown below, *a(x4)* consists of a quartet that includes actors, activities, artifacts and atmosphere. It can be defined as: a multifunctional framework and method, based on the dynamic relationship between the key elements (actors, activities, artifacts and atmosphere) of an experience in a design context, and used for exploring, developing and communicating scenarios about user experience.

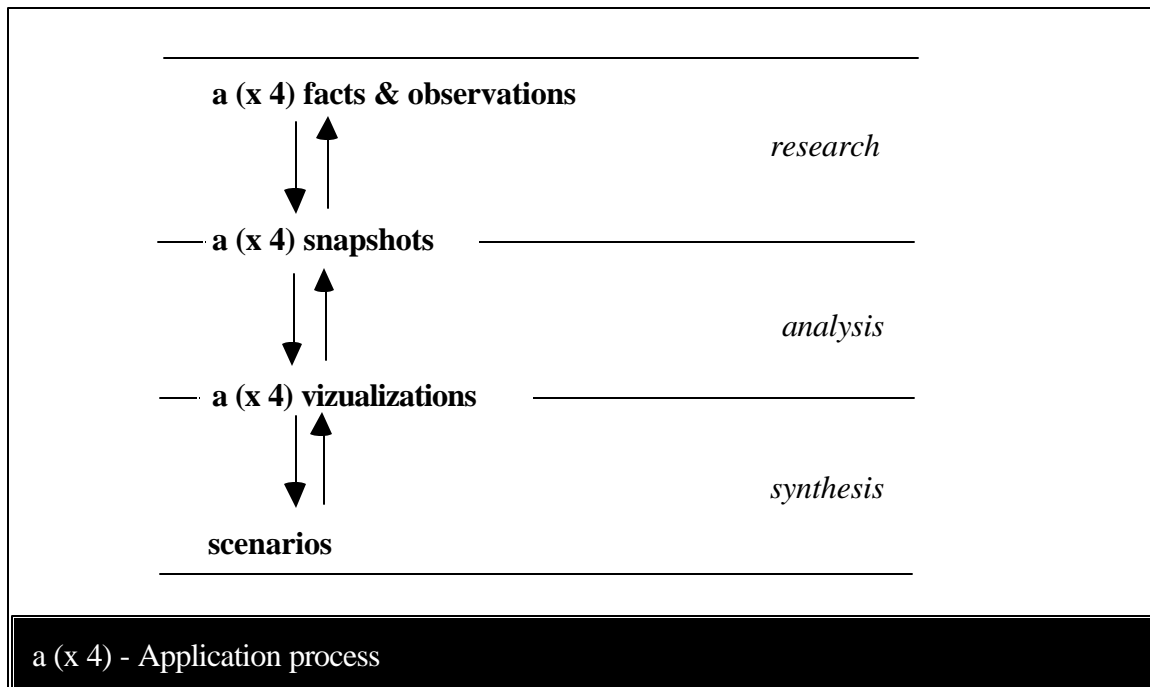


Origins of *a (x 4)*

a (x 4) is derived from coding schemes, which ethnographers and other qualitative researchers have developed to focus and organize research. Colin Robson (1993), author of *Real World Research*, notes that coding schemes “. . . contain predetermined categories for recording what is observed. They range from simply noting whether or not a particular behavior has occurred, to complex multi-category systems” (Robson 1993, 206). Coding schemes are, in fact, tools for a researcher to frame the focus of an inquiry according to a defined number of key categories. As noted, *a (x 4)* includes four categories or elements. By focusing on these four, designers and researchers can quickly “unpack” some of the complexities that animate everyday experiences with design.

Application Process

a (x 4) can be applied in a relatively linear fashion (though this can be modified according to the constraints of specific projects or assignments). The process includes four steps or phases, as illustrated by this diagram:

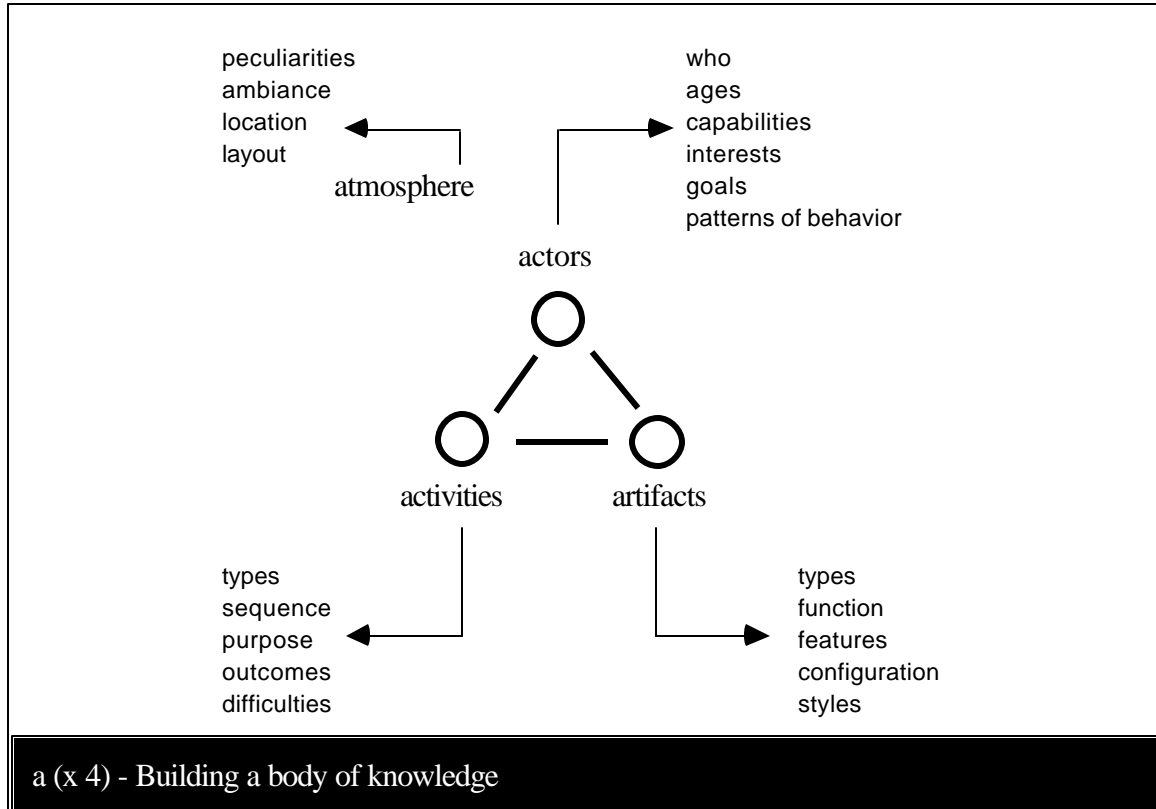


a (x 4) Facts and Observations

Acquiring information about users and their everyday lives is the first step. This activity, which can be complimented by more traditional forms of secondary research into trends, technology development, etc., is identified by almost all experts in the field as critical in the scenario development process (Suri and Marsh 2000; Moggridge 1993; Rhea 1992; Ireland and Johnson 1995; Couch, Sanders and Welker 1997). This is equally true whether the scenarios are part of a strategic planning initiative or whether they are prepared by ergonomists or designers for a more narrowly-focused design project. Peter Schwartz (1991), for example, always conducts research from the real world as a first step when developing strategic business scenarios. “Observations from the real world,” Schwartz writes, “must be built into the story. The only way they can emerge there is for the storyteller to sample evidence from the world before spinning the tale” (Schwartz 1991, 61). Suri and Marsh would likely agree. They note: “The process begins by identifying the range of users, goals, tasks and activities which need to be considered. Ideally this exercise is based upon detailed research of users in context interacting with products, and using methods such as user profiling, field observation, contextual inquiry, protocol analysis and interviews” (Suri and Marsh 2000, 152).

As a field research tool, *a (x 4)* helps a development team quickly gather and manage information about people and their everyday lives. In this regard, it is fundamentally a data collection and “learning tool.” It results in a highly useful body of knowledge (see below) about the users, activities and things that are relevant to a specific project. Managing this type of “messy” data, and making sense of it, is of course a significant challenge. Using *a (x 4)* helps a

development team meet this challenge because it focuses the team on the essential elements of human interaction with the designed world.



a (x 4) Facts and Observations - as shown, a (x 4) can generate a fairly comprehensive body of knowledge about existing user experiences.

a (x 4) Snapshots

Once a body of knowledge has been established, the next challenge is to make sense of the data. This typically involves applying analysis methods as a tool to identify the meaning that lies hidden in the data. *a (x 4) Snapshots* can be effective in this process. The snapshots involve organizing, summarizing and communicating essential information that has been learned about the four key elements. This can be communicated with text or visual illustrations constructed with a variety of media (e.g., photo/video, collages, hand drawn pictures, etc.). The following examples of *a (x 4) Snapshots* were developed as parts of larger groups of snapshots used to express information about actors. As shown, the examples were composed with different techniques and materials. Similar types of *Snapshots* should be developed for each of the elements of *a (x 4)*, resulting in a comprehensive set of snapshots that describe a high-level analysis of information about actors, activities, artifacts and atmosphere.



a (x 4) Snapshots - two Snapshots that communicate key information about users. Note the variety of materials and techniques used.



a (x 4) Snapshots - two types of users with descriptive names and characteristics noted.

a (x 4) Snapshots are effective in the analysis process in at least three ways:

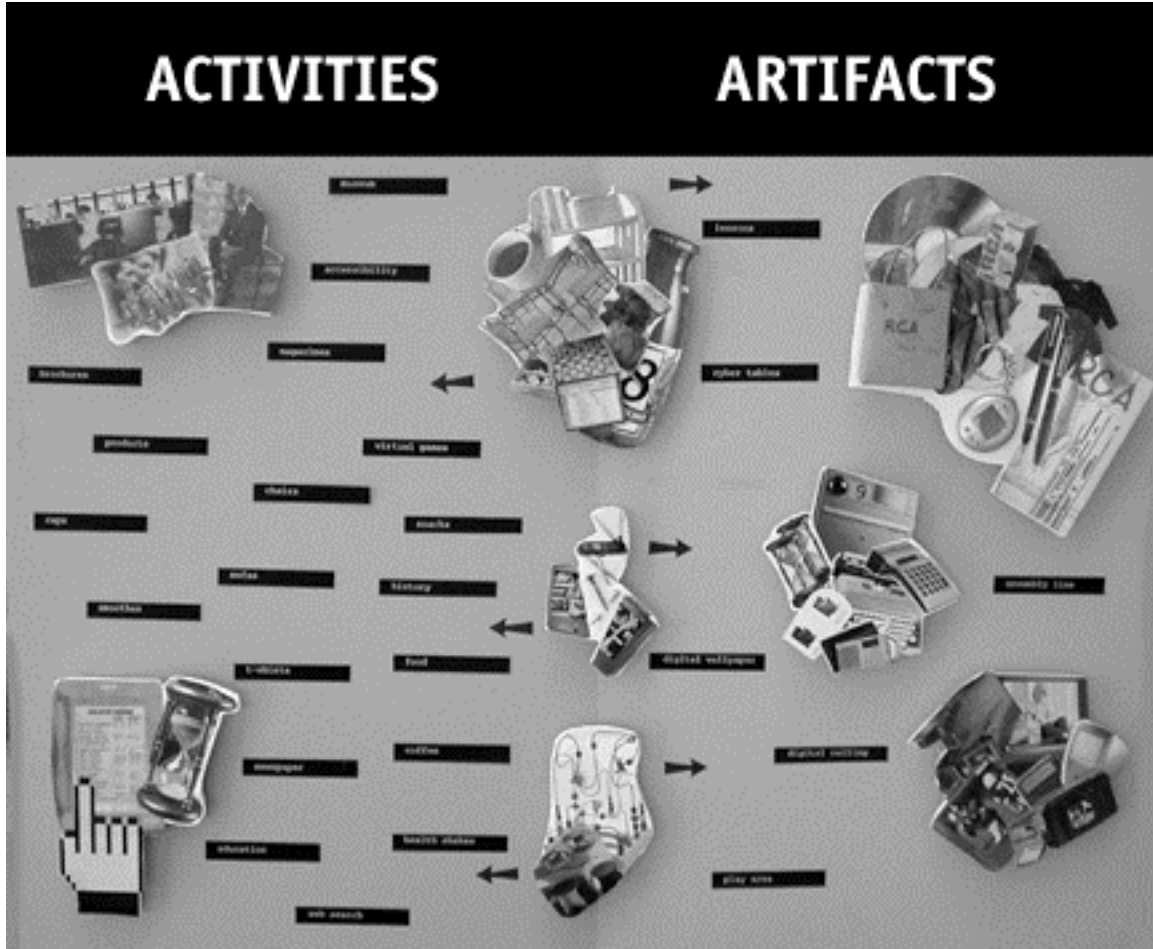
- *a (x 4) Snapshots* compel development teams to organize and summarize information they gathered during a research phase. The act of composing the snapshots - of sorting through all of the data and selecting the most important parts relative to the *a (x 4)* framework - compels development teams to focus their efforts around the production of an identifiable deliverable. This is helpful during analysis since qualitative data is notoriously “messy” and difficult to manage. Specific tasks or assignments help overcome this problem.
- *a (x 4) Snapshots* promote effective communication and understanding. As visual representations of analysis, *a (x 4) Snapshots* are meant to be easily understood and remembered. This is important since analysis results are, fundamentally, the foundation upon which a new design project is built. Effective communication is, therefore, critical if analysis results are to be applied.
- *a (x 4) Snapshots* serve as useful reminders throughout the development process about important parts of the inquiry. As quick references, the snapshots remind development teams of key findings and conclusions. Recalling these can become difficult as a project moves beyond analysis and into conceptual exploration and development. *a (x 4) Snapshots* serve as a common source of information that development teams can use throughout the development process to refocus on key research findings.

a (x 4) Visualizations

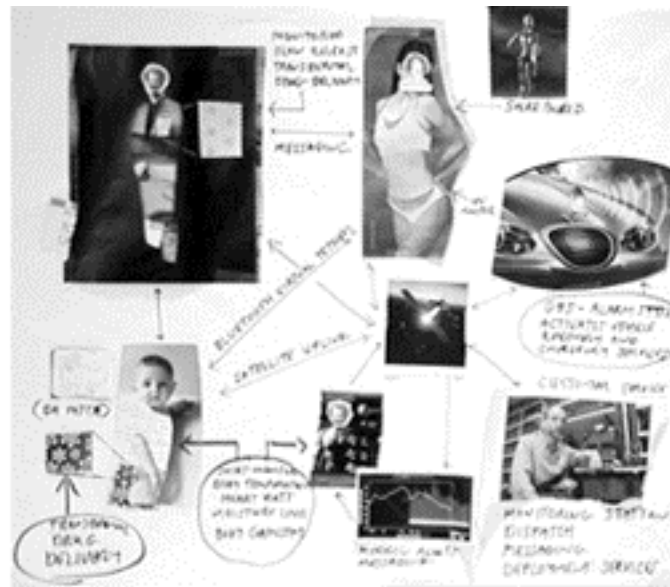
The third part of *a (x 4)* involves creating an image (or set of images) about the future of user experience based on the key parts of the *a (x 4)* framework. Called *a (x 4) Visualizations*, these images are intended to help development teams set a foundation or create a vision for conceptualizing innovative experiences. As such, *a (x 4) Visualizations* are a precursor to the development of more specific and highly defined scenarios and concepts. This preparatory step is important and useful because it helps individuals and groups break free from the constraints and limitations that circumscribe typical concept exploration. If done correctly, *a (x 4) Visualizations* create a broad, somewhat abstract image from which specific scenarios and concepts about user experience can later be constructed.

The importance of this step should not be underestimated. Establishing a speculative image of user experience, that is free from restrictive real-world concerns, is critical for generating innovative ideas and concepts. Bill Moggridge, author of “Design by Storytelling” and a principal at IDEO, argues strongly that effective scenario-building is based on a willingness to suspend real world concerns. “Perhaps these possibilities seem too good to be true - a slightly unreal world that we are unlikely ever to live in . . . The question is not that such futures are difficult to achieve; it is whether designers are prepared to use scenario-building strategies to help them envisage such futures and then go on to design for them” (Moggridge 1993, 16).

