Luxury & New Luxury, Quality & Equality

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Abstract. This paper describes and compares notions of *luxury* and *new luxury* as a social notion of sustainability. The context of the discourse is sustainable interaction design (SID), defined in the paper and attributed to several sources. Several research questions are posed concerning the relationship between luxury, new luxury, quality, and equality in the context of SID. We propose an informal design critical framework that embeds interaction design in terms of luxury and sustainability. Several examples of products and services are analyzed in the proposed framework according to three themes: communications, computer software, and music. The paper concludes by reflecting on the research questions with respect to the framework.

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1 Introduction

This paper explores the ways in which design notions of luxury, new luxury [40], quality, and equality, when set in the context of sustainable interaction design (SID) [2-4, 20], are compatible or work in opposition to each other. Specifically, we examine (i) *luxury* as a traditional notion of product and service design; (ii) *new luxury* as an enterprise notion of opportunity, fashion, and an agency of consumption; (iii) *quality* as a catalyst for environmental sustainability; and (iv) *equality of experience* as a catalyst of social sustainability. This is an especially complex mix of concerns. The goal of this paper is to provide a foundation for understanding the relationships between these different design notions through the proposition of research questions and an informal framework for analysis. We apply this framework to several themes in the arena of interaction design products and services.

The paper begins by defining the terms of inquiry and pointing to some sources in Section 2, which concludes by proposing several research questions to frame the discourse. In Section 3, we give a framework for constructing design criticism-oriented analyses about specific interactive products and services in terms of luxury and sustainability effects. The framework is applied to three thematic areas as a means of understanding the material effects of luxury and quality, namely communications, computer software, and music delivery. In Section 4, the paper concludes by

reflecting on the research questions, informed by the exercise of constructing and applying the framework.

2 The Terms of our Inquiry

In what follows, we characterize the terms *Sustainable Interaction Design (SID), Luxury, New Luxury, Quality,* and *Equality of Experience.* It is important to emphasize that these terms are not mutually exclusive, but rather imply many complex interrelations that this paper seeks to describe. We close this section with a summary of the research questions posed by this paper.

2.1 Sustainable Interaction Design

The issue of sustainability—especially *environmental* sustainability—is now common in design research and practice. It has only recently surfaced as a concern in interaction design and human-computer interaction (HCI), however. Blevis introduces the notion of Sustainable Interaction Design (SID) [2, 4], the inspiration for which is traced to various authors and literatures [1-7, 10-13, 19-22, 24-29, 31, 34, 38, 41-42, 44, 46-48, 50]. This introduction of SID proposes a rubric of material effects and several design principles for predicting these material effects.

The material effects enumerated by the Blevis rubric are *disposal, salvage, recycling, remanufacturing for reuse, reuse as is, achieving longevity of use, sharing for maximal use, achieving heirloom status, finding wholesome alternatives to use,* and *active repair of misuse.* Each of these material effects is a possible outcome of the use of any designed artifice. Specific examples of how each of these effects may occur as an outcome of the use of interaction designs—which includes physical material effects that are induced by the use of software—are described elsewhere [4].

The design principles are hypotheses about how to move the material effects of interaction designs from less preferred outcomes to more preferred ones—for example, *reuse as is* most often proves preferable to *recycling* from the perspective of sustainability. These principles are presented in both the *design criticism sense*—the analytic act of describing what is needed to explain present ways of being—and the *critical design sense*—the creative act of describing what is needed to ensure that the choices we make as designers lead to sustainable future ways of being [4]. The key principles relevant to this paper are reproduced here:

(i)   ***linking invention & disposal****—(a) which in the critical design sense is the idea that any design of new objects or systems with embedded materials of information technologies is incomplete without a corresponding account of what will become of the objects or systems that are displaced or obsoleted by such inventions, and (b) which in the design criticism sense is the idea that understanding the effects of recent or imminent inventions entails understanding what has and might be displaced or obsoleted by such inventions and how such things will, are, or have been disposed;*

(ii) ***promoting renewal & reuse***—*(a) which in the critical design sense is the idea that the design of objects or systems with embedded materials of information technologies implies the need to first and foremost consider the possibilities for renewal & reuse of existing objects or systems from the perspective of sustainability, and (b) which in the design criticism sense is the idea that understanding how to promote renewal and reuse entails understanding why invention and disposal is more common;*

(iii) ***promoting quality & equality***—*(a) which in the critical design sense is the idea that the design of new objects or systems with embedded materials of information technologies implies the need to consider quality as a construct of affect and longevity, and quality in the sense of anticipating means of renewal and reuse, thereby motivating the prolonged value of such objects or systems and providing equality of experience to new owners of such objects and systems whenever ownership transfers, and (b) which in the design criticism sense is the idea that things of poor quality invite disposal and are unsuitable for bridging social divides; and that the aesthetics of disposability is a barrier to sustainability and equality.*

Two other SID design principles—*de-coupling ownership & identity*, and *using natural models & reflection*—are more abstract and outside the scope of this paper.

