Furniture Longevity: How Mass-Produced Heirloom Furniture Supports Sustainable Consumption

by

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ABSTRACT

In recent years, the length of time people use and keep belongings has decreased. With the acceptance of short-lived furniture and inexpensive replacements, the American mentality has shifted to thinking that discarding furniture is normal, often in the guise of recycling. Americans are addicted to landfills. The high cost of landfill real estate and other considerable ecological impacts created by the manufacturing of furniture should persuade people to give their belongings a longer life, but in reality, furniture is often prematurely discarded.

This grounded theory study takes a multi-method approach to analyze why some types of furniture are kept longer and to theorize about new ways to design and sell furniture that lasts well past its warranty. Case studies bring new insight into designer intention, manufacturer intent, the world of auction-worthy collectables and heirlooms, why there is a booming second-hand furniture market and the growing importance of informed interior designers and architects who specify or help clients choose interior furnishings. An environmental life cycle assessment compares how the length of furniture life affects environmental impacts. A product's life could continue for generations if properly maintained. Designers and manufacturers hoping to promote longevity can apply the conclusions of this report in bringing new pieces to the market that have a much longer life span. This study finds areas of opportunity that promote user attachment, anticipate future repurposing, and provide services. This thinking envisions a paradigm for furniture that can re-invent itself over multiple generations of users, and ultimately lead to a new wave of desirable heirloom furniture.

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Problem Statement

> A fine, enduring treasure that is cherished and passed along, acquiring a warm patina from many generations of caring hands, is an accomplishment most designers would find tremendously rewarding. Yet the products we design typically find their way into landfill well before their functional life has expired, sometimes within months of purchase. Not only does the short life span of most products seem to flout our creative abilities, the rapid transformation of resources into waste is a mounting burden the planet cannot bear. (St. Pierre, 2008, p. 28)

The United States Environmental Protection Agency (2010), in its annual report *Municipal Solid Waste in the United States: 2009 Facts and Figures,* estimates that 20.4 million tons of durable goods waste were generated in 2009 (p. 77). Approximately half (9.9 million tons) of that was furniture or furnishings. Furnishings include decorative household items including curtains but excluding carpets, rugs and building finishes or materials. This figure has skyrocketed to more than four times what it was in 1960. Natural resources such as wood, ferrous metals, plastics and glass are being discarded (p.75). North Americans leave behind an onerous legacy of trash in landfills (Slade, 2006, p.7). Every year companies release new, "improved" or trendy furniture products that encourage consumers to discard their previous purchases in favor of the newest version. Since planned obsolescence was pioneered in the early 20th century, corporations have learned to use it as a tool that drives profitability. The unfortunate reality that each product produced is trash in the making, and we have recently felt the effect of economic growth crashing to a halt in early 2009. The economy and our ecosystems are heavily burdened, as Matthews and Hammond (1999) point out in their article *Consumption trends and implications degrading earth's ecosystems*: "wasteful, inefficient or short-sighted production and consumption patterns are putting at risk whole ecosystems" (p.9). These patterns need to change.

This research aims to examine ways to break the wasteful cycle of planned obsolescence in furniture design through alternative methods of production, sales and consumption. Instead of producing of-the-moment “look-books” which reinforce consumer thinking about furniture as disposable, what if, instead, furniture designers and manufacturers promoted ways to encourage and enable consumers to keep these products? Despite manufacturers and “of the moment” designers continuing to push the concept of planned obsolescence by emphasizing the latest and greatest, there continues to be a market for vintage furniture – both restoring old designs, selling second-hand furniture and selling of new productions of vintage designs. This research aims to examine that paradox: despite all the marketing of short-lived fashion, old designs continue to be desired and pursued. What can the industry surrounding vintage modern furniture teach designers and manufacturers who wish to produce long lasting furniture?

This mixed-method study, employing both quantitative and qualitative methods, seeks to understand specific environmental impacts of furniture and understand why some furniture has successfully enjoyed a long service life to its users in an effort to design for these traits in the future. This research has the opportunity to lead to greater user satisfaction, and affect consumers to consider more carefully what they purchase, as it will be with them a long time. Designers have the ability to mold culture and perception by reframing age as something that can be honored, celebrated and appreciated. With this ability, there is also a responsibility. The goal for designers should be to educate their clients in practices other than constant turnover (St. Pierre, 2008, p. 31). It is unsustainable for designers to continue to make things that are quickly discarded as they use our valuable and limited resources.

What method is the most effective to combat planned obsolescence? “The easiest way to get the most out of your products is to make them last a lot longer. An object that lasts five or ten times as long embodies only 20 percent or 10 percent of the energy – the approximate level of energy reduction needed to make a difference in

carbon emissions" (Winters, 2009, p. 42). This study employs the quantitative evaluation method of life cycle assessment (LCA) to demonstrate that extending the length of time a piece of furniture is used has much potential to significantly reduce environmental impacts. This research project examines the environmental impacts associated with extending a chair's lifespan. The main question remains: Since the decision to keep something or dispose of it is determined by the consumer, how could furniture be designed to facilitate reuse, repurposing, or resale in the second-hand market? What can the industry surrounding vintage, mid-century modern furniture teach designers and manufacturers who wish to produce long-lasting, emotionally resonant furniture artifacts? How could this lead to a future generation of heirloom-quality furniture? The qualitative portion of this research seeks answers to these questions. A grounded theory study of people from the furniture industry uncovers insights which lead to the formation of themes and frameworks. The findings and conclusions identify key factors that can be used to inspire and inform design and business strategies with ecologically benign product or service. Findings also identify areas for future research.

Research Topics and Questions

This thesis aims to explore the following topics and address the following questions:

Collectables and undesired furniture *too good to throw away*.

- What attributes are common among *classic*, *collectable* or other *highly desirable furniture*?
- What are attributes of low-end furniture found in second-hand markets?
- What factors dictate price increases or decreases (deviates from the original value dramatically or slightly) in a second-hand market?
- Why has mid-century modern design either remained popular or regained popularity to the point that some manufacturers sell new versions of mid-century designs?

Restoration.

- How could restoration or refurbishing increase the life span of a product?
- What characteristics in a piece of furniture facilitate or hinder refurbishing?

Contextual influence.

- How does emotional attachment express itself in the second-hand market?

Economics.

- What economic incentives do manufacturers have to produce longer-lasting furniture?
- How does the second-hand market generate revenue?

Environmental impacts.

- How would environmental impacts change if furniture were kept longer?

Conceptual Framework

The following diagram puts unintentional and intentional characteristics of second-hand furniture into a framework for heirloom design. How could designers and manufacturers intentionally optimize products for the second-hand furniture market? This thesis gives designers and manufacturers a theoretical foundation on which to base new furniture concepts.

Figure 1. Conceptual Framework

Definitions

Sustainable consumption. Organization for Economic Cooperation and Development (2002) defines sustainable consumption as, "the [household] consumption of goods and services that meet basic needs and quality of life without jeopardizing the needs of future generations" (p. 16). This is based off the Bruntlandt commission's definition of sustainable development (NGO Committee on Education, 2011). Campbell adds that household decisions—"selection, purchase, use, maintenance, repair and disposal of any product and service"—are part of sustainable consumption (Campbell, 1998). Because of this, Life Cycle Assessment (LCA) is becoming an increasingly relevant tool for addressing the metrics of sustainable consumption (Loerincik et. al., 2005, p.228). Hofsetter et. al.'s 2006 study is a prime example of these two fields merging (Hofsetter et al., 2006). Hofsetter asks, "Should happiness be the functional unit of sustainable consumption" (Loerincik et. al., 2005, p.229)? It is important to note that for this report, sustainable consumption primarily refers to environmentally sustainable consumption.

Heirloom design. Heirloom design is a hybrid strategy that brings together the notions of design for longevity and design for emotion. The first is an ecodesign strategy, also known as *optimized product lifetime*, focuses on physical aspects, such as durability, maintenance, repair, upgrades, and second life (White et. al., 2009, p. 34). The second aspect is emotion that authors such as Norman (2004), Schifferstein and Zwartkruis-Pelgrim (2008) discuss at length. Topics under emotion include attachment, beauty, and memories. Both components are examined in detail in the following literature review. Heirloom design has been described as:

> A vision of shoes that can be repaired, cell phones too beautiful to throw away, and watches and calculators that are bequeathed to one's grandchildren. We would still have the same amount of stuff in our lives as we do now. It's just that the stuff would stay with us, for keeps (Winter, 2009, p. 39).

Heirloom furniture. When applying the *heirloom design* concept to furniture, a new category is identified – heirloom furniture. This strategy works particularly well for furniture because design for longevity and design for emotion approach the same goal, increasing longevity, from different angles. It is important to view furniture from its life cycle perspective, as it typically has very low impacts during the use phase, with the majority of impacts occuring in the production and disposal stages (Parikka-Alhola, 2008, p. 472). In most cases, market sectors where energy efficiency innovation is not an issue, extending product life is the environmentally preferable ecodesign strategy (Van Nes & Cramer, 2005, p. 287).

Goal

The goal of this research is to better understand the second-hand furniture market, identify furniture attributes that contribute to its success, and to find ways for designers and manufacturers to intentionally design furniture for prolonged life in this market. The research also attempts to understand the economic ramifications that furniture manufacturers face when designing for longevity. Additionally, this project will apply life cycle assessment to quantify the reduction in environmental impacts when an item is kept rather than discarded.

Scope

This study explores mass-produced modern furniture in the context of United States' (US) and the US consumer. One-off custom designs are outside the scope of the study, as is anything hand-made or produced before the year 1900. The reasoning for looking only at mass-produced designs is the sheer number of these products that are brought to market every day. This study lightly touches on how human emotions influence decisions about disposal of furniture, and frames the research in an economic context in order to provide insights for profitable business models. This study assumes that embodied environmental and human health impacts throughout the total life of products should be considered when assessing a product's impact, thus adopting a life cycle perspective.

Limitations

Based on this research, many opportunities are available for designers, manufacturers, and entrepreneurs to profitably increase a product's longevity. John Thackara (2006) points out in his book, *In the Bubble,* that the design phase is the point at which the most damage can be done or mitigated: "The designers and researchers at Pre' insist that environmentally sound materials do not exist; environmentally friendly design approaches do" (p. 14). This study does not try to give a complete solution to sustainable furniture design, but it does attempt to understand where manufacturers have opportunity to design furniture to be more environmentally benign. Nor will this study cover recycling-based design approaches or deal with recyclable materials. Recycling-based approaches, in all cases, require energy in the reuse phase, whereas repair, reuse, and upgrade require considerably less energy. This study acknowledges that manufacturing products for initial durability may be cost-intensive up front, but in the long run are a solution for helping combat planned obsolescence. Although some questions explore the psychology behind the thinking about furniture longevity, that is not the aim. Rather, the goal is to gain a better understanding of attitudes, opinions, and actual practices when it comes to the furniture reselling industry. This study does not assess different segments of the furniture market (by market value, functionality, or other sub-category), but deals with the category of furniture in general.

Research Strategy

The research strategy employs a multi-dimensional approach. The first study uses flexible and qualitative research techniques to understand the culture of objects surrounding second-hand markets (Robson, 2002, p. 88). This grounded theory exploration looks to generate theories on various aspects of understanding why some products have longer useful lives (p. 190). Interview research is used to uncover valuable insights. The second study is a non-experimental fixed strategy which employs a rigorous and quantitative environmental life cycle impact assessment of a single chair using SimaPro 7.1 software and three characterization and normalization methods (p. 88). This

assessment provides an overview of how lengthening product lifetime directly improves use of naturally occurring resources, reduces effects on the environment and effects on human health. This research is particularly important in the context of the economic system's way of producing energy, materials, and products that has come about in the last two centuries (Mumford, 1995, p. 28). Assessing the environmental impacts of consumer goods can be used to inform decision-making in the development of new products, especially with the increasing trend of globalization and the Internet age, and might ultimately influence how consumers research and buy goods.

Through secondary research, in the form of a literature review, the following concepts are examined: the disposable mindset of North American culture; how product obsolescence and consumption play into this mindset and hard data on waste and natural resource depletion. The project briefly touches on sustainable consumption by exploring economics and the relationship with the environment. The literature review culminates with an overview of eco-design strategies that are poised to lengthen product life span, namely: design for durability, design for emotion, and heirloom design.

Data was collected and analyzed using approaches based on grounded theory (Glaser & Strauss, 1967) and borrowed techniques from Miles and Huberman (1994). After clustering and coding, themes and other insights were visualized. From the findings, opportunities for implementation and future research were drawn and discussed as conclusions.

Viewpoint

> "Do not ignore interiors. After all, what is a building for? It is for doing something inside the building, It isn't for standing out on the street looking at it"
>
> – Warren Platner

Furniture and architecture are inseparable. Furniture relates to the human form in an intimate way by indicating use patterns, cuing flow in a space, and setting the aesthetic tone of the interior space. Different furniture in the same space can elicit various human responses and influence how people interact. You can almost pinpoint the

year something was built or renovated by looking solely at the furniture. Furniture lies at the intersection of my professional interests, hobbies, and life experience.

I was born and raised in the United States, a product of the 1980s. Growing up, my “Pack Rat” parents and “Depression Era” grandparents gave me an appreciation for thrift and understanding the value of old things, but the media has bombarded me with daily messages that, to be in fashion, I must purchase new things. These conflicting messages are part of the mass-produced, media-obsessed world I live in. As a student exposed to current topics, I always felt passionately about is how sad it is that Americans accept overconsumption so readily. In the last half of the century, the growing economy was built on consumerism. This model boosted our economy by cycling through poorly constructed, inexpensive goods. This rapid evolution of products is encouraged by constant barrage of mass media and marketing to throw out things that still function, and then purchase new because consumers are told that these goods will bring happiness. The end result is an overworked consumer and a culture of continual dissatisfaction. The dangers of this consumer-driven culture are pointed out by Mont in Jonathan Chapman’s book *Emotionally Durable Design (2005)*:

> The rampant consumption and waste of natural resources so prevalent in the developed world is a legacy of modern times, born largely from the inappropriate marriage of excessive material durability with fleeting product use careers. Some products are discarded before they are physically worn out or are technically superseded because their design is out of fashion or inappropriate to changed circumstances. (p. 8)

Many corporations have made it easy to buy new, shiny, cheaply made objects that live short lives in our homes and then, when they no longer look “fresh” or when we get tired of them, or when a new product is offered, we have a desire for the new thing and the old gets thrown in the dumpster. Trendy items, trinkets marketed toward children and youth, movie merchandising/ advertising, and many other short-lived products are unnecessarily bought and thrown away daily. The Happy meal could be considered the

“poster child” for American wastefulness, as it teaches our children to be happy with a plastic toy that gets thrown out soon after the meal is finished. I would like to suggest that if we teach our children to appreciate well made goods that will stand the test of time, then we will see a change in the amount of products whose lives end prematurely, meaning less trash for the landfill. Throwing trash “away” is not really “away.” It disappears from immediate sight and remembrance but remains on the earth. As a designer, I want to help my peers create furniture that will be worthy life-long companions for their owners. Creating furniture that lasts as long as its user is not a paradigm shift for the sake of being different: “If we’re going to avert ecological destruction, we need to not only do things differently, we need to do different things.” (Steffen, 2008). Doing things differently starts with designers—as Herbert Simon (1996) memorably stated, “Everyone designs to move from existing situations into preferred situations”—through design, I believe we can change this existing destructive situation and arrive at a preferred situation that takes the health of the environment into account as well as the welfare of people (p. 111).

According to Chapman (2005), “The mess we are in today is more likely to be a result of unsustainable developments in the way we design, manufacture and consume objects in the modern world” (p. 3). He says that the root cause of our unsustainable economy lies in our socially constructed consumption cycle and the manufacturing practices that have encouraged these: “production and consumption on their current guises are both inequitable and without a future” (p. 33). Chapman (2005) thinks that the current methods that designers employ has devolved into a treatment of non-sustainable “symptoms,” much like a band-aid on cancer; rather than treating the root cause, “sustainable design” regularly settles for a marginalized role in the product life cycle (p. 10). As a designer, there is an imperative duty to work with a product’s entire life cycle in mind, whether that be a building or a sandwich wrapper. Looking at the end of a product’s life is a critically important moment and may even change how a design begins. “When

you truly value this important moment, it necessarily impacts on all design decisions that precede it – often in unexpected and exciting ways" (Huff, 2010, p. 18).

Many visionary designers like Bruce Mao and Ezio Manzini call on designers to take action and start making giant steps in a new direction:

> Transition towards sustainability requires radical changes in the way we produce and consume and, in general, in the way we live. In fact, we need to learn how to *live better* (the entire population of the planet) and, at the same time, *reduce our ecological footprint* and *improve the quality of our social fabric*" (Manzini, 2007, p. 78).

Envisioning the future of a new system of living in America is an intense interdisciplinary effort, and one I am personally passionate about. The point of design should be to make our world a better place. In recent years, Americans have been more obsessed with making money and boosting the economy, this has overshadowed environmental and social objectives which are principle to sustainability. It is time for designers and manufacturers to regain the original intention of design and to create things they will proud of well into the future—things that put our planet and people first.

LITERATURE REVIEW

Introduction

The topics covered in this literature review are obsolescence, planned obsolescence, overconsumption, fashion, waste, resource depletion, economics and its relationship with the environment, sustainable consumption, and design strategies to increase product lifetime. A vast amount of literature exists on each one of these topics. A growing number of design researchers and thinkers write in the fields of sustainable consumption; many have proposed ecodesign strategies. It is important to cover a variety of topics and themes that relate to this research; it is by no means an exhaustive review of the literature, but should provide adequate context for the issues of interest.

Obsolescence

Obsolescence. In modern consumer culture, the term *obsolescence* seems normal, inevitable, and economically desirable because new things appeal to most people. *Planned obsolescence* stems from the early twentieth century when it stimulated the manufacturing economy. Design for obsolescence is the driving factor for why objects today live shorter lives than modern technologies allow.

In his book, *The Waste Makers*, Vance Packard (1960) distinguishes between three types of obsolescence: function, quality, and desirability. Obsolescence of function is when “an existing product becomes outmoded when a product is introduced that performs the function better.” Obsolescence of quality has to do with planned obsolescence: “a product breaks down or wears out at a given time, usually not too distant.” Lastly, obsolescence of desirability: “a product that is still sound in terms of quality or performance becomes ’worn out‘ in our minds because a styling or other change makes it seem less desirable” (p.21).

Victor Papanek (2009) agreed with Packard’s various types of obsolescence, detailing them in his book, *Design for the Real World*. For Papanek, the three types of obsolescence were technological, material and, artificial.

> Technological (a better or more elegant way of doing things is discovered), material, (the product wears out), and artificial (the death-rating of a product; either the materials are substandard and will wear out in a predictable time span, or else significant parts are not replaceable or repairable (p.34).

In “Inadequate Life? Evidence of Consumer Attitudes to Product Obsolescence,” Tim Cooper (2004) adapts Granberg’s definition of obsolescence, which refers to two types: relative and absolute. *Relative* refers to “a consumer’s decision to replace a functional product,” as opposed *absolute*, which refers to an actual product failure (p.423). While researching how consumers occasionally re-evaluate their possessions, Granberg points out that with absolute obsolescence, inherent durability is dependent upon three factors: the material’s ability to resist degradation or “wear and tear,” construction quality (related to quality-controlled manufacturing), and maintenance or repair factors (set by the manufacturer). As for relative obsolescence, Granberg distinguishes between “functional” and “psychological” reasons – which come about when consumers evaluate their existing models to that of new models. Objective criteria such as economic depreciation, technological change, and new situations that affect need fit under the “functional” category, while (subjective) perceived changes associated with past experiences, status achievement, fashion, or aesthetics are deemed “psychological” (Granberg, 1997).

In *Made to Break: Technology and Obsolescence in America,* Giles Slade (2006) reframes obsolescence as disposability, an American device which has fostered a rapidly changing and progressive culture. Three types of deliberate obsolescence are: technological, psychological, and planned (p.4). Technological obsolescence is created by advances in technology that increase convenience or safety for the consumer. Psychological obsolescence is a manipulative practice used by manufacturers, based solely on changes to the superficial appearance of a product. Once manufacturers discovered they could cheaply renew demand for a product by giving their product a new form, this technique became widely adopted (p.36). Lastly, planned obsolescence is “the

catch-all phrase used to describe the assortment of techniques used to artificially limit the durability of a manufactured good in order to stimulate repetitive consumption" (p.5).

Planned obsolescence. Slade (2006) points out that one of the earliest references to planned obsolescence is in Bernard London's 1932 publication titled *Ending the Depression through Planned Obsolescence* (p. 76). Early on, manufacturers regarded planned obsolescence as an important business tool to stimulate consumer replacement buying. Sheldon and Arens (1932) wrote that:

> People are persuaded to abandon the old and buy the new to be up-to-date, to have the right and correct thing. Does there seem to be a sad waste in the process? Not at all. Wearing things out does not produce prosperity but buying things does" (p. 7).

This thinking became commonplace among manufacturers during the Great Depression, manifest in a scheme known as "adulteration". By using substandard materials and careless workmanship, products were intentionally diluted—driving people to replace their products frequently out of necessity (Slade, 2006, p.77). In *Designing Things,* Boradkar (2010) gives a history of planned obsolescence, pointing out that many American designers readily accepted the economic opportunity they saw in the practice of planned obsolescence, including American designer Brooks Stevens who in the 1950s described it as "instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary" (Heskett, 2003, p. 4). Others involved in its promotion included Gordon Lippincott, George Nelson, and Harley Earl (Boradkar 2010, p. 181). But not everyone was in favor with planned obsolescence, as some despised the wastefulness it produced. In 1960, Vance Packard wrote *The Waste Makers* vehemently in opposition to it, and in 1971, Victor Papanek (2009) followed with a charge to designers to fight against this practice in his book *Design for the Real World.*

The American economy is consumer-driven; it must have a constant stream of buying, therefore obsolescence continues to be a necessary component of it today. As Boradkar (2010) points out, "economists have demonstrated that [planned obsolescence]

products is of economic advantage to firms operating in competitive as well as monopolistic markets" (p. 200).

Planned obsolescence in business and marketing literature is defined in many ways. In "Creative Destruction and Destructive Creations: Environmental Ethics and Planned Obsolescence," Joseph Guiltinan (2009) surveyed a variety of planned obsolescence techniques to show how it is employed to this day, and to argue why it is profitable. The following strategies exemplify different approaches to planned obsolescence:

- *Limited functional life design* – "death dating" of the 1950s and 1960s, a common industry practice of artificially limiting the functional life of products (Slade, 2006).
- *Design for limited repair* – this includes single-use and disposable products.
- *Design for aesthetics that lead to reduced satisfaction* – when something is designed to have "faultless forms and surfaces," but is easily damaged with intended everyday use, consumers are less likely to keep it (Cooper, 2005).
- *Design for fashion* – trends influence people's replacement decision.
- *Design for functional enhancement through adding or upgrading product features* – new features, such as in computers, which make the old less desirable.

From this, Guiltinan determines three reasons that manufacturers rely on obsolescence: "stimulating revenue, reducing competition from used markets, and to increase prices for replacement products" (Guiltinan, 2009, p. 21).

The manipulation of consumers to regularly replace items is commonly a manufacturer-driven plan. The direct result of planned obsolescence is a shortened product life span. Jeremy Bulow, in *An Economic Theory of Planned Obsolescence*, bluntly defines planned obsolescence as "the production of goods with uneconomically short useful lives so that customers will have to make repeat purchases" (Bulow, 1986). Orbach defines planned obsolescence as "a strategy of shortening the lifetime of a product before it is released onto the market. Under this strategy the manufacturer 'convinces' the consumer to replace an old product with a new one, thereby rendering the

lifetime of the old product shorter than its actual useful lifetime" (Orbach, 2004, p. 24). In his book, *The Durable Use of Consumer Products,* Michel Kostecki (1998) articulated a list of reasons why consumer products often have shortened life spans:

- "Strategies expanding market size through lesser durability continue to be widely followed.
- Managerial decision-making is biased towards single use.
- Consumers have a preference for novelty.
- Consumers are manipulated to consume faster.
- Higher per capita income reduces consumers concern with optimal use of products.
- Product/service price ratio has changed to the disadvantage of the repair service.
- Technological progress renders products obsolete.
- It is difficult to communicate the benefits of durability to the consumer.
- Used products have an image problem.
- The system of retake, remarketing and remanufacturing tend to be archaic and ineffective" (p. 10).

As Kostecki's list points out, not all of these reasons are manufacturer-driven; shortened life spans, for example, are often consumer-driven.

Consumer replacement decisions. Van Nes and Cramer (2005b) point out an important reality for manufacturers who intend to develop long-lasting products: "The decision to replace a product is made directly by the consumer" (p.1317). This is important when attempting to influence consumers' replacement decisions in an environmentally preferred direction.

Heiskanen, in a study of product life extension, identified three categories of obsolescence to explain why people replace products: failure (due to technical life span – specified by a manufacturer or customer behavior), dissatisfaction (prompted by the desire for new innovated products, updated features or styling, fashion or changes in

lifestyle), and a change in consumer needs (externally influenced changes in a consumer's life) (Heiskanen, 1996).

Four distinct motives for product replacement are identified in a study by Van Nes & Cramer (2005a):

(1) wear and tear (due to loss of partial or complete function)

(2) improved utility (related to loss of function combined with the desire for improvement in "safety and/or the economy of use of the product")

(3) improved expression (related to loss of function combined with desire for any combination of the following: comfort of use, quality, or design)

(4) new desires (meets new desires for comfort of use, design, quality, safety, etc.) (p. 293).

The authors conclude: "What people basically want is a well functioning and up to date product that meets their altering needs" (p.293). They state that this means products should be designed to be flexible, updatable, and amenable to anticipated future obstacles.

Slade (2006), referring to the work of consumer sociologist Collin Campbell, notes: "Campbell refuses to blame manufacturers or marketers alone for the massive amount of waste produced by our throwaway culture." Slade goes explains the condition of *neophilia*—the disdain for signs of wear on the items; "they want to live in new houses, drive new cars and wear new clothing. They immediately replace anything from furniture to plumbing fixtures that bears the slightest sight of wear" (p. 266).

Researchers have explored the motivations and the decision-making processes of consumers with regard to product replacement: "during the ownership of a product, a consumer mentally depreciates the initial purchase price by creating a kind of 'mental book value' for the product" (Okada, 2001, p. 435). Okada (2001) concludes that consumers resist throwing out items that still have remaining "book value" imagined or otherwise (p. 435).

Consumption and its Consequences

Ghandi once said the “earth provides enough to satisfy every man’s need, but not every man’s greed” (Schumacher, 1989, p.34).

Overconsumption. Compared to nations or populations with low per-capita incomes, nations or populations with high per-capita incomes consume a proportionally greater amount of natural resources and material goods. Not only do high-income nations consume more resources, they also create much more pollution and environmental damage (Chapman, 2005, p.62). “In 2005, the wealthiest 20% of the world accounted for 76.6% of total private consumption. The poorest fifth just 1.5%... Breaking that down slightly further, the poorest 10% accounted for just 0.5% and the wealthiest 10% accounted for 59% of all the consumption” (Shah, 2010).

In the case of manufactured products, the term *consume* can be misleading. Landfills around the globe swell with dishwashers, televisions, hairdryers, computers, mobile phones, answering machines, bicycles, food processors and much more. Most of these discarded items have spent a year or so of conscious time in the garage prior to being dumped. Many of these products – in a utilitarian sense – still function perfectly and most definitely have not reached the end of their functional life. So, what have these apparently indispensable life-changing products ceased to do in order to be granted a 4000-year death sentence of slow biodegradation (Chapman, 2005, p.36)?

Sociologist Robert Bocock (1993) attempts to answer this question by labeling consumerism as a socio-cultural issue coming from a sense of deficiency. “Consumption is founded on a lack – a desire for something always not there. Modern/post-modern consumers, therefore, will never be satisfied. The more they consume, the more they will desire to consume” (p. 46). Chapman (2005) explains Bocock’s reasoning as a “restless state of being” contributing to consumer discontentment causing consumer “behaviors such as shopping, discarding or other modification to the material fabric of one’s life” (p.38). In response to this problem, the Buy Nothing Day Organization blames advertising with “nurturing dissatisfaction within consumers” since “advertising abets over-

consumption by causing people to feel unfulfilled with what they have, and playing with many personal insecurities, manipulating people into buying more" (Buy Nothing Day Organization, 2011).

In the article, *Toward a Sociology of Consumption,* authors Nicosia and Mayer (1976) study the nature and dynamics of consumption in affluent societies and recognize a link between social changes and consumption activities. Consumer behavior strongly contributes to the depletion of basic natural resources. Indicators for rapid consumption are identifiable as the social processes of cultural values, institutions, or societal norms (p. 69). Chapman (2005) explains that "Material consumption is driven by complex motivations and is about far more than just the acquisition of newer, shiner things. It is an endless personal journey toward the ideal or desired self that by its very nature becomes a process of incremental destruction" (p. 30). Peter Corrigan, in his book *The Sociology of Consumption*, examines how users express themselves through their possessions. Corrigan argues that people use their physical possessions to tell the world who they are (Corrigan, 1997). Humans express themselves through the products they own. If no products existed, we might have a different means of expressing ourselves. "Products provide a tangible means for us to engage with the world on this abstract level, and the motivators underpinning the drive to consume are powerfully influenced by emotional and psychological factors" (Chapman, 2005, p.11). Possessions, although not part of the human being, may reflect the desires, self image and hopes of an individual. Possessions can be part of an individual's personal history serving as a memento or milestone in his or her life. Possessions may be part of the personal history of a wider audience such as a family, culture or a nation. Possessions set the stage for human existence.