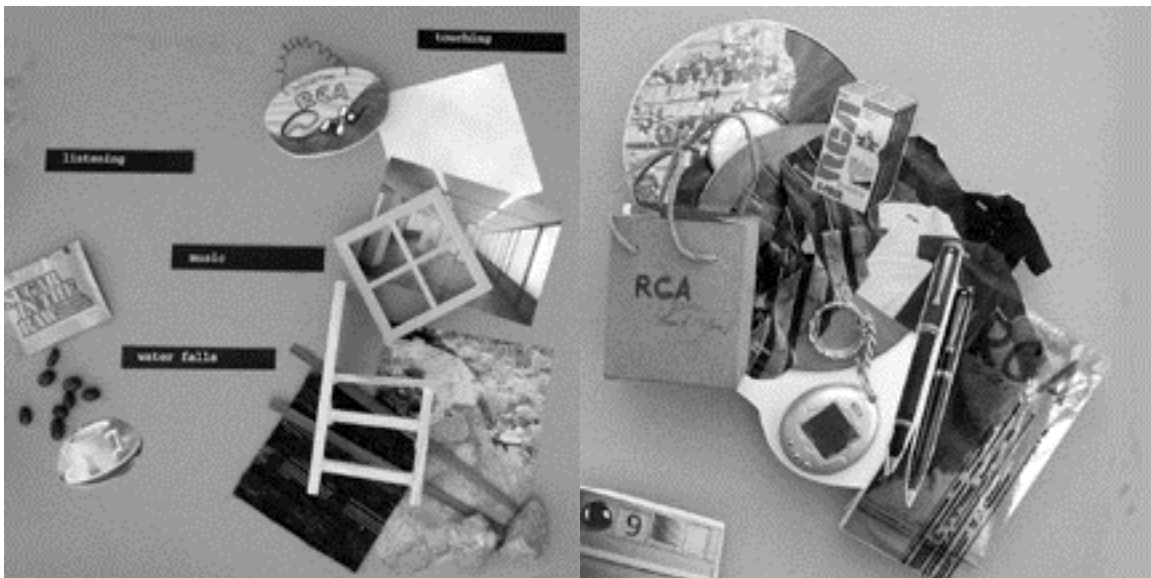
Developing an *a(x4)* Visualization can be done in a variety of ways using different types of media (e.g., text, image, video, drawings, etc.). Whatever the method or media, there are a few common principles which need to be considered.



a(x4) Visualizations are structured around the key elements of an experience in design (actors, activities, artifacts and atmosphere). The goal is to project or speculate about how each element will look, feel, act, etc. in the future. In this example, the development team created a collage comprised of text, assemblages, images and real products and materials - all of which were organized around two of the key *a(x4)* elements.



a(x4) Visualizations are broad and speculative and should be conducted as an initial part of concept exploration. As such, it is important to avoid developing the image(s) with too much specificity and detail. As illustrated by this example, *a(x4) Visualizations* are best used to develop and express a general tone and attitude from which more detailed scenarios can later be developed. In effect, an *a(x4) Visualization* provides a development team with the opportunity to dream about a new experience and speculate about the future without addressing immediate problems and issues.



a(x4) Visualizations are presentational. The ultimate function of an *a(x4) Visualization* is to communicate a vision that provides guidance and meaning to a development team. The

presentational nature of *a (x 4) Visualizations* should not be underestimated. As illustrated by this example, developing a final image requires a development team to express its vision of a user experience with clarity, decisiveness and imagination. In doing so, the team is able to effectively communicate with others and apply what it has learned in the development of more detailed scenarios.

Scenarios

With the previous steps completed, scenarios about user experience can now be created. A development team begins this part of the process equipped with considerable knowledge and insight about actors, activities, artifacts and the context (atmosphere) in which these all interact. The team will have conducted field research, created detailed profiles as part of an analysis process, and developed a visionary image (or set of images) that speculates about a new experience. Subsequent scenario-building will, thus, be based on a solid foundation of research, analysis and imagination.

The form of a scenario can vary greatly depending on circumstances, time constraints and/or other needs and expectations. Common types of scenarios used in both business and design include: written stories, illustrated stories, comics, storyboards, plays and, increasingly, multimedia productions. Employing the *a (x 4)* framework does not require the development of any particular type of scenario. All forms will benefit from the research, analysis and speculation that are essential parts of *a (x 4)*.

Theoretical Foundation

a (x 4) is based on two theoretical assumptions relating to experience and experience design. In combination, these assumptions imply that experience (in a design context) is active (rather than static) and that, ironically, designing experience requires studying the present as much as speculating about the future.

