Do Digital Homes Dream of Electric Families?
Consumer Experience Architecture as a framework for Design

Introduction

The title of this paper takes its inspiration from the title of Philip K Dick's 1968 science fiction masterpiece "Do Androids Dream of Electric Sheep?" The novel tells of the moral crisis of Rick Deckard, a bounty hunter who stalks androids in a fallout-clouded, partially-deserted future San Francisco. (Wikipedia). The novel was popularized the early 1980s when Ridgley Scott directed the film Blade Runner, based loosely on Dick's story. One of the most enduring themes of the book is what it means to be human and conversely what it means not to be. I wanted to make reference to Dick's novel because I'm interested in what it means to design for humans. How do you design sometimes futuristic products for people so that such products will fit into their lives and make their lives better? Similarly, what happens when you design without humans in mind? What happens when products are designed without an understanding of the people who are going to use them?

In this paper I explore consumer experience architecture as a practice and a methodology for developing new and innovative products which fit seamlessly into our lives. Here, I draw on recent experiences at Intel Corporation, where we have applied this framework directly to the development of personal technology devices. Consumer experience architecture (CEA) provides a means for multiple inputs into the product design process; including ethnographic research, market analysis, demographic profiles, technological surveys, as well as competitive analysis of similar products. Additionally, the framework gives development teams the ability to identify, document and validate specific experience metrics by which the product can be designed. Ultimately CEA allows a means to validate its own progress and it's ability to delivery on the experience opportunities or development goals throughout the process.

Understanding People to build better Technology

In 2005, Intel underwent a significant restructuring which included the establishment of several new business groups focused explicitly around usage ecosystems and activities – the home, the office, emerging markets and mobile users. As part of the restructuring, senior executives also endorsed the inclusion of user research teams and competencies. In the newly established Digital Home Business Group, an explicit committed to consumer centric thinking has been an important part of business from day one. The User Experience Group, of which I am a member, is an interdisciplinary team dedicated to bringing the perspectives of ordinary people into Intel's product planning, development and marketing activities. For the last two years, I have been a consumer experience architect within this group.

Our group includes two distinct competencies: one with quantitative and qualitative research focus and the other oriented more closely to usability, usage modeling and user

experience assessment. My role, created in 2005, was intended to provide a much needed bridge between these different emerging user-centric competencies and the larger organization and industry.

The research competency, which consists of social science and design researchers, spends time in people's homes all over the world. We take as its starting point a firm conviction that people's social and cultural practices change far more slowly than technologies themselves. This team is really dedicated to getting a sense of what makes people tick, what they care about, what they aspire to, and what frustrates them. This research is focused around getting a sense of the larger cultural patterns and practices that shape people's relationships to and uses of new technologies.

In 2006, we conducted more than 400 field interviews in sixteen countries, and the team is on track for similar metrics in 2007. To accomplish this research we use long-standing qualitative and interpretive studies such as participant observation, interviews, shadowing people's daily lives. Typically these are on small scale, conducted in person by the team and are based on a traditional approach of ethnographic field research. (Salvador et al. 1999). Along with this we will also use more experimental design research methods such as cultural probes, photo diaries, cognitive mapping and story telling exercises (Gaver, B. 1999). These more contemporary methods are a means to involve the participants in a more hands on way during the research. Often we send design research activities to the participants before the research team arrives, prompting the participant to begin documenting their lives providing a rich starting place to begin once the traditional ethnographic research begins.

Guiding Principles for Field Research

Our research activities are guided by three principles: privileging people, practices and presence. Firstly we focus on people not users. It can be an unfortunate trap for many product development teams to conceptualize the people who will be buying and/or using their product as simply a user of that specific product. They do not envision or comprehend the wider life and influence on their customer. This conceptualization doesn't see them or treat them like a human; much like this chapter's title it treats the user more like a digital family then a flesh and blood user. The result of these digital fantasies can be quite shocking and are rendered most visible when the person who is looking to buy or use the product doesn't know how to use it. On some occasions, the consumer may never understand the value of the product and simply ignore it.