> We transfer resources into products that – in a sense – provide us with existential mirrors, allowing us to view and experience our dreams and desires in real time. These reflections help us to construct an identity that we feel is individual, while also being indicative of our individual aspirations and dreams. In this respect, objects are meaningful in that they illustrate – both to society and the self – our

> personal life journeys. The process of consumption also appears to possess a quality of avoidance: by continually busying ourselves within a world of goods and services, we cunningly side step sensations of emptiness through sheer distraction – consumption gives us a sense of purpose (Chapman 2005, p. 36).

In other words, we keep products that reflect our own existence or maintain our desired reflection, and dispose of products when they fail to reflect our desired persona (Chapman 2005, p. 42).

Fashion. Leslie and Reimer (2003) point out that strong associations exist between clothing and furniture. Fashion companies have seen that there is a market for furniture and are moving into its realm, examples of which are Ralph Lauren, Calvin Klein, Donna Karen, and Banana Republic. The proliferation of explicitly lifestyle-oriented retailers such as IKEA, Urban Outfitters, and Pottery Barn also suggests that a more fashion-centered and disposable notion of furniture has taken hold in the U.S. market. There is a purposeful blending of these two realms of related design. Current magazines illustrate this, showcasing fashion and furnishings side-by-side (e.g. *Elle* and *Elle Decoration*). “New magazines launched in the 1990s such as *Wallpaper* and *Living etc.* explicitly combine furniture and fashion design, travel, and food” (p. 428). Idealized life as seen in magazines and other media must be furnished with the correct styles in apparel and objects. Consumers are drawn to a style which manifests itself through a variety of product offerings.

> Commodity chains continually evolve through interaction with many other sectors. While investigating the material and cultural practices associated with the home furnishings commodity chain, we frequently encountered overlapping articulations with architecture and clothing. Recent transformations of the furniture network have involved alterations to the temporality and spatiality of furniture which are in part tied to a blurring with the fashion industry (p. 427).

Thinking of furniture as fashion is especially disconcerting because most people do not wear their clothes as long as they could; they change fashion and dispose of

clothing long before it is worn out. Now it seems the rapid cycles are extending to durable products such as appliances, technology, and furniture (Slade, 2006, p.65). Fashion accelerates obsolescence and waste since it is continually changing, replacing one design with another due to its fickle and dynamic nature. Slade (2006) explains that more often "people are persuaded to abandon the old and buy the new in order to be up-to-date, to have the right and correct thing" (p. 66). Leslie and Reimer (2003) explain the problem further, squarely pointing a finger at furniture retailers and manufacturers that "accelerate the fashion cycle for furniture" (p.427). The higher price of most furniture compared to most clothing may attenuate this trend. Throughout most of the twentieth century furniture consumption was at a much slower pace because furniture was considered a durable good, with most pieces of furniture being replaced only 1.5 times on average in a consumer's life (p. 430).

> If increasing disposability in clothing is viewed as morally or environmentally problematic, how much more questionable is the speeding up of fashion cycles in furniture? …Consumer concerns about the environmental consequences of increasing disposability or an enduring cost differential between furniture and other goods – even in an era of IKEA (p. 436).

Buying second-hand. With the internet came a rise of online sellers and venues such as eBay and craigslist to enable the exchange of goods and to provide a large market for second-hand individual sellers. Craigslist and eBay expand the possibilities of searchable used items and products. Craigslist's venue is the best of both worlds, primarily local but searchable globally: "the joint phenomena of globalization and increased connectivity have given rise once again to the local dimension…the new local combines specific features of places and their communities with the new phenomena generated and supported worldwide by globalization and by cultural, socio-economic interconnection" (Manzini, 2007, p.81).

Valerie Thomas (2003), in her article "Demand and Dematerialization Impacts of Second-Hand Markets," questions whether this swapping, trading, and selling could be

fueling our desire for the exchange of old for new. She introduces readers to A.H. Fox's 1957 research: "second-hand market activity can increase demand for new goods." Fox argued that strong second-hand markets allow consumers to easily turn a liquid asset, such as a piece of furniture, into cash. This, by extension increases the primary (new) market by enabling people to easily sell their old things and buy brand new ones (Fox, 1957, p. 101). Although the findings in Thomas' (2003) article find that the opposite is true in the second-hand furniture market as well as a few others. Thomas (2003) believes that these markets decrease overall demand (p. 75). Ultimately the choice of new, used or vintage goods is determined by the consumer and is increasingly facilitated through the Internet (p. 76).

Waste. Waste is a distressing result of a failed user/object relationship. As Chapman (2005) points out, "The utopian futures promised by most products at the point of purchase set up grossly unrealistic expectations within consumers, and these expectations practically guarantee disappointment the moment honeymoon periods draw to a close" (p. 63). The result is waste. Pongrácz and Pohjola (2004) define four classes of waste.

1. Non-wanted things created, not intended, or not avoided, with no purpose.
2. Things that were given a finite purpose thus destined to become useless after fulfilling it.
3. Things with well-defined purpose, but their performance ceased being acceptable.
4. Things with well-defined purpose, and acceptable performance, but their users failed to use them for the intended purpose. (p.144)

Based on the United States Environmental Protection Agency's (2010) 2009 report on municipal solid waste (MSW): "Generation of furniture and furnishings in MSW has increased from 2.2 million tons in 1960 to 9.9 million tons in 2009". This increase of 7.7 million tons represents an increase of 450% in 49 years. "Wood is the largest material

category in furniture, with ferrous metals second. Plastics, glass, and other materials are also found in furniture" (p. 75).

"Currently in Europe, the average lifetime of a piece of office furniture ranges from 5 to 10 years. Almost 1.2 million tones of office furniture is discarded annually in the EU" (Parikka-Alhola, 2008, p. 476). Unfortunately, not all of these discarded desks, chairs and files are useless. Tim Cooper (2005) cites a research study that evaluated the condition of bulky household items discarded at waste sites and concluded that 77% of upholstered furniture could potentially be refurbished and reused (p. 60).

No matter how long a couch, a pair of shoes, or a teapot lasts, the reality is it will eventually become waste: "Modern society remains largely ignorant, often willfully so, of the inevitable end that the once cherished and shiny new objects of consumer society will find… all things are waste in the making" (Boradkar, 2010, p. 201). Unlike the artifacts of agrarian societies that largely decomposed after their usefulness was gone, our discards find their way into expansive, ever-growing landfills, or to a lesser extent, in waste incinerators. The waste is not only the discarded product, but also the emissions of many thousands of substances to water, air, and soil generated through the manufacture, packaging and shipping. Datschefski (2001) notes that "Thirty tonnes of waste are produced for each tonne of goods reaching the consumer, and 98 per cent of those goods end up being thrown away within six months" (p. 17). He does not explain whether or not waste at the raw material level, such as tailings in a mining process for copper ore, is included in his figures. This distinction is important to note, because waste at the raw material production stage is beyond the scope of this project.

According to Easterlin (1974), on the average, people are no happier in affluent countries than they are in low-income countries (p. 118). It is also known that economic growth does not automatically improve human well-being (Oswald, 1997, p. 1827). "Desire, consumption, waste – followed by re-desire" is today's vicious circle of dissatisfaction, wasted resources and inefficiency (Chapman & Gant, 2007, p. 10). Even recycling does not break this cycle, since, as Chapman (2005) points out, "Consumers

continue wastefully on, but do so, now, with recycled materials instead of virgin ones" (p. 9). Recycling provides consumers with a false sense of security – products that are produced with recycled content or allow for post-use recycling gives the consumer a cleaner conscience when it is time to potentially throw away or replace an object. This concept of recycling as a "free pass" has the potential to generate even more waste than before (p. 10).

Manufacturers and craftsmen traditionally took pride in their handiwork and what they produced, but modern consumer capitalism has caused a shift from crafts that lasted a lifetime to easy disposability of mass-produced garbage. "The proliferation of objects that once provided living testimony as to one's degree of individualism and uniqueness is today an ecological burden carried by the entire biosphere, of which we are an integral part"(Chapman & Gant, 2007, p. 10). The first step to enacting change is to recognize our trash problem and wastefulness. Hamilton gives a hopeful realization "four fifths of Americans believe they consume far more than they need to" (Hamilton, 2004, p. 14).

Resource depletion. Chapman (2005) offers this staggering statistic: "Over the last 50 years the world's population has increased by 50 per cent; but our resource utilization has increased by 1000 per cent for the same period" (p. 3). Our society as a whole has embraced the mindset of the free-market economy that produces continual innovation and a steady stream of improved products. We have come to expect that resources are ours for the taking as long as life gets better and better.

The durable goods of pre-industrial societies were primarily glass, ceramics, wood, various plant fibers, concrete, flax, cotton, silk, wool, stone, iron, bronze and copper – with compositions fairly close to their elemental material source. The last few decades have produced demand and market for durable and strong fibers, plastics and durable non-rusting metals. Corian, Kevlar, Teflon, polyester, polypropylene, polyethylene, styrene, and stainless steel are just a few examples of material technologies which are tough, stable and long-wearing. "Over 90 per cent of the resources taken out of the ground today become waste within only three months: waste

consisting of plastics, metals and other synthetic compounds no longer recognizable to the microbial decomposers that degrade substances back to their basic nutritional building blocks" (Chapman, 2005, p. 8). While resources in their natural pre-manufactured state break down some, once they are processed, they are no longer biodegradable. To illustrate this point, Chapman (2005) uses the example of plastic, which "has been projected to take as long as 4000 years, in some cases, to degrade fully" (p. 8). Even if all products were biodegradable, conditions for decay are not always optimal in American landfills. He notes that "even biodegradable waste such as paper, wood and other vegetable-based compounds escape decomposition as overloaded landfills lack the correct mix of water, oxygen and light for nature's microbial banquet to occur"(p. 8). Eventually our landfills may serve as our natural resource pools when our recycling technologies catch up with our voracious appetite for resources.

Economics and the Environment

In *Planned Obsolescence as an Economic Tool for Progress,* Arthur Fishman, Neil Gandal, and Oz Shy (1993) present the case for planned obsolescence as a tool for a healthy economy. They posit that in consumer durables, fast deterioration causes fast innovation and slow deterioration causes slow innovation (p. 361). Fishman et. al (1993) approach planned obsolescence from a traditional economic model, but in "ecological economics" Herman Daly and Joshua Farley (2004) present the argument that the economy is not a self-contained system, but rather a subset within the closed system of the natural environment. "Ecological economics has a fundamentally different starting point – a different vision at its core of the way the world really is." (p.15). Daly and Farley (2004) go on to explain that Ecological Economics puts the "macro-economy" as a subsystem of the whole – in their words the "Earthsystem." They explain that this system is finite, non-growing and materially closed; aside from solar energy, it has a finite amount of resources. It is, they say, a "closed system." They also explain that the current economic model views this Earthsystem solely from the perspective of how its resources can be exploited for economic gain – "forest, fisheries, grasslands, mines, wells,

ecotourist sites and so on" (p.15). The authors also touch on the concept of natural capital "Natural capital is a stock that yields a flow of natural services and tangible natural resources. This includes solar energy, land, minerals and fossil fuels, water, living organisms and the services provided by the interactions of all these elements in ecological systems" (p.17). Defining the earth's resources as natural capital puts it into the economic model as an asset with a limited supply. Daly and Farley (2004) argue that for a functional system, repairing of the dysfunctional system requires a paradigm shift in metrics used to measure economic success. "As the economy grows, natural capital is physically transformed into man-made capital" (p. 19). This statement implies a change in the economic model to include the role of a limited natural asset in limiting economic growth. This perspective is conspicuously absent in Fishman et al.'s (1993) view of planned obsolescence. While all recognize the importance of not destroying finite or competing resources (such as agriculture and biofuel), not all economists agree that natural resources limit growth. In fact, there is another school of thought, lead by Ehrlich, who believe that technological evolution allows us to use resources more efficiently, and hence allows the economy to grow. (Population matters, 2011, p. 1). Under this assumption, however, the carrying capacity of the earth is in question: "even with very modest lifestyles and very good technology, human activity will still be unsustainable if the population is too large" (p.1).

Happiness. The concept of economic metrics is also examined in "Happiness and Economic Performance," in which Andrew J. Oswald (1997) draws both correlations and disconnects from economic performance and the happiness of constituents (people) within that economic system. His study found that "reported happiness is high among those who are married, on high income, women, whites, the well-educated, the self-employed, the retired, and those looking after the home. Happiness is apparently U-shaped in age (minimizing around the 30's)" (p. 1823). Although money plays a factor in happiness, it is by no means the only indicator whether people experience a happy existence. Oswald's study also makes the point that the highest education levels had the

highest levels of stress, compared to less-educated demographics. When the economy is good, people are not necessarily happy and when it is depressed, it does not mean that they are necessarily unhappy (p. 1827). Current economic modeling does not capture real-world conditions—be it, the happiness of people or the status of the "Earthsystem".

Connecting this concept of happiness and economic performance, Ann Thorpe (2007), along with other authors in *Designer's Atlas of Sustainability,* points out that overconsumption and a debt-based economy is largely a 20th century invention. In agreement with "Ecological Economics" she agrees with the argument that the current economic model places no value on natural resources that play a vital role in the closed-loop ecological system called planet earth. "Many important values and resources such as clean ocean water or diverse languages are difficult or impossible to price in the marketplace. The market in effect gives these the price of zero, and the result is that we treat them as though they have no value at all. At the same time, the damage caused to these unpriced resources are not measured by the market either" (p. 67). Thinking of these resources in terms of revenue is difficult, but a necessary challenge to economists. Thorpe sets a staggering figure: "Nature's services are estimated to be worth $36 trillion annually. This figure is probably a conservative estimate considering that we can't life without nature's biological services, and many can't be replaced at any price. Yet the market counts these as "free" because we don't pay money for them" (p. 67). These natural resources are the backbone of our economy and broadening our worldview to include the "Earthsystem" would re-write the paradigm of our economic system. Wood (2007) is blunt about the trade-offs involved: "The idea that the economy is more important than the ecosystem is not only bad for business, it is bad for all of us" (p.108). The global adoption of a new model that more accurately includes and places value on natural and human capital would certainly accelerate the potential for sustainable development and consumption.

Sustainable Development

In 1987, the Brundtland Commission gave us a new definition and model: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (NGO Committee on Education, 2011). In 1994, John Elkington's "triple bottom line" urged corporations to think not only of the economic bottom line but also to consider social and environmental factors (Elkington, 1994, p. 69). This concept demands that a company's responsibility lies with stakeholders rather than shareholders. Decisions of today shape the future of every human and the condition of the environment; thus each person can be considered a stakeholder.

Sustainable Consumption. From this logic, a new ethic emerged, led by the Organization for Economic Cooperation and Development, which defines sustainable consumption as, "the consumption of goods and services that meet basic needs and quality of life without jeopardizing the needs of future generations"(OECD, 2002). Sustainable consumption depends on increasing life cycles of products and goods. Lawn chairs, dressers, and entertainment centers do not last as long as they could. "Sustainable consumption is unlikely to be achieved as long as the quantity of household waste generated in industrial nations continues to rise. One factor underlying this trend is the life span of household goods." (Cooper, 2005, p. 51) Tim Cooper points out that product life as a means to sustainable consumption has resurrected a broader array of issues: "More recently, the growing importance of sustainable product design, integrated product policy, and sustainable consumption has revived interest in product life. Research… suggested that product life spans are determined by a complex range of factors that include design, technological change, the cost of repair and availability of parts, household affluence, residual resale values, aesthetic and functional quality, fashion, advertising, and social pressure" (2004, p. 422). Many of these factors that influence product life could be addressed by the manufacturer and designer since the consumers can only choose from goods offered to them. Cooper's study on consumers'

perceptions of durable goods concludes that consumers rarely consider durability to be a critical element, and see product life span not as an environmental issue, but instead as a quality issue. He also finds that concern for the environment or waste does not make people more likely to repair objects. (p. 446). This is an odd disconnect between values and actions of consumers.

As for consumers committed to making more environmentally responsible decisions, the research of Niva and Timonen (2001) finds that consumers are confused even when they are educated about the ecological ramifications of their choices, and defer environmental responsibilities and screening to manufacturers and distributors who have conflicted interests (p. 336). If this is the case, Guiltinan (2009) suggests two opportunities for addressing environmental concerns: “(1) the designers and engineers responsible for choosing specific components, materials, architectures, and interfaces, and (2) marketing and business strategists” (p. 23).

At this time, no one is able to determine whether a product, service, or behavior unambiguously qualifies as sustainable consumption. Currently, metrics for sustainable consumption are under investigation. Sustainable consumption and environmental life cycle assessment (LCA) have come together and sparked an interesting conversation. Many authors agree that LCA will pay a major role in sustainable consumption (Loerincik, Kaenzig & Jolliet, 2005). When conducting a life cycle assessment, the functional unit is the mode of comparison between various products. Patrick Hofstetter posed the question “Should happiness be the functional unit of sustainable consumption” (Loerincik, Kaenzig & Jolliet, 2005)? This thinking frames design decisions in light of human well-being. This is no easy task, as measuring any impact a product has on meeting all human needs can be difficult. The result of putting happiness as a functional unit is that furniture would have metrics that correlate to their emotional durability.

The Slow Movement. Slow Food is a global grassroots organization started in Italy in 1986. Its mission is “to counter the rise of fast food and fast life, the disappearance of local food traditions and people’s dwindling interest in the food they eat,

where it comes from, how it tastes and how our food choices affect the rest of the world." It now claims 100,000 members in over 150 countries (Slow Food, 2011). This movement prompted a wave of discourse into quality of life and happiness. From this discussion stems other dissatisfied groups and activists who have adapted the concept to their cause. Cooper (2005) points out that the "The slow concept is now being applied as a prefix in other contexts" (p.54). In particular, designers and thinkers have embraced this movement in the context of sustainability. Some examples of the groups that exist are: The Sloth Club, Slow Cities, Long Now Foundation, Thinkcycle, Doors of Perception, Slow planet, SlowLab and Tempo (Fuad-Luke, 2004).

The slow concept has challenged even the fashion industry as Hazel Clark (2008) notes in "Slow + Fashion" (p. 428). She cites London-based fashion studio Worn Again: "Our vision is to transform waste and manufacturing patterns through sustainable innovation, using textile waste as a resource to create new products, green jobs, good growth and to lead a saleable re-manufacturing industry, becoming an international beacon for closed loop upcycling processes" (Worn Again, 2011). Giulio Ceppi's (2006) idea of "sustainable sensoriality" implies a transparent life cycle approach that Clark describes as "the way of understanding a product from the knowledge of how it is made, through its raw material to the end product, rather than just through (the exaltation of the experience of) consumption" This implies that manufacturers will have to open up in a vulnerable way, possibly exposing their flaws.

> "For mass-produced fast fashion the metaphor of speed serves as a smoke screen for the harsh realities of the sourcing of materials, means of production, conditions of workers, distances traveled for distribution, and other less acceptable factors. A slow or more sustainable approach focuses greater attention on valuing and knowing the object, and demands design that generates significant experiences, which are not transformed into empty images for rapid consumption" (p. 6).

The “slow” concept has been adopted by designers as a possible approach to reduce consumption patterns in affluent nations. Ax (2001) points out the need to slow the rate at which raw materials are transformed into consumable products and eventually discarded – she labels this term “slow consumption” (p. 402). Cooper (2005) gives a preliminary model for sustainable consumption based upon harmonizing eco-efficiency and slow consumption, which leads to longer product life spans and oversight. Although he cautions that eco-efficiency with overconsumption is still waste and slow consumption without eco-efficiency is simply a recession (p. 55).

Since 80 per cent of the environmental impact of today’s products, services and infrastructures is determined at the design stage (Graedel & Allenby, 1995), it is important for designers to focus on *eco-efficiency* and *slow consumption* as a means to produce products with increased product life spans in order to move toward sustainable consumption. Alastair Fuad-Luke (2006) lists guidelines for designers:

A sustainable slow designer will design to:

1. satisfy real needs rather than transient fashionable or market-driven needs.
2. reduce resource flows and environmental pollution by minimizing the ecological footprint of products/service products.
3. harness solar income—sun, wind, water or sea power and renewable materials
4. enable separation of components of products/service products at the end-of-life in order to encourage recycling, reuse and remanufacturing.
5. exclude the use of substances toxic or hazardous to humans and other forms of life at all stages of the product life cycle.
6. engender maximum benefits of well-being to the intended audience
7. educate the client and the user by encouraging sustainable literacy and graphicacy.
8. exclude innovation lethargy by re-examining original assumptions behind existing products

9. dematerialize products into service products wherever there is proven benefit in terms of individual, social and/or environmental well-being
10. ensure physically, culturally, emotionally, mentally and spiritually durable products
11. maximize products benefits to socio-cultural communities.
12. encourage modularity: to permit sequential purchases, as needs and funds permit; to facilitate repair /reuse; to improve functionality.
13. foster debate and challenge the status quo surrounding existing products.
14. publish sustainable designs in the public domain for everyone's benefit, especially those designs which commerce will not manufacture.
15. promote Design for Sustainability as an opportunity not a threat to the status quo.

(p. 15)

Design Strategies for Increased Life Spans

Product durability. Cooper (1994) defines durability as: "the ability of a product to perform its required function over a lengthy period under normal conditions of use without excessive expenditure on maintenance or repair" (p. 2). Function is a requirement, but economic considerations do not play a role in this definition. Kostecki (1998) expands the definition of durability to include three facets: (1) functional (effectiveness in relation to other products), (2) economic (product's comparative performance/cost ratio) and (3) symbolic (capability to meet abstract needs and facilitate image perceptions) (p.17).

In his book *Rubbish Theory*, social scientist Michael Thompson (1979) points out that durability is socially constructed and relates to individuals continually changing worldview. Thompson explores cultural and economic constructions of value related to man-made objects, cultural artifacts, and ideas. He proposes that throughout an object's lifetime, value levels change and can be viewed as either: "transient (value decreasing), rubbish (no value) or durable (value increasing)" (Noble, 2004, p. 113).

A few authors describe durability in terms of *lifetime optimization*, which seeks to differentiate between making things last as long as possible and making them last an appropriate amount of time (Van Nes & Cramer, 2005a). Both Chapman (2005) and Van Hinte (2004) suggest that durable and tough-wearing designs should have careful oversight and follow-up, because substantially more resources may be required to make them than other products. It is critical for these to not end up in the landfill, as St. Pierre (2008) cautions:

> "not all products can and should be designed for longevity. In many cases, alternate end-of-life strategies should be considered, such as recycling, biodegradability, reuse or design for next life. In some circumstances, older products may be so ecologically inefficient that it is best to replace them with new models that consume fewer resources" (p. 31).

St. Pierre mentions this in the context of the use phase of products where I would argue that this rarely applies to the furniture sector (except for maybe in the case of furniture with built-in electronics, such as a speaker or lighting that is placed inside an end table). As Parikka-Alhola (2008) points out in her article, *Promoting Environmentally Sound Furniture by Green Public Procurement,* furniture is one area where extending the lifetime of a piece could do substantial good: "for furniture, environmental impacts are quite limited during use but more associated with production and disposal" (p. 472). In most cases, in market sectors where energy efficiency innovation is not an issue, extending product life the ecologically preferable ecodesign strategy (Van Nes & Cramer, 2005a, p. 287). Nonetheless, when conceptualizing a piece of furniture to be made out of materials that are of higher quality, designers should carefully consider the product lifetime in order to see if the designing a more durable product is appropriate.

As for *lifetime optimization* strategies, White, St. Pierre and Belletire (2009) give various strategies that contribute to an optimized product lifetime. "Build in user's desire to care for product long term, design for take-back programs, build for durability, design

for maintenance and easy repair, design for upgrades, design for second life with different function [and] create timeless look or fashion" (p. 34).

The emotional relationship with a product and its relationship with durability, harkens back to the opening part in this section on function. Authors Verbeek and Kockelkoren (1998) suggest the route to durability is through greater transparency with use, function, and usability. When consumers and users understand the inner workings of a product, they interact with it and maintain it. Through this dependency, a connection is made. But, when an object is so shrouded in mystery that it is not apparent how to repair, maintain, or care for an object, the relationship is lost and that object is typically thrown away (p. 38). Transparency in function is a means to building a relationship between a product and a user.

Emotion. People display a range of emotions when interacting with possessions. Products such as furniture become intertwined with intangibles such as pleasure, meaning, attachment, value, memory, nostalgia, and symbolism.

According to Woolley (2003), the consumer goes through several phases on his way to deciding whether an object will be kept. The initial phases start with anticipation and exploration. During the use phase a product either provides long-term pleasure and satisfaction or the owner becomes dissatisfied with it. At this point, the product is either kept or discarded. The phenomena of the fifth phase (see Table 1.), at which point a product is kept because it provides satisfaction and pleasure would be an optimal outcome and a goal for a product designer. Heirlooms, collectibles and antiques make it to this phase often due to the respect the owner has for the item. The owner takes pride in ownership and may have an attachment to the object. In this case, the object may transcend its original function; reasons for this new value include sentiment (memories, stories and associations), historical context, or physical/sensory attributes (p. 78).

Table 1.

Table of Pleasure and Use (Woolley, 2003, p. 78).

	Phase	Pleasure	Change	Outcome
1	pre-purchase	anticipation	growing pleasure	arousal
2	short-term	exploration	optimum pleasure	excitement
3	medium-term	application	decreasing pleasure	assimilation
4	long-term	use	pleasure to dissatisfaction	disinterest or boredom
			DISPOSAL OR RETENTION	
5	beyond	satisfaction	life-time pleasure in ownership	respect

Economic value and emotion are independent of one another. High-end vintage dealers have learned the monetary value of artifacts in this category, thus they are able to capitalize on the inherent assigned values. Collectors take stock in collectables and antiques, and the rich stories that so often go along with these items. Shifferstein and Zwartkruis-Pelgrim (2008) disagree with using market value as an indicator, because the monetary value of a product is probably largely independent of its emotional value to a particular owner or user (p. 3). Many times people do not know the value of their beloved artifact when they bring it to the "Antiques Roadshow," At the end of a brief interview, the appraisal price is revealed and the owner reacts with gasps of surprise or subdued disappointment.

Beauty plays an important role in design for longevity and the future of heirloom-quality products. "If we believe that we are designing for longevity, we can invest in visioning a new way of being in the future and a new relationship between artifact, lifestyle, humanity and the environment" (St. Pierre, 2008, p. 32). If taking the "quality over quantity" approach literally, the intangible of luxury might influence consumers to desire this product, increasing brand loyalty and driving sales. This could potentially be a sustainable business approach if the product was manufactured, sourced, produced, and

distributed locally, and done in a socially equitable way. Marketing these “luxury goods” could breed a resurgence of localization. Although this may add cost to the product, purchasers will need to weigh whether the premium materials are worth the extra investment. Saul Griffith agrees with this approach to increase quality, stating that “objects designed to endure over decades need to be not only functional but also beautiful…A beautifully made object—whether it’s a wristwatch, an iPhone, or a Fender Stratocaster guitar—is more likely to be used and maintained” (Winters, 2009, p. 42). Slade (2006) sees beauty as an important reason to keep things forever. This concept of more beautiful and durable goods conflicts with the consumption driven economy as illustrated by Huxley in *Brave New World*:

> “Why is it Prohibited? Asked the Savage…
>
> The controller shrugged his shoulders. “Because it’s old; that’s the chief reason. We haven’t any use for old things here.”
>
> “Even when they beautiful?”
>
> “Particularly when they’re beautiful. Beauty’s attractive, and we don’t want people to be attracted by old things. We want them to like new ones.” (Huxley, 2010, p. 241).

Attachment. Emotional attachment, as explored in his book *Emotional Design* by Donald Norman (2004), is derived from three levels of product interaction: visceral, behavioral, and reflective (p. 5). These three levels are activated by the senses and create a response in people based on a combination of these: automatic human responses built into our human nature, the function of the object, and cognitive responses derived from our experiential resources (p.21). Authors Schifferstein and Zwartkruis-Pelgrim (2008) find that “when a person becomes attached to an object, he or she is more likely to handle the object with care, repair it when it breaks down, and postpone its replacement as long as possible” (p. 1). This statement implies that designing products to promote emotional attachment is one approach to lengthening the life span of products. Miles Park (2006) adds that there are in fact, three realms of product longevity: “design

that facilitates emotional attachment to objects (the behavioral level), design that maintains quality over the passage of time (the product level) and design that provides for ease of ongoing repair and upgrade (the system level)."

Muggee, Schifferstein and Schoormans (2004) focus on personalization, the connection between self-expression and emotional attachment in products whose appearance can be changed to show the world who the consumer is. When the owner spends energy to express him/herself and change their product to meet their preferences, this self expression increases the owner's attachment to the product (p.10).

Heirloom design.

> One way of encouraging more sustainable behavior is to change the 'meaningfulness' of commodities, creating stories around products that allow consumers to build stronger connections to their possessions, incentivizing them to keep products around longer, and engendering concern with the goods' pasts and futures (Oehlberg, Aipperspach & Jefferey, 2007, p. 1).

Some objects are designed to last through the years, but what about electronics and other time-sensitive technology? Designers can challenge themselves to think of product repair, upgrade, durability, and beauty from the initial design intent. If we buy new things that are designed to last, not only will they be more environmentally conscientious, they will also increase collaboration and community by giving a sense of history and a story to our products. This thinking has the potential to leave a lasting legacy in the future of our society and how we helped change our course of history from destruction to a constructive paradigm (Winters, 2009, p. 43). In some cases, designing for project longevity or heirloom quality from the initial project conception will nudge the designer and client to think in unfamiliar territory. The key to the success of these robust designs will be the long-term user experience, creating attachment, quenching desire for new products, upgrading products, product reliability, and repairing the products when they are broken or malfunction.

> Instead of buying a new cell phone to get new features, for example, consumers would just have new circuitry installed in their existing handset. And the kind of maintenance and repair that motorists routinely schedule for their cars could be adopted by users of computers, televisions, and other electronics (Winters, 2009, p. 42).

Winters (2009) describes this prime opportunity for furniture manufacturers to expand their range of capabilities and to offer services that could enable long-term user satisfaction and build the relationship with their customers.