2.2 Luxury & New Luxury

According to Yeoman & McMahon-Beattie, *luxury* is traditionally associated with affluence and consumption exclusively available to the elite [49]. The concept of luxury remains "incredibly fluid and changes dramatically across time and culture" [49]:320. As a result, new forms of luxury emerge on the marketplace as it is blurred and renegotiated.

New luxury is defined as "products and services that possess higher levels of quality, taste, and aspiration than other goods in the category but are not so expensive as to be out of reach" [39]:1.

This new luxury opportunity market is being pursued from both above and below. Catering to consumers' burgeoning desires for lavishness, old luxury brands have extended the exclusivity of their label to lower priced versions, making the product— as well as its prestige—affordable [39]. The concept of "trading up"—referring to consumers' willingness to pay additional funds to receive higher quality, super-premium packages—is closely tied to new luxury. Such products and services sell at higher volumes, as well as higher prices relative to the category, and are becoming widely embraced by middle-market consumers. These new luxury drivers craft a distinctly different economic identity than that of traditional luxury. Consumers worldwide are indulging in new objects and comforts afforded to them, "resulting in a trend of a cultural shift for personal fulfillment and aspiration through experience" [49]:320.

In our own estimation, the traditional notion of luxury may be characterized as one that concerns expensive and exclusive products and services of high status, high fash-

ion, and high comfort. The notion of new luxury may then be characterized as products and services that offer the same function and semiotics of fashion as luxury ones, but which are targeted at the mass or semi-mass market.

Luxury and new luxury are in a sense relative terms. If you can afford something that others cannot afford, that is luxury. If you can afford something you couldn't afford previously that has now become available to you at lower cost, approximating more expensive things you can't afford, that is new luxury.

Luxury	New Luxury	Quality	Equality of Experience
 a	 b	 c	 d
Expensive and exclusive, high status, high fashion, high comfort	Same functions and fashion as Luxury, semi-mass market to mass market	Made of superior materials with superior care, built to endure, use as a tool	Robust and lasting, ownership transfer preserves quality of experience
 e	 f	 g	 h

Fig. 1 Characterizations of Luxury, New Luxury, Quality, and Equality of Experience: GPS and Range-finder examples.

In Figure 1, we give some exemplars to characterize these distinctions. In-car GPS navigation (a) is depicted as an example of traditional luxury. Such systems are increasingly available and have come down considerably in price, yet still arguably fairly exclusive luxury items. Portable GPS devices—such as the Garmin Nuvi device (b)—are arguably new luxury items. They are still expensive, but affordable to a wide variety of people without entailing the purchase of a new vehicle to acquire the same functions as installed by the vehicle manufacturer.

In our other example, a purposefully collectible camera—the Leica "Hermès Paris" edition (e)—is an exclusive product which is unlikely to see use as an image making device. Only 500 have been made with numbering like that of a fine art print. Here is an interesting assessment of this genre of camera from the site of Erwin Puts, an expert on the topic of Leica cameras:

> *The special series (150 years of optics) used a metal cover with a platinum layer and a body cover from the Karung snake, a not-endangered species. Even so, as a snake, you will not be pleased to be forced to give your skin to a camera that will be put for ever in a cabinet, as the place where most of these specials will end. The special Henri Cartier-Bresson camera with signature was delivered in a box, designed by Louis Vuitton. Presumably out of*

anger, Hermes bought 30% of the Leica shares to promote their own design. Indeed, with the current announcement that users can personalise their M camera with signatures and other options, the famous M camera is in danger of becoming a designer gadget for the ones who do not photograph but are in the business of conspicuous consumption. ... This is a worrying trend. The Hermes Leica will cost you Euro 8.500 at least. As a bonus you will get Barenia calfs-skin, and you may cross your fingers that the leather in your Porsche cayenne has the same atmosphere [32].

If in-car navigation is classed as traditional luxury, the Leica "Hermès Paris" may be considered to be perverse luxury. By contrast, our example of new luxury—the Panasonic "lumix" camera (f)—is the product of a co-operation between Leica and Panasonic, marrying Panasonic digital electronics know-how to Leica lens design. The "lumix" line includes several cameras at different price points, many of which have Leica branded versions and all of which have Leica-branded optics. Sony has a similar co-operation with the German lens manufacturer Zeiss, as does Kodak with Schneider. Such new luxury approaches put better than average optics and caché into the hands of more people, but lack the enduring qualities of the remaining picture-taking devices in the figure.