Our second guiding principle concerns social and cultural practices: when we study live in and around the homes we are interested in everyday lived practices. We look for domesticated technologies as opposed to imagined technologies. Much like design teams conceptualization people as simply users or non-humans, these same development teams can imagine their technologies as theoretical or engineering prototypes. What is lost in this approach is that all technologies exist in the real world once they have left the lab. And as we all know the real world is a very different place than the lab. Because of this when we explore or investigate how people all over the world are using technology or

devices we make sure to look at how they are actually used. What do people do with the technologies in their lives? What works for them? What doesn't work? How do they break? Who spends time with the device? In this way we begin to form a grounded and realistic vision of how technologies are used by people everyday.

Our third and final guiding principle is that we always make sure to keep in mind that most of people's lives are spent off-screen; meaning that most people's lives are spent not using technology or devices. In fact this off-screen time is the time that most people cherish the most out of their days. To understand this life off-screen, understand why it fuels people and what they like to do we explore the meaning people get from every aspect of their lives.

These guiding principles and our blend of research expertise ensure that this is not the typical flavor of consumer research, like the traditional focus groups or product testing with which many of us in the consumer electronics field are familiar. We strive to develop a deep understanding of global cultures and how people integrate technology into their daily lives. Beyond our commitment to support consumer centric thinking in our business group, we are also driven to utilize our insights into every day life to drive new technology innovation and development. We deploy our research findings to guide Intel's product development. Using a process we development (see Illustration 1), we drive from ethnographic insights or human values to strategy and core technologies. We are particularly interested in delivering products that will fit seamlessly into consumers' lives.