RESEARCH METHODS

Research Strategy Overview

This research incorporates both fixed and flexible elements in a multi-method or hybrid approach (Robson, 1993, p. 87). First, a flexible, qualitative grounded-theory case study is conducted and followed with a fixed non-experimental quantitative environmental life cycle assessment. A literature review provides context as secondary research. Figure 2 is visual overview of my research approach:

Figure 2. Research Approach

Planning. After deciding on my topic, I reviewed pertinent literature on the topic and related themes. Tony Buzan's (1996) mind-mapping technique, described in his book *The Mind Map Book: How to Use Radiant Thinking to Maximize Your Brain's Untapped Potential,* helped me identify and solidify a list of questions and a conceptual framework. From there I came up with a list of questions. From these questions, I decided to plan out how I would answer each one. I settled on using semi-structured interviews for many of the questions. This led to the development of an interview guide to (see appendix D). The documents for this study were then submitted to Arizona State University's Institutional Review Board and were approved as "exempt" (see appendix B).

Goal. This research was conducted to generate theories and principles for furniture designers and manufacturers. Two additional objectives are to envision ways to enact societal change and to inform future research studies.

Secondary Research

Literature Review. This element of my research prepares a basic understanding of the context and provides the theoretical foundation for the primary data collection. Its purpose was not to find theories for which to base data collection, but rather to enrich a

reader's understanding of the primary research results. How these topics relate to my research is shown in Figure 3:

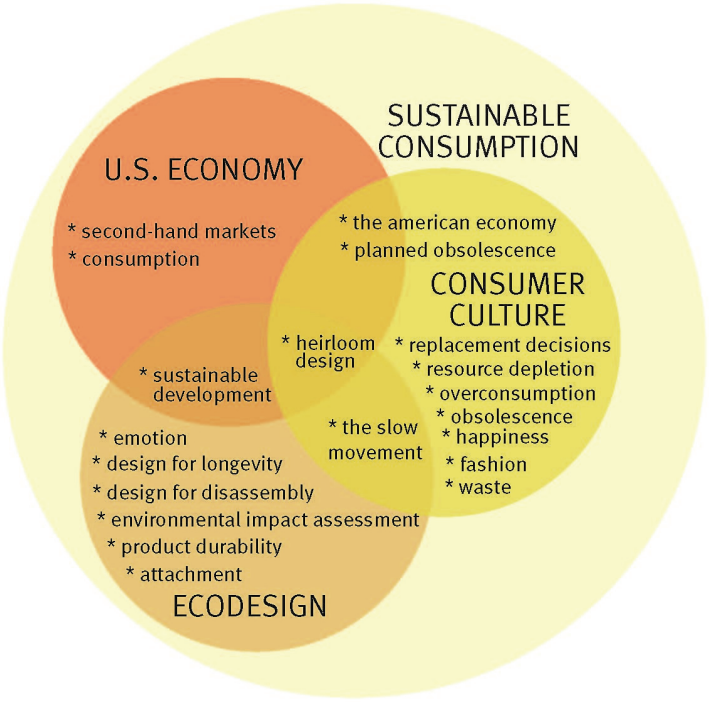

Figure 3. Literature Review Topics

Flexible Research Strategy—Case Study Interviews

Methodology. Zina O'Leary (2004) defines methodology as: a "framework" that operates with a given set of assumptions to provide structure to the research process (p.85). This research employs a case study framework. Case studies are described by Colin Robson (1993) as "a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence" (p.146). In this particular study, the contemporary phenomenon is the thriving industry that surrounds manufacturing, sourcing, refurbishing, and reselling mid-century modern furniture in the consumer culture of the United States. In this *case,* people in the "furniture industry" who are associated with long-lasting furniture are chosen as subjects. O'Leary (2004) states that case studies can have an intrinsic value, be used to debunk a theory, bring new variables to light, provide supportive evidence for a theory and/or be used collectively to form the basis of a theory.

Case studies also “allow for in-depth exploration; are an examination of subtleties and intricacies; attempt to holistic; explore processes as well as outcomes; and investigate the context and setting of a situation” (p.116).

Method. Informal semi-structured one-on-one interviews were the *techniques* used to collect data (O’Leary, 2004, p.85, & Robson, 2002, p.270). Semi-structured interviews guide the conversation with a set of predetermined questions in order to stay on task, yet this technique allows the researcher flexibility to modify questions or the order of the questions “based upon the interviewer’s perception of what seems most appropriate” during the conversation (Robson, 2002, p. 270).

Data collection. Research subjects were initially approached through email, and then called on the telephone. In order to provide convenience for the interviewee, I suggested that they select a reasonable venue. Some participants wanted to conduct the interviews at their place of work; other participants preferred an off-site meeting. Each participant received an explanation letter outlining the project and explaining their voluntary consent to have audio from the interview recorded (see appendix C). Interviews were to last around thirty minutes, be informal, and conducted with a semi-structured set of questions (see appendix D). A voice recorder was used to document the interview and photographic documentation excluded the subject participants. Audio data from the interviews were transcribed completely following the interview. (See Paul and Barry’s transcribed interviews in appendix E and F.) Data were categorized and analyzed thematically.

Participants and sampling. Participants were selected using *theoretical sampling* which is a type of *purposive sampling* used in grounded theory studies. This sampling technique relies upon the “researcher using his [or her] judgment to achieve a particular purpose” (Robson 2002, p.193). In this case, participants were selected based on their relationship to second-hand furniture. Furniture sold second-hand ranges from the very low-end (typically seen at a non-profit donation venue) to the very high-end (seen at private, highly curated auctions). “The persons interviewed, or otherwise studied,

are chosen to help the researcher formulate theory" (Robson, 2002, p.193). The first participants I spoke with were hand-picked, and these people then recommended additional people to talk with—an example of snowball sampling (O'Leary, 2004, p.110). All participants' names have been changed to protect their identity.

Table 2.

Participant Demographics

Participant	Gender	Low End	Med	High	über high	Refurbisher	Repair Outsourcer	Consultant	Manufacturer	Retailer	Auction	Consignment	Non-profit
Barry	M			X	X		X				X	X	
Al	M	X	X			X							
Neil	M	X	X			X							
Max	M	X	X	X		X	X					X	
Kate	F	X	X	X		X	X					X	
Erik	M		X	X				X		X			
Roy	M			X	X		X					X	
Paul	M		X	X					X				
Andrea	F		X	X	X		X	X					
John	M			X					X				
George	M			X		X			X				
Janis	F	X											X
Russ	M	X	X	X		X							
Larry	M	X				X							X
Carrie	F			X	X		X				X	X	
Reggie	M			X	X		X						

Data analysis. Data analysis in grounded theory involves three sets of coding: open coding, axial coding, and selective coding (Robson, 2002, p.194). This coding or categorization process allows patterns or themes to emerge in the data. These categories and themes in turn guide this study's findings and structure.

Quantitative Impact Measurement Research—Life Cycle Assessment

Strategy. This component of the study is a quantitative process sum life cycle assessment (LCA). The concept of product life cycle can be understood intuitively by looking at a product throughout its sequential life cycle stages, including extraction, manufacturing, distribution, use, and end of useful life. The International Standards Organization (ISO) has a series of documents that guides the process and sets a framework. The outcome of an LCA quantitatively compares the natural resource use, human health impacts, and environmental impacts for two or more scenarios. According to ISO 14040 (2006), there are four phases in an LCA study: goal and scope definition phase, inventory analysis phase, impact assessment phase, and the interpretation phase (p.8). How these components relate to the framework can be visualized in Figure 4:

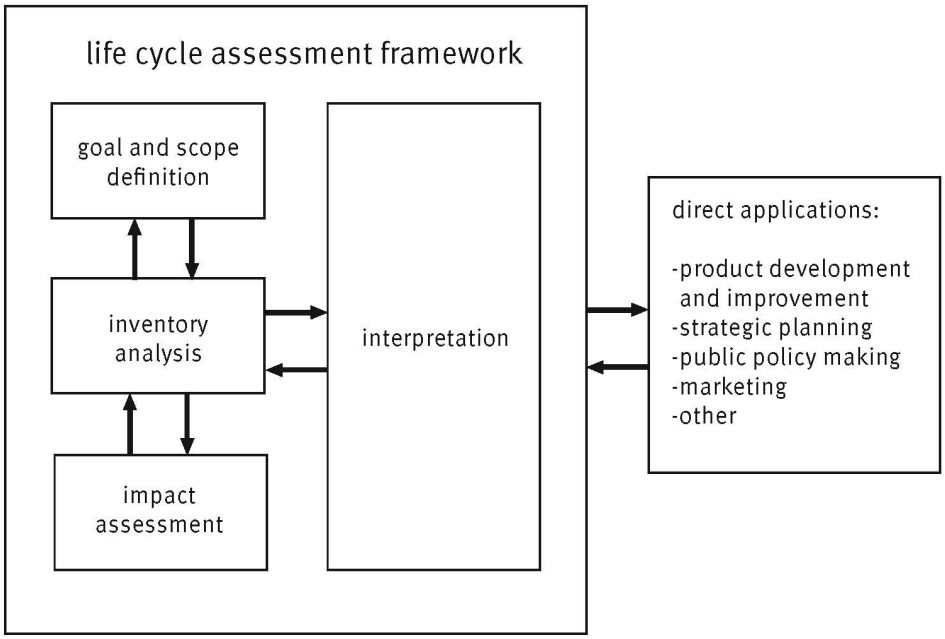

Figure 4. Stages of an LCA *(ISO14040, 2006, p. 8)*

In this study, a life cycle assessment is used for the direct application of furniture development and improvement (ISO14040, 2006, p. 8).

Goal. The goal of this LCA is to explore the environmental impacts that occur for the same chair used for various lengths of time: 15 years, 30 years, 45 years, and 60 years respectively. The goal is to quantify the environmental impacts of four chairs that are identical in all ways except for the number of years that they are used.

Scope. The intended scope of this study includes procurement and processing of raw materials, manufacture and assembly of product and packaging (in-factory energy), the consumer use phase, packaging and product disposal at the end of life stage, and transportation among all of the product stages. It excludes all capital equipment (the construction of factory and tools) as well as human labor and infrastructure (construction of buildings, roads and utility infrastructures). It uses data that is assumed to be valid for the years 1990 to 2020. Cleaning agents used in the use phase were excluded because it was assumed that these do not significantly add to the life cycle impacts of the chair.

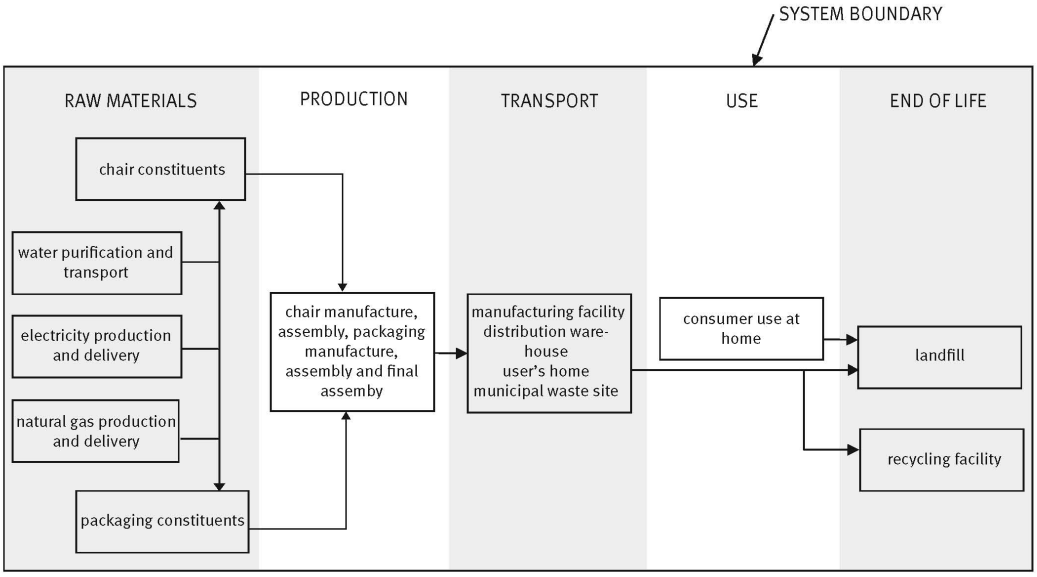

Figure 5. System Boundary

Planning. In every LCA, the means of comparison is called a functional unit. In this LCA, resource depletion, ecological, and human health impacts throughout the entire life cycle will be compared using the functional unit: “one year of seating.” First, a piece of

furniture, the Herman Miller fiberglass shell armchair (See photo, Figure 6), designed by Charles and Ray Eames, was weighed. Each component was then listed and the individual component weight was estimated. This study was conducted using SimaPro7.1 software which uses the EcoInvent database. Three impact characterization methods were used to demonstrate applicability of the product longevity principle.

Figure 6. Herman Miller Shell Chair

These characterization and normalization combinations were:

1. CML 2 Baseline 2000 (Version 2.05, November 2009)

The impact category “Marine ecotoxicity” had been removed in this characterization method because it is overly sensitive to metals, which it cycles and amplifies (as has been corroborated by the LCA scientific community).

Normalization: Global normalization for 1995, estimated by the Center for Environmental Science Leiden University, The Netherlands

“Freshwater ecotoxicity” normalization values were reduced one order of magnitude because of the problems the LCA community has had in valuing metals.

2. TRACI 2 + Norm (Version 3.03, February 2010)

   Normalization: U.S. year 2000 (Bare et. al, 2006, p. 5113)

3. ReCipe midpoint method, heirarchist version (Version 1.04, March 2010)

   Normalization: World ReCiPe H, created by Pre Consultants

The materials and manufacturing techniques specified in the SimaPro database. Assumptions were made for any data that was uncertain. The quantitative data (numerical data) were analyzed statistically in both characterized and normalized forms. Charts and graphs will be made to display the comparison.

Inventory analysis. A Herman Miller fiberglass shell chair with a wire base weighed 9.5 lbs total was broken down into components and the weights were estimated, materials used were found in the EcoInvent database and manufacturing technique was empirically derived. Inputs from raw materials, production, transportation, and disposal stages were entered into the SimaPro database. There are limitations and solutions in the LCA process:

Limitation: SimaPro7 database does not offer every possible chemical, material or process.

Limitation: The boundary conditions for data collection are not absolutely identical; hence, there is some margin of error inherent to the process.

Solution: The LCA community accepts both of these limitations. The ISO 14040 (2006) series standards on LCA promote transparency and documentation. It is acceptable to substitute materials as long as what has been substituted has been clearly documented (p.2).

Raw materials. The production phase includes material constituents and preliminary raw material processing inputs for the product and packaging. Colorant was excluded from this study since it was not found in the database. A list of material inputs can be found in Table 3:

Table 3.

Process Inventory Analysis: Constituent Inputs, Product and Packaging

Components	Process sum inventory data from EcoInvent database	Amount	Unit
Chair body	Polyester resin	4.42	lb
	Glass fiber	2.38	lb
Wire base	Steel, low-alloyed	2.1	lb
	Nickel, 99.5% (plating on legs)	0.25	lb
Mounts	Synthetic rubber (mounting grommets)	0.22	lb
Feet	Polyethylene, HDPE	0.13	lb
Packaging	Polyethylene, LDPE	0.03	lb
	Packaging, corrugated board, mixed fibre, single wall	2.2	lb
	Printing color, rotogravure, 55% toluene	0.001	lb

Production. The production phase consists of the manufacturing energy and inputs that are required to produce one chair. General electricity and natural gas inputs were estimated – this includes all inputs that were not found in the database such as inputs that were required to form the fiberglass shell, bending and cutting wire and assembly.

Table 4.

Production Inputs, Product and Packaging

Description	Process sum inventory data from EcoInvent database	Amount	Unit
Electricity	Electricity, U.S. production mix	3	kWh
Natural Gas	Heat, natural gas, at boiler modulating	0.8	kWh
Steel wire	Deep drawing, steel 650 kNpress, automode	2.1	lb
Welding base	Welding, gas, steel	8	inch
Finish	Selective coating, aluminum sheet, nickel pigmented aluminum oxide	24	sq.in
Mounts	Injection molding	0.13	lb
Feet	Injection molding	0.22	lb
Packaging	Stretch blow moulding	0.03	lb

Transport. This stage takes into account the pre-production transport, transport form the manufacturing facility to the distribution warehouse, the transportation from the distribution warehouse to the home of the user, and the transport at end of life.

- Pre-production transport (assumed distance that constituents and packaging travel from their respective origins to the manufacturing facility) of constituents and packaging is 967 miles (1/3 distance New York to San Francisco) and assumes 28% by truck and 72% by train.
- Transport from manufacturing facility to distribution warehouse is divided as such: 96% truck, 4% train. Distance from manufacturing facility to distribution warehouse is 967 miles (1/3 distance New York to San Francisco).
- Distance from distribution warehouse to home is 150 miles via delivery truck.
- Transport of materials at end of life via municipal waste truck is 50 miles.

Table 5.

Transportation Inputs, Entire Life Cycle

Description	Process sum inventory data from EcoInvent database	Amount	Unit
72% train: material origin to factory	Transport, freight	4.11	tmi
28% truck: material origin to factory	Transport, lorry 16-32t	1.6	tmi
4% train: factory to distribution warehouse	Transport, freight	0.0354	tmi
96% truck: factory to distribution warehouse	Transport, lorry 16-32t	0.8496	tmi
Home delivery truck	Transport, lorry 3.5-16t	0.885	tmi
Garbage Truck	Transport, municipal waste collection	0.295	tmi

Use. This LCA addresses the length of time a chair will be used: One chair will be used for four different lengths of time: 15 years, 30 years, 45 years, and 60 years. All impacts associated with cleaning products are excluded from the use stage in this assessment. Some uncertainty is introduced by this exclusion, but the amount of detergent and water would likely be small. Because we are comparing the same chair with varying lengths of life, the cleaning impact could be marginally greater on the chair used for the longest period.

End of life. Disposal takes the product and its packaging into consideration. Assumptions used in this *stage:*

- 40% of cardboard packaging is recycled.
- 60% of cardboard packaging is land filled.
- 100% of polyethylene packaging is land filled.

- Chair at end of life is not broken down. It is disposed of as municipal solid waste.

Table 6.

End-of-Life Inputs, Product and Packaging

Components	Process sum inventory data from EcoInvent database	Amount	Unit
60% cardboard land filled	Disposal, packaging cardboard, landfill	1.32	lb
Packaging land filled	Disposal, polyethylene, landfill	0.03	lb
40% cardboard recycled	Recycling cardboard	0.88	lb
Chair disposal, landfill	Disposal, municipal solid waste, landfill	9.5	lb

FINDINGS

Life Cycle Impact Assessment Findings

Once the inventory analysis was complete, data was analyzed using characterized values, which were then normalized. The following visualize the life cycle impacts that occur for the four different chairs in the following graphs.

CML 2 Baseline 2000 with global normalization for 1995.

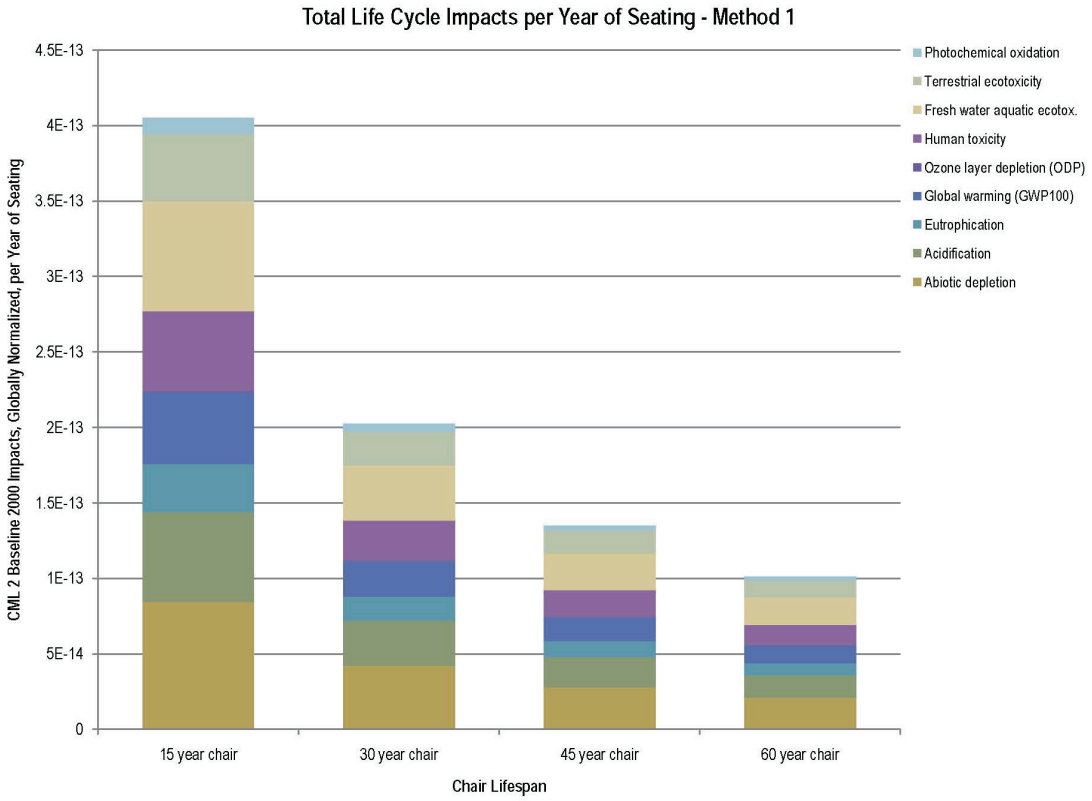

Figure 7. Total Life Cycle Impacts per Year of Seating, by Impact category—Method One

According the CML Baseline 2000 characterization method, the three impact categories that have the largest impacts are: fresh water aquatic ecotoxicity (toxic to fresh water ecosystems including species which inhabit them), abiotic depletion (fossil fuel depletion), and human toxicity (toxicity that affects human health).

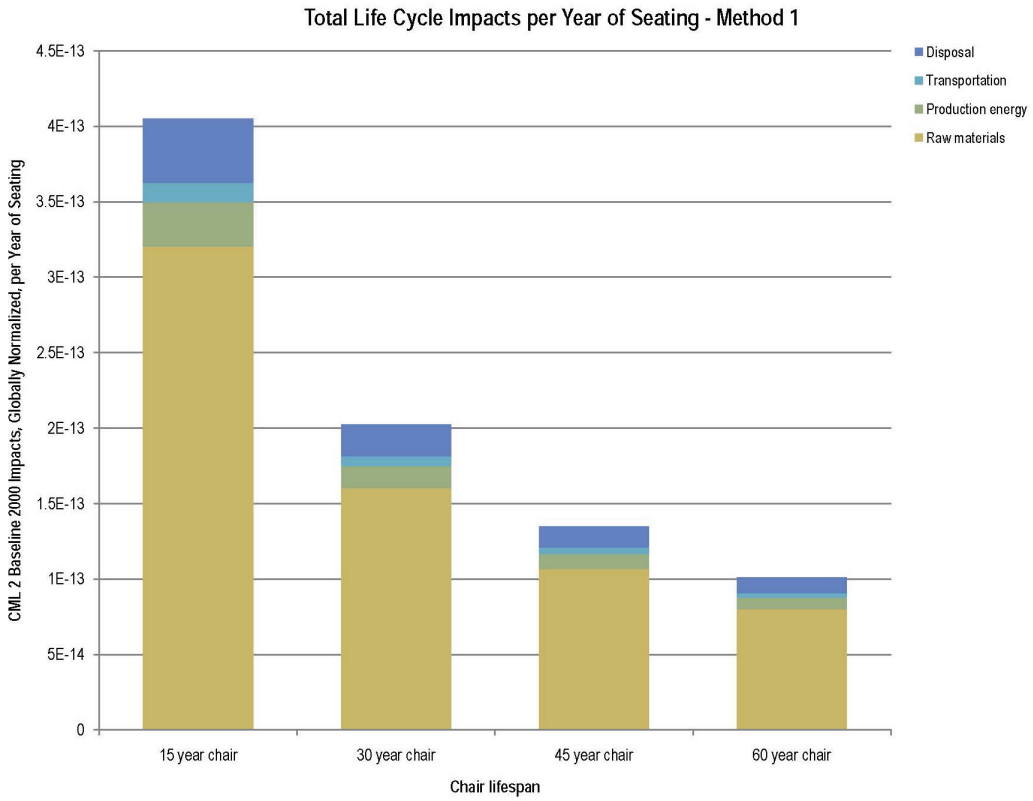

Figure 8. Total Life Cycle Impacts per Year of Seating, by Stage—Method One

The largest impacts of this product assessed with the CML Baseline 2000 characterization method occur at the raw material stage.

ReCipe Midpoint (H) with global normalization for 2010.

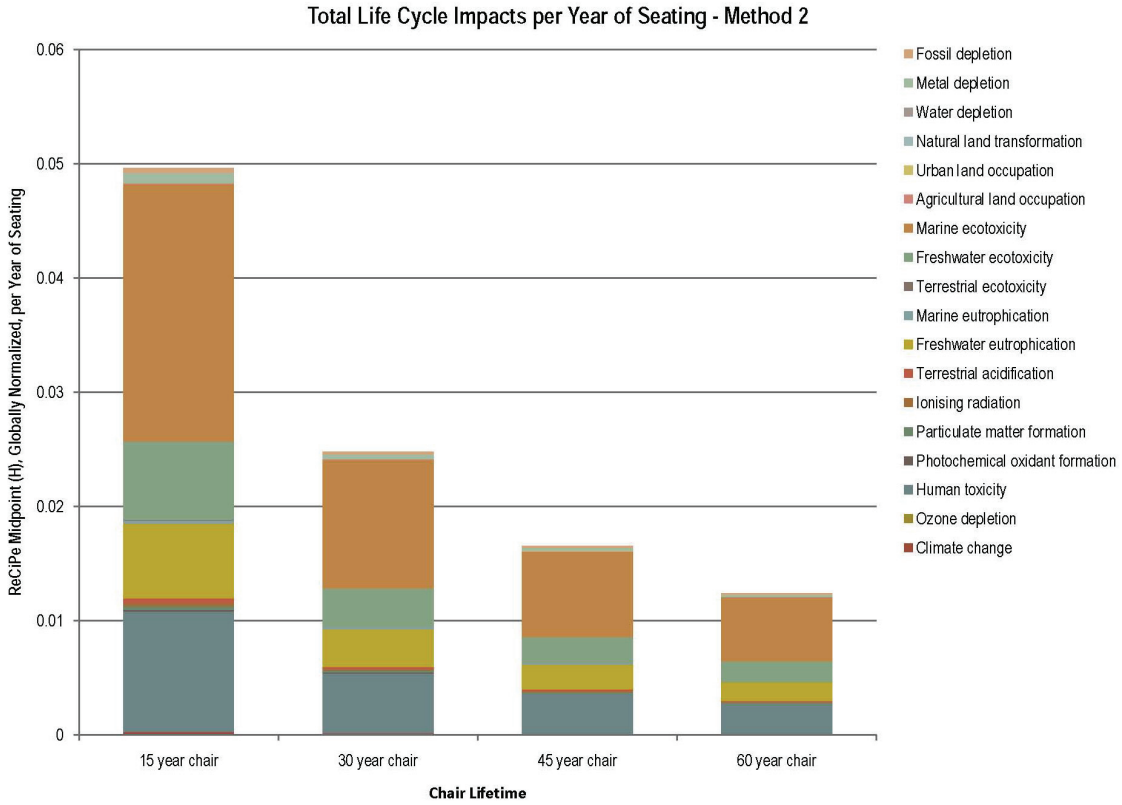

Figure 9. Total Life Cycle Impacts per Year of Seating, by Impact Category—Method Two

According the ReCiPe Midpoint (H) characterization method, the impact categories where the largest impacts are: marine ecotoxicity (toxic to the marine ecosystem and species which inhabit them), human toxicity and particulate matter formation (airborne particulates).

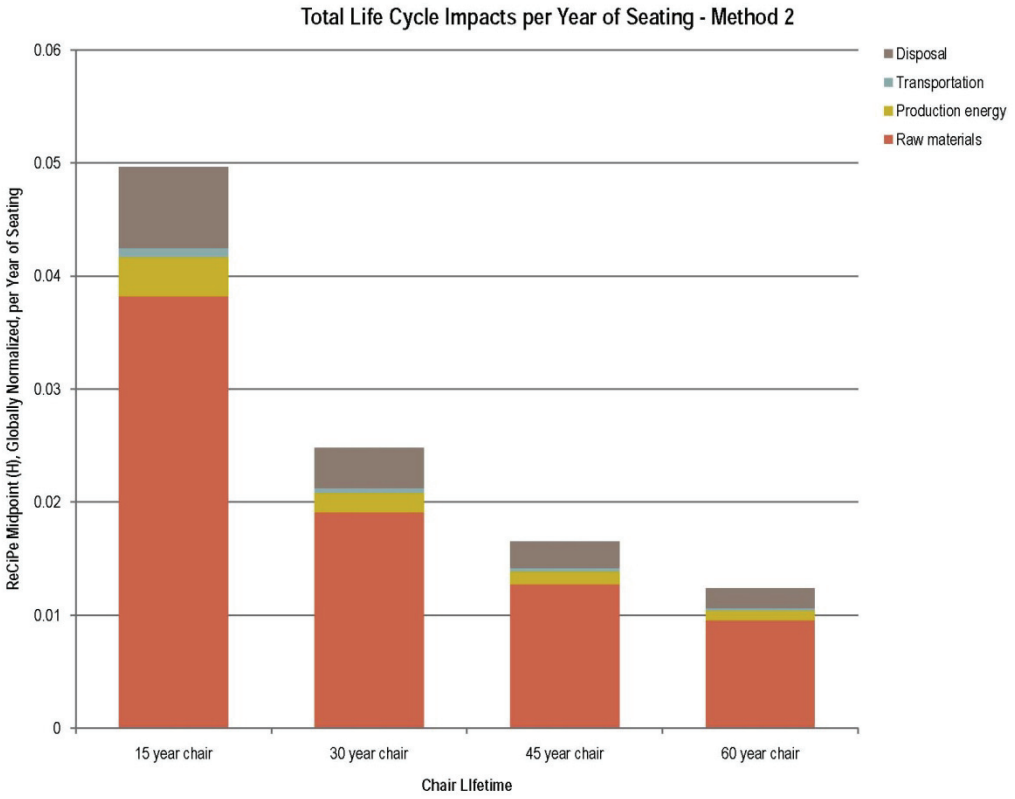

Figure 10. Total Life Cycle Impacts per Year of Seating, by Stage—Method Two

Like the previous methodology, the ReCiPe Midpoint (H) characterization method indicates that the largest impacts occur at the raw material stage.