2.3 Quality & Equality of Experience

In addition to our earlier description of Quality and Equality as a principle of sustainable design, we can provide more pragmatic definitions through our examples in Figure 1. Here, *quality* is depicted as objects that are made of superior materials with superior care, built to last, endure, and continue use as a tool. *Equality of experience* is depicted as objects that are robust and long-lasting, such that a later transfer of ownership preserves the original quality of experience.

In Figure 1, the Trimble handheld GPS (c) is a professional grade device made to the highest standards of quality and highly resistant to the elements. People who use this device are probably using it as a matter of occupational necessity, rather than as a luxury. Similarly, an ordinary Leica M camera (g) is made to the highest quality standards and is used by professionals and serious amateur photographers alike. While not inexpensive, it is not "a luxury" to those who use it as a serious tool. As such, it evokes an emotional response among the people who own it, a response characterized as *ensoulment* by Nelson & Stolterman [26]. The notion of ensoulment goes beyond the notion of quality. It speaks to an aesthetic of well-loved designs in which "the meaning and value of a design is taken in as a feeling of being deeply moved and as a consequence, a feeling of being significantly changed" [26]:269.

Also in Figure 1, an image of a fine brass compass (d) (downloaded from the web site http://www.stanleylondon.com/compsurv.htm on February 28, 2007) is included as an example of equality of experience. This compass is an enduring object made of the highest quality materials. It may actually gain value as it transfers ownership from one person to another. While not a GPS device, it can be used in many contexts and serve a similar function. Likewise, many older 1950's vintage Leica M cameras (h)

are still in use. The experience of using one does not depend on being the first owner. In fact, part of the pleasure of this object owes to its historical associations with some of the most famous photographers of the past century, including Henri Cartier-Bresson and Andreas Feininger.

In these initial examples, we have mixed analog and digital devices in a way that suggests such distinction does not matter with respect to our framework of luxury, new luxury, quality, and equality of experience. What remains to be seen is if any of the digital devices can achieve the enduring qualities of analog counterparts. It is our ongoing research concern to determine the degree to which digital technologies drive disposability and to suggest ways that designers can avoid such unsustainable acts.

2.4 Research questions

As parties interested in sustainability, we are interested in ways in which new luxury might be perverted as a mechanism of profit-driven and consumption-driven waste. We seek strategies capable of ensuring that the positive material effects of products and services are at the forefront of consumer expectations and behaviors. We are optimistic that the positive qualities of luxury, coupled with an awareness of the negative impact of design, can be used to promote aesthetics of well-cared-for, enduring things.

In keeping with what precedes, we can state our research questions as follows: How do luxury & new luxury, quality & equality inter-relate? What are the mutual compatibilities and incompatibilities of the elements in our critical framework? How can each inform the other to produce an ethical, yet viable enterprise?

3 Design Critical Themes and Exemplars

In this section, we apply an informal framework to begin a discourse on the inter-relations between luxury, new luxury, quality & equality of experience from the perspective of sustainability. We do so as a matter of design criticism to three themes, namely (i) communications, (ii) computing, and (iii) music. Each critique consists of a description of the exemplar, an analysis of its luxury, and an analysis of its sustainability. The goal of working in this way is to create a design criticism account that can later be interpreted as implications for a critical design framework, benefiting the design of new systems. This paper concludes with a list of such implications and looks forward to the construction of a critical design framework.

Exemplars are examples of products or services within a theme. Each exemplar is justified as a choice through our analysis of the qualities of luxury, new luxury, quality, and equality as well as specific "new luxury" comparison categories of material consumption, longevity, qualities of use, and consumer choice.

Luxury analysis is a description of each exemplar in terms of how it is or is not an example of new luxury. This might include discussion of the displaced products or services, either traditional luxury or some other classification other than new luxury. We consider different forms of luxury, such as disposable, professional or "prosumer" luxury. Is the exemplar of high quality or fashion? Is it exclusive? An exclu-

sive product or service may be considered new luxury when it is made available to a second tier or previously excluded demographic group.

Sustainability analysis is a description of each exemplar in terms of how it might induce sustainable or unsustainable behaviors. Our goal is to enumerate the material effects in as dispassionate and unbiased terms as possible. The material effects of each product or service are stated in terms of the sustainable interaction design rubric: *disposal, salvage, recycling, remanufacturing for reuse, reuse as is, achieving longevity of use, sharing for maximal use, achieving heirloom status, finding wholesome alternatives to use,* and *active repair of misuse.* When applicable, we describe how the exemplar is representative of any of the design principles of interest: *linking invention & disposal, promoting renewal & reuse,* and *promoting quality & equality.*

3.1 Design Critical Theme: Communications

As a first application of the above framework, we consider the theme of communications. In contrast to the "high-end" products of Figure 1, here we choose two exemplars that are more global in nature and that exist as luxuries on a different scale, outside of western notions of the luxury marketplace.