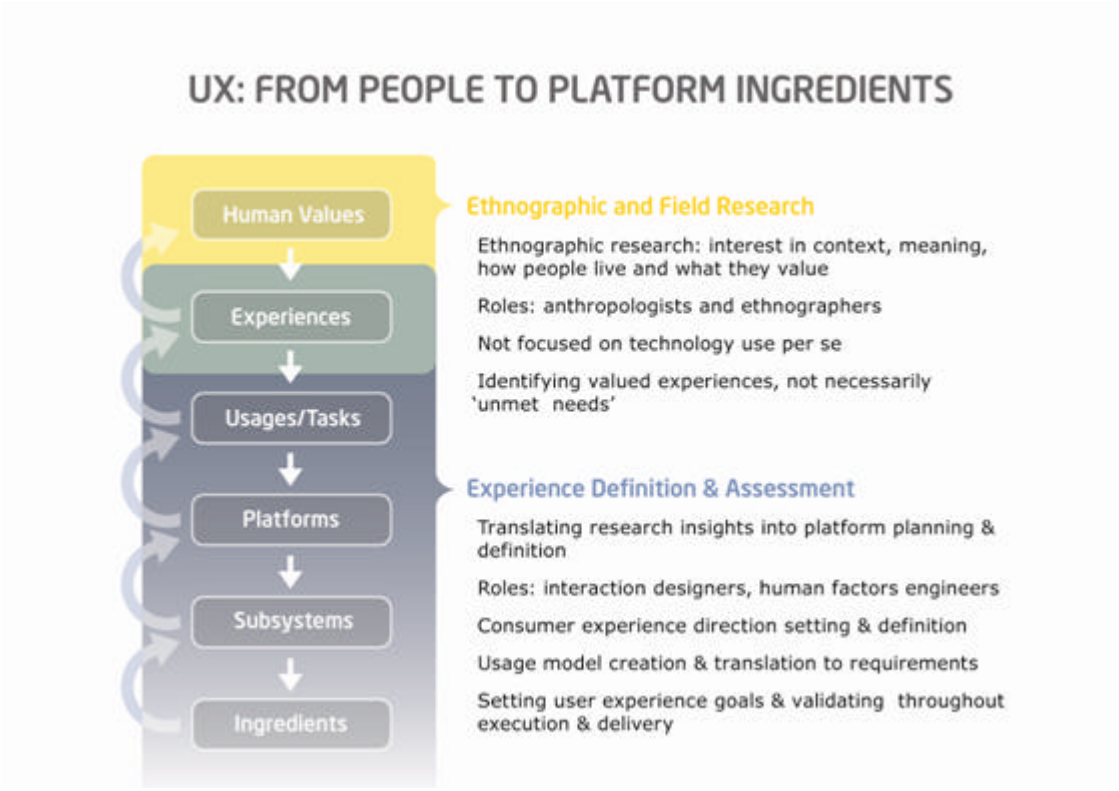

Illustration 1 (print version being developed)

The first step in our process of driving from research insights to technologies is to identify the experience opportunities that present themselves from the research. We make a point of including market and demographic data along with technological and competitive landscapes surveys. Once the team has identified specific experience opportunities and the technologies, subsystems and ingredients that can deliver these experiences, we can begin the experience design process.

Houses are Hairy: The Need for Experience Design

Experience Design has become newly recognized and named. However, it is really a combination of many previous disciplines; but never before have these disciplines been so interrelated, nor have the possibilities for integrating them into whole solutions been so great. (Shedroff, 2001)

A few years ago I was building a personal computer with a friend of mine. He is a software engineer for a near-by science museum. We were talking about where to put the computer once it was build. My question was, "Should I put it on the floor of the study or on a table?" He said it really didn't matter. "But there's so much more dust and dirt on the floor. It has to matter," I replied. "Brian, you have no idea how much dust and hair there is in your house….In everyone's house," he replied. "If a hardware engineer ever opened up my computer or any appliance in my house they would be shocked and horrified with what they found. Our houses aren't clean rooms. What can you do? Houses are hairy; it doesn't matter where you put it."

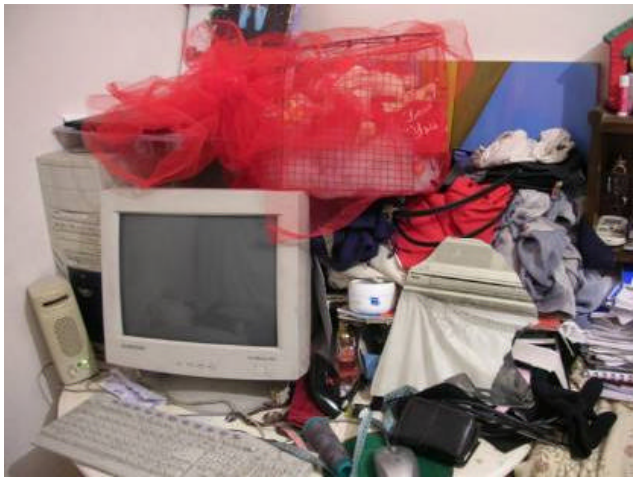

Illustration 2: The PC goes home (Germany 2005).

My friend made a very good point; houses are "hairy" and many products, especially high-technology products like computers aren't always designed for the cluttered lives of humans. But this example goes far beyond the physical. It can be argued that the

physical designs of products are actually far more suited to consumers than their wider needs for purchase, set up, maintenance and ongoing use. Not only are houses hairy but humans lives are busy and wonderfully cluttered with a vast array of influences that affect how they understand and use technology. In short, the entire consumer experience of many products appear not to be designed with the real life of their consumers in mind. Using the process I outlined above, my organization is always and already oriented toward a holistic understanding of innovation and product development. To accomplish this end, my group relies on a team of human factors engineers, usability professionals and interaction designers. This team, working hand-in-glove with the research competencies, takes insights into every day practice to inspire and inform new digital technologies for the home. Specifically we aim to architect a fully fleshed, authentic and desirable consumer experience.