TRACI 2 with U.S. normalization for the year 2000.

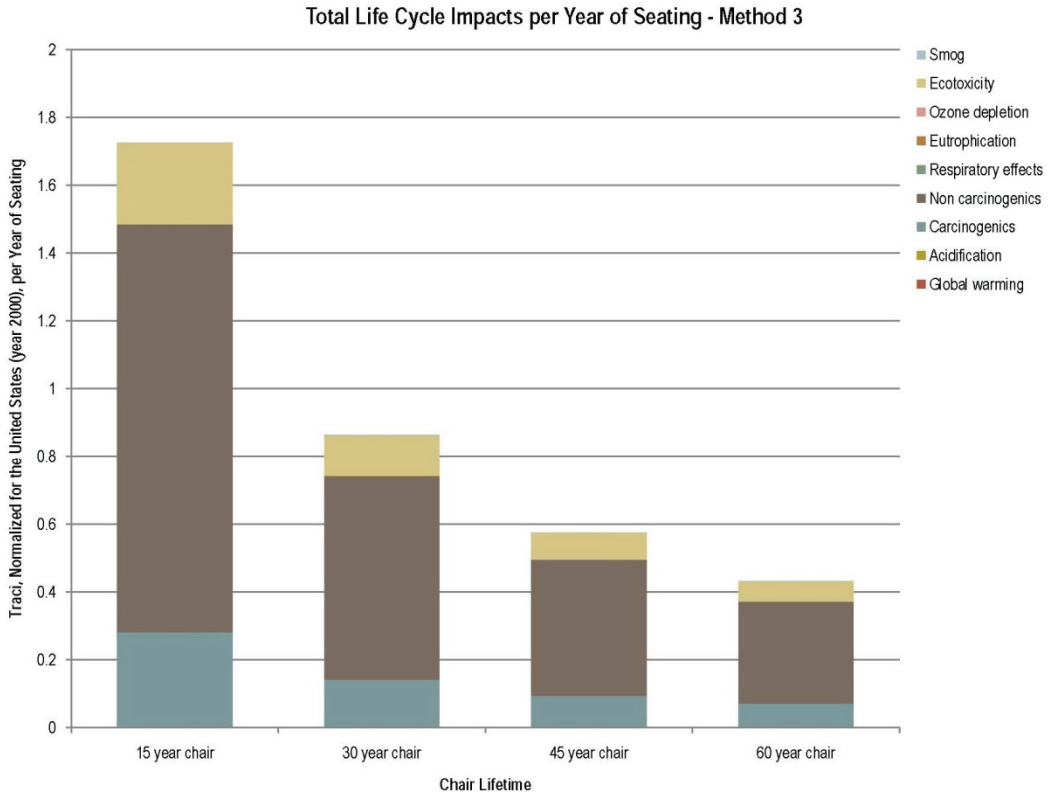

Figure 11. Total Life Cycle Impacts per Year of Seating, by Impact Category—Method Three

According the TRACI 2.0 characterization method, the majority of impacts occur in the non-carcinogenics category while additional impacts occur in ecotoxicity and carcinogenics categories.

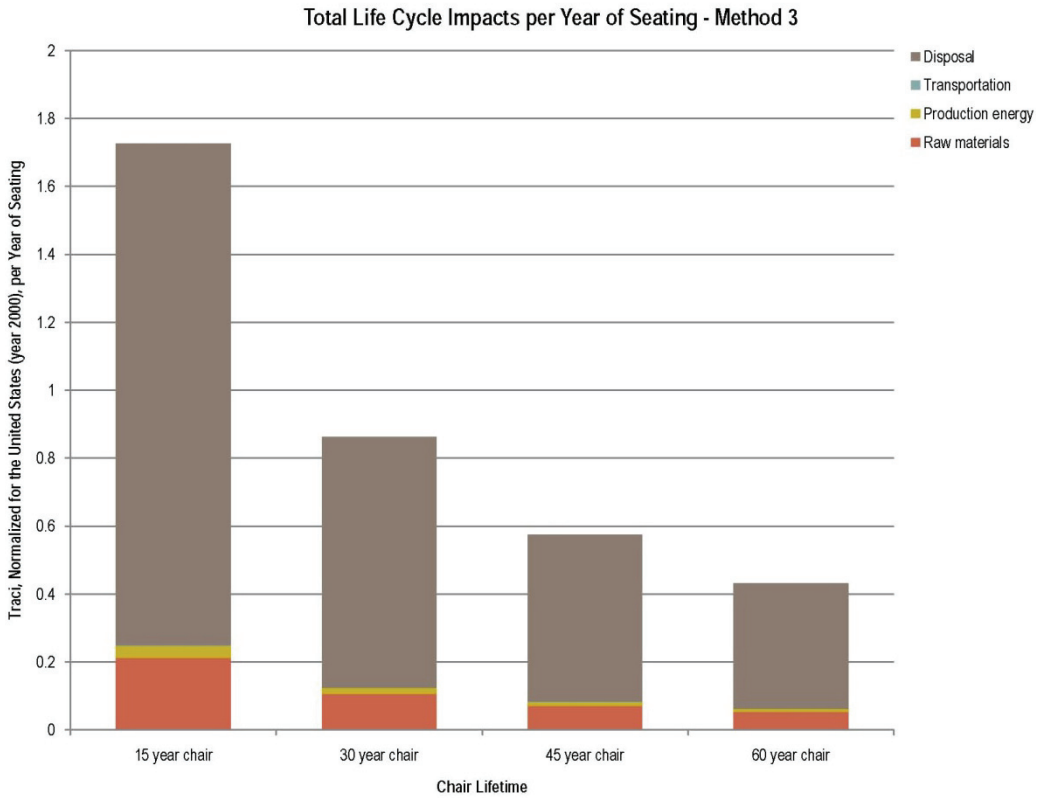

Figure 12. Total Life Cycle Impacts per Year of Seating, by Stage—Method Three

Unlike the previous two methods, the TRACI 2.0 characterization method indicates that most impacts occur in the disposal (landfill) stage.

LCA Findings Summary

Each of the three methods used the exact same process inventory data for the materials and processes used for the chair over its life cycle, but delivered different results. These differences are the result of differences in impact assessment methods. Nonetheless, *regardless of the impact characterization and normalization methods used in this LCA*, the chair used for the longest period of time (sixty years) demonstrated the least impacts per year of seating. The relationship between years and impact is: i= l/n, where I is impact per year, l is impact per lifetime, and n is the number of years in the lifetime. This important (though also somewhat intuitive) finding illustrates that resource depletion, ecological, and human health impacts will reduce every single year a piece of furniture is used. In conclusion, this study demonstrated the significance of product lifespan in creating lower environmental impacts. Because of this, I considered it

unnecessary to perform a sensitivity study or intensive review of potential uncertainties, which would not likely change the results of this central finding.

Qualitative Findings: Factors of Longevity

Several patterns emerged when analyzing the data collected from the interviews. These patterns fit into three themes: physical, emotional, and economic. These three themes are all major factors of longevity. For the purpose of this project, each is explored individually to better understand how furniture can be designed to last longer.

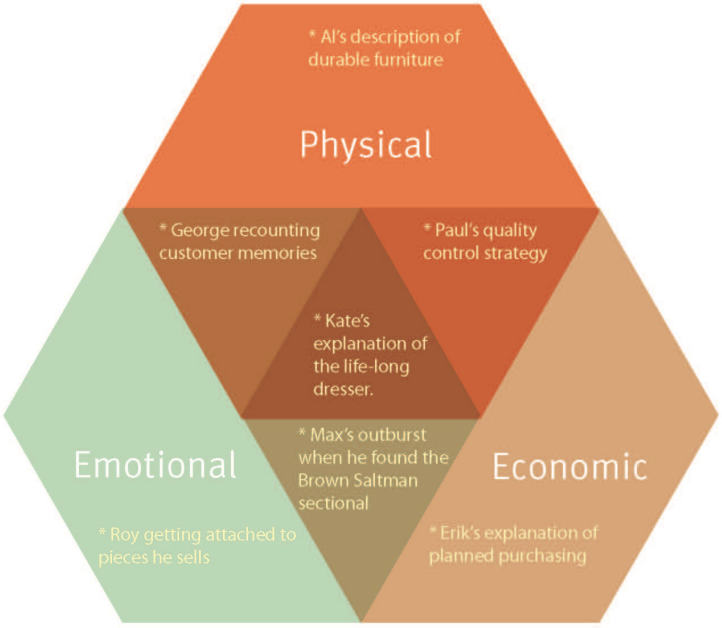

Figure 13. Factors of Longevity

The interviewees' responses can be organized into three main categories: physical, emotional, and economic. Patterns emerged that were closely aligned with the individual's area of work, interest, and expertise. In an effort to better understand these participants, I defined emotional, economic, and physical roles that they each play. Table 8 organizes these roles according to the participant and their responses to the physical, emotional, and economic criteria.

Table 7.

Roles that Participants Play Related to Factors of Longevity

Participant	Emotional	Economics	Physical
Designer	philosopher	artist	inventor
Manufacturer	collaborator	tight-rope walker	aerospace engineer
Re-seller	historian	treasure hunter	connoisseur
Specifier	matchmaker	financial advisor	stylist
Refurbisher	healer	best friend	horse whisperer
Consumer	soul-mate	investor	life-partner

Physical. Data suggest that a variety of physical characteristics contribute to furniture longevity. The two main elements that contribute to physical longevity were mentioned by George, Carrie, and Barry during our conversations. George brought up the example of an iconic piece that their company has manufactured continuously for fifty years:

> The two key factors in their original success and ultimately underlying their longevity is the *timeless quality of their aesthetic form*, and the underlying *quality of their manufacture*. (George, communications director, well-known furniture company)

Carrie used the example of a Knoll credenza to mention the same characteristics of aesthetics and quality:

> I would say, for example this Knoll credenza from the 1950s. People are still looking at it because 1) it is simple, simplicity is timeless, 2) the material, how it was made – it is not an IKEA piece of crap. They way things were made is what makes it pass through. (Carrie, curator, auction house)

Barry concurred, but thought that aesthetic was the primary consideration:

> Our clients tend to look for specifics, meaning they appreciate quality, I think, more than ever. They appreciate aesthetic, I think, above all else. So, aesthetic is primary. And then, quality can be secondary. (Barry, auction house director and curator)

The following interview excerpts demonstrate the role aesthetics and quality play in heirloom furniture.

Aesthetic. A thread that connects the opinions of many participants is that "form follows function" a phrase attributed to architect Louis Sullivan. Erik, George, and Barry feel aesthetics will emerge through functional problem solving. Erik wants the designer to ask the appropriate questions, and out of those answers a solution will arise:

> Why, what's it doing, why are you making it, who is going to be using it in what setting, Answer all of those questions first… Form is derived from the function... To me, that is one of the truest expressions of the product. Those are the products that are going to last. It is solving the problem versus styling the products to get a certain look. (Erik, interior consultant, furniture showroom)

George agreed with Erik, and offered a more succinct definition:

> We tend to think of design as much more – a solution of a problem statement. (George, communications director, well-known furniture company)

Andrea brought up that the function of the piece could relate to the greater whole:

> Furnishings are, in my opinion, part of architecture and part of the space, part of the functionality of the space. (Andrea, architect and interior specialist)

Andrea made the correlation between furniture and space. Russ also mentioned that people come to him for repairs because they love how the piece fits in a particular space.

> *I know this sofa's old, I know this sofa is not worth what it is going to cost me to reupholster, but … it fits perfectly in this space and room.* (Russ, owner, refurbishing and reupholstery shop)

Along the same lines, Erik considered how the furniture will be used in a space but suggested that each piece was designed for a certain optimal use and space, so choosing pieces is all about finding a good match:

> It gets back to function. I'm not a sales person that sells furniture, I'm a designer. It's all about the questions and about finding something that will fit the [consumer's] needs. From there, it's all about finding the product that does the job. (Erik, interior consultant, furniture showroom)

Paul, a designer and manufacturer, mentioned the reactions people had to his desk once they start using it. Ultimately, the design of the desk changed the work habits of its user:

> The desk…pushes people – it's a desk that says, if you use this desk, you are giving up stacks of paper, and stacks of mess… I get emails from people saying it completely changes the way [they] work… I was about to print this, and I was about to stack that, and I was about to… No – I don't have to. I could make a PDF [or] organize a folder [on the computer]. (Paul, business owner, designer and manufacturer)

Max noted that with technological advances, the needs of consumers change in the way of furniture. Today's thin television displays negate the need for entertainment centers, now people come to his store seeking a credenza:

> Flat screen TVs…you can just hang them on a wall. So, everybody wants a credenza for below it. Whether it be in the bedroom, at the foot of the bed, across from their bed, or the living room, credenzas are hugely popular. (Max, mid-century modern furniture refurbisher and dealer)

But, Paul cautioned integrating technology into furniture:

> I deliberately avoid putting electronics in my products. I get a lot of requests to make my desk, but with an integrated USB hub. And it's just like *noooo*, don't you understand USB won't be around 5 years, 6 years, 10 years from now. (Paul, business owner, designer and manufacturer)

Paul understood that in a culture where planned obsolescence is the norm, he did not need technology that may one day drag his product to a landfill.

Use. Use is a sub-section of aesthetics. Although obvious to some, consumers keep objects that they use, whether that be daily or regularly. Roy, when asked, "What makes furniture usable for many decades or generations?" responded:

> How well it holds up to daily use. (Roy, owner high-end vintage furniture store)

Paul told me things that are "*dib-worthy*" are the practical things that get used and last. Many times, these items outlive their owner, and the next generation "calls dibs" on the items to secure their future possession.

> So, the idea that when somebody dies and when you are looking through their stuff—the family has to decide who gets what, people call dibs. That is the kind of stuff that I find interesting. It is the things that—especially the things that did not start their life assuming that they would be 'dib-worthy' later on… It just happened that it was how it was made that it survived—and the other thing was that it got used…*a lot*. It wasn't a vanity thing, a vanity purchase … it was just some practical thing. (Paul, business owner, designer, and manufacturer)

For Andrea, the physical signs of use were what make a piece aesthetically pleasing:

> I always like pieces that have kind of patina or something that is supposed to look worn so that when people move into their apartment it doesn't look like a furniture showroom, so there is some sense of a user—sense of touch on it. So, if you embrace that, then these pieces will last forever. (Andrea, architect and interior specialist)

Andrea touched upon the important connection between physical objects and emotion, how objects with signs of wear on them make a space more comfortable for the user. Embracing this patina is an important point. Yes, all objects age, but some materials facilitate a more graceful aging process. When materials get better with age, they have the potential to be desirable in their later years. For John, a "timeless" look is an important aesthetic consideration:

> We don't want to do a chair that will be out of style in five years, and then you are stuck with it another 145 years. So, we try to work out chairs and products that have timelessness to them, that we anticipate them looking good in 50 years and 70 years. And that is sort of the reason that [our classic] chair is still our best selling chair, is because you can use it almost anywhere, and you can still count on it looking good for years and years and years, it doesn't go out of style…[and] so you don't get tired of them. (John, VP of sales and marketing, furniture manufacturer)

Many participants agreed that furniture and apparel should be kept separate, since clothing fashion trends tend to become outmoded quickly and do not reflect classic, timeless design:

> When you combine fashion and industrial design, you get landfill—its fine to paint your walls in a trendy color, but when you are done with it, you just paint over it—you don't tear your walls off and throw it in a dumpster. The more that companies do that—that make physical objects that are trendy, the more I liken that to greed. They want the built-in obsolescence. They need the sale from the next version two years from now, even though that thing could have lasted. But, they put that color on it, and they put the fleur-de-lis and scroll work on it, or whatever else was trendy. Moons and suns, you know, [ha, ha] anything with a moon and sun will sell—what was that 1996? (Paul, business owner, designer, and manufacturer)

Paul's anti-trend philosophy was a common among participants. John described this approach as well, ironic since his firm counts a couture fashion house as a customer.

> We watch trends and fashion, but we try to do, in a way, the opposite of a trend. If we see ourselves becoming too trendy—consciously—we pull back and we try to do something... the inverse of that. Once you get involved in the thinking of fashion, you get involved in the idea that you have to change your furniture every season, like you change your clothes, and then when you do that, you have to

> throw it out. You have to do things in the color of the season. Then, once the season is gone, you have to throw the furniture out, and so, it's really the opposite of our philosophy as far as making and designing things. But, we watch it. (John, VP of sales and marketing, furniture manufacturer)

George agreed and cited a major designer of the 20th century in his firm's approach to fashion and style.

> Very, very little in terms of fashion inspiration and maybe none except for in terms of color, and I would say to lesser degree pattern has some fashion cycles…To quote George Nelson, another great in our design history: 'Design is a response to social change,' so we tend to think about design in terms of user experience, whether it be their health or productivity, or a kind of visceral sense of happiness associated with it, or their lighting, etc. Or, maybe it is an environmentally sustainable solution and that has large social implications. But, rarely do we think of it in terms of fashion. (George, communications director, well-known furniture company)

This anti-style was not just limited to furniture design but also to the design of buildings and spaces as Andrea pointed out:

> You try not to be stylish to begin with. I don't ever consider following a style or trying to be a style or trendy, with architecture or furniture, you *can* do it, but… it's not really the right place for that. It's a different application than some showroom that is expected to be trendy—like a fashion showroom. (Andrea, architect and interior specialist)

Instead, Reggie stated simply that pieces he buys to sell have a "look":

> It has to have a certain look. (Reggie, owner, vintage furniture store)

This look Reggie referred to is an intentional form given to the piece by its designer. Kate and Roy agreed that following trends are fleeting, but their resale businesses are based on *design*.

> Design stays, but trends come and go. (Kate, mid-century modern furniture refurbisher and dealer)
>
> Good design is good design, it doesn't fall out of fashion. (Roy, owner, high-end vintage furniture store)

Reggie mentioned the aesthetic of his mid-century modern case goods as having an aesthetic that transcends time:

> [These pieces were] designed in a very straightforward manner… nothing really ornate—some of those things transcend time. They are just timeless pieces. Some people look at this stuff and ask *where did you have it made*? I'll say *its old.* Because they think it is something Room and Board or Design Within Reach are grasping for the same look, whereas that look has been around for a long time. (Reggie, owner, vintage furniture store)

Erik distinguished contemporary from modern. Erik explains that modernity is not a style, it is instead derived from a design philosophy based on deeper criteria, such as proportion:

> I believe that true modern… is derived from Modernism. We are talking about proportion and form and timelessness… when we start talking about contemporary—that is when we are talking about trends… contemporary furniture is there to push the limits of current materials, current trends, current fashion, and current color…[but] when you start playing with [fashion or style], things start looking dated faster. Not that there is anything wrong with something that was contemporary that now screams of a certain era, but, when we are talking about furniture, I don't necessarily want to buy a sofa that is "super hip" for six months. (Erik, interior consultant, furniture showroom)

Barry and John both brought up the point that innovative material applications often drive the aesthetic and create beauty:

> From a materials point of view, at least for modern design, new materials sort of lead the way. So, the Eameses… Charles and Ray Eames, started working in

> molded plywood, which was a new material after World War II, and started working in the molded plywood chair business with Herman Miller, and then started working in fiberglass which was also a new material, so you see a lot of their chairs in a lot of these new materials. (John, VP of sales and marketing, furniture manufacturer)

Charles and Ray Eames were not alone in using furniture design as a means to signify the technological advances of their day or to respond to what came before it:

> The Mies van der Rohe pieces were actually a response to the old bentwood chairs. The old bentwood chairs where the steam-bending of the wood was becoming very expensive. Then the chrome-plated tube was very inexpensive. (John, VP of sales and marketing, furniture manufacturer)

As a response to our modern day struggle with plastic waste, John mentioned his company's new design, which recycles it into a chair.

> Our new chair, the plastic one, is a response to this need to do something with all this trash… plastic. It will be probably 30% of our business this year. In just half a year, it has taken off and it is because that particular material seems to make a great chair. It is very solid, durable, the colors are wonderful and it feels good. (John, VP of sales and marketing, furniture manufacturer)

This innovative process gives a new purpose to plastic waste. Barry discussed innovation of another kind, based upon materials and local or cultural traditions. He cited Max Lamb whose process for his stool design was based on his personal experience of building sandcastles on the beach in his childhood. His way of working lends a local perspective:

> Innovative technology that produces something that is efficient and beautiful and durable… gets you there. For example Max Lamb produces lots of furniture that is made with almost like a lost wax process to pewter stools or copper chairs with hollow cores. They are on the level of fine art. They are not as utopian as Charles Eames was. (Barry, director and curator, auction house)

The dystopia that Barry referred to is Max's process of casting in bronze a single hand-carved Styrofoam (EPS) chair—it is a labor-intensive process, and expensive, yet his forms are eerily-striking and entirely beautiful. They are art and immediately valuable as well as instantly collectable because of their beauty. Paul also touched on beauty, adding that if something is intrinsically beautiful, you would not want to just throw it out.

> I've got that book on Dieter Rams and every page is amazing, and you just look at the products he did—everything is gorgeous. (Paul, business owner, designer, and manufacturer)

When furniture has inherent beauty and it is still in decent shape, it's likely to be reused, as Paul points out:

> Even if the use dies out, they can't get rid of it, they'll seek out a new home for it, or they will realize that to someone else it might have value, so they will bring it to a second-hand center, or Craigslist or something. (Paul, business owner, designer and manufacturer)

Many times, lasting beauty is linked to material quality, which will be a major portion of the following chapter. To summarize this section, physical aspects are of absolute necessity when designing furniture for long life.

Quality. As the counterpart to aesthetic, quality is the other component to the physical factors of longevity. Participants discussed in depth various facets such as the initial material quality, the manufacturing quality, and the impact initial quality has on future repairs and the physical documentation of quality. To begin with, the majority of interviewees placed emphasis on the material quality and alluded to the material's influence on robust durability:

> Our design philosophy is pretty simple. We make the chairs to last forever. They are tested to 1000 lbs, they have a lifetime guarantee. The estimated lifespan is at least 150 years…They are built [out of] one solid piece of aluminum. (John, VP of sales and marketing, furniture manufacturer)

> Most of our pieces were designed and made when these pieces were made with better quality materials. They were meant to last and were not viewed as disposable trends. (Roy, owner, high-end vintage furniture store)

Russ commented that even strong materials, like wood, require the designer and manufacturer to build it with the proper knowledge and expertise to pick the right variety and use the proper joinery and bracing techniques to ensure long-term structural stability:

> …all about the joinery and structural bracing. Also selection of proper wood species. Not all woods have the same strength. So, you want to select the proper wood species for longevity, and proper joinery… we get furniture from the late 1800s that is still in very good condition structurally; the finish is pretty worn and doesn't hold up to time. But, the structural integrity of furniture is still there. Most of the pieces we get in from the late 1800s, early 1900s are structurally very sound still. (Russ, owner, refurbishing/reupholstery shop)

Andrea added that it is not just the material that needs to be robust; hardware such as hinges or sliding mechanisms should also be highly durable:

> Whatever hardware you are using, make sure it could hold up to that much wear over time. (Andrea, architect and interior specialist)

Max, like Roy sells furniture with high-quality materials mentions names of a few stores that sell fashion-savvy disposable furniture, he said that these stores use lower-quality materials:

> When you are talking about Pottery Barn or Crate and Barrel, they use particle board, IKEA for sure… but if it is solid wood, it is going to last longer. (Max, mid-century modern furniture refurbisher and dealer)

As the counterpoint to Max, Kate mentioned that part of material durability is the ease with which furniture pieces are able to be maintained, and that even the thickness of wood veneer could impact a table's life:

> If you get a coffee ring on your [mid-century] dining table, you can sand it down and re-stain it…the veneers that they used back then were thicker [than what is used today]. (Kate, mid-century modern furniture refurbisher and dealer)

Kate touched on repair and refurbishing which leads into a few aspects of quality in terms of the ability to repair a piece of furniture. Many of this study's participants repair furniture as well as sell it, and the repair is part of keeping their business alive. George, whose company offers a repair service pointed out that the initial quality is what makes repair possible:

> The fact that they are, in effect, buying an heirloom…In fact, at the plant where we produce those chairs, we also refurbish them and they get pieces that date back to the 50s all the time. Maybe a shock mount is gone, but they get them repaired because they have the ability in terms of their underlying quality to do that. (George, communications director, well-known furniture company)

Al, an owner of a furniture repair shop that specializes in wood repair described the types of repairs that are typical:

> A lot of times there are structural repairs…More difficult would be stripping and re-finishing, or in some cases doing what we would call a veneer patch, where just a piece of veneer is broken out. If it is an older piece, so if it is worth putting a new piece in, fitting it in place, coloring it to match as opposed to just filling it and coloring it with something other than wood. (Al, owner, repair shop)

Both Al and George agreed that things have to be "worth" repairing. The worth in this case could be a variety of factors that will be discussed later. Al made it clear that a piece's initial material quality can significantly influence his repair job:

> There are some that are very difficult that I won't even touch. A lot of what's happening today… is the disposable furniture. This stuff you find that people pay a lot of money for today that looks nice, but it is not made well… when it gets damaged, you can't repair it, because underneath the surface is pressed

> cardboard as opposed to wood. I can't repair cardboard, sorry! It's impossible. (Al, owner, repair shop)

In wood furniture, Al picks out some particular details that add to the quality of a piece:

> Even the old pieces were veneer, but they would veneer over wood as opposed to how they build it today—it's veneer over a pressboard. So, I would build everything out of wood. I would make sure the joints were made differently, that there were glue-blocks and dowels in them, as opposed to shooting staples into them to hold them together. (Al, owner, repair shop)

Russ also brought up that the initial quality of joints is what determines how long a repair can last.

> Poor construction from the manufacturer in the beginning. If they don't take their design into consideration in the beginning, good quality joinery especially – poor joinery doesn't [withstand] normal wear and tear usage. So, if there is poor joinery, it is difficult for us, because if we are going to repair it back to the same type of joints that they have got, then our repair might not last. If the manufacturer joint only lasted five years, ours may only last five years because of that. (Russ, owner, refurbishing/reupholstery shop)

Sometimes Russ even engineers his own structural additions to a repair if the piece has poor joinery. On a related note, George noted how exposed fasteners enable repair:

> There needs to be an apparent and obvious honest construction to the piece—you will find exposed fasteners. It is very rare that you couldn't as an individual with a few hand tools disassemble a [name of company removed] piece of furniture yourself… It is designed for long term and even multi-lifetime of repair. (George, communications director, well-known furniture company)

Erik illustrated the hypothetical scenario that George set up, but took it a step further; the design of furniture can facilitate inexpensive and relatively painless repairs:

> For example one our sofas, if someone sat down or like a cat sliced open the edge of your leather sofa, sometimes you can't repair a big cut like that. The way

> the sofa is designed is you can unbolt just the arm and you can literally ship it back to the manufacturer. The manufacturer will grain and color match your exact leather, reupholster that arm, ship it back to you, and you can just bolt it back on. You don't even need to send the whole sofa in or have it all re-upholstered. The way it was designed makes it more of a life-time product. (Erik, interior consultant, furniture showroom)

In Erik's example, even if someone is not skilled enough to *make* the repair, they can certainly *facilitate* an easy repair. This has the potential to bring about more business for manufacturers who wish to offer services. Many participants recognized the ease with which a piece can be reupholstered with the ultimate longevity of a piece. If a piece can be updated when it gets dirty, deteriorates, or goes out of style, new life could be given to a "dead" piece:

> Some things like upholstery…fabric is going to wear out, foam is going to break down, that's fine, but then when you do have a frame that is warranteed for life, you put a new fill on the cushions, you re-upholster, and it keeps going. Its like a car, you are going to put in gas, you are going to put in oil, and then every 100,000 miles, you will change the timing belt so there are those parts that last a little bit longer. (Erik, interior consultant, furniture showroom)

Even in the highest end second-hand retail or auction environments, repair and refurbishing is commonplace, Barry and Roy both pointed out the range of repairs that they face:

> We specialize in restoration so 95% of our pieces have either been refinished, reupholstered, cleaned… It can [range from] pristine condition to… need[ing] complete repair. (Roy, owner, high-end vintage furniture store)

Barry reported the same for his auctions:

> That is also a mixed bag, some come in pristine, others come in needing extensive restoration, and we help facilitate that… It can be really everything. Refinishing sometimes, pieces might need structural work, so structural repairs,

> other times it is as simple as a broken leg that needs to be re-glued, or re-upholstery. (Barry, director and curator, auction house)

Carrie confirmed this, but mentioned the correlation between the condition and rarity:

> We vet all the items, so we only take things that are in very good to excellent condition. If they are in poor condition, it would be because the piece is very rare. (Carrie, curator, auction house)

Max and Kate also repair or reupholster items they acquire but only do it if it made economic sense to them:

> Sometimes it is just a coat of teak oil with steel wool, which usually does the trick, or you know, just depends on how bad it is. Everything from staple-gun re-upholstering dining chair seats to gluing—wood glue and clamping things…to, every now and then he has to fix a veneer chip and use paint. So, it can be as extensive or not, as it needs to be. If it's like a full, giant thing, we either won't buy it to begin with, or if we have it and we think it's worth it, we will send it off to a place called Alison's to get it re-done. And the upholstery is done by—not us, an upholsterer. A lot of times, things have been reupholstered away from the original fabrics. Usually, with this era, it was like bought in the 50s or 60s and redone in the 80s or 90s, and it is just like *disgusting*! (Max and Kate, mid-century modern furniture refurbishers and dealers)

Max and Kate mentioned how trends in upholstery come and go. Many pieces are reupholstered to be highly fashionable in one era and then when that trend dies out, the piece becomes completely obsolete. New upholstery refreshes the piece and gives a sense of newness for the owner. Andrea explained her recent re-upholstery experience:

> I just finished a project… the client, she didn't want any new furniture, but she just wanted to re-upholster some things and get some new throw pillows and you know, freshen it up a little bit. So, what we did was, I have a great upholsterer in Greenpoint and we sent everything there, chose new fabrics, and just recovered her furniture. And, it is interesting because when she first bought the furniture, it

> was vintage, so it has held up and really lasted this whole time [12 years], and now it has stood up through another re-upholstery. (Andrea, architect and interior specialist)

Just by re-upholstering a piece, Andrea can create another 12 years for it. Reggie who refurbishes most pieces he finds also mentioned the newness factor:

> We will buy it in the best condition possible, but we do a lot of reupholsterery and a lot of refinishing, so it is almost like brand new In fact, a lot of my upholstery pieces are better than you would buy brand-new. (Reggie, owner, vintage furniture store)

Because of the ability to get something better than you would buy brand-new, Andrea told me about a recent project where the client wanted something special and rare, she found her solution customizing an old mid-century piece:

> My favorite was a Hans Wegner Papa Bear chair and ottoman, and I found it at a store here in Manhattan. The store is very expensive but it is highly curated so you can just walk in and see something that is amazing. So, that was my favorite thing. It is not like I really had to search for it. They had repaired it and recovered it. But, my client wanted leather, so we recovered it in leather. And, they had an upholsterer there who does it, and they had also refilled it with horsehair, because on the inside it is horsehair. So, they had already re-structured it, because it was from the 50s. (Andrea, architect and interior specialist)

Through this process, she was able to give her client a unique and custom aesthetic, which some clients might value more than just picking a chair out of a magazine or a furniture manufacturer's seasonal catalogue. This process matters to some clients who pay for custom and high-end design. I will return to this example in the following sections on emotions and economics.