Four Parts of Experience (in a design context)

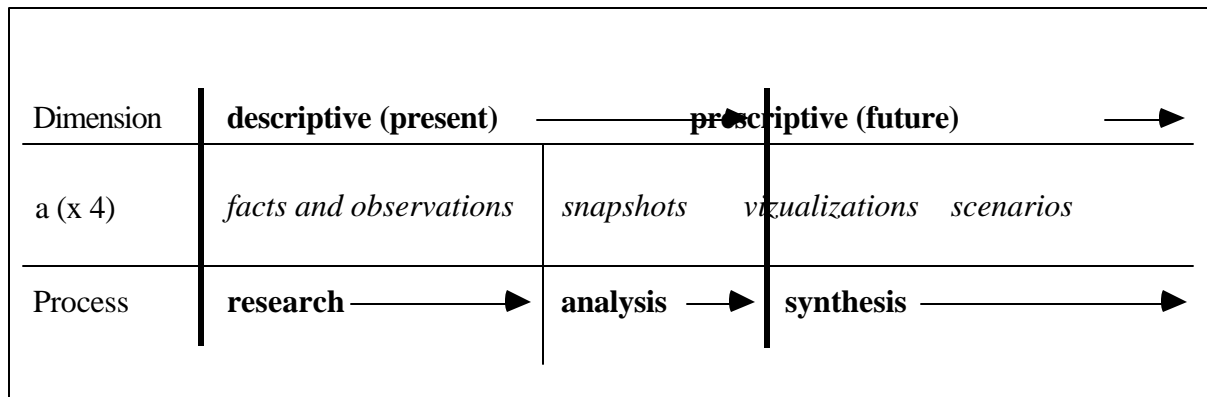
a (x 4) is founded on an understanding about what constitutes an experience in design. As illustrated below, experience is comprised of an interaction between four key elements - actors (people), activities (tasks), artifacts (things) and atmosphere (context). *a (x 4)* emphasizes the *interaction* that occurs between the elements. That interaction is active and, as such, is the experience that needs to be studied and/or designed.

The Two Dimensions of Experience Design and Scenario-building

As noted earlier, telling stories about new user experiences requires research of the present as a means to guide and fuel speculations about the future. In other words, scenario-building and experience design include both *descriptive* and *prescriptive* dimensions. If managed properly, the use of both equip individuals or groups with valuable knowledge and a source of inspiration for visualizing innovative user-centered scenarios about the future of experience.

a (x 4) has evolved into a method that addresses both the *descriptive* and *prescriptive* dimensions of experience design and scenario-building. Each specific part of the method is designed to either explore the present, speculate about the future, or some combination of the two. As such, *a (x 4)* is a fairly comprehensive research and design method that can be used to investigate the totality of designing experience.

The diagram below illustrates how *a (x 4)* addresses these two dimensions and how it integrates with a typical development process comprised of research, analysis and synthesis phases.



PART THREE

Evaluation of a (x 4)

Introduction

As a part of the development of *a (x 4)*, a research project was conducted at Arizona State University (ASU) to gain insight into whether *a (x 4)* was an effective research and concept-generating tool for developing scenarios and designing experience. This project was part of a larger inquiry into the effectiveness of user-centered research and design, and funded by Thomson multimedia, Inc. (owners of the RCA and GE brands of consumer electronic products).

To study this topic, a special studio course was developed. Called *Interdisciplinary Conceptual Prototyping*, the course introduced a group of undergraduate students (juniors and seniors from industrial design, graphic design, interior design and business) to *a (x 4)*, scenario-building and experience design. As a part of the course, the student teams were required to apply what they learned about these subjects in the development of scenarios about user experience. Two assignments were specified, giving the student teams ample opportunity to become familiar with using *a (x 4)* as a tool to design experience.

To complete these assignments, the student teams did the following:

- completed *a (x 4) Facts & Observations* and created *a (x 4) Snapshots* and *a (x 4) Visualizations*.
- developed detailed scenarios, using storyboards to define characters, plot and setting.
- performed their concept (i.e., a new user experience) in front of a public audience.

Strategy

This research project was based on a case study strategy (Robson 1993) and included the following assumptions and constraints:

- the research focused on a single case comprised of a participant group (i.e., twelve students) enrolled in *Interdisciplinary Conceptual Prototyping* during the spring 2001 semester at Arizona State University.
- the purpose of the inquiry was exploratory. Key topics and questions were defined (see below) to guide the exploration, but no conclusions or hypothesis were articulated prior to conducting the research.
- the results of the research are confined to the case itself. Though perhaps suggestive, the results cannot be assumed to have relevance beyond the scope of this study.

Topics/Questions

The major question this research project explored was: is *a (x 4)* an effective method for teaching and developing scenarios about user experience? For this project, effectiveness was measured by evaluating how *a (x 4)* impacted the ten students in terms of the following questions:

Was a (x 4) understandable?

This question explores the students' comprehension of *a (x 4)* as a group of elements and a process for gathering and analyzing data, and visualizing design solutions.

Was a (x 4) useful?

This question explores how the students define and describe the usefulness/utility of *a (x 4)* in terms of both immediate and future needs or circumstances.

Did a (x 4) produce a significant change in awareness and capability?

This question probes how/if exposure to *a (x 4)* changed the students' awareness of design and their capabilities as designers.

Rationale for Selecting the Topics/Questions

At a basic level, the effectiveness of a method like *a (x 4)* (in both classrooms and professional settings) will be largely determined by whether it can be readily understood and subsequently applied. These are "baseline" requirements that must be met for *a (x 4)* to be applied in a research and design context.

Effectiveness, however, goes beyond mere utility. This is especially true in a discipline like design where there is a premium on articulating fresh observations and visualizing innovative

solutions. Here, a method is often deemed effective if it produces a change or new way of viewing something. This will be evidenced in the results of a project. More important, however, it will be detected in the way a respondent (in this case, a student) describes the impact of learning and using a specific method.

Methodology

The project included six phases or steps:

1. Instruction

During this phase, students were given a detailed introduction to *a (x 4)*, scenario-building and experience design. This was provided during the first four weeks of the semester and included a variety of field research exercises, lectures, presentations and readings. The goal of this phase was to equip the students with the knowledge and skill required to use *a (x 4)* in the development of scenarios about user experience.