Whereas architecture and furniture design have successfully operated in the realm of cultural speculation for some time, product design's strong ties to the marketplace have left little room for speculation on the cultural function of electronic products. As ever more of our everyday social and cultural experiences are mediated by electronic products, designers need to develop ways of exploring how this electronic mediation might enrich people's everyday lives. (Dunne. 2006)

Consumer experience architecture, as it can be applied as a framework for the research, design, development and marketing of computers, laptops, cell phones and other high-technology devices, is a powerful tool. It allows companies like Intel to hardwire the real lives and desires of humans into a process which at times can be oriented more towards an engineering culture. With the increasing complexity of digital home products and services, understanding and architecting consumer experiences is becoming more important and essential for success.

Consumer Experience Architecture in Industry

Consumer experience will drive the adoption of home media technology, not a particular piece of equipment."(Kim, 2007)

At Intel and across the high-technology development industry CEA or more specifically the desired result of consumers' acceptance of new devices and services is gaining exposure and relevance. This increased exposure and acceptance has everything to do with financial success. A recent Parks & Associates Digital Home Services Report (2007) found that as many as 40% of people purchasing wireless networking equipment to connect computers and other devices in their homes return them to the store for a refund. The alarming part of this statistic is that of the 40% that were returned, 90% of these devices had no known defect when the returned merchandise was checked. From this information one can extrapolate that people were returning the devices because they didn't understand them, didn't value them or simply couldn't make them work. This is just one example of many. The rising complexity of devices in the market means that

this problem will only continue unless there is a significant cultural shift in the way that devices and products are developed for the general public.

Companies are seeing that even if their devices are innovative and priced right consumers may still not buy them if they don't understand how to set them up and use them. Worse yet, people will return products if their experience with the product doesn't match what they thought they were buying and what the manufacturer had promised and advertised.

Technology for Humans: a Design Frame work

CEA provides a framework that we can use to interleave the consumer's perspective at key points in the product development process. At Intel, the cycles of planning, development as a product moves from prototype to alpha and beta and finally to release candidates are intersected at key points to ensure that the original goals of the product and the value of the product to the general public is always met (see Illustration 3).