The key for pieces like Andrea's to work, is to build them with high level of initial durability and great production quality so that the lifetime of a piece can be prolonged through repair. This was mentioned by Erik, Andrea, and Al, although they do not all

agree, they found one thing to be certain—each piece needs a certain initial production quality to enjoy a successful life. Erik mentioned that mass-production can in fact improve the strength or quality of a piece.

> With a lot of pieces, they will use modern manufacturing techniques to improve the strength or quality. (Erik, interior consultant, furniture showroom)

Al was not confident in the quality of today's mass-produced pieces:

> Unless they are hand-made or custom designed by an artisan, it's not going to have the same qualities as an old piece. It is still going to be manufactured in a plant with a lot of different people touching it the quickest, possible way because they have to get it out the door…I have stuff out there that is 200 years old, and I have stuff out there that is 2 weeks old. So, when thinking about it, I would rather work on the 200-year-old pieces, because I know that they are made better. (Al, owner, repair shop)

Andrea suggested that quality mass-production is possible, but often differs by piece:

> It is 100 years old, that chair, made by craftsman as opposed to things that are being mass-produced. I think that when things are mass-produced, it doesn't necessarily mean that they are less, you have to be sure that they are still the same quality. (Andrea, architect and interior specialist)

Andrea noted that details of construction are important features of quality, but quality is also linked to the design. Erik explained that people will come in with a brochure from a competitor and on paper, they will say that they look similar with a "hard wood frame", "double-dowel blocked suspension seat" and "Dacron fill" but Erik explained that it is more than just construction details and materials that go into the quality:

> Construction-wise they may be pretty similar… But, the design is in the details. You are paying for the whole creative process behind the product… if the guts are all the same, then it is all about the details, the proportions, the fabric selection, where the seam is placed. When you are looking at those things, the

> competitors, in a lot of ways, can't stand a chance. (Erik, interior consultant, furniture showroom)

To reiterate Erik's point: quality is also related to design. When the design is a significant part of the product, it is generally documented with the designer's signature or a manufacturer's stamp on the bottom of a piece. This leads to the next facet of quality: documentation as a physical indicator of quality assurance. A few of the participants mentioned that high-end pieces of furniture come with documentation as a measure of quality assurance. Carrie mentioned that this may not make something more valuable, but the quality in materials and manufacturing technique are guaranteed:

> The documentation provides assurance. I guess, that makes it more valuable to you, but the price of eggs is the price of eggs… but you aren't going to say: this one has a receipt so it is $1000 more, but you do get more assurance. (Carrie, curator, auction house)

Barry used the word *provenance* as the proper term for this type of documentation and asserts that this can add quality assurance:

> Documentation can be provenance. Sometimes provenance, for example George Nakashima, will be a receipt drafted to the family that was the original owner. If that is not available, but the lineage of ownership is, we can take that back to the Nakashima studio, and they can provide a copy of the original index card. (Barry, director and curator, auction house)

Barry explained that other examples of provenance can be who imported it, who owned the piece, if the designer was consigning it or even if it was a historically significant piece. Roy also often sees receipts and documentation sell with the pieces:

> I've purchased numerous pieces from people who've kept their original receipts from their pieces, which is always fascinating to see. If the client purchasing the piece wants it we provide it with the sale. (Roy, owner, high-end vintage furniture store)

Eric explained that new, high-end pieces have physical signs of this quality in the form of a serial number or a signature:

> Most classic pieces, especially the more expensive pieces, such as Le Corbusier, Knoll, Herman Miller, Cassina (well, Le Corbusier) and Fritz Hansen are going to come with a serial number stamped into the piece, and often times, a signature stamped into the piece. And that is something that they have done, some of these more recently, that guarantees that even if you lost the piece of paper that says "this is authentic" that you have that permanent imprint in the furniture that says "this is authentic", Most of the pieces also come with some sort of certificate of authenticity, a way you can register the product, in the box, so that you have for your records as well… Items from the Republic Of Fritz Hanson…like the Egg Chair even have a serial number imprinted in them. You can go [online] and register an item …If you go to buy an item you can verify that it is authentic, that it's not stolen. (Erik, interior consultant, furniture showroom)

This point that Erik makes is discussed further in the next section, on emotion. Also, the physical indicators of quality (such as provenance, receipts, stamps, and serial numbers are a major indicator of the pride that the manufacturer takes in making a quality product. Documentation provides is a sense of security and reliability.

Emotional. Emotional aspects play a substantial role in the longevity of furniture. From the data, there were the two aspects of the emotional component: connections and pride.

Connections. Paul and Janis showed how people connect their personal values to the mission statements or design philosophies of the companies they support. When a customer's values align with that of a company's, these connections are often filled with emotion:

> I communicated enough on my website – this is not a huge corporation, it is a smaller company that gives a damn, and if there is someone who cares about

> buying their products from someone who gives a damn, if that resonates… (Paul, business owner, designer and manufacturer)

Paul was passionate about quality construction; he uses his products and marketing to specifically connect with customers who have the same passion. Janis, although from a very different perspective, recognized that people donate for reasons very similar to those mentioned by Paul. They connect with the company's mission statement and acts of community involvement through human service programs.

> We'd like to think, many folks donate to because of our mission. Many folks understand when you donate, those goods are then sold in our retail stores to help generate revenue for our human service programs. Another portion of the donations come to us, because people want to be green and donating is recycling. (Janis, communications director, national non-profit thrift store)

Although Kate and Max's business is ecologically and socially sustainable, they do not cite that as their mission, but rather, their excitement lies in connecting with the history and design of the furniture they find.

> We recycle as much as we can, but we aren't like totally "go-greeners". But, this is green, it really is. It is re-using things. We do have a compost in our kitchen, but this is saving a lot more than the compost ever would… we just like [our business and Mid-century modern furniture]—we genuinely do… The collectability of it, the history of it, the design of it. (Kate and Max, mid-century modern furniture refurbishers and dealers)

Historical *c*onnections that people have with furniture can be powerful. Historical furniture is still being reproduced today for the same reason Shakespeare is still performed – masterpieces give people of a modern era a connection to a past, and time is the ultimate judge of taste. Barry mentioned a historic item that sold recently at his auction; he used the word *iconic* to describe its location and designer:

> More historically important pieces like the Wharton Eshrick stone sculpture that we sold recently, was sitting outside a University for many years, so… that is not

only is Wharton Eshrick an iconic designer, but it's the location on the University that owned it was iconic as well. (Barry, director and curator, auction house)

The relationship between furniture and an era of building design and construction is an intimate one. Erik cited a chair designed by le Corbusier, a leading architect of the early 20th century, as a piece that is historic and could be considered iconic:

> I think there are some pieces, such as Corbusier in particular, that historically are so important that even if not every person finds them comfortable, so to speak, in the modern day context, it is that historical importance that keeps them around. (Erik, interior consultant, furniture showroom)

Erik explored the idea that a piece is influenced by the history of a location in which it is made.

> Even Cassina, for example, their headquarters are basically the same buildings that they have had for going on 200 years. And, all those little villages they have the same tanneries. They have been using the same barrels for decades. They share sometimes the high quality leather from the same tanneries with Louis Vuitton and Prada and some of these other really high brands. It's all part of the history behind the product. (Erik, interior consultant, furniture showroom)

Manufacturers and designers can jump-start the bonding process between owner and object in various ways. Paul works to establish that connection through the open display of emotion on his website for his products. Erik explained how other firms foster this special user-object relationship:

> Some of them, like Fritz Hansen, literally include a Mini-book that talks about that product…. and the designer especially is the main focus. So it is not just, this is how to care for the product. It is instead "Let me tell you what you bought," the importance behind it. I think that teaches people how to treat the chair. So, Instead of just a chair, you take care of it, it takes care of you. It is kind of a different relationship than just a thing in your house. (Erik, interior consultant, furniture showroom)

The fostering of relationships is not solely the purview of the designers and manufacturers, but also extends to the specifiers, interior designers and architects. Andrea told a story of a client who was captivated by the stories behind Andrea's selections.

> The client was really interested and was planning on using the space to have parties and wanted to be able to talk about the furniture and the designers with whoever came to the parties as like a conversation piece. So I made a book of all of the designers of all of the furniture for her, so she would have some information about that. I think somehow it adds value, or they have a different connection to the piece because they know the history of it. They view it more like a sculpture, or an art object than just a piece of furniture. Like that [shipping container] coffee table, as soon as we told her what it was, it just became so much cooler to her. (Andrea, architect and interior specialist)

Personal history. History can be personal and recall specific moments, memories and stories for the owner of the piece. These foster connections that can have no relation to the item in a broader historical context, but rather a personal one. This process leads to long-lasting bonds and attachment as objects become companions on a lifelong journey.

> There are other pieces, such as the Eames lounge and ottoman…the way that the leather wears in instead of wears out. How each wood grain veneer on the back of the piece is different from the next… as you sit in it lounger, as it has been in your family longer, it creates its own story. So, it is its own personal history, your own personal history with the item that I think is what keeps those items around. So, I think there is the greater context of the item in society, but then also the history in your own home. (Erik, interior consultant, furniture showroom)

In speaking of the Eames Lounge Chair, it is important to note that it was a design decision to let the leather break in. Charles Eames described his own chair as having

"the warm, receptive look of a well-used first baseman's mitt" (Landis, 1990). Customers routinely have emotional connections with pieces of furniture; Russ, Erik, George, Kate and Max frequently heard stories from their customers. Stories play a large role in these personal histories. Russ acknowledged in many cases his customers brought him pieces for repair because they are attached in a sentimental way to the piece:

> They have a sentimental attachment to their furniture – it was my parents', grandparents'—something like that. (Russ, owner, refurbishing/reupholstery shop)

Erik recalled customers sharing stories about relationships with their furniture, objects that have meaning beyond their function.

> "When I got a divorce, I let my ex-wife have everything but the Eames Lounge." We also had a couple who said that they were looking at the chair for 50 years. So I said *You have been looking at it since it almost came out?* they said *yes* They bought an Eames lounge for each other, so two, for their 50th wedding anniversary.

Erik, someone constantly surrounded by carefully designed furniture, made this connection from these countless interactions.

> These products are not just another thing. They are a reflection back on history, society, there is an emotional connection. It's more than just a chair… It was grandma's chair and then I was excited to get grandma's chair and then I couldn't believe that I had it, and then all my kids sat in it, and I told them how it was grandma's chair, then those kids grew up and then they wanted it. (Erik, interior consultant, furniture showroom)

But it is not just furniture industry or design professionals who have daily interactions with users who are aware of this relationship. Even the manufacturers are connected to the stories, as George noted:

> I had a couple that was celebrating their 20th wedding anniversary, and their idea was to come visit [us]. We get calls like that all the time, and emails, and … when

> I go to public events and trade shows, people come up and tell me stories about having grown up with an Eames lounge chair, or they remember fondly being rocked in an Eames RAR rocker by their mother or their grandmother. So it is very fun if you know, furniture is a very intimate – it's the stage setting of your life and where a lot of people who are in tune with their interiors, it's like the small chocolate chip cookies – it's the connection people make to it. (George, communications director, well-known furniture company)

The connection shared by the user to the rocking chair speaks to something larger – the designers of the chair initially created it not because of economic motivation, but rather because a family friend was having a baby and needed a rocking chair (Landis, 1990). Kate took this generational connection a step further, from those old enough to appreciate it to a new generation young enough to grow up with it.

> People will come in here and say *I had this piece when I was little, and I still have it.* I think it is just the dependability. They can bring it from move to move and it withstands … after a while, people just like the history of things, and passing it down… If you bought a dresser and you had it in your baby's room, that baby when it goes to college could take that dresser and then use it when they are a newlywed because it will still be there. (Kate, mid-century modern furniture refurbisher and dealer)

Kate mentioned dependability, a physical aspect, but this factor appeals to the emotional nature, too—our dependence upon something for emotional reasons. Paul mentioned the inverse of that—the dependency goes both ways:

> It has got to be there. It had to have—people need to feel personally connected to it so that they don't throw it out. It has to have stayed in the person's good graces long enough to be there years from now. (Paul, business owner, designer and manufacturer)

If the connection becomes deep between the user and piece of furniture, then their relationship becomes established, which could turn into long-term respect. Al mentions that when this level of rapport is reached, a piece could last forever:

> If you take care of it and respect what it is and what is supposed to be used for, it should last a long time… I have a dresser in our guest bedroom at home that is from the late 1800's that we use every day in our guest bedroom. And, it is as nice, I've done some work on it but it is structurally sound, and it is as nice as it was the day it was made. And, it'll last forever if it is taken care of properly. (Al, owner, repair shop)

This connection is not something only the initial user experiences; it influences the treasure hunters who discover and restore them as well. Roy explained this connection, both in how he advises customers and how he feels when a piece goes out the door.

> I always advise people buy what they connect to verses what they think may increase in value… I typically only buy things that I love. It's parting with them to sell that's more difficult. (Roy, owner, high-end vintage furniture store)

Barry described the extraordinary moment when, in the auction setting, many variables align and a piece sells for well over the appraised value.

> I think when the provenance or the background or the documentation really adds up to something special, that is – Special in my mind is iconic and rare at the same time… recognition of what it is, but [also] super rare. That creates a lot of emotionality, and desire for ownership. In the auction paradigm, that creates lots of bidders. Lots of competition, and gets a piece sold very, very well. (Barry, director and curator, auction house)

George indicated that a brand gets its reputation and following through the products it makes and the connection people make to their products:

> Ultimately a brand is a promise – that is a very widely understood, maybe hackneyed phrase, but I think there is a lot of truth in it. If the experience people have with your brand through your products is a great experience, one that has

> positive emotional connotations, and a sense of quality and longevity. And, that there is a sort of visceral connection to those products. (George, communications director, well-known furniture company)

This idea of a user connecting with a piece of furniture is something that designers and manufacturers who care about long life are passionately interested in, but it is not just a point of passion for them, it is closely connected to a sense of authorship or pride in the objects that carry their name.

Excitement is a strong emotion that is almost a reflex that treasure hunters and passionate consumers both experience when they connect to a piece of furniture. It is an instant recognition or a moment of discovery. For consumers, it's the discovery of soul mates, for treasure hunters, it's finding the buried plunder.

When clients come into Max's store, their emotions are triggered when they see something that they connect with:

> We had a womb chair in – it didn't last two days. Someone was like *A womb chair!* (Max, mid-century modern furniture refurbisher and dealer)

That "someone" in Max's story found their soul mate. But the treasure hunters are not just out for buried loot – their experience connection is unique as well. When Max discovers something great, his reaction is to call his wife.

> Over the weekend I bought a modular seating section. I knew it was cool, I knew it was vintage, but I didn't know anything about it… as I was putting it back together, I noticed that there is a Brown Saltman tag on it. Brown Saltman is a big deal. And I was like *Oh yeah, its Brown Saltman!* I called [my wife]. (Max, mid-century modern furniture refurbisher and dealer).

Erik described how customers come in and are excited by a product that they connect with because its function fulfills their need:

> I think sometimes our items solve problems. And that's when people stop back in and they are like "Brilliant! I didn't even know that this existed and it does exactly what I need it to do". So, it's not just… pushing more needless products down

> people's throats. It is having that product in our assortment that serves a purpose and a function… (Erik, interior consultant, furniture showroom)

Paul described how his customers arrive at his products and how they connect with it because if fulfills their search criteria that other desks do not.

> I hear a lot from people who are at the tail end of a search. They had an idea in their head of what they need, or what they wanted, and they searched, they didn't find it, and they stumbled across my thing, and "Oh my god, oh my god, that's what I need." And there is certainly an emotional, irrational element to it. Everything clicked, and they have to have it. (Paul, business owner, designer and manufacturer)

Love. Love is as emotional reaction that occurs once a piece of furniture lives up to the consumer's expectations and creates a deep emotional connection. Paul described his firsthand experience with this phenomena:

> I write the word love on my website a lot, that was something unexpected, people would write me… the way I felt about the desk was the way other people felt about it.

Paul went on to explain how some large manufacturers actually over-sell their furniture and how he believes consumers have been conditioned to accept this, often resigned to a broken relationship with the furniture from the start.

> I think people have been trained to expect disappointment when they finally get an item. It is somehow subtly trained – it is in the best interest of large manufacturers that we as consumers are trained to get really excited about something to get us over a peak, pulling out our wallets to buy it, knowing full well that once we get over that peak, we will be disappointed somehow.

Paul understood that his customers often come to him with a "broken heart" about their relationship with past furniture purchases.

> I hear that in my customers before they buy – the skepticism, the questions where they are trying to figure out what it is they are going to be disappointed

> about once they get it. “Does it wobble?”, “No, it doesn’t wobble.”, “Does it do …this” you know…”How tall is it?”, “I’m 6’4”, will it work for me?”, they are just trying to set their own disappointment. They will probably buy it anyway, no matter what I say, but they are just trying to set their own expectation. And then they get it, and it doesn’t disappoint them on any level, they react with the word love. (Paul, business owner, designer and manufacturer)

In winning the customer over, not over-promising but rather meeting the expectation in a meaningful way, fulfilling a user’s need and facilitating a connection between the user and the object, designers and manufacturers have the ability and opportunity to connect emotion and a long lasting product.

Pride. Pride is an emotion shared by both manufacturers and customers. Often, pride comes from ownership, rarity, and quality. Al explained that with older pieces, there is an element of pride and craftsmanship, something he shares when making repairs to a well-built piece.

> The quality still was there. The pride of building something was still there … We always repair a piece of furniture as though it is going into our own house. That is the way I want it to go out the door, so that the customer will be proud to put it back in their own house. (Al, owner, repair shop)

Paul’s sense of pride for his minimalist desk takes on a personal aspect – even when someone else owns it, he still considers it “his stuff”. He described a hypothetical scenario of someone throwing it away, how it would hurt him—make him ask, *Why didn’t they like it?*

> I think about why people would throw away my stuff. Less motivated by what it does to the environment when it happens, but more motivated by *why didn’t they like it?* That is good information for me to have. Why were they angry with the product? Or, why were angry enough to toss it? Then you have the idea – even if the product is recyclable, does it even make it to the recycler, or does it still get thrown out? (Paul, business owner, designer and manufacturer)

Paul's thought process was multi-faceted. He connected their disposal of the desk with emotion, but he also realized that just because something is recyclable does not mean that it will be recycled.

Economics. During the interview research, economics was a constant theme. In classifying the comments about economics, participants' comments fell into two camps: investment and tradeoffs.

This section is more tightly structured, compartmentalizing economic factors by the participant categories shown in Table 7, since investing in a product as a manufacturer and investing in furniture as a consumer involves two very different decision-making processes.

Manufacturer investments and tradeoffs. Manufacturers can range from small, privately held firms to large corporations. They all have strategies balancing what a consumer is willing to pay with the cost of fabrication and materials.

Investments. George, pointed out the incentive of economies of scale, which refers to manufacturing a large quantity of a particular product, allowing the costs of tooling to be minimized per unit sold:

> If you having invested money in the development of this particular design, and over time, you have amortized the tooling costs, and you have perfected the manufactured the manufacturing techniques, and you have really fine-tuned your organization's ability to sell that product successfully, and it has proven to be a successful product, there are great economies as a commercial business, in being able to sell something for many, many, many years. (George, communications director, well-known furniture company)

George's company was clearly from the school of "if it isn't broken, don't fix it." The one key part of that equation was designing it right the first time.

Paul saw this concept from a different perspective because he is a niche manufacturer who designed his product to be the highest quality and did not cut corners to save a few dollars. As a small-scale manufacturer who makes a few products and sold

them online, Paul knew that every decision he makes was critical to his success or failure. His economic model was similar to that of a “tight rope walker.” Paul knew that his reputation was at risk. He knew that designing and overseeing the manufacture of his product and that spending the extra money to allow maximum durability was essential to his business model. As a niche manufacturer, his product appealed to a core group of people—those who are passionate about design and quality. He realized that he could not give up the important aspects of his way of manufacturing to quickly make a profit or draw a larger audience:

> If I am going to do this, let’s do it right! If I am going to cut 50 bucks out of the project now… no, I’m just going to go for it, I’m already spending “blank” for this…

Paul’s internal dialog about how he approached design was telling: he was unwilling to compromise his commitment to the product.

> I can’t afford not to [built it like a tank]. Even returns… if I send something to Paris and it breaks, or breaks after a week, I am out of business. It costs that much to ship it.

Paul’s return on investment was as much about his commitment to his designs as it is a practical business decision: a well-constructed product can be safely shipped longer distances than a poorly constructed one.

> Any conversation I have with a reseller, contract furniture person, is how I should change what I do to make them happy. It’s like, no. The reason when you are calling me is because people like this desk, people want to buy it *as is.* (Paul, business owner, designer and manufacturer)

Paul’s thinking represented a paradigm shift in planned obsolescence. Pushing back on resellers and middlemen who were more interested in the short-term profitability than long life was a key part of unlearning a near-century of planned disposal.

Tradeoffs. Manufacturing an heirloom piece requires an investment: materials, construction, and initial design all play a part. Yet these up-front costs can be worth the expense because of the incentives, as John and Paul mentioned:

> So… this idea of building a chair that lasts forever could hurt us… [but] our integrity and our belief in that is one of the reasons people come to us. It is sort of a two-way street there. (John, VP of sales and marketing, furniture manufacturer)

John realized his customers come to him because of how long his products last. He realized that this means he was not the low-cost provider, but rather one that people can rely upon. Paul, a "tight rope walker" was giving up clients, but understood his client and made products in a way that may not please the masses:

> I realize that most of the decisions I make force myself out of the mass market… but the small group that it appeals to, they are ravenous for it… People are willing to try something different, and that's not only in the fact that it is a different looking thing in their house… the process is different – going online to buy a desk, sight-unseen, for 700 bucks, *that's different…* I am saying this thing is built like a tank, I better deliver on that. It costs more to make it built like a tank. That has to resonate with the buyer. If it is ok that it is wobbly and tin-y and it's something that they can pick up at IKEA, they are obviously not my customer then.

Paul understood that his customer was an "enlightened" user who valued quality construction and was willing to pay for it, even without physically touching it.

> The whole thing started with the attitude of *what is it that I want, not necessarily what the market wants or what would a distributor want*…. I wish everybody demanded one heck of a desk, but they don't. They have been trained to say desk—200, 250—that is what I will go out and spend on a desk… They don't know that they have been trained… If you go buy something at Target for 20 dollars, it was made for a buck-fifty… [people] have been trained to think that 20

> dollars is an excellent value for what they got, and meanwhile the manufacturers are held prisoners… [but] if 50 % of their business came though the website, and they sold direct, they would have amazing power to tell Target: No, you are not buying these from us for a $1.50. You are buying these from us for $4.50—because we make [enough] business selling these things on our website, we don't need your business… Target is no longer the 800 pound gorilla. (Paul, business owner, designer and manufacturer)

Paul was passionate about fighting planned obsolescence through responsible economic means and pushing back on retailers and distributors who had business models centered on consumers buying cheap stuff often.

Designer investments and tradeoffs. From this research, it's clear that furniture designers, in an economic sense, are artists who need patrons. In today's society, economic factors play a large role in the success of an artist.

Investments. Designers choose certain elements that are the identity of their product—it can be the physical dimensions, materials or construction—in essence anything that can be perceived or imagined through the five senses. Barry thought that this investment was best suited when the designer was uncompromising in their vision.

> No one chair can do it all, no one table, no one house. Decide what your expression is for that piece, and don't try to make it all the possible impulses that you have. Let it be the one impulse—one expression that you are trying to execute. Whether it becomes timeless, or fantastic, it may in the end be an accident. That you couldn't have controlled any better had you tried harder. So, just let it be that one expression, and I think it will resolve itself. (Barry, director and curator, auction house)

Maybe this one aesthetic expression is based upon an idea of a new function, a unique spatial experience for a user, a new material, a new process of working, or a new concept entirely. That is the first piece. Executing this singular expression is the second part—where quality makes all the difference. Most importantly, when these investments

were made, and the single honest expression was achieved, Barry believed the best outcome was possible.

Tradeoffs. During the design process, tradeoffs are often necessary. Sometimes these tradeoffs take the form of "value engineering"—the concept of balancing the cost with the desired function. These value engineering exercises sometimes are due to fabrication limitations, material cost or availability and are almost always linked to budget constraints. An important realization is that no matter how the design is executed, it is impossible to make every potential customer happy with just one design. Any design excludes some potential customers. But the best designs "choose" the users, and design to that target market.

> I would say basically that a person designing today has to create a niche for himself, create a buzz and do a lot of advertising and not produce for the masses—that is going to be their downfall—if they want something to be timeless and also appreciate in value. (Reggie, owner, vintage furniture store)

The important element for designers interested in the economic role of heirloom product design is a careful balance between an uncompromising vision for the "investment" elements in the design, while being flexible with potential tradeoffs.

Reseller investments and tradeoffs. These "treasure hunters" make their profit from discovering furniture that was devalued by previous owners but nevertheless possess inherent value beyond their asking price.

Investments. Max and Kate, who both started out as treasure hunters for their own homes, believed that their vintage furniture was an investment, due to the materials and fabrication techniques as well as the design.

> They don't make it like they used to—they really don't…if you do find something that is made as well as this stuff is made, it's *really* expensive!
>
> In finding stuff for our own house, we would find a sofa, right, and then we would find another sofa, and we go—well we already have a sofa, but oh my gosh its

> only 50 dollars, and we get to sell it for 500 dollars, why would we not want to buy it? (Max, mid-century modern furniture refurbisher and dealer)

Max's entrepreneurial attitude not only explained the innovation for going beyond the cultural norm of visiting a big-box store for his furniture needs, but also shed light on his desire to take these weekend bargain hunting into a full-time business. His business grew over multiple locations and iterations into a 4,000-square-foot store where his passion for investing in vintage furniture is shared with customers. Kate explained why spending slightly more money on a vintage piece of furniture is actually a safer bet than buying from IKEA:

> I'm willing to spend more because… you can sell it for what you paid, or maybe even sell it for more, or take barely any loss. And so, there is not as much risk. (Kate, mid-century modern furniture refurbisher and dealer)

Max used the analogy of buying a new car:

> You can't buy a car and do that, but if you buy this type of furniture you can… Buying new furniture is a lot like buying a brand new car. The second you buy it, you drive it off the lot, and it goes way down in value. (Max, mid-century modern furniture refurbisher and dealer)

From consumers investing in the resellers, to the resellers investing in the consumers, all of this additional money points to one salient fact: well-designed vintage furniture maintains enough value to warrant post-purchase maintenance.

Tradeoffs. "Treasure hunters" make trade-offs when they take in pieces that they do not love or that does not fit their taste, but it does fit that of their clients. Other businesses, like the one Janis worked for, accept all donations, where the condition varies. As a donation-based business, the quality and quantity of what Janis received varies significantly from week to week. Here, the tradeoff was one of having to take in garbage, store it, attempt to sell it and if it cannot be sold, dispose of it. Much like someone panning for gold, she took in everything that was donated, "rocks," "gold," and all: 33 percent of furniture is not resold.