2. Application Exercises

Once informed, the students were required to complete two application exercises. The first involved using *a (x 4)* and storyboarding to develop a specific scenario which was play-acted in front of a public audience. The exercise required that students create characters, props and a plot - all of which were derived from their field research or that completed by other students in a previous semester.

The second exercise involved the students using *a (x 4)* to reinvent the “Mini-putt Experience.” The project included field research at a local mini-putt site and the development of a detailed concept focusing on user experience. The concepts were communicated by drawings, written stories and *a (x 4)* *Visualizations*.

The goal of these exercises was to give students an opportunity to apply what they had learned about *a (x 4)* as a tool to develop scenarios about user experience.

3. Data Collection

To probe the primary topics/questions of this project, a semi-structured interview was conducted with each student (a total of ten interviews). All of the interviews were based on a detailed interview guide (see appendix) and lasted no more than one hour. Consistent with the nature of semi-structured interviewing (Robson 1993), the students’ were encouraged to “lead” the conversation, with the interviewer (an ASU research assistant hired to conduct the interviews) providing occasional probes and redirection to keep the conversation relevant to the research topics.

The interviews occurred after the students had completed the second application exercise. At this point, it was felt that they would have a good understanding of *a (x 4)*. Their responses

would, therefore, support the primary goal of the interviews - i.e., to have the students describe their observations about *a (x 4)* and the research topics in their own words.

4. Analysis

Three methods were used to analyze the data collected during the interviews:

- *Key Word and Phrase Identification*: words and phrases were identified from each of the interviews and organized according to the key topics/questions. The result of this exercise was a list of words and phrases that the students had spoken relative to their comprehension of *a (x 4)*, their sense of the usefulness of *a (x 4)* and any change *a (x 4)* had caused in their knowledge and attitudes.
- *Content Analysis*: a content analysis of the data was performed as a means to explore and uncover response patterns. The analysis included the development of a coding structure comprised of four categories:
 - (a) about the elements of *a (x 4)*.
 - (b) about the process of using *a (x 4)*.
 - (c) about the value of *a (x 4)*.
 - (d) other
- *Summarization*: individual “summary memos” were composed for each of the ten students according to the three key topics/questions.

5. Observations and Conclusions

With analysis of the data complete, observations and conclusions were articulated.

6. Recommendations

This final step entailed reflecting on the strengths and weaknesses of the research project, and articulating recommendations for subsequent research inquiries in the future.

Observations and Conclusions

The results of this research project suggest that *a (x 4)* is reasonably effective in teaching and developing scenarios about user experience. Though differences were evident, the majority of students clearly understood *a (x 4)* as a process or method comprised of a framework (actors, activities, artifacts and atmosphere) and a set of exercises (*Facts and Observations, Snapshots and Visualizations*). Most were also generally able to articulate the purpose of *a (x 4)* and gave highly relevant examples of projects or disciplines (outside the scope of the class) where *a (x 4)* would be useful. Finally, a number of the students said that exposure to *a (x 4)* and the design of experience had expanded their understanding of design and their capabilities as designers, while also opening their eyes to new potential employment opportunities in the future.

As noted earlier, the effectiveness of *a (x 4)* was measured according to answers to three key topics/questions. The results are as follows:

Was $a(x4)$ understandable?

“... to put it in an equation form was just so clear” (Klamrzynski 2001).

The use of a common framework (comprised of actors, activities, artifacts and atmosphere) seemed to help the students conduct their projects. Some noted, for example, that reducing the framework to four elements made it easy to recall and simple to apply. As one student said: “It really is an easy way to remember the four things you need to remember and then go into more detail.” (Lulling 2001). Or as another noted: “. . . it just made it so clear to have this diagram (of $a(x4)$) that we could always refer to. It helped us with our process, getting to where we’re at now” (Klamrzynski 2001).

“All four make one system” (Johnson 2001).

Most of the students referred to $a(x4)$ as a system or method. When asked to describe the system or method, most recounted how they had applied the method on one of their projects. Their descriptions generally included all of the key elements of $a(x4)$. Equally important, seventy percent of the students understood that integrating the elements was an essential part of $a(x4)$ and was, in fact, what made it a system or method. “You just have think about it,” one student said, “as a whole process” (Mosley 2001).

“I think there are some good tools here” (Krise 2001).

Most of the students understood $a(x4)$ as a “tool” for designing experience. They defined or described it with a variety of words, including: practical, realistic and easy to use. As with other types of design tools, the students seemed to regard $a(x4)$ as a functional means to accomplish defined tasks.

Conclusions

Based on the students’ responses, $a(x4)$ seems to be generally understandable. Without prompting, most of the students were able to define and describe $a(x4)$ in great detail (including the framework and parts of the method). In addition, they defined $a(x4)$ as an integrated system or method and regarded it as a practical (as opposed to theoretical) “tool” for accomplishing tasks. Combined, these observations suggest that $a(x4)$ is adequately defined as a method and potentially useful in educational/training environments.

Was $a(x4)$ useful?

“I’m very structured and detail-oriented, so it really helped me” (Lulling 2001).