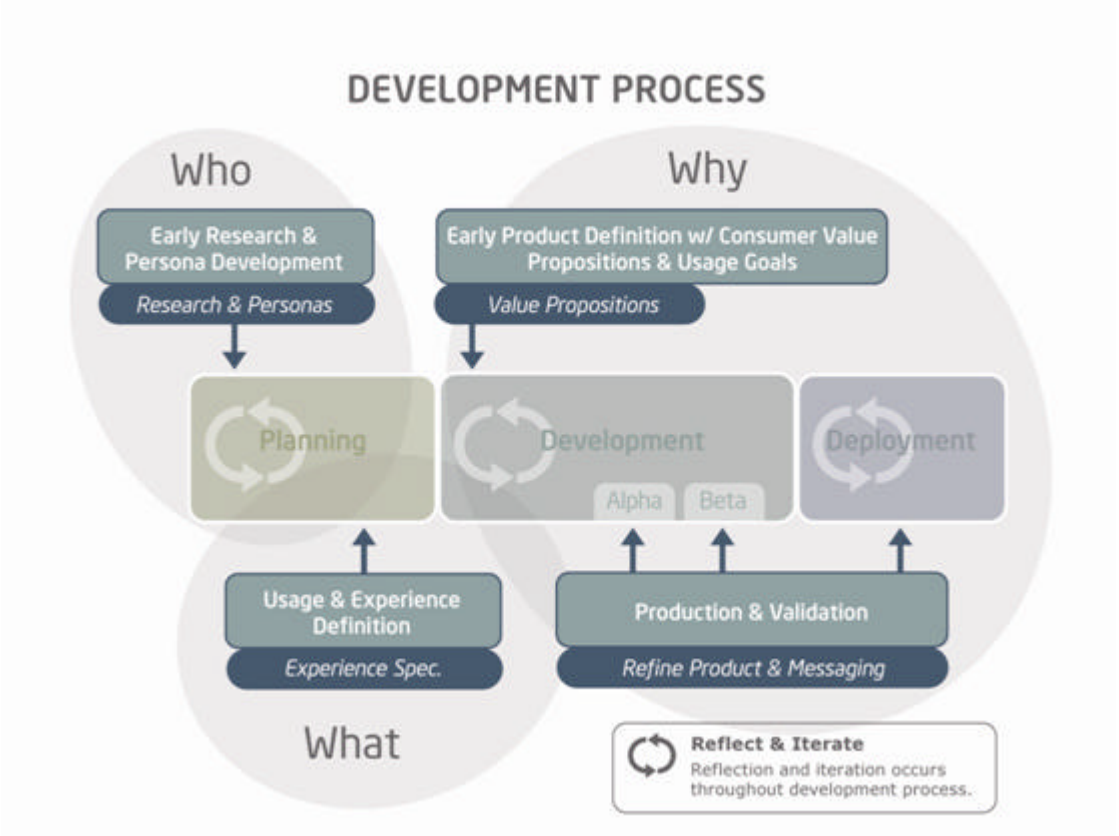

Illustration 3: a high level of overview of a typical development process (print ready version being developed)

This development process can be broken up into four discrete and distinct stages. Each stage serves as a key point of intersection, influence and iterations in the development process.

Stage 1: Lasting Consumer Insight

I was once asked, if using this process, could have predicted the important and massive pubic acceptance of email. Slyly I replied, that yes, I probably could have recognized the significance of email as a technology in which people would be wildly interested. My reasoning was simple: for hundreds of years people, in a range of different social, cultural and economic circumstances had been composing, writing and sending letters to one another, and of course, for thousands of years before that, oral messages conveyed thoughts, emotions and information over distances, small and great. It is at the foundation of how we communicate with our friends and family. Email was simply a new means of distribution for a very old and cherished form of social interaction – communication. Improving on this deep-seated need, when applied correctly could be nothing but successful.

The initial research and information gathering stage of this framework provides input into the planning cycle. Here the team's ethnographic insights are coupled with market and competitive landscape data. It is important to note that for many new or innovative products there may be little to no existing competitive or market information. In this case, ethnographic and other forms of qualitative consumer-centric information becomes even more valuable, as it provides a foundation of human values and behavior around the new product. Even if the product is new, the human behavior that will take advantage of the product remains the same.

Out of this early research and persona development, key deliverables are a clearly actionable summary of the research. Typically this includes a top line report or executive summary with appropriate detail and field findings. It is important at this stage that the recommendations or areas for development serves as guides for early design.

A second deliverable from this cycle is a set of personas or archetypes that describe the people for whom the product is being designed. Utilizing personas in the design and development of products is not a new practice (Cooper. 2004) Traditionally personas utilize market and demographic information to create a personality or lifestyle. A way to expand this sometimes limited approach can be the addition of real world data and insights. Archetypes, as they are sometimes called, can consist of a collection of ethnographic family and participant profiles that outline actual people that have been observed and studied. The collection of these profiles combined with demographic and market information, can provide a more in-depth portrait of the target consumers with a depth that is grounded in actual human interactions.

Stage 2: Experience Definition

New cognitive models can often revolutionize an audience's understanding of data, information, or an experience by helping them understand and reorganize things they

previously understood (or, perhaps, couldn't understand), in a way that illuminates the topic or experience. (Shedroff, N. 2001)

As the planning cycle moves forward and the product becomes more defined, a set of documents are created that outline the specific consumer experience that the product or service is trying to bring to market. This step in the experience design process utilizes the process outlined above (see Illustration 1).