> If items are not sold in our retail stores they go to our Clearance Outlet where everything is sold by the pound. If it is not sold there, we work with several salvage operators who breakdown different product for use elsewhere
>
> There are several reasons individuals donate their material goods to Goodwill. Their donation is tax deductible. We give them a donation receipt when they drop-off their item(s) at any of our retail stores or 8 stand-alone donation centers. (Janis, communications director, national non-profit thrift store)

Barry described a similar tradeoff in the auction house context, specifically auctioning those pieces he personally did not appreciate:

> Pieces are taken in primarily to sell, that is the first one. That is my mission, to sell pieces and have good outcomes for my consigners. Good outcomes meaning sell it within the estimate range or above, if possible. Do I believe it is going to sell well? Do I believe there is going to be a market for a piece, even if it is a narrow market? Does it fulfill our obligations for ourselves in terms of value, so we have roughly a 500-lot auction, each one of them needs to have a minimum value of... Even if there is a narrow market slice where I think a piece will sell successfully, I will take it in. (Barry, director and curator, auction house)

For Roy, another tradeoff with “treasure hunting” finding pieces that are valuable was also difficult—when he had to part with them in order to maintain revenue: this business requires that you are always researching and educating yourself about different designers and artists.

> I typically only buy things that I love—it's parting with them to sell that's more difficult. (Roy, owner, high-end vintage furniture store)

For Janis, this business model aimed to *invest* in the community: this non-profit business accepts donations in hopes of selling them. As a business that operated solely from donations, the valuable proceeds made at their nation-wide retail stores fund a variety of human-service programs. Janis noted that furniture sales make up ‘7.9% in 2010’ of yearly total revenue:

> We accept community donations, which are inspected and sorted to be sold in our retail stores, where 90 cents of every dollar goes directly to our human service programs. The programs provide education and job training opportunities to individuals with barriers to employment, therefore giving them a chance to become self-sufficient and successful community members. (Janis, communications director, national non-profit thrift store)

Tradeoffs are everywhere – the most important part for resellers is to choose what tradeoffs provide the best return on investment and what tradeoffs are not worth the sacrifice, be it a personal dislike, items donated in a state of disrepair, or even having to emotionally part with an item that the reseller grew attached to.

Repair/ reupholstery investments and tradeoffs. Repair and reupholstry shops are the linchpin to the antique and vintage furniture market. They enable those who find valuable items that have been neglected or unfairly categorized as junk or of little value to rejuvenate their products. They are reclaimers and restorers. Neil discussed how they viewed themselves as an investment service – not the cheapest firm, but not unnecessarily boutique:

> We take care of our customers. We are not the least expensive, we are not the most expensive. We give a good dollar value for the work we do. (Neil, repairman, wood furniture repair and refinishing shop)

Neil simultaneously described both an investment and a tradeoff – an investment in custom-made furniture, and a trade-off by purchasing from a chain that produced products made with thin veneers:

> Most of the time, if you want a good quality wood nowadays, you are going to have to go to a person that is going to custom-make your furniture for you… If you go through Ethan Allen, or even Copenhagen… Copenhagen charges thousands for tables and it's not real wood. It's just a veneer on the top. With a veneer, if anything happens, you will be losing a couple thousand dollar piece of furniture, and you can't really fix it… Now, you need to find a professional to build

> your stuff, but then you are going to pay for it too. (Neil, repairman, wood furniture repair and refinishing shop)

As specialists in the field of restoring heirloom furniture, repair shops would be an ideal topic for further research—their focus on the materiality and construction of furniture would provide a trove of insight into product failure and how it could be designed in the future for longer lives.

Specifier/ deisgner investments and tradeoffs. Andrea specified furniture for interior applications as part of the work she performed at her New York-based architectural firm, she also took on freelance jobs with clients who just want to "freshen up" their interiors. Each client was on a budget. Andrea's goal was to find furniture that met each client's needs and for each selection to be a long-term solution. In the economic sense, she acted as a "financial advisor" showing the client what was a good investment and where they could save a few dollars. She thinks investing in furniture was key to designing a space that would serve the client for years into the future. Erik helped guide people through the process of picking out a piece that would work for them in his retail store that carries new versions of classic furniture.

Investments. Andrea acts as a financial advisor in that when she specified furniture for her clients, she urged them to buy *investment* pieces.

> I always prefer to buy things that are a little better made, [and often] more expensive—so that they will last longer. I am always saying to clients, this is a very expensive piece, but you'll have it forever... I use that example of that client and I bought a vintage piece twelve years ago and just had to recover things. I would prefer for them to do that—just buy it once. (Andrea, architect and interior specialist)

Erik explained the adage that "cheap is expensive and expensive is cheap" – the idea that buying the "level 5" (in Erik's words) product the first time saved the consumer the trouble of buying lesser quality (level 2 or 3) products over and over… only to ultimately give up and finally buy the level 5 item.

> With the economy, people are returning to that traditional old European mentality. Instead of, “I can’t afford it now, but I want it now, so I’m going to buy something cheap now” and then when I can afford level 2, buy level 2, and then level 3, then buy level 3... By the time you do that, you could have bought level 5. So, you know, saving, buying what you really want, planned purchasing, buying something that really lasts, I think is something that is increasing. (Erik, interior consultant, furniture showroom)

Erik placed this concept of levels into a real-world scenario:

> I think people realize, you know, “I bought that damn IKEA chair four times”, or “how many little Target lamps did I pick up that were cute in an impulse, and then I left it in my one dorm when I moved to my other dorm, or I just got rid of it, or I gave it away”. By the time you add that number up, sometimes you have paid more than or equal to or close to something that you never thought you would have bought. So, there is that instant gratification. There is the “gotta have it now…” there is the “more for less” mentality that ran rampant. (Erik, interior consultant, furniture showroom)

Tradeoffs. Andrea and Erik both explained that customers often make the mistake of trading quality for shiny:

> The reason why we fall into this trap of more for less is convenience a lot of times. We want the glossy outside, and that’s all we care about. We don’t care if it’s filled with cardboard, we don’t care if it’s filled with formaldehyde, we don’t care if a child made it… Its gotta be cheap, and glossy. (Erik, interior consultant, furniture showroom)

Erik explained how the history of vintage furniture can be a blessing and a curse – the furniture may require more work, but it has a history that a new item cannot replicate.

> Exactly. And so, vintage pieces, to refurbish them costs money, and once that all happens, you are buying something used, that sometimes is expensive. And if you buy something that sometimes isn’t that expensive, then it needs refinishing,

> so are you willing to put that work into it? Another thing: it all boils down to cost. It's like a vintage car, you buy the car, by the time you replace the engine, and fill it with oil, paint it, reupholster the interior, it may actually be more than a new one. But, you have the history, and you have something that no one else has. You treat it differently, you appreciate it differently, it's a different ballgame. It has a different quality level than a newer item. So, I think there is a different mind-set. (Erik, interior consultant, furniture showroom)

Consumer investments and tradeoffs. Generally speaking, the best thing a consumer interested in heirloom furniture can look for is a piece that fits their need, their lifestyle, has a somewhat timeless aesthetic, and is built in a durable way so that they are able to maintain it well into the future. Consumers can be either individuals or corporations.

Investments. Heavy daily use in a corporation, such as a fast food chain, can cause premature product failure. These heavy-use customers can benefit greatly from well-constructed furniture that lasts longer and requires less administrative overhead with fewer unplanned replacements.

> The fact that there is, that our stuff is nicely designed is that we also do a lot of work for hotels and restaurants, and it is interesting that people aren't more and more interested in the longevity of the products. So, even in a McDonalds, for instance, they don't want to replace those chairs every year now like they used to – now, they want a chair that will last for years. (John, VP of sales and marketing, furniture manufacturer)

John explained that despite his company's popularity among residential customers, their primary constituents are commercial:

> Yes. That is how we intend things to be. Either it gets passed down from… we do 80% of our business for commercial use, so restaurants, hotels, and things like that. Only 20% is residential. So, yes of course the residential stuff will get passed down to people and traded – you see it all the time on eBay… A guy is

> getting rid of a set of [aluminum] chairs because he wants something new. But, our most important thing is that it is an heirloom for businesses, when businesses move, they want to take [our] chairs with them because they like them, and they use them again and again and again. Restaurants clean them off and use them for new restaurants. It is sort of interesting. From our point of view, that would be the heirloom… from one restaurant to another, from one hotel to another. You can re-use them for new spaces. And, they have been in some spaces for 20, 30 years. I've been in offices that have had them for 30 years. (John, VP of sales and marketing, furniture manufacturer)

John's perspective of the commercial use of furniture was another area for further research: Are the characteristics that make heirloom furniture for personal use the same as those which make for heirloom furniture in commercial settings as well?

Tradeoffs. Consumers often make tradeoffs, either out of frugality or lack of economic means. Yet, sometimes the tradeoff is in the opposite direction – consumers can spend more money because of an emotional attachment to their furniture.

> They picked a piece of furniture or multiple pieces based on how it feels when they sit in it, how it fits in the room they want. They will come in and say—*I know this sofa's old, I know this sofa is not worth what it is going to cost me to reupholster, but I have always loved the style of this sofa; it's so comfortable to come home and sit down on this and it fits perfectly in this space and room.* (Russ, owner, furniture refurbishing/ reupholstery shop)

What Resells Where?

Not unlike how cream rises to the top and the dregs sink to the bottom, furniture in its resale stage becomes stratified in how it is typically re-sold. Auction houses only concern themselves with the unique and high-end pieces. These pieces are highly sought-after and certain pieces of furniture sell for much more than the cost of the materials they are made from. Auction-worthy pieces have a mixture of desirable factors:

the designer, the manufacturer, the provenance, the rarity, the age, the condition, cache, and trends.

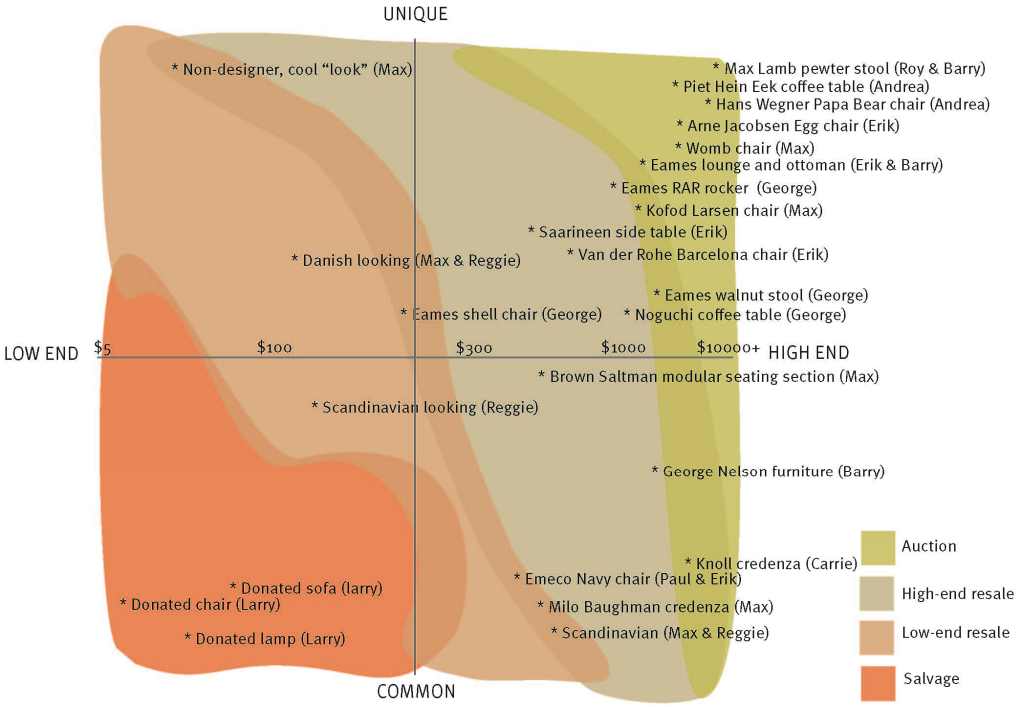

Figure 14. Biaxial Map: What Sells Where: Pieces Discussed by Participants

Conversely, pieces with poor craftsmanship, deteriorating finishes, missing parts, and lack of cache are common features of these pieces that sink to the bottom of the strata. Many never find homes and/or are considered unworthy of the inevitable repair bill.

Most pieces finish their initial cycle in the furniture resale-market. Pieces found here are bought in a range of conditions and require a variety of refurbishing and maintenance techniques. The reseller determines whether pieces are worth fixing up or not. The likelihood of whether something sells in the high-end auction market has to do with its uniqueness and working condition. A rare and pristine piece is more likely to sell at a higher price than a common or damaged piece, but the rare piece must also be in

demand, according to collectors' trends.

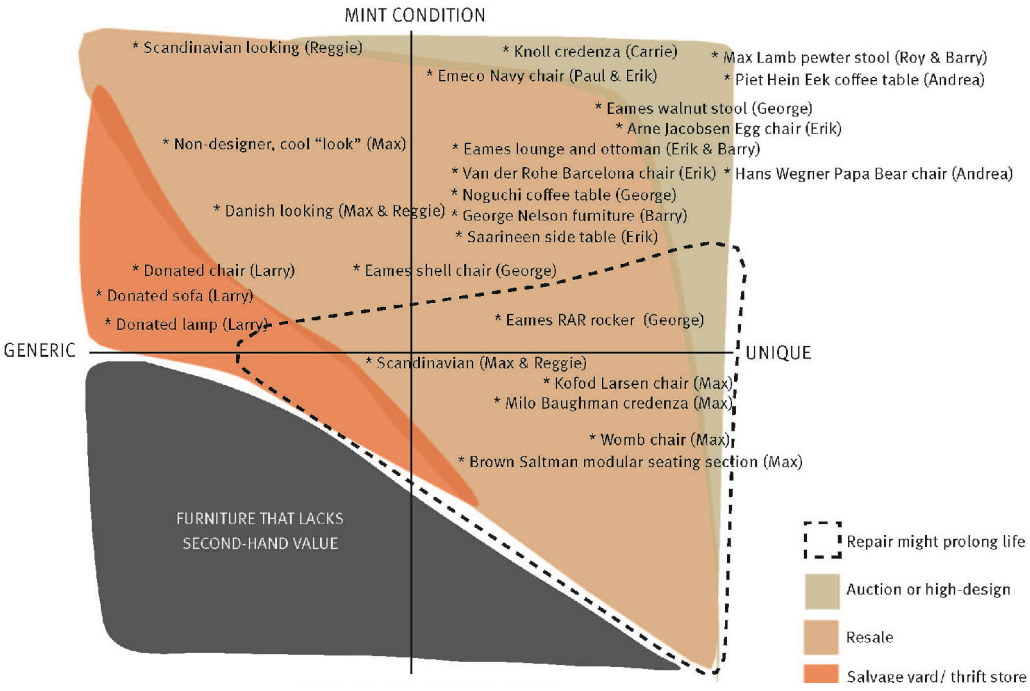

Figure 15. Biaxial Map: Condition of Used Furniture: Pieces Discussed by Participants

An interesting finding is that auction houses as well as re-sellers use repair to earn the maximum potential out of a piece and many rely on this practice to gain revenue. Salvage yards and thrift stores typically do not perform repairs, but leave repairs to the purchasers.

CONCLUSIONS

Summary

The findings of this research gathered insider perspectives on heirloom furniture culture; this information now needs to be translated and distilled into useful information for designers and manufacturers who wish to design long lasting, emotionally resonant heirloom-quality furniture. Translating insights gained from this research into opportunity areas can provide a "stepping stone to idea generation" (IDEO, 2008, p. 21). Designing for heirloom quality from the initial conception nudges the designer and client to think in unfamiliar territory. Long-term user experience, creating attachment, quenching desire for new products, upgrading products, product reliability and repairing the products could lead to innovative solutions or a new way of doing business. Based on this research, there are many opportunities for designers, manufacturers, and entrepreneurs to profitably engage in increasing a product's longevity. Manufacturing products for initial durability may be cost intensive up-front, but in the long run have many perks. Some of these benefits are incentives such as brand (or design) recognition, loyalty, and the ability to offer repair warranties and services. Helping combat planned obsolescence or reducing environmental impacts, while less tangible, could make for a strong mission statement or business model especially now with growing awareness of this necessity. Based on this research, many opportunity areas exist that would give any furniture company or entrepreneur a chance to create a piece that has the durability, underlying quality and design intention to last and give service to its owner for a long period of time.

Designers influence how products function; they can push the materials in a given piece of furniture to the limit. Manufacturers have the ability to work with designers, building their products from the designers' intentions instead of watering them down. This is a collaborative effort. Manufacturers typically define policies about offering replacement parts and services. This collaboration is of great incentive for both parties, as it enables manufacturers to build bonds with designers who could give them an incredibly

successful product, and it helps designers to be able to realize products to the designer's full intention.

Three Areas of Opportunity

Plotting physical and emotional characteristics of heirloom furniture onto an axis of controllable and uncontrollable furniture characteristics helped to visualize three areas of opportunity for designers and manufacturers (See Figure 16).

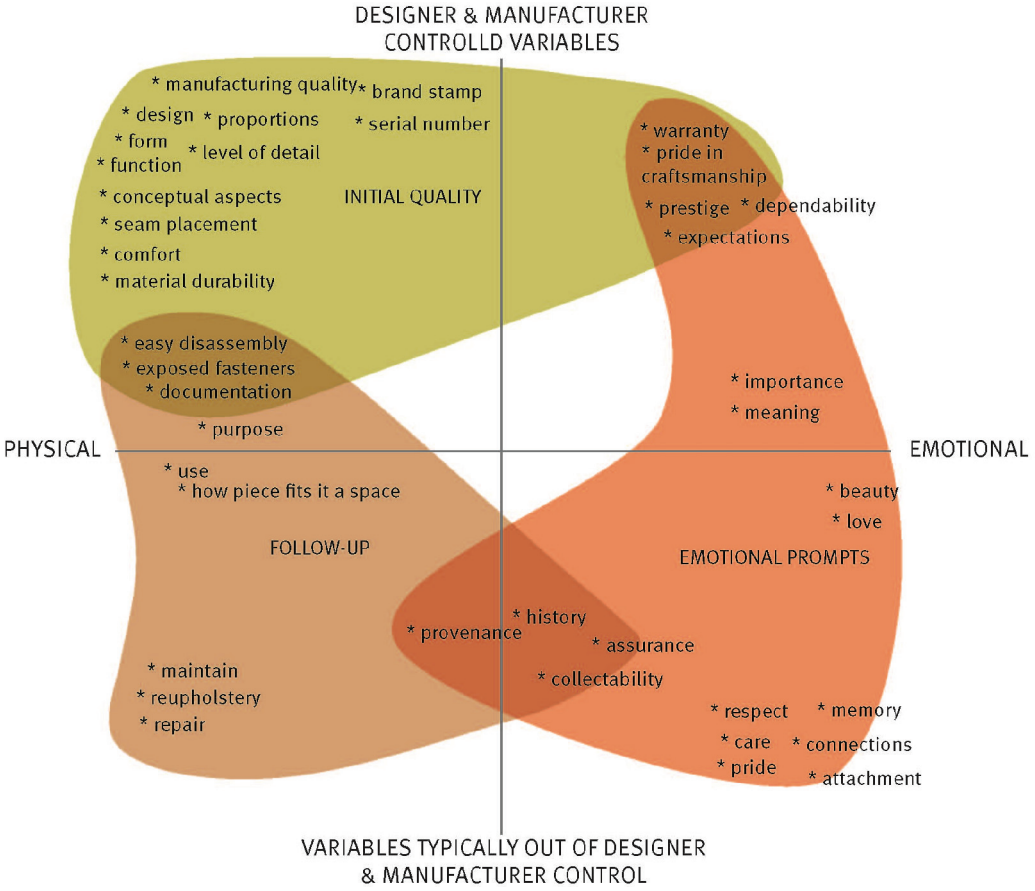

Figure 16. Bi-Axial Map: Three Areas of Opportunity

No formula exists for creating a long-lasting and successful piece of furniture. Instead, manufacturers and designers need to be cognizant of a few areas of opportunity during the design and fabrication process. Three areas emerging from these findings are: initial quality, follow-up, and emotional prompters. Initial quality that increases the longevity of furniture is obvious. Yet, follow-up areas and emotional prompts are typically overlooked areas of opportunities for designers and manufacturers. Unlike cars and

appliances, furnishings and home-goods are not sold with replacement parts or service contracts. In addition, little is typically known about a piece's designer or about the design or manufacturing process. Going against the tide means thinking through new strategies that could become business solutions. The considerations of higher initial quality, follow-up, and emotional prompts are part of efforts designers and manufacturers can adopt in hopes to take a stance against the dominant strategy of planned obsolescence.

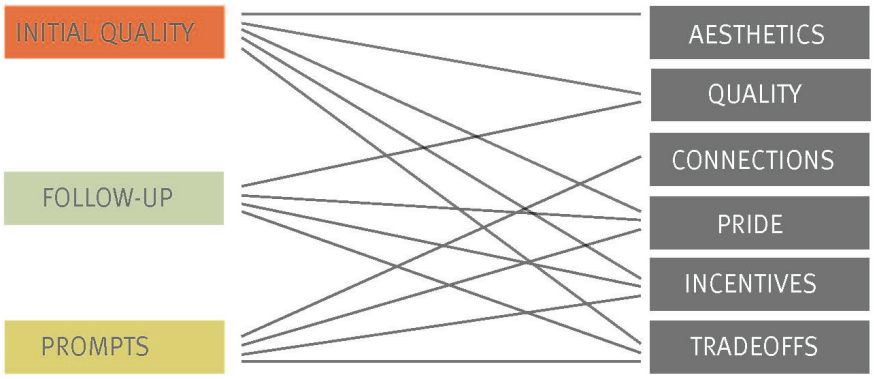

Figure 17. Relationships Between Factors of Longevity and Areas of Opportunity

Initial Quality

The area of initial quality is intended to set a model for interdisciplinary collaboration between a furniture designer and a manufacturer. To a designer, reaching a final design with a satisfactory level of execution can be difficult unless a designer either works for him or herself, or with a manufacturer that aims to enable the design. Likewise, manufacturers must collaborate with designers who share their vision of long-lasting products and provide feedback regarding the means and methods to attaining that goal. Design implementation decisions influence the audience that the business attracts—a market that demands quality.

Quality of design. Manufacturers need to understand that the initial quality of design is what makes many of these pieces survive and become heirlooms. The lesson for designers is: make something to its full and singular expression, making sure that one expression is evident in even the smallest detail. Inspiration may come from any number of sources. A few examples of sources of inspiration could be: a new function, material,

application, manufacturing process, space, concept, personal experience, phenomenon, or local circumstance. For designers, finding and embracing their niche is critical: This niche could be any number of things, but having this authenticity come from a specific geographical place or location seems a place for potentially great success. Thinking about this scenario in a life cycle mindset, a specific locale as a point of inspiration and as a client population would reduce transportation impacts as well as empower local material producers and businesses that would be of social and economic benefit.

Durable materials. This ecodesign strategy encourages designers to think in the long-term when specifying materials. With age, materials that proudly display signs of wear and use (such as materials that develop patina) are preferable. For a designer, specifying durable and application appropriate materials that age gracefully are essential for making a table, chair, or sofa last longer.

Structural transparency. Conveying the structure and method of construction in a transparent way enables repair and refurbishing that could in turn increase life span. If mechanisms, fasteners and hardware are exposed or packaged in an understandable way to the end user, they can recognize and assess the extent and feasibility of repair.

Execution. For a designer's full intent to be realized, execution is paramount. Unless the designer and manufacturer work closely at every stage, the design could become diluted and miss its mark.

Follow-up

Typically, furniture manufacturers sell a product and then do nothing to follow-up with the user. Could this be a missed area of opportunity?

Offer spare parts. If spare parts straight from the manufacturer were available online, customers would be encouraged and enabled to keep their furniture in good condition. Users could more easily replace aging parts and breathe new life into their pieces. Spare parts could extend into the area of personalization through optional hardware, replacement feet, alternate legs and updatable components. If optional textiles or leather cut to the right size or made into pads or covers were offered online, these

could help owners make freshening or style updates easy. The idea that these would be continually available (or possibly instantly made-to-order with computer aided cutting machines) after the original sale could make continuous revenue a reality and extend the life of furniture.

Leasing/ refurbishing services. On a commercial scale, contract furniture is typically bought in bulk and could be kept in working order through a lease/refurbishing arrangement. Offices, airports, stadiums, malls, corporate headquarters, restaurants, cafeterias, churches and other public venues would benefit from this agreement. This could benefit the manufacturer if the design was intended for this refurbishing process.

Provenance tracking and online documentation. Let your piece of furniture wear a badge it can proudly display. Place a serial number on it. Set up a website where customers can register their product, log various owners and keep a record of ownership, upload photographs or post stories that could later serve as provenance. This type of log would be useful for future owners as well as for manufacturers who could track the future uses of their product for marketing purposes.

Emotional Prompters

Meaning. Provide meaning and context for the owner through taking the time to explain the design intent of the piece, history of it, designer statement or biography, manufacturer information or other pertinent details about a piece. This type of information could take the form of a booklet or be available online. If an owner knows specific details about a piece, they will understand what they bought and they might more easily form an emotional connection to a piece of furniture. This type of connection fosters bonds that turn into long-lasting respect.

Expectations. Managing expectations begins with the promises that manufacturers make. When a product meets those promises, expectations have been met. Some of the controllable design decisions such as material durability, comfort and quality lead to prestige, dependability and ultimately to positive emotions such as love and pride.

Durability. In order to promote memories, connections, respect and attachment, a piece needs to be able to last in a durable way. When something is of obvious quality and demonstrates clearly that much thought went into its design, it is kept—resold, perhaps, but not thrown out. Re-sellers might make repairs so that a broken piece is functional, or a customer might buy a piece with the intention of fixing it up. The important point is that it remains functional.

Take-Aways

Take-aways for designers.

1. Do not try to make a piece that does it all. Make your piece do one thing exceptionally well.
2. Materials that patina in a beautiful way or show signs of age without deteriorating is a sign of durability.
3. Think about repair and refurbishing when designing.
4. Help the user intuitively understand the construction of the piece, so that maintenance and repair is conceivable and straightforward.

Take-aways for manufacturers.

1. Communicate the significance of a piece to the user.
2. Ensure long-term availability of replacement parts. Additionally, stock upholstery and leather, pre-cut or pre-sewn for easy upgrade.
3. Offer personalization through optional finishes and hardware.
4. Limited editions may increase chances of revenue and rarity.
5. Warranties provide assurance.
6. Leasing along with refurbishing contracts could ensure brand loyalty and generate revenue.
7. Build community and provenance. A website where users can register their pieces in order to track provenance more easily, connect with other owners, search for matches or sought-after items, and upload photos could achieve this goal.

Business Opportunities

Business typically concerns itself with making profit, research and development, supply chains and marketing – but as society's focus changes to look at future goals, business can work towards goals that better society and produce better products. What about enriching community and the quality of life, instead of the bottom line being only profit? Figure 18 explains the connection between revenue-generating tangibles, non-revenue generating tangibles and non-revenue generating intangibles. The column on the left explains categorizes actions a company could take that directly influence revenue by changing a product or way of working. The middle column describes how those changes can lead to measurable differences, while the column on the right explains non-physical end results that are still valuable to the company and its customers.

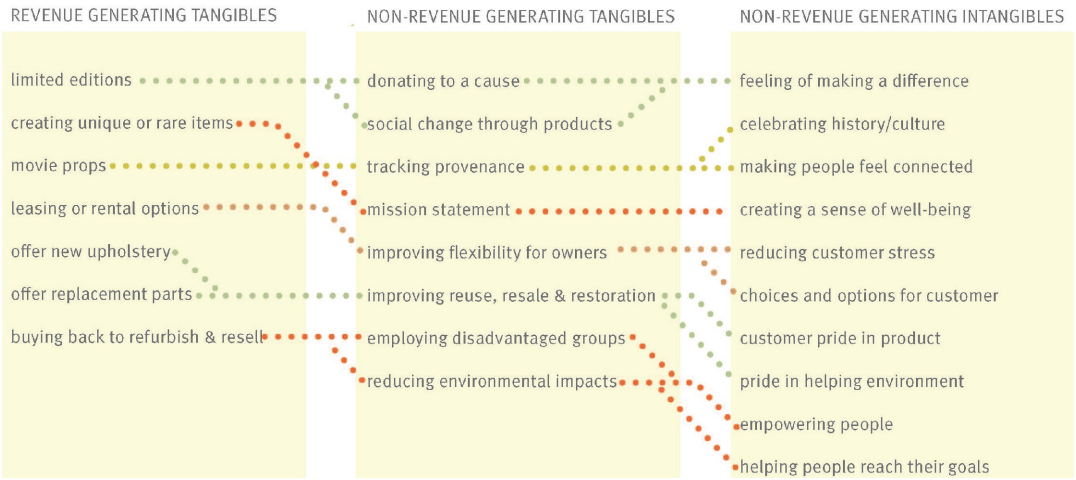

Figure 18. Actions a Company Might Take

Implications for Future Research

This study identified four areas in need of further research. The first being, a better understanding of furniture and the space that the furniture inhabits—is furniture is discarded because of a failed relationship?

A second area of further research was identified through my interactions with Al, Neil and Russ, all specialists in the field of restoring heirloom furniture. They offered insight into furniture initial construction, repair, and refurbishing that could have become a much larger discussion. A case-study solely on furniture repair shops would be an ideal

topic for another research project. A study which focuses on the materiality and construction of furniture would provide abundant insight into product failure; insights gained from this study might provide tangible outcomes for designers looking to increase the life spans of their designs.

A third area of interest is a study on consumer attachment: what do people become attached to and why? This could unlock insight into consumer emotion and attachment to furniture. This information would be useful to designers.

Lastly, a wide-ranging study of flat-pack furniture would be interesting. An LCA which compared various flat-pack pieces to fully assembled pieces built with durability in mind would be useful to understand environmental impacts. A cost analysis of the two scenarios would be another way to approach this question of flat-pack furniture versus durable, robust designs. This study would not be complete without understanding how flat-pack furniture is changing the perspectives of younger generations of Americans and what furniture means to them.

Food for thought.