Forty percent of the students used the word “structure” to describe the usefulness of $a(x4)$. Their comments suggested that $a(x4)$ provided them with a way to manage the design process and the complexity of design problems. Interestingly, the value of structure was articulated by both extremes - that is, students who were naturally structure-oriented and others who were more intuitive and “messy.” For the former, $a(x4)$ supported natural tendencies and helped the student progress efficiently. For the more intuitive students, $a(x4)$ enabled them to overcome the confusion and uncertainty that commonly accompanies their work. As one of these students

noted: “There was definitely a specific way about it (*a(x4)*) that helped us to understand what we were trying to do and create” (Bocchi 2001). Or, as another succinctly said: “You didn’t feel like you’re just blindly going into a project” (Gilman 2001).

“It gives you more ways to get in contact with the user” (Johnson 2001).

All of the students identified *a(x4)* as an effective way to learn about users and to explore design solutions from a user’s point-of-view. In fact, the emphasis on users was identified as the primary purpose of *a(x4)* and provided a clear focus to guide the students’ work. “It forces us,” one student said, “to go through the process of really getting in the user’s head and try to actually be that person or that group of people” (Krise 2001). Interestingly, another student noted that *a(x4)* corrected a common problem design students (and design education) face when trying to connect with users. “We talk about thinking about the user but we often don’t fulfill that requirement . . . even though it’s (the *a(x4)* method) harder this way, it will make a more successful design” (Johnson 2001).

“a(x4) notched it up another level as far as creativity” (Jepson 2001).

Thirty percent of the students emphasized that *a(x4)* helped them imagine more ideas or concepts. They explained that they developed new ideas with each step of the process. “Out of the research,” one student noted, “come a lot of ideas, but then those ideas double . . . when you start getting into the scenario-building because you start realizing that maybe one of the ideas . . . runs into some other idea also and then you have these two ideas work in synthesis . . . it kind of builds on itself” (Jepson 2001).

“I thought it was a really good way to test what you had theorized about” (Gilman 2001).

Nearly half of the students stated that *a(x4)* was useful in helping them evaluate and test their ideas. They emphasized that creating storyboards and play-acting scenarios were effective tools for refining ideas and correcting mistakes. As one student said: “If I was just designing . . . without *a(x4)*, I wouldn’t have gone through the testing as thoroughly and finding out the experiences of the person. It’s a better way to test all aspects of what you’re doing” (Gilman 2001). Another noted: “. . . when you have to actually go through the scenario you start to realize the mistakes you made by the quick judgments . . . I think that’s what some of this process teaches us, is to catch all of them” (Krise 2001). These observations were somewhat surprising since applying *a(x4)* as a testing method was not overly emphasized prior to the interviews. Nonetheless, the students found it to be an effective way to evaluate their ideas and correct/avoid problems or mistakes. “It (testing your ideas with a scenario) helps you think,” a final student noted, “. . . so that you’re not guessing what’s going to happen” (Telge 2001).

“ . . . I do think that I got some principles and some tools to help me in presenting a design better” (Mosley 2001).

A few of the students highlighted the communicative value of *a (x 4)*, indicating that it helped them present their ideas so that an audience could understand it from a user’s point-of-view. They felt that this was a particularly powerful way to convey the most important aspects of a design concept. “I think it’s a more effective way,” one student claimed, “ to put the user in the space and the person who is looking at your design as the user so they can see it is more effective.” (Mosley 2001).

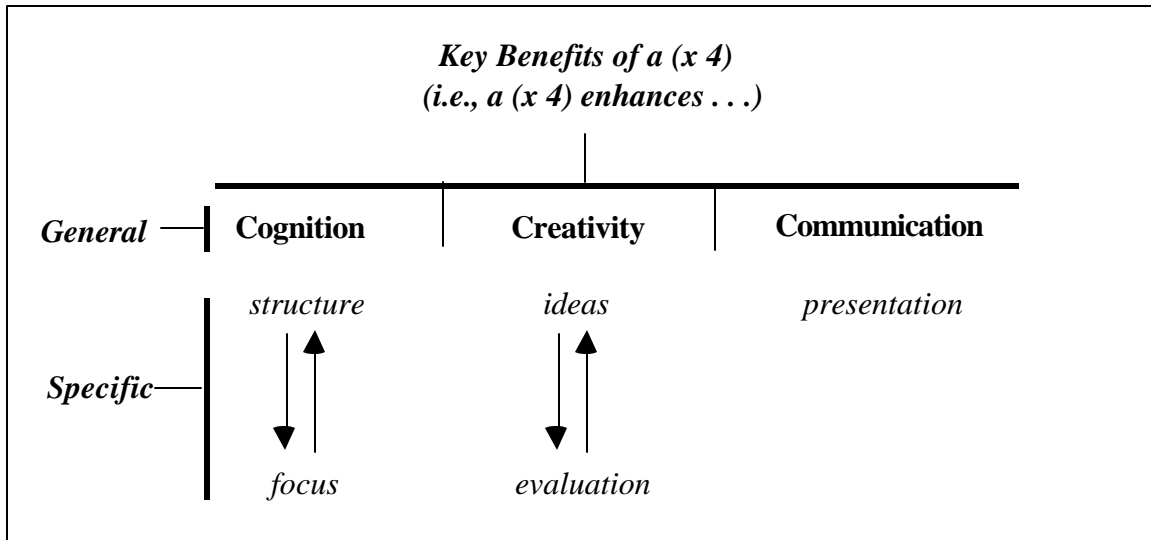
“When I do go to work, I will for sure think about a (x 4) and how I can apply what I learned. . .” (Gilman 2001).