Another benefit of this stage is that it provides the opportunity for every member of the development team to gain a holistic understanding of the desired consumer experience. From the technical developers to marketing team, this knowledge proves to be invaluable as the development cycles move forward. It provided both a base of knowledge from which each team member can draw upon to inform their specific domains in the design process but also this knowledge becomes a shared understanding between all team members. It gives them a common language and enhances collaboration. Additionally, it gives them a shared goal that has been documented and can be retuned to for wider problem solving activities of even broader corporate or business group alignment. This experience definition can help bridge the process gaps that occur between engineering and marketing or hardware and software teams or even project teams and management.

The experience specification builds upon the early research and persona development and identifies experience opportunities or specific human values that the product can enhance. As stated previously, consumer experience is the sum total of multiple inputs or influences on the consumer understanding of a product. All of these inputs serve to form a mental model for the consumer. It is this mental model that we can use to construct and develop a solid experience that will be both usable and desirable.

Each of these influences can be mapped and explored in an in-depth review of the product's lifecycle. This process begins with the consumers' first awareness of the product; typically through advertising or marketing. This can also occur through the consumers' social network of friends and family. From this point the product lifecycle documents the consumer's behaviors as they gather more information, research the product and ultimately use or touch the product for the first time. This first experience can occur in a retail setting or even online. Continuing on, the lifecycle outlines the purchase environment either in a retail store or online and then the physical out of box experience. This step in the process should be specific, documenting if the appropriate documentation and cables are included, does the printed package design continues to deliver on the product's marketing and brand promise, even if the packing materials are easily recycled. Finally we follow the product through its initial instillation and set up, ultimately exploring the complexity of the products daily use by multiple consumers in the household.

This exhaustive documentation and visualization affords the development team a framework to envision the product and comprehend the overarching consumer experience at its earliest stage of development. It uncovers details in every step of a complex process that are typically overlooked.

The consumer experience specification becomes a core document in the product's development library, consulted by new team members, reviewed by the team in problem solving brainstorms and also as a foundation for the third stage in the framework.

Stage 3: Early Product Definition

Once the experience opportunities have been identified and the consumer's experience mapped it is necessary to deconstruct these opportunities into usage models and values propositions. Usage models are an industry accepted standard format for the development of technology specifications and prototypes (see sidebar for Usage Model Details)

SIDE BAR

Usage models contain the detail necessary to translate usage information to a set of user requirements to guide planners, architects and engineers in generating hardware and software requirements. Usage Models Include:

Usage Summaries: a descriptive summary of the usage (e.g. text, storyboards, concept drawings)

Use Cases: a collection of related interactions between users and system (e.g. streaming video content from home pc to mobile phone, co-editing video simultaneously from two PCs in different locations)

Usage Scenarios: stories or explorations that illustrate how people or the archetypes in a specific context actually use the system to accomplish their goals (e.g. Vijay, joins his family of 6 in the main room (hall) in their home in Chennai, India. This being the only TV in the house, and Vijay not wanting to watch the current show, he decides to stay with the family in the same room, but stream a recorded TV show from the previous night to his mobile phone)

Task Flows: a visual representation of the step-by-step course of events required for the usage to occur in a positive way

Operational Profiles: the operations a person can perform with the system, along with how frequently each will be performed relative to the others

END Sidebar

From the experience opportunities and usage models we then develop the product's value propositions. These value propositions act as an expression of the product to the consumer, using their own language. Documenting these value propositions in consumer specific language is an essential part of the framework. Many times in the development of products the development team can use their own corporate or engineering based terms and vocabulary to describe this value. The team uses this language to describe to themselves and their management the benefit of the product to the consumer. This practice opens up a massive gap between the development team and the people who will

ultimately use the product. Not surprising the average person wouldn't understand the corporate and engineering terms used in most development companies. Using this language further separates the production team from the people they are designing for.