My conversation with Paul made me question how programmed people really are when it comes to buying furniture. Does consumer understanding of the things they buy extend no further than what marketing departments tell them? Can consumers short-circuit mass media through new communication methods such as the internet? How has marketing and focusing on short-term profitability damaged consumer expectations? Have our expectations as a culture lowered to expect less from the products we buy?

As nearly every participant alluded to, if consumers bought only things that resonated with them, didn't see old as a four-letter word, and saw furniture as an investment, they might demand a higher level of quality of furniture from manufacturers. Ultimately, breaking the current cycle of planned obsolescence means a dramatic shift: consumers need to become intelligent buyers, designers must become advocates and vehicles for cultural change, and manufacturers need to see beyond the balance sheet to understand that profit and loss do not matter in a world overrun with waste.

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APPENDIX A

LIFE CYCLE NORMALIZATION VALUES

Method 1—CML 2 Baseline 2000 (Version 2.05, November 2009)

The impact category “Marine ecotoxicity” has been removed in this characterization method because it is overly sensitive to metals, which it cycles and amplifies, this has been corroborated by the LCA scientific community.

Normalization: Global normalization for 1995, estimated by the Center for Environmental Science Leiden University, The Netherlands

Impact category	Normalization value	Unit
Abiotic depletion	6.39E-12	kg Sb eq
Acidification	3.11E-12	kg SO2 eq
Eutrofication	7.56E-12	kg PO4--- eq
Global warming (GWP100)	2.41E-14	kg CO2 eq
Ozone layer depletion (ODP)	1.94E-9	kg CFC-11 eq
Human toxicity	1.75E-14	kg 1,4-DB eq
Fresh water aquatic ecotox.	4.90E-14	kg 1,4-DB eq
Terrestrial ecotoxicity	3.72E-12	kg 1,4-DB eq
Photochemical oxidation	1.04E-11	kg C2H4

“Freshwater ecotoxicity” normalization values were reduced one order of magnitude because of the problems the LCA community has had in valuing metals, as described in the previous page.

Method 2—ReCiPe Midpoint (H) (Version 1.04, March 2010)

Normalization: World ReCiPe H, created by Pre Consultants

Impact category	Normalization value	Unit
Climate change	0.000146	kg CO2 eq
Ozone depletion	26.8	kg CFC-11 eq
Human toxicity	0.00835	kg 1,4-DB eq
Photochemical oxidant formation	0.0202	kg NMVOC
Particulate matter formation	0.0716	kg PM 10 eq

Ionising radiation	0.000766	kg U235 eq
Terrestrial acidification	0.0264	kg SO2 eq
Freshwater eutrophication	7.93	kg P eq
Marine eutrophication	0.112	kg N eq
Terrestrial ecotoxicity	0.155	kg 1,4-DB eq
Freshwater ecotoxicity	0.235	kg 1,4-DB eq
Marine ecotoxicity	0.756	kg 1,4-DB eq
Agricultural land occupation	0.000186	m2a
Urban land occupation	0.0013	m2a
Natural land transformation	0.0837	m2
Water depletion	0	m3
Metal depletion	0.00226	kg Fe eq
Fossil depletion	0.000733	kg oil eq

Method 3—TRACI 2 + Norm (V3.03, February 2010)
Normalization: U.S. year 2000 (Bare et. Al, 2006, p.5113)

Impact category	Normalization value	Unit
Global warming	4.08E-5	kg CO2 eq
Acidification	1.34E-4	H+ moles eq
Carcinogenics	3.88E0	kg benzen eq
Non-carcinogenics	6.8E-4	kg toluen eq
Respiratory effects	1.31E-2	kg PM2.5 eq
Eutrophication	5.56E-2	kg N eq
Ozone depletion	3.22E0	kg CFC-11 eq
Ecotoxicity	1.36E-2	kg 2,4-D eq
Smog	8.26E-3	g NOx eq

APPENDIX B

INTERNAL REVIEW BOARD APPROVAL LETTER

ASU Knowledge Enterprise Development

Office of Research Integrity and Assurance

To:	Philip White AED
From:	Mark Roosa, Chair Soc Beh IRB
Date:	10/12/2010
Committee Action:	**Exemption Granted**
IRB Action Date:	10/12/2010
IRB Protocol #:	1009005557
Study Title:	Project Longevity: Exploring the Experience of Keeping Products Longer

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.

APPENDIX C

INFORMATIONAL LETTER

ASU Herberger Institute FOR DESIGN AND THE ARTS
ARIZONA STATE UNIVERSITY

Project Longevity: Exploring the Experience of Keeping Products Longer

Date

Dear _____:

I am a graduate student under the direction of Professor Philip White in the School of Architecture and Landscape Architecture at Arizona State University. I am conducting a research study to understand why some furniture lasts, while some ends up in the landfill. This research seeks to develop a new paradigm for furniture designers to adopt that will increase the longevity of their pieces thus combating wastefulness and planned obsolescence.

I am inviting your participation, which will involve an informal interview that is expected to range from half an hour to an hour at a location that is convenient for you. During the interview, I will ask you a series of questions. You have the right not to answer any question, and to stop the interview at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty.

Although there may be no direct benefits to you, the possible benefits of your participation in the research are that others may benefit by understanding the value in designing products that last and how best to go about it, as well as educating people on the negative environmental impacts of land filling. There are no foreseeable risks or discomforts to your participation.

In order to maintain the confidentially of your records, Sarah Ingham and Philip White will assign you a code name and destroy your contact information after the completion of the interview. Only Sarah Ingham and Philip White will have access to the audio files that were recorded during the interview. Upon completion of data analysis (expected to conclude May 2011), transcripts of the interviews will be shredded, audio recordings and electronic files will be deleted and the recycle bin will be emptied. Your responses will be confidential. The results of this study may be used in reports, presentations, or publications but your name will not be used.

I would like to audiotape this interview. The interview will not be recorded without your permission. Please let me know if you do not want the interview to be taped; you also can change your mind after the interview starts, just let me know. The audio files will be stored on my password-protected computer, and will be deleted once the study is complete.

If you have any questions concerning the research study, please contact the research team: Philip White, Associate Professor, School of Design, Arizona State University, at (480)727-6719 and/or Sarah Ingham (520)490-2731. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study.

Thank You,
Sarah Ingham, Sarah.Ingham@asu.edu

APPENDIX D

INTERVIEW GUIDE

Second-hand donation furniture store owner

Can you describe your customer demographic? (age range, income level)
What types of furniture do people drop off?
Why do suppose people donate them instead of sell them?
What percent of your revenue is made off furniture sales?
What items generally sell quickly?
Roughly speaking, what % of furniture is never sold?
Where does the remaining furniture go?
What are common items or characteristics that get sent to the dump?
If you were going to design furniture to last a long time, what characteristics do you think it would have?
Do you think much about the link between sustainability(environmental responsibility) and durability?

Salvage yard owner

How long have you been in this business?
What made you want to open your business?
Can you describe your customer demographic? (age range, income level, education level, design aesthetic?)
What types of things do clients come in looking for?
What types of things do clients get really excited about when they come into your store?
Are there some pieces of furniture that are easier to sell than others? Why?
Do you mind if I ask how you acquire your inventory?
What condition is the furniture in when you acquire it?
What types of repairs/ cleaning do you typically perform before you sell an item?
When considering additions to your inventory, what is your decision making criteria?
How do you price the pieces?
What documentation do you provide with the piece, and does it add value?
What makes furniture usable for many decades or generations?
Is there any way to predict what particular pieces being designed today will still be demanded in the future?
My thesis is being written for designers. If one asked: “What could I do so that you are selling my piece in 50 years?”, what would you say?

Second-hand furniture store owner

What year did you open your business?
What made you want to open this business?
Can you describe your customer demographic? (age range, income level, education level, design aesthetic?)
When considering additions to your inventory, how do you research the pieces?
Do you mind if I ask how you acquire your inventory?
What condition is the furniture in when you acquire it?
What types of repairs/ cleaning do you typically perform before you sell an item?
Are there ever any surprises you find out about once something is cleaned?
How do you price the pieces?
Are there some pieces of furniture that are easier to sell than others? Why?
What types of things do clients come in looking for?
What types of things do clients get really excited about when they come into your store?
Are there any specific materials or details that you look for?
Are there any particular details on the pieces that create increased value?
Do you ever provide information on the designer/ historical context of the piece to the client?
What kind of documentation do you provide with the piece, if any, that you sell?
How much does the designer add to a piece, value wise?
Have you ever told a potential buyer where you sourced the piece from?

In your mind, what is the difference between vintage and antique? In your mind is there a cut-off year that separates the two? Would that be the year that it is designed or manufactured?
How does your company keep up with trends and changes inspired by fashion or culture?
What makes furniture usable for many decades or generations?
When you buy a piece that comes with a story, do you pass that story along to its new owner?
Is there any way to predict what particular pieces being designed today will still be demanded in the future?
Do you think it is possible for a designer to guarantee that a product will be valuable in the future?
Do you think much about the link between sustainability and a durable, timeless piece of furniture?

Auction House

How long has “name of company” been in business?
What is “n.o.c’s” potential customer target demographic?
What is this company all about?
What margin of profit do you make on these sales?
Do you disclose the sale prices?
Why do people pay these prices for old designs?
What is it about these designs that people are willing to spend money on?
How does your company keep up with trends and changes inspired by fashion?
Why do you suppose these designs have held up so well?
What are people paying for?
What creates meaning (and money) for collectors?
If you were going to design furniture to last a long time, what characteristics do you think it would have?
Do you think much about the link between sustainability(environmental responsibility) and durability?
My thesis is being written for designers, so if one asked you “what could I do with my design so that you are selling my piece in 50 years?”, what would you say?

Furniture manufacturer

Could you tell me about your company’s design philosophy?
What is your company’s process for design?
Why do people choose to purchase your company’s products?
There are some pieces you offer (such as the *) that have been manufactured for over 50 years…why you think these designs continue to sell?
What financial incentive does your company have to manufacture a longer lasting product?
How does the design of your company products enhance your brand’s reputation?
How does your company keep up with trends and changes inspired by fashion?
How long does your company intend a customer to keep a piece of your furniture?
Would you say that any your company’s products are highly repairable or infinitely refurbish-able?
Do you have limited editions of your designs?
Do you think people treat limited edition products differently than a standard edition?
How long does your company intend a customer to keep a piece of your furniture?
Would you say that any of your company products are highly repairable or infinitely refurbish-able?

Small manufacturer

Tell me how your company started.
Do you have employees or do you outsource jobs at all?

Can you describe your customer demographic? (age range, income level, education level, design aesthetic?)
Could you tell me about your design philosophy?
What is your process for design?
Why do people choose to purchase your products?
How do you go about getting the things you design manufactured?
How long do you intend a consumer to keep one of your designs?
How you think your design will adapt to fit users needs in the future?
Is there any way to predict what particular design features will still be demanded in the future?
Do people ever buy something and then use it in a different application from what it was intended for?
What makes something able to be used decades or generations later?
What financial incentive do you have to manufacture a longer lasting product?
Do you have limited editions of your designs?
Do you think people treat limited edition products differently than a standard edition?
How does your company keep up with trends and changes inspired by fashion?
Have you changed the design of “one less desk” since its initial design?
Why do you think some product designs in general remain popular and some do not?
What characteristics would you tell other designers to include in their products to make them longer-lasting?
What about aesthetics-wise?
Do you think much about the link between sustainability (environmental responsibility) and creating timeless, durable, long-lasting products?
Do you think it is possible for a designer to guarantee that a product will be valuable in the future?

Company that manufactures new versions of old designs

How long has your company been in business?
Can you describe your customer demographic? (age range, income level, education level, profession)
In your own words, what is your company all about?
What is it about the furniture you offer that differentiates your company from other furniture companies?
There are some pieces that have been manufactured for over 70 years… could you give me some reasons why you think these designs remain popular?
How long do you intend a customer to keep a piece of furniture they buy from DWR?
Do you think the furniture your company sell today will be future vintage? Why?
How does your company keep up with trends and changes inspired by fashion?
What do you think your company looks for when adding a new piece to the collection?
Do you do durability testing? If so, what kind?
What financial incentive do you have to manufacture a longer lasting product?
Why would someone purchase new rather than try to look for a vintage piece?
Why do you suppose vintage pieces in good condition are rare (expensive, in poor condition)?
Do you sell or consign vintage furniture?
Do you offer refurbishment services?
Do you offer replacement parts?
Why do you suppose there is a resurgence of Mid-Century Modern style right now?
Why do you suppose your business is doing so well in this tough economy?
If you were going to design furniture to last a long time, what characteristics do you think it would have?
Do you think much about the link between sustainability(environmental responsibility) and durability?
Have you ever heard of a furniture manufacturer who has a lifetime guarantee on their products?

Repair/ Reupholstery/ Refinishing Shop Owner

How long have you been in business?
How did you learn this trade?
Can you describe your customer demographic? (age range, income level, education level, design aesthetic?)
Do you have repeat clients? Do you regularly work with interior designers?
What sets your shop apart from other repair shops that specialize in _____?
How old are the pieces of furniture people generally bring in?
What characteristics in a piece of furniture make a repair especially easy?
Are there any brands that are particularly easy to work on?
What characteristics in a piece of furniture make a repair particularly challenging?
Do any manufacturers make it nearly impossible to fix their furniture?
What types of jobs do you turn down?
What do you put into your work that makes your repairs special?
Are there ever any surprises you find out about once you start in on the refurbishing process?
Do you ever work on heirloom pieces?
How long do you think a well-built piece of furniture could last?
In your mind, what is the difference between vintage and antique?
In your mind is there a cut-off year that separates the two? Would that be the year that it is designed, or is that the year it was manufactured?
If you were going to design furniture to last a long time, what characteristics do you think it would have?
Do you think much about the link between sustainability and a durable, timeless piece of furniture?

Interior Designer/ Specifier

How long have you been in business?
What sets your business apart from other interior design businesses?
Do you ever source vintage pieces for your interiors? Why would you go for vintage over new?
Do you ever have things repaired, refurbished or reupholstered?
Have you ever been told that you can't repair, refurbish or reupholster something?
How long do you intend your clients to keep their interiors before they need revision or a facelift?
How do you keep up with trends or changes inspired by fashion?
When considering a similar piece of furniture at two price points, what is your decision making criteria?
Do you ever buy something and then use it in a different application from what it was intended for?
What makes something able to be reused decades or generations later?
What makes furniture usable for many decades or generations?
Is there a way to make ensure that your design won't go "out of style"?
My thesis is being written for furniture designers. If one asked: "What could I do so that you are using my piece in 50 years?" what would you say?

APPENDIX E

INTERVIEW WITH BARRY

How long has * been in business?
For over 40 years, and [our] area of expertise is American ceramics from the 20th century, and [more recently it has] blossomed into Mid-Century.
Can you describe your customer demographic? (age range, income level, education level, design aesthetic?)
Ok, in recent times it has shifted a little bit. Currently, I would say they are affluent, passionate about design, they are well-informed and they appreciate the modern pieces we bring to market. And do make sacrifices in their lives to buy these pieces.
What types of things do clients come in looking for?
That is a mixed bag, because it depends on who the client is, for example there are decorators and designers, there are some architects, and there are people who are sort of do-it-yourselfers that appreciate the mid-century pieces and come in either with specifics or with an open mind. It really runs the gammet – it runs the gamet from people who are looking for specifics and they finally found it at our auction, or are coming with an open mind, and once they find something they like, really try to measure it up and see if it will fit their needs.
Do you mind if I ask how you acquire your inventory?
Oh sure, that's also a diverse kind of field from which it comes in. It comes in from estates, it comes in from collections or collectors, it comes in from dealers too—dealers that are looking to move pieces along to generate revenue. So…all of the above. Every once in a while it will come in from a more important source like a museum.
What condition is the furniture in when you acquire it?
That is also a mixed bag, some come in pristine, others come in needing extensive restoration and we help facilitate that. There you go.
What types of repairs/ cleaning do you typically perform before you sell an item?
It can be really everything. Refinishing sometimes, pieces might need structural work, so structural repairs, other times, it is as simple as a broken leg that needs to be re-glued, or re-upholstery. So, it is a mixed bag. Some ceramics need to be repaired, that's rare, glass generally if its broken we do not handle unless it's a really special piece.
Are there some pieces of furniture that are easier to sell than others? Why?
That is a tough question. The nature of Mid-century modern and collecting – getting to whether pieces are going to sell easy or not, has a lot to do with taste at any given time, and whether a piece is in that high profile sought after group. There are generally more pieces that fit that…those parameters. Rare, iconic, designed by notable people. All of those are the factors that a piece is easy to sell.
Are there any particular details on the pieces that create increased value?
Our clients tend to look for specifics, meaning they appreciate quality, I think, more than ever. The appreciate aesthetic, I think, above all else. So, aesthetic is, I think, primary. And then, quality can be secondary. Function is also very important. Ease of placement in an interior plays a big part too.
When considering additions to your inventory, what is your decision making criteria?
For an auction house this is more complicated, because we have to generate revenue. For an auction house, a piece may not fit my tastes, looking at it through a lens of a wider audience. Pieces are taken in primarily to sell, that is the first one. That is my mission, to sell pieces and have good outcomes for my consigners. Good outcomes meaning sell it within the estimate range or above, if possible.
Do I believe it is going to sell well? Do I believe there is going to be a market for a piece, even if it is a narrow market? Does it fulfill our obligations for ourselves in terms of value, so we have roughly a 500 lot auction, each one of them needs to have a minimum value of... Even if there is a narrow market slice where I think a piece will sell successfully, I will take it in.
How do you price the pieces?
I advise our consigners to price pieces conservatively, so that their piece will sell successfully. Successfully to me means within the estimate range because estimates represent expectations for us, and for the consigner – they are a reasonable guideline of

expectations. And, if we can exceed that, that is obviously the most successful – when pieces sell above the estimate range.

What documentation do you provide with the piece, and does it add value?

It adds value, absolutely. Documentation can be provenance. Sometimes provenance, for example George Nakashima will be a receipt drafted to the family that was the original owner. If that is not available, but the lineage of ownership is, we can take that back to the Nakashima studio, and they can provide a copy of the original index card. So, that's a common documentation or provenance I would expect of modern furniture as it pertains to Nakashima – provenance elsewhere can be something like Charles Stendig who imported lots of furniture to United States – Danish Modern furniture. Consigning a modern piece, a designer like Joe Durso consigning a Durso table. This kind of provenance is very important. More historically important pieces like the Wharton Eshrick stone sculpture that we sold recently, was sitting outside a University for many years, so… that is not only is Wharton Eshrick an Iconic designer, but it's the location on the University that owned it was Iconic as well. So, these kinds of backgrounds, provenance, documentation, historical placement can really add value. They create in the minds of buyers green light that enables them to buy a piece—the assurance to buy a piece and maybe even pursue a piece.

Is there an emotional component to that?

Absolutely, I think when the provenance or the background or the documentation really adds up to something special, that is – Special in my mind is Iconic and rare at the same time. And still, recognition of what it is, but super rare. That creates a lot of emotionality, and desire for ownership. In the auction paradigm, that creates lots of bidders. Lots of competition, and gets a piece sold very, very well.

Do you think much about the link between sustainability and a durable, timeless piece of furniture?

Sure, sure. Absolutely. I think that sometimes those considerations need to be suspended. There are lots of great pieces of furniture out there that are not environmentally mindful, not sustainable, and there are others that kind of really tout that. And the argument can be made that even though, for example I'll go back to George Nakashima because it's an easy example – George believed that it was more sustainable to build pieces out of solid wood than laminated wood. And, that in the minds of buyers whether it is true or not – to cut down the whole tree and give you a whole trunk of a tree – that's debatable rather than spreading it across 50 pieces of furniture. George tried to push that that was sustainable, and buyers of George Nakashima tables where there are rare specimens of woods feel that that is ecologically better

What makes furniture usable for many decades or generations?

Heirloom furniture. These ideas of quality and functions and aesthetics wrapped up into one piece that is a solution. Nowadays, you know I shop at IKEA. IKEA is not heirloom furniture but something people want because it is so easily disposable. You buy it because you can throw it away and not feel bad about it. And, I think timelessness now, heirloom furniture now as it relates to mid-century modern – it is in a state where it is being challenged. There are notions of – are we buying this because it is timeless, I don't think that comes into the minds of buyers today—even when they are spending big money. You know, if they are looking at a piece whether or not its timeless, they look at it – is this important, is it something we want to own. Is it something we feel good about spending X amount of dollars on it. And, timelessness and heirloom quality to those pieces play a back role in my opinion.

Is there any way to predict what particular pieces being designed today will still be demanded in the future?

I think like psychology, my wife's a psychologist, and past behavior is a predictor of future behavior. If you were to extend that out to pieces being made today, and going forward… innovative technology that produces something that is efficient and beautiful and durable… gets you there. For example Max Lamb produces lots of furniture that is made with almost like a lost wax process to pewter stools or copper chairs with hollow cores. They are on the level of fine art. They are not as utopian as Charles Eames was, They

are not getting cheap but beautiful pieces into the hands of the masses, but they do satisfy requirements of beauty, and functioning at a level of fine art and collectability and create lots of desire for ownership. I think lesser of qualities of materials can do this. But they do that when…they kind of embrace – forgive me for putting it for lack of a better term the Bauhaus or form follows function, great quality production – cheaply put into the hands of the masses. There is another designer that I just thought of: Jim Dine – who hammers quarters into complex, compound curves and builds a superstructure underneath to make a very elegant sofa that looks sort of like the Eames lounge that looks like that floating cloud. It is all made of quarters, so if you are paying 20 or 30 grand for a Jim Dine sofa, you might have 20 or 30 grand in quarters there, I don't know, but its certainly not sustainable furniture. It satisfies a different set of requirements for people when they are looking at furniture.

My thesis is being written for designers, so if one asked you "what could I do with my design so that you are selling my piece in 50 years?", what would you say?

I certainly don't know it all, but what I see is a successful – no one chair can do it all, no one table, no one house. Decide what your expression is for that piece, and don't try to make it all the possible impulses that you have. Let it be the one impulse. One expression that you are trying to execute. Whether it becomes timeless, or fantastic, it may in the end be an accident. That you couldn't have controlled any better had you tried harder. So, just let it be that one expression, and I think it will resolve itself.

APPENDIX F

INTERVIEW WITH PAUL

Tell me how about 'DIBS!' How did that come about?

That came about…uh, that came about last minute too. The actual phrase probably came about probably a day or two before I gave that. The sentiment behind it is something that I have been conscious of for a long time. But, I was trying to boil it down for the presentation…into something that I could communicate into a couple words. So, the idea that when somebody dies and when you are looking through your stuff; the family has to decide who gets what… some people call DIBS, some people call DIBS on things when the person is still alive…so, it is that kind of stuff that I find interesting. It is the things that… Especially, the things that did not start their life assuming that they would be 'Dib-worthy' later on, it was something mundane, some purchase that was made… it just happened that it was how it was made that it survived… and the other thing was that it got used. Like the binoculars—the folding field binoculars—that my grandfather… he used that, *a lot*. It wasn't a vanity thing—a vanity purchase for him—it was just some practical thing. But, because… I'm always a sucker for shiny metal, you know…when I was a kid it was…shiny metal, spring-loaded, it still worked. Um, ya it has got glass and optics for it is a good kid toy. Calling Dibs on things… I remember – immediately going back to memories. I remember playing with those binoculars as a kind, so when we were going through my grandparents house, when he died… I really wasn't interested in much of anything, except for… 'Hey, if you come across those binoculars…I want those. Anything else you find you can have… But, I *want* the binoculars.' Other stuff was; My grandparents went to the '84 Olympics, and he bought a bunch of trinkets from the '84 Olympics. And… I think I was doing a report in school at the time, but, when they were in L.A. for the Olympics, actually during the Olympics, they were sending me stuff. And so, I have my own little collection of Olympics stuff, and I figured he had more Olympic stuff. So, I called dibs on all the Olympic stuff. So, it's a simple guide of when you apply that to your own life, when was the last time you went out and bought something that had any potential of it being 'dib-worthy'. It is surprising how little of the stuff we buy today that is anywhere close. I always question 'why?', "why does that make the mark?", and sometimes it is just as simple as materials…or it could be technology.

It could just be by chance even… a chance purchase, but why it stuck was because it was a well-made thing.

To answer your question, it came about as a short, simple way of trying to describe what was complex. Because, when I picked a theme to present on a theme for this thing, I realized I have to boil it down in order to get the point across. So, I can make examples. That is how it came about.

So, I wanted to know how… you told me a little at the Pecha Kucha…but, tell me how * started.

I always wanted to be an architect…

Oh, that is what I did for undergrad… fun [sarcastically]. *Real fun.*

See, that is why I didn't do architecture the thing, I would hear these stories: *I started* or *I used to do it* or *I was doing that and then….* My older brother had a friend of his who went into architecture school. And, I would always ask my brother "How is he doing? how is he doing? Oh man, oh man. It just sounded Hell-ish, and then the internship just didn't… I have control issues, so the idea of going through school and then being a slave to somebody else for years and years and years…I couldn't do it.

It is a broken system.

Ya, it sounded a lot like medical school and so I knew I couldn't do that, so in general I went into business and took business classes and marketing classes. I have two degrees. Just one in marketing and one in management – same school. But the whole time, all the electives I took were in the design and architecture school. Any elective that they offered, I was walking all the way across campus to take that one and then back to the business school. And a lot of those elective classes are appreciation classes, you sit there and watch the slideshow, listen to the case history about a particular product…or…I got a good background in it.

That is probably the best thing you could have done… and you didn't have to do crazy all-nighters or slave projects.

When I graduated, it was the middle of the dot-com boom, so, I was also a 'techie'. I knew software and I knew management and so I fell right into a software startup when I graduated. It was a bad software startup, but it was a software startup. There I learned how to do software management, manage a software team, and I would do all the design. Interact with all the customers, find out what was the… you know, create the brief. And then, create the interface, the interaction design, and then manage the software team. I liked doing that, the creative part of that. But, after doing that for years, you fall into a niche in the software business and my particular niche was very boring. We were making specialized software for industrial treatment plants.

Oh, wow!?

I started my own company doing this, a three person company, and then at one point I just did the math and figured out that I had spent maybe 2 weeks out of the past year really 'designing' software. It was all plane trips and software presentations and you just weren't doing enough of what you liked to do. So, I started phasing out that company and tried a little dot com company, that didn't work out. But, when I shut down the office, the software office, I was working out of my house, and in my den I had built this huge desk, this huge 3' by 8' desk. It filled the whole room. I didn't need all that. I wanted the room back. So, and a lot of times I am working on a notebook, on a lapdesk on the sofa just like anybody else. So, ya, I do need a desk sometimes, so I trashed the big desk and started thinking of what I wanted for a little desk and that's how *Desk came about. I just made a bunch of phonecalls, try to find people in town who can make it the way I wanted it made. You know, not compromise on what I had drawn because I had fallen in love with what I had drawn. Ultimately got a couple of prototypes made, the second one was pretty much exactly what I had drawn and then people liked it. They started asking me if they could have one…if I could make them one and so I put in an order and then I put up a website. That was the day that the Macbook Air was released. So, on the web, on a lot of design blogs there was the macbook air on one thing and then a picture of [edited for privacy] on the very next thing. You know on Notcot they would do those panels – the macbook and One side-by side…

Caught on really quick

[Uh huh]

And it looks just like the Mac products…

When I designed it, I was pretty unsophisticated. I drew it in Corel Draw, and it was floating in Corel Draw, drawing the desk underneath it. I was stealing some of the proportions of it… so that wasn't an accident for sure. It wasn't intended purely to be a *Mac-desk*. I wanted to make sure nothing I did was exclusively…

Right, like you could use it for another machine…

The biggest thing I learned during that process was …

[phone rings] [waitress comes over]

The desk and I had a bunch of living room furniture – I drew it up and had a company make it, in both cases it is being made for me. I was making something for me to own, so when the questions came back of you know…'we could go this way *or* we could go *this* way…this way would be cheaper and the other would be more expensive but it will be better' I always went with…'if I am going to do this, lets do it right!' If I am going to cut 50 bucks out of the project now… no, I'm just going to go for it, I'm already spending blank for this…So, the whole thing started with the attitude of 'what is it that I want, not necessarily what the market wants or what would a distributer want… Hopefully there are other people out there like me.

I think that people are realizing that most products aren't made to a standard that they appreciate…so they are looking for something like your products…

Something stood out once I watched a podcast – I think it was at a, it was a Mac World podcast where an interviewer was going around to the booths and asked each person to talk about their products. This guy was showing off just another I-phone case. He had different designs, and he was showing off these wacky designs. And the interviewer said

"Who is your customer?" you know, "Who is your customer for these things?". What she meant was *what kind of person would want to own one of those cases.* And the guy's response was 'Oh – Best Buy, the Apple Store umm Target". In their mind, so many manufacturers think that

Ohhh, like We are just marketing our product to the company that sells it.

I'm just designing for the purchasing agent…

Ya.

Ya.

And so, I find its true – as soon as I… All my stuff still sells direct

The *[edited for privacy] is the first thing I can sell wholesale. Any conversation I have with a reseller, contract furniture person, is how I should change what I do to make them happy. Its like, no. The reason when you are calling me, is because people like this desk, people want to buy it *as is.*

That was one of my questions so, have you changed the design of "one less desk" since its initial (or you said second…) design?

There have been iterations… the outer dimensions—the main dimensions—have not changed from what I drew on paper. The only thing was, what I originally drew was just a C-shape with no supporting brackets underneath. It had the shelf feature, because I knew I was going to need that to support the weight. But, when I would show those early drawings to the manufacturers, they would say "that'll be enough. The steel…if we make this out of stainless steel, that will be ridged, it won't rock back and forth. Oh ya, that's fine. We made the first prototype and it wobbled back and forth.