Perhaps the most significant finding about usefulness was that many of the students easily identified other design areas or projects that would benefit from *a (x 4)*. Some identified other classes or projects (one individual had, in fact, already successfully applied parts of *a (x 4)* in a final presentation in another design studio). Others identified a variety of design or professional areas where *a (x 4)* might be useful, including training exercises in the business sector, exhibit design and events coordination. In each case, the students noted that the focus on users and the combination of research, analysis and testing would improve the likelihood of a successful design and/ or experience

Conclusions

To be a relevant design method, *a (x 4)* must ultimately be regarded by individuals and groups as useful in the design of experience. That is, it must provide tangible benefits that enable individuals and groups to accomplish tasks with efficiency and produce high quality results. The findings of this project suggest that *a (x 4)* satisfies these requirements.

As the following diagram illustrates, the students identified a variety of specific benefits that *a (x 4)* provided. When considered at a higher level, these benefits relate to cognition (i.e., modes of thinking), creativity and communication, and in combination describe the usefulness of *a (x 4)* (as defined by the students involved in this research project).



Did *a (x 4)* produce a significant change in awareness and capability?

“ . . . it’s almost like designing in three dimensions for the first time” (Gilman 2001).

Most students credited *a (x 4)* with expanding their capabilities as designers. Some referred to the fact that they had learned how to conduct research better; others noted that they had gained skill in storyboarding and focused brainstorming. Their responses were not necessarily surprising since learning these skills was a core part of the class.

Comments about changes in awareness were significantly more interesting. Most (seventy percent) indicated that learning about *a (x 4)* and experience design had affected how they defined the scope of design and their role as designers. The words they chose to describe the change were revealing, as exemplified by the following responses:

“It kind of broadens our outlook” (Pettibone 2001).

“This class kind of opened my eyes” (Johnson 2001).

“It’s changed my perspective” (Jepson 2001).

“Design has kind of opened up” (Gilman 2001).

“It’s changed me” (Klamrzynski 2001).

The most consistent theme identified in the students’ responses was that *a (x 4)* and experience design had nudged them to reconsider the scope of design. Their comments fell into two areas: first, that *a (x 4)* and experience design had helped them see beyond basic design skills to focus on higher level issues. *“This is really so far out there,”* one student noted, *“ as far as what we’ve been taught (in previous classes) . . . it’s so different, it’s really hard to reel yourself in from all the drawing (that we’ve been taught) and start thinking about how somebody is going to use this concept”* (Jepson 2001).

Second, *a (x 4)* and experience design changed how many of the students regarded the significance of artifacts (i.e., a product, interior or communication). Though clearly important,

the design of individual artifacts was seen as supporting the design of a comprehensive user experience. This response was shared equally by students from graphic, industrial and interior design. As one product design student noted:

“... products aren't always the means of making money, it's also the experience behind it” (Krise 2001). A graphic design student made her point by analyzing the success of Starbucks: “... there's so many different kind of things that are going on in the store that that is the experience, and that is why Starbucks is how they are. I really would like to get involved in doing that in my field of work because you're selling design but more than that” (Klamrzynski 2001).

Conclusions

The comments offered by the students suggest that learning about *a (x 4)* and the design of experience produced an identifiable and generally positive change in their awareness about design. The most common changes can be summarized as follows:

Before a (x 4)	After a (x 4)
demonstration of skills	search for usefulness
focus on artifacts	exploration of experience
<i>remedial concerns</i>	<i>advanced concerns</i>

In each case, the change compelled the students to consider what are arguably higher level issues relating to usefulness and an overall design experience. Though still important and interesting, showcasing skills and designing artifacts were viewed by these students as secondary concerns which only gained meaning when used to support a more comprehensive user experience. The recognition that individual artifacts are subservient to experience is, of course, vital if the design disciplines are to become equal players in an emerging experience economy. Based on the results of this project, *a (x 4)* seems to encourage this type of recognition.

Recommendations

This project produced reasonably meaningful preliminary data about the effectiveness of *a (x 4)* as a research and concept-generating tool for developing scenarios about user experience. In short, the student responses suggest that *a (x 4)* is effective, at least in terms of the three key questions that were asked.

However, the results of this project should be viewed with some caution since the scope of it was confined to a single case comprised of ten students. Though significant in itself, this is a small case (or sample) and, thus, cannot be generalized.

Further inquiries into this subject should incorporate the following recommendations:

In terms of data collection

- expand the methods used to collect data. For example, to determine how well students understand $a(x^4)$ as a method comprised of interrelated parts, a survey or questionnaire might be developed and used. This would probe the issue consistently and produce results based on a common format.
- apply more emphasis to exploring the usefulness of $a(x^4)$. Particularly focus on issues relating to the way $a(x^4)$ provides structure and enhances creativity.
- expand the project to include collecting data from the students at some point in the future (e.g., a small-scale longitudinal study). This data would provide insight into how/if students views about the effectiveness of $a(x^4)$ change over time.
- develop a tool to define students' attitudes and beliefs before exposure to $a(x^4)$. Possibly use it as part of a "before/after" strategy.

In terms of analysis

- consider applying more structured methods to compliment interpretive ones. For example, a structured word count (relative to key parts of $a(x^4)$ or experience design) would be helpful in determining how students describe $a(x^4)$ and the design of experience.
- add more individuals to the analysis team. This would be particularly useful if interviews remain a major part of the data collection strategy, and if content analysis is used to analyze that data. Fresh perspectives and opinions would likely counteract the bias that can form with small, insulated research teams.
- evaluate the students' projects as part of the analysis phase. A qualitative analysis of their storyboards, written stories and play-acted scenarios will likely reveal key information about retention, application and creativity.

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