Clearly development teams need their engineer cultures to operate as a business but at the same time it is important that they also take a moment and speak the product's value propositions in the language of the personas or archetypes that were defined in the first stage of the process.

This step in the framework serves as a point of reflection and iteration. It allows the team to make minor adjustments to their products personas and minor course corrections in the experience that is being developed. In this way the team can track their progress. Also this articulation can serve as a way to discuss the attributes and value of the product to people both inside and outside the development team. It becomes a kind of short hand or elevator pitch that can be used to explain the product to management, outside companies or investors.

Along with this reflection and iteration the product's experience opportunities and value propositions are formalized into usage models (see side bar). The usage models provide the in-depth detail needed for engineering to develop the product to the point of execution. The details of a full usage model definition should encompass the full specifications of the product. Again the framework provides the team a means to visualize the product down to the smallest detail before they begin building. Here issues of technical feasibility can arise and possible adjustments to the product will need to be made. Likewise, marketing and business teams' involvement can uncover underlying customer feasibility.

Stage 4: Production and Validation

The final step in the consumer experience framework is the longest in duration and the most complex in execution. During the product development and validation cycle the team applies a user experience (UX) validation process or UX process throughout the entire production process. The UX process encompasses a variety of systematic methods employed to evaluate and understand people's perceptions and experiences with the product, throughout the product lifecycle. UX's targeted methods examine the user experience with concepts, prototypes, functional product and competitor products. UX is not market research or focus group testing, but rather assessment of people's actual interactions with a prototype or product of some sort.

At each key milestone in the development process (e.g. prototypes, alpha, beta, and release candidates) the team uses UX to validate that the original consumer experience goals are being met by the product. The test protocols for the UX validation are based upon the core documents of the consumer experience framework. The archetypes and personas establish the audience for the UX test. The experience specification describes the test environments and how the product should present itself to the consumer. Finally the value propositions can be tested to see if they do indeed have value to the consumer and if the product is meeting the promise of these propositions.

The UX validation process provides iterative feedback directly from the consumer as to the successes and failures of the product. By performing this validation process multiple times throughout development and basing all stages on a consistent framework UX allows the development team to refine the product multiple times to meet the original experience opportunities outlined for the product.

The results of the UX validation process are not only valuable to the development team. The iterative results of this process, coupled with the experience documents from previous stages of the framework provide a clear and compelling picture of the product even before it has been shipped. The results of the UX validation can provide clarity to upper management, possible partners as well as the investment community.

Conclusion

The CEA framework, as outlined in these four stages, provides a systematic approach to ensure that products are both grounded in human values and that these values are delivered upon throughout the development process. From initial research to the final validation, the CEA framework lays a solid foundation upon which all team memebers can base their specific innovations, assured that their efforts will resonate with the intended audience.

How I learned to stop worrying about the future and love science fiction
A challenge
It is my contention that some of the most remarkable features of the present historical moment have their roots in a way of thinking that we have learned from science fiction (Disch T. 2000)

Now that we have established an actionable framework for the application of human centered values and experience to the product development process, it allows us to examine other inputs we might use in this process.

How can we utilize the undeniable power of futuristic visions exemplified in the inspirational visions of science fiction or the dream of the digital home? The power of these mental models is evident in the technologies that surround us. Nanotechnology has brought us the iPod. Video phones imagine in fictions like *2001 A Space Odyssey* are available for purchase right off the store shelves. What is the latest mobile phone but a realization of the Star Trek communicator?

By using the CEA framework could we not take advantage of these future visions to create products that ignite the consumer's imagination, delivering upon an imagined future made real by the innovations of development teams? By grounding product development in the real world of humans can we not now apply the very human imaginings of the future in fiction to help consumers understand and value new technologies? By viewing science fiction as yet another potent input into the CEA development process we now have a means to deliver upon the promise of the future,

imagined and explored by so many science fiction writer and filmmakers. In this way science fiction could become the laboratory of product innovation. What future visions will you deliver?

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