Oh ya, I watched the manufacturing video and you put that strut in …

There were iterations of the strut, and then last year, there was a revision on all the office products. Just some very, very minor things. Like…The bracket on the upper deck used to be a complete C-shape that would go in front of the shelf face and down. That wasn't necessary, the shelf created that rigidity up top, and it also introduced a minor issue in that bracket lay flat against the shelf, so the powder coat couldn't get back there. You really want full-coverage on everything. So…

Because it is steel… especially so it doesn't rust.

So we changed it so the bracket is just a straight piece that welds right to the bracket at the bottom of the shelf. Now we don't have any of those issues. It's nice, we are always doing small batch productions, so if there is anything we recognize in the meantime, the next run we can make minor changes. And, everything is cut—computer controlled cutting so changing the program – there is no major re-tooling. There are a few minor things I would like to do going forward… The feet on the desk is now an expensive milled part – it doesn't need to be. It could just be – it can be a molded part. I have a local vendor that can mold it. That is something that wouldn't cut the quality of the product in half… it may actually, the design for the new foot I have, people like more, but it needs to be molded. So, there are things I can do.

So, refinements…

Oh another – the main thing, the material changed. It started as a stainless steel desk – just with exposed stainless steel with a brushed finish. Then the cost of stainless steel doubled, so it moved to steel with a powder coat, and then introduced colors and it is much better that way. Some shops don't work in stainless steel because you need some special tools – and it is very hard on the tooling. So, the current shop I use, they work with stainless steel up to a max thickness, and then they don't want to bend it because it destroys their tooling.

[Waiter comes by…]

Do you have employees or do you outsource jobs – like rendering for example?

Now, I have an assistant, she is the front line on customer support and keeping me organized. So, she sends out the order confirmations, she sends out all the shipping paperwork, arranges all the shipping, monitors inventory… it was becoming one of those things like the software business where too much of my time was spent designing and not managing the business. But, all the modeling…

Do you do that all yourself?

Now I do, there was a time where if I wanted a 3-d rendering, I farmed it out, but I have since learned how to do that myself. Now it's this nice process where I can think it up, I can draw it, I can render it, show the drawings and designs to the factory just to get them to say what's realistic and what's not… if that passes the test, I can start pre-sale. For something like this, I had done some prototyping and stuff, so I was confident to release it before it has been finalized. I had a tv stand coming next…

Cool – that would be very useful, since there are some pretty bad tv stands out … most all are….

They are all pretty trashy, they are all overpriced. And, there are some unique features that this tv stand has…

I already asked what 'Dibs" was, but do you have a design philosophy? That is a weird question…

When I hear Dieter Rams list, I agree.. simple, honest. I hate anything that is made to look like something that it is not. Even right now, the most popular color on my desk is silver. Its silver made to look like aluminum. It is a steel desk – that bugs me. It bugs me that it is the most popular one… I would like to phase that out, but to the determent of my business I would phase it out. The thought that comes to mind is always… its difficult to do this, so if you are gonna do it, do it right. And, also because I'm the small player, I should be doing the things that the big guy can't or doesn't want to do. I realize that most of the decisions I make force myself out of the mass market. Its forcing a smaller and smaller and smaller… but the small group that it appeals to, they are ravenous for it – I mean… people tell me that they have saved up all year for their desk. The other thing is… I can't separate the notion of designing the products with communicating and knowing the customers and the people. The thought of changing my business to sell through distributers and never hear direct feedback from a customer before they bought…while they are waiting for it…after they have gotten it…that sucks.

Can you describe your customer demographic? (age range, income level, education level, design aesthetic?) Who do you intend to use your products?

The short answer is a lot like me, but probably living in a more urban setting. That is for my existing products. It just happened that I started with this theme of space-saving and minimalism. And so…

You probably ship a lot to New York..

New York and Paris…and San Francisco. So, it would have to be definitely geared towards creatives – seems to be the audience. People are willing to try something different, and that's not only in the fact that it is a different looking thing in their house, that their friends are going to see, but the process is different – going online to buy a desk, sight-unseen, for 700 bucks, *that's different.* It is people willing to take a chance on something new, different, and willing to recognize – there is some stubbornness in it – I am saying this thing is built like a tank, I better deliver on that. It costs more to make it built like a tank, that has to resonate with the buyer. If it is ok that it is wobbly and tin-y and it's something that they can pick up at IKEA, they are obviously not my customer then.

They are going to just go to IKEA and get one that is half the price…

Demanding and creative.

Why do people choose to purchase your products?

I communicated enough on my website – this is not a huge corporation, it is a smaller company that gives a damn, and if there is someone who cares about buying their products from someone who gives a darn, if that resonates…I hear a lot from people who are at the tail end of a search. They had an idea in their head of what they need, or what they wanted, and they searched, they didn't find it, and they stumbled across my thing, and "Oh my god, oh my god, that's what I need. And there is certainly an emotional, irrational element to it. Everything clicked, and they have to have it.

How long do you intend a customer to keep one of your designs—your desk?

Much longer than the average life expectancy of a desk is the short answer – because the desk today, and especially three years ago, pushes people – it's a desk that says, "if you use this desk, you are giving up stacks of paper, and stacks of mess. You are ready

to make that adjustment. I think a lot of people bought it, they certainly didn't work that way before, and then I get emails from people saying it completely changes the way I work. If I have a mess, it's not my work area, I realize that I have to stop and think – oh ya, I was about to print this, and I was about to stack that, and I was about to… No – I don't have to. I could make a PDF, I can organize a folder. Especially early on, I either got angry emails, or angry comments on the blogs, because the mere suggestion of being able to work paperless, or with one stack of paper, ticked people off. It was like I was being presumptuous to assume people could work like that. The same way people react to generally saying "go make your corporate office paperless" "Oh you cant do that, da da da da da…." And so that is a market that some people weren't ready for yet. So, to answer your question: Because its meant, the desk is designed for the tail end of the paper age, and into the age where you are not only paperless, but you are using the desk less and less, it no longer justifies the space in your home. The desk, as a category of furniture, it no longer justifies its own room in your home, let alone the space of a thirty inch by six foot desk, it represents the shrinking need of a huge home-work space, when you know for a fact that 50% of the time or more, you are sitting Indian-style on the sofa with your notebook working. Its only when you go hardcore – and you need the big monitor. It is targeted to be youthful for long period, startting in 2008 and moving forward – more than the big desks in the market. Then you just get into the conversation – of well, its welded, its powder-coated… screws aren't going to come loose on it, its not going to get creaky, its not going to flake. You know, at the corners, the melamine is not gonna bust off at the corners. And, if you love the design, when you bought it, I have yet to hear… First of all, I have lived with these things more than anybody else, and if anybody should hate the design, I should probably hate the design… and I don't hate the design—I like the way it looks in the corner of the room. So, first of all, I try to make it to last, second of all, design it so that there is not some silly thing in there that seeds the idea that "I don't like it". Much like a relationship, there might be some quirky feature that drew you in, in the beginning, but years later it became the one thing that starts to bug you.

Would you say that the design is timeless?

No…I definitely tried to design out the things that would be associated with a point in time, but there are still things in it that. You, know you have to pick something, and try to pick something as timeless as possible. You later realize those things aren't timeless, the hole pattern in the front of the shelf – that is lifted straight from the hole pattern in the mac pro – you know the perf pattern, it's a common perf pattern, but it happens to be a very Braun, Dieter Rams… you go look back, that hole pattern is in some radios Dieter Rams did in 1960, and it still looks good. It's fairly timeless, but there is going to be something about it that needs to be updated. Maybe rounded corners in general (questions) turns out that was…

Is there any way to predict what particular design features will still be demanded in the future?

There is a way to... Well, I deliberately avoid putting electronics in my products. I get a lot of requests to make my desk, but with an integrated USB hub. And its just like—*noooo*, don't you understand USB won't be around 5 years, 6 years, 10 years from now, and im not going to do that. Integrated power cords – no. One thing I do is : I do have wire management features, but all my wire management features are not done with holes. One, for convenience so that you don't have to feed a wire in and out, to manage the wire and make changes, instead I'll do a tab. So, you just wrap it around a tab, instead of fishing it through a hole. The point being is: What diameter hole do you pick? Right now you would have to pick a hole about 2 inches in diameter to fit the largest obnoxious cord out there… If I was designing for cables with holes 10 years from now, they would probably be ¾ of an inch, that in and of itself changes.

And in Paris.

Ya, different plug sizes. These things are shipping internationally. So, you can have enough foresight, so that your product design works in conjunction with something that does change a lot, you can definitely think – what was this category of product like 10 years ago, 20 years, what is it going to be like 10 years from now. Another thing, in the

lower deck of *Desk, I thought about putting wire managers in the surface of *Desk, in case you are using a wired keyboard or a wired mouse, but I ditched that idea, because most stuff right now is already wireless, it was going that way, and I didn't want to add things. I think it is just discipline to say, yes if you put a whiz bang feature in today, it could help sales and attention and all that stuff, but you are definitely aging your product. And it's sad, I've got that book on Dieter Rams and every page is amazing, and you just look at the products he did – everything is gorgeous – its sad that every single thing is out of date – he put all that talent into a radio that you don't use, a portable record player, even now alarm clocks and all that stuff – categories are vanishing. I try to pick categories that think aren't going to vanish or at least make something that fits the changing nature of it. The desk is flexible – its two pieces, if you no longer use it as a desk, you could use those things as something else. You could give to to a person who still uses a desk. That category is going to stick around a while. This [*[edited for privacy]] I feel, that one last little power cable is going to stick around a while. I have gotten some comments online "soon phones won't…" Ya they will and when they don't you..
Or you will keep it around because it was made beautifully – It is this shiny object that if you don't want it, somebody else will. It won't end up in the landfill.

Do people ever buy your product and then use it in a different application from what it was intended for?

Yes, a lot of people sit on the printer stand, they buy the whole office suite and then use the printer stand as a bench at the desk – which I had drawn up and considered, but I do not promote it for that purpose, but people discover it anyways. I hear from people saying "we used your desk at a dinner party, as a buffet to put food on". It was meant to be flexible, but the things that people come up with. People flip over the file, and use that as another stand. What else do I make – Oh, the ipad stand. I just got an email from a guy who mounted his ipad stand in a very different way than it was designed to do. So, ya, and the more interesting point is that – when you engineer a product to be as cheap as possible, you are going to make it with a material, and you are going to make all your decisions – in that one thing it does, and that one position it is supposed to sit in, is it strong enough, let's make it as strong as it needs to be, but no stronger, in that one thing, and so you – what ultimately ends up there is no potential to use it as other things. But if you make this object that was meant to hold your ipad, but you can stand on it – how many stools or chairs do you have in your house that you stand on and use as a stool? But, if you go to Target, and you buy yourself a 5 dollar chair, those are the ones you don't want to stand on.

What makes something able to be used decades or generations later?

It has got to be there. It had to have—people need to feel personally connected to it so that they don't throw it out. It has to have stayed in the person's good graces long enough to be there years from now. If it is there years from now, they will find uses for it. I don't know how many times I have become quite the minimalist and every once in a while you just sweep through your living space and find something that you don't understand why you bought it in the first place, you are angry with yourself that you bought it, you are angry… you know, you remember that you used it once and you threw it away, even though it might even be recyclable, you throw it in the trash just as a way of saying "I was so stupid", but primarily it is just… I write the word love on my website a lot, that was something unexpected, people would write me… they way I felt about the desk was the way other people felt about it. Disappointment is…I think people have been trained to expect disappointment when they finally get an item. It is somehow subtly trained – it is in the best interest of large manufacturers that we as consumers are trained to get really excited about something to get us over a peak, pulling out our wallets to buy it, knowing full well that once we get over that peak, we will be disappointed somehow. And, I hear that in my customers before they buy – the skepticism, the questions where they are trying to figure out what it is they are going to be disappointed about once they get it. "Does it wobble?", "No, it doesn't wobble.", "Does it do …this"" you know…"How tall is it?", "I'm 6'4", will it work for me?", they are just trying to set their own disappointment. They will probably buy it anyway, no matter what I say, but they are just trying to set their

own expectation. And then they get it, and it doesn't disappoint them on any level, they react with the word love.

That is cool. Especially buying it online sets them up for being disappointed.

I think there are a lot of shysters working online. So, what I try to do, and it's a scary bar to possibly shoot for, but…

Sorry, let me go back to the point of online, its like this – if this was my product, and I painted it, and I knew my customers were going to get some object that is painted and looks like metal, I would go overboard on the photography, to make it look online like gleaming perfect metal. I might disclose somewhere that it is not, but I want people to feel like they are getting a big chunk of metal. And I – as the seller and the maker will have their money long before they get it and they are disappointed, yes it is what it says it is, it is functional, but it is plastic. I totally feel the pressure of the game. When I show this to manufacturers, they immediately ask "why aren't you doing this out of plastic?…you could make these for 10 cents apiece out of this and that… and you could sell them for 20…", Its like, "ya, I know I can, but I'm doing it the other way." Oh, when you reach that love word, when the customer loves it, that is critical for me from a business perspective, because I know when they fall in love with the desk they just bought, they are going to be telling everybody. And, I can't afford advertising.

Word of mouth is worth more than gold.

Now they want to have a dinner party to have their friends over, why? The secret reason is that they want their friends to see the new desk. I get emails from people after they had their dinner party… "Oh, I think you will be hearing from five of my friends because they saw it." That is one of the reasons my next product is a tv stand. Because, what do Americans do, they invite people over to watch tv, and if they have got their new tv stand, there is my marketing campaign right there. They are staring at it for two hours and the guest is staring at it like "oh, I gotta get one of those, I gotta get one of those" and that is my whole marketing campaign. That and Americans are more willing to spend 500 dollars on a tv stand then they are a desk.

[haha] That is true! That is a huge point. So, what financial incentive do you have to manufacture a longer lasting product?

That is a very good question, and the answer is: I can't afford not to.

Your reputation…?

Even returns, if my return rate—my breaking rate, if I send something to Paris and it breaks, or breaks after a week, I am out of business. It costs that much to ship it. The way the world works with distributers and stuff is that they balance out the risk all across the distribution chain so that they can produce crap, push it out through the distribution chain, and when it reaches the consumer, there will be a fair amount of push back—back down the chain, but that financial risk is shared across multiple organizations. And, most of the time people are just lazy and bought something cheap and were disappointed with it and they don't return it, they just live with it.

Not to name names, and I won't name names, there is another company that is more obviously a "mac desk" and it's a small little mac desk, and a lot of people buy my desk after they have bought that desk and they have nothing but a tirade to talk about their disappointment and how cheap it was when it showed up, and how terrible their customer service was when they tried to return it. Obviously their whole business is designed to push garbage. And, the unfortunate thing is, I become the brunt of that. I have to answer 10 emails from a customer because they are suspicious that my product is equally as cheap as theirs, and that my customer service is probably is bad as that. And, they realize that after 10 email exchanges in the course of an hour with the guy who owns the company and designed the product, my customer service is probably better. That I am probably standing behind this product and it has my name carved in the thing – that they can probably rely on it. Then there is FedEx – goof ups, they call me angry and obviously I am doing the best I can and they realize oh ya, it's probably not this guy, it's probably FedEx. That is let me give you another for example: when I revised the product last year, there was a discussion about welds, and well there are always discussions about welds

whether I want them visible, or very subtle. I always say – I want people to see them, in a discrete location, but when people go looking for them, I want them to see a nice bead weld that you know is stronger than you are. You can't bust it. That has complications – puts a lot of heat down to the product, causes the metal to bow a little bit, and then you have to be concerned with the customer not liking the metal bowing a little bit. All sorts of complications, but we tried experimenting with other welds – and in those meetings… they would say: here is one where we welded it this way, and here is one we welded this way, of course option A – the new option is cheaper and will save time, but might pop. It might pop in shipping – and its just, as long as I would love the extra margin, that would kill my business – customer satisfaction aside, that would kill my business because they are not going to be satisfied with something actually busted. If something gets damaged in shipping, it is usually because of bending forces, because it is a huge steel desk welded together with hot welds and bead welds, you can just bend it back into place, and customers take pride in that. They will call me or email me, "this thing showed up a little bent" – well I'll say try this – this is what we do at the factory – if something gets bent, and they will say "ooooh".

The short answer – you almost fear what happens if or when this company gets huge and you have massive overhead and you will have to start making decisions based off of profit. I intentionally don't manufacture these myself, so that my organization, the overhead is very low, and I have all this flexibility to say "well if you can't do it with this machine, I can take it to someone who can do it with that machine." And just constantly gear the whole organization, so that I have the luxury to make the decision toward the quality decision.

Do you have limited editions of your designs?

Currently, this one will, but just promo to launch the product. I don't typically, and I was actually criticized by that, and I knew I was going to. I used to have the high-end *Desk – the stainless, when I moved factories, I stopped selling those. I do custom colors, and because of the direct customer relationship, I can do extraordinary things. I have got to do this today to – customer contacted me and said ever since I started dating this guy, he won't shut up about your desk, we are getting married and I am going to get it for his wedding present. Can you do something special for the wedding. And I said first of all, I can sign it on the underside or something, and I can put a plaque on it, and what do you want it to say – so I'm getting a little plaque made to stick on the desk—again, only possible because we ship direct from the factory. I'll literally go to the factory to sign it as it is going in the box, and it ships straight from the back door of the factory to her front door. If that was to go through a distribution network in the contract furniture industry, maybe you could do it, but there would be a $10,000 minimum order for the custom color.

Do you think people treat limited edition products differently than standard edition?

I think people need to realize that most limited editions are marketing tools, I have a benefit of having a marketing degree. When you price out products, you don't come out with it at one price, you come out with 3. The bare minimum hardcore low end with the name called basic – you have to throw the word basic on it. And then you do your standard model, and then you do your super-duper. And, your super-duper is unreasonably high priced. This is so that customers look at that and it is no longer a choice between do I buy the product or do I not buy the product, The choice they focus on is "which of these three products do I buy, and 99 times out of 100, they buy the middle one. They don't want to be perceived as the cheap-o not getting the thing that they want and they are far too logical to be tricked into buying the super duper fancy limited edition, so I will buy the standard. The company go the sale. It was never in question whether or not they were going to get it – it was just which one do I get. That is why Apple brings out the 64Gb White version. Yes, it will sell, it will sell to the people who want that cache. But, you gotta be honest in that the company snickers in that it only cost them two dollars to put that extra ram in and make it that special color. But, it didn't cost them anything. The profit margin on it is incredible, and at any company, you are going to have the marketing guy, and that is where limited editions come from. For the *[edited for privacy], Kickstarter project we are giving rewards for pledges, Kickstarter says straight

up – offer something that they are not going to be able to get afterwards. Do signed editions, do limited editions, because obviously the people you are playing to are the early adopters, the influencers, who are going to want to go show off – those are the people who often opt for the high-end. And that is the only reason why I am offering a product with my signature on the outside – is for that audience. And, my three reward levels at Kickstarter… that's the 3 reward levels. $25 for one unit, $60 for 3 units, and $100 for four. You do the quick math and right away the math says well the best value is the middle one, but I don't get the *gold* one.

Aww man.

So, most people go for the 60 dollar option.

I am curious why you asked that question

Honestly I haven't asked that one to anyone yet, but I was hoping to ask Herman Miller…

If you get an answer tell me, because the only honest answer is profit.

I'll let you know…

When you pick the Herman Miller Setu chair with the polished base, yes it took another man hour to polish that base, but they are charging you 4 times as much for that polished base. For 60 dollars in labor, they just charge you 400 dollars extra for it. Because they know there is a market for people who cannot stand to have the same thing their neighbor does. What wacky thing do we offer those customers. I consider custom colors different from limited editions—someone is trying to match their décor or something, ok, they are willing to pay extra to get that match. Ok, yes, I will stay flexible enough to do that. One thing I'll do that is like limited editions, is seasonal, trying to maximize profit and just encourage people to buy no matter what, there is the idea of urgency. These are the 2011 colors, we make no promises in 2012 that that bright red color is going to be there in 2012. If you were thinking about getting the bright red one, you better get it before December. Most of these *[edited for privacy]'s will be silver – just natural aluminum anodized, come Christmas, red and green will show up, after Christmas, you don't know if red and green is going to still be there. So, buy it now. All of that, for me, its just fun. Holidays are coming, and its just fun. The blogs will have something to talk about if I release a red and a green.

Creates some buzz…So, How does your company keep up with trends and changes inspired by fashion?

It's purely color – and I think that holds true to most of the industries. It is too…

Crate and Barrel, it is part of their corporate plan to have a range of products that are right on the dot with fashion. Because they need people to redecorate, treat things in their home like their clothes and cycle it out. They are a big corporation with huge overhead. They can't afford people buying something liking it and then sticking with it for 10 years—that doesn't work for them. So, I'm on one end, far end of the spectrum– I am trying to create something with classic colors – that is largely inspired by Deiter Rams and looking back at what colors were on those things back in 1965 and those things still look good – they had a graphite slate color, a bright red, essentially a white and a silver. White fits most décor, grey fits most décor, silver is for the "mac-fan" because they want it to match their computer, and the red is for someone who wants it to really pop. I did do the buttercup – and that was not a coincidence – that color, also known as Marigold I believe was also the 2009 pantone color of the year.

That is cool.

The 2010 color was turquoise, but I couldn't bring myself to make a turquoise *Desk. This year is some kind of fuscia pink. When you combine fashion and industrial design, you get landfill – its fine to paint your walls in a trendy color, but when you are done it, you just paint over it – you don't tear your walls off and throw it in a dumpster. The more that companies do that – that make physical objects that are trendy, the more I liken that to greed. They want the built in obsolescence. They need the sale from the next version two years from now, even though that thing could have lasted. But, they put that color on it, and they put the fleur-de –lis and scroll work on it, or whatever else was trendy. Moons and suns, you know, [haha] anything with a moon and sun will sell – what was that… 1996?

What characteristics would you tell other designers to include in their products to make them longer-lasting?

Go for the things that elicit the long-term emotional bond between the person and the thing. In my case—I am a sucker for anything that has weight to it, is shiny, that is a real material, but that is not necessarily appropriate for all products. Even if the use dies out, they can't get rid of it, they'll seek out a new home for it, or they will realize that to someone else it might have value, so they will bring it to a second hand center, or Craigslist or something. When I find myself throwing an actual purchased product in the garbage can, I am usually ticked off. I am usually stomping out to the garbage can and ticked that I ever bought it in the first place.

Do you think much about the link between sustainability (environmental responsibility) and creating timeless, durable, long-lasting products?

Yes. I completely work for myself, and my ideas help me to pick whatever I can pick what kind of broad categories I go into next. I am motivated a little more by the fact that this is hard work, I am going to have to live with the product for years, my name is all over it, and I am going to have to honestly promote it myself. And because of that the category of products I deal with generally tend to be more meaningful purchases, I try not to sell crap. This is an intentional thing, because it is something I needed, it solves a problem, and if I was going to solve this problem, you can solve it in a million cheap ways, but what is the way I would solve the problem for myself. It just so happens to be a big chunk of aluminum, which happens to be the second most recyclable material on the planet. Your neighborhood probably has an aluminum recycling center. I think about why people would throw away my stuff. Less motivated by what it does to the environment when it happens, but more motivated by why didn't they like it. That is good information for me to have. Why were they angry with the product, or why were angry enough to toss it. Then you have the idea – even if the product is recyclable, does it even make it to the recycler, or does it still get thrown out? The best case scenario is that they just keep it. If they get a cell phone that charges itself over the WiFi 5 years from now, somehow they don't need it, but like that shiny thing, and they do this [tosses it in the air and catches it] in the living room when they get bored…

Or they put business cards in it…

Or they say – Hey do you want this? But, the idea – I reject so many ideas of cool little products—where I could have a cheap mold made, make a bazillion of them and feed them to my distributers. And that's—I am learning the motivation and that is, once you have a network of dealers built up who comes by and cuts you a check for half of your catalogue of products that you manufacture, that is difficult to do – build those dealer relationships. And, once you have them, you realize that anything you make, there is a good possibility that they are going to buy and cut you a bigger check. So, how do you leverage these relationships, and so when you have an idea, or a cheesy little product that literally is going to take a guy a day to model and you have a pre-existing relationship with the mold-making factory and they already make other things for you, there is no longer anything holding you back, It is no longer hard for you to make a product and get paid for it. And so that is how crap ends up in the market. For me, it is still very hard for me to make products. So, I have 50 ideas for something I can make as a little crappy thing, is it worth it – is it worth all the effort that I have to go through – I don't have the dealers, I don't have the mold company, I don't have the big account with the mold company so they are willing to sit for 120 days to pay for a 10,000 dollar mold, you know, you don't have that, so you just reject the idea of producing junk. It will just be too hard and will not be worth your time. There are big companies out there – and they need to show 10 or 20 % growth this quarter, this year, they have all these pre-existing things – there is nothing left to hold them back, and the market seems to buy them anyways. There is a tone even – I wish everybody demanded one heck of a desk, but they don't. They have been trained to say desk – 200, 250 – that is what I will go out and spend on a desk. T.V. stand, uhhh 350, 400 if it is a big entertainment center, I guess. They don't know that they have been trained. They have been trained for a reason.

They don't think about the quality or why

The mass market.

Convenience, maybe even – to be able to pick it up at Best Buy.

And, the impatience. I have said the real fix to American Manufacturing problems and all that is a patient…a real patient audience, and things like Kickstarter too – that is something too that is a missing component of going from idea to delivery of a good product – it's the fundraising…but what I do, I couldn't have done 10 years ago. Is – which is I come up with an idea, I put it out there for the whole world to see, orders come in directly from the person who is going to use it to me, therefore I have the full retail amount in my pocket to produce and deliver the product back to them. So this—

Because of the internet

Yes, Because of the internet, because of the blog age too, the fact that there is an audience of people who proactively go out and look through feeds or something – they are hungry for it. They have ways to feed themselves that information. But again, it is not the mass market, it is still a fraction, and even then, those people usually have to wait. So, it's a patient subsection of the forward thinking, quality driven – and that is a *tiny* market compared to the mass market. If the mass market was patient, and if you could go directly to the manufacturers, ultimately what you would get are a lot better products for a lot less money. It is sickening how much the middle man adds to the cost. If you go buy something at Target for 20 dollars, it was made for a buck fifty… maybe $1.50 – people don't know that, they have been trained to think that 20 dollars is an excellent value for what they got, and meanwhile the manufacturers are held prisoners—that the only way they can stay up are the big purchases from the big… but it 50 % of their business came though the website, and they sold direct, they would have amazing power to tell Target – no, you are not buying these from us for a $1.50. You are buying these from us for $4.50 – because we make plenty fine business selling these things on our website, we don't need your business. We would like your business, but Target is no longer the 800 pound gorilla, they are balanced off with the mass-market if everyone finds their way to the manufacturer. Now the manufacturer has $4.50 to make this object, not $1.50 and they can make it in the U.S.

That could change easily…

Then your neighbors are making it, it doesn't have to be flat pack, the whole shipping equation changes.

You could bring a lot of American jobs back, if we brought back manufacturing.

I would like to sell through distributers, but I fell in love with that desk, and didn't want to compromise it any step of the way, and the original design wasn't even ship-able. It wouldn't fit in a box FedEx or UPS would ship, I had to slightly re-design it with removable feet in order to make that work. But, I wasn't willing to make it fold up into a little flat object. That didn't sit well with me. There is more than one way to skin the cat. Consumers don't realize that products aren't being designed for them rather than for the entire overcomplicated process. Of – it is going to be made on the other side of the planet, its got to be shipped over here, so there cannot be any air in those boxes, because we don't want to ship air. So, design decisions need to be made where…These solid wrought iron chairs, those came from China, they break down somehow—you can see the seams, you can see the bolts, you can see the …—they were inspired by some old wrought iron chairs that I bet you a million bucks were one solid piece.

But these still sell…

They still sell

It is funny.

Emeco Chairs – I like those.

Is that the navy chair—right? All aluminum…

I really dig those.

That is a cool company

Still made in America – a really industrial firm and they

I should try to interview them

Absolutely – and that is another one with very practical goals, they were trying to make a chair that doesn't rust on a navy ship. Well we make aluminum chairs, and they make the

same one to this day – and it's a pain, they have like 70 something process steps to make each chair. It is ..

I love that they made that chair with such a minimalist aesthetic.

The Navy doesn't care about scroll work, or any of that. They nailed it. I try to look critically at things I design and say – is there anything arbitrary on this – why did I do the curve like this, would I make a different decision on Friday

Do you sit with the piece for a while and let it marinate?

Oh ya, I'll put the rendering on the screen and have it rotate and leave the video running on a loop, on my desk during the day when I work, so my latest design is just spinning as a photorealistic rendering. Just to see if there is something that—why did I pick that angle, or is that based off of a golden section, or because I got lazy and just drew a line from here to here –and I'll just rework the design until I have got – it is unimpeachable in my mind. Every detail of this… it works fine, but it has a slightly high center of gravity so when the cable pulls, it wants to tip, so how do I know , how low do I go, so what is the next shape down?

I'll just make it a golden section, and it lowers the center of gravity, and it is also the golden section, can't argue with that. And, the rounded courners of the production unit are also this groove – well I meansured about 50 power cords,

Big enough for most cables, but small enough for most ends, that is when I came up with the 0.1 radius. So, everything is 0.1 radius, and where that circle sits is the center of the golden section. Can't impeach that, so why would I go an inch higher, why would I go an inch lower if it works on center. It is simple to communicate with the manufacturers and everything, and every single thing I will question, question, question, question, question, and say why, why, why, why, until every answer is satisfactory. And that does create a very industrial and hopefully somewhat timeless – when the next designer wants to copy cat, where are they going to go with it – are they going to put kitten ears on it, or make it look like a seated dog? Ya, those will sell, but those will fall out of fashion, and be one thing to do…Have you ever watched Portlandia?

No – I have *wanted* to see that, my friend told me I have to see it.

The whole thing about "putting a bird on it".

My friend told me about that!

These two hipsters go into a store – "look at this bag!", "ummm, did you even notice this bag before? – I just put a bird on it."

[haha!]