Exemplar: The Virgin Mobile Kyocera.
Prepay cell phone plans allow people to add additional minutes to their account through the purchase of phone cards. This model permits consumers to manage their minutes while avoiding the demands of a monthly contract. Cell phones tailored to these plans—such as Virgin Mobile's Kyocera—are offered at a low cost, specifically targeting "teens, seniors, consumers with poor credit history, as well as citizens of developing countries" [25].

Luxury analysis. When it first emerged, the cell phone was a costly technology to purchase and maintain, limiting its use to an exclusive group of business professionals and wealthy socialites. Over time, wireless cellular communication decreased in price, resulting in increased adoption and use among middle-class consumers. Cell phone culture continued to evolve as a result, often marketing the experience as fashionable and socially desirable. As with other new luxury products, the individualistic quality of the communicative experience offered by cell phone technology represents a key component of its design [49].

Sustainability analysis. Prepay cell phones are presented as the lowest-tier marketplace for purchase and use. The cheap components used to construct these devices may cause owners to attribute little monetary worth or personal value to these products. Additionally, once a person's minutes have been depleted, there is no incentive to purchase additional minutes for her or his specific device. The combined effects of low cost technology and the lack of a monthly payment requirement encourage a disposable attitude toward these cell phones, allowing people to quickly abandon the service and discard the device with few repercussions. These dissipative actions produce dire environmental consequences, releasing toxic chemicals into the air, soil and water as the phones are disposed [9, 25].

Exemplar: Vodacom Community Services Phone Shops.
For many developing nations, cheap and accessible mobile communication technology, such as the cell phone, represent *"the first opportunity to possess this means of communication"* [15]:2. Vodacom, a South African cellular-phone company [33], has a distribution model whereby local entrepreneurs can establish "phone shop" franchises in underprivileged communities. Each shop owner can operate five prepaid cellular lines and charge patrons a government-mandated rate to make calls. This is a novel example of making an otherwise exclusive luxury accessible to an underserved population by means of a service, rather than product-based business model.

   Luxury Analysis. The service provided by Vodacom phone shops can be considered a new luxury in that it is a previously exclusive service now made accessible to a wider population. In locations where new shops are established, existing access to communications of any kind is scarce. As a standardized service, Vodacom calls may be a different kind of product experience than the highly personalized ones to which industrialized cultures are accustomed and typically associate with luxury. However, considering the extreme level of relative connectivity this service affords its consumer populations, the term *luxury* does seem appropriate.

   Sustainability Analysis. The Vodacom phone shops have many positive effects on sustainability. As an effect chosen from the rubric of material effects described above, *sharing for maximal use* is achieved because a single phone shop provides service to hundreds of people with just five units, as interpreted from data given in [33]. Phones are owned and maintained by entrepreneurs who have a vested interest in maximizing longevity, and thus profit out of the product. Since consumers do not have to purchase individual phones to enjoy the service, the business model can also be seen to *promote renewal & reuse*. Furthermore, *salvage* and *reuse* are utilized as the shop buildings themselves are built out of discarded shipping containers. In contrast to the case of disposable prepaid phones, this exemplar demonstrates the viability and potential sustainability of a service-based model when introducing a new luxury to a new larger or non-traditional market.

	Material Consumption	Longevity	Use	Consumer Choice
Kyocera (Product Model)	1 unit per consumer	disposable	fashion and status	diversity of experience
Vodocom (Service Model)	1 unit per 100+ people	Investment and maintenance	utility	standardized

Table 1 Comparing the characteristics of two models of communications enterprise.

3.2 Design Critical Theme: Computer Software

As a second application of the framework, we consider the theme of computer software. Here, we contrast Microsoft's new Vista operating system to the one it replaces, in our evaluation of the role of new luxury and its relationship to sustainability.

Exemplar: Windows Vista Enterprise.
On January 29, 2007, Microsoft released their latest operating system for Windows-based machines. Vista entered the consumer market with several flavors catering to specific niche markets and user needs [43]. The most visible change over previous operating systems is the addition of AeroGlass, a 3D desktop navigation tool with eye-popping animations. Vista also introduces two new functional features, Super-Fetch and ReadyBoost, which improve use of cached or physical memory and reduce delays in everyday operation. Many current applications will still run under Vista, although it is unlikely the system will be compatible with everything [37].

Luxury Analysis. All new software releases carry an air of exclusivity, where early adopters can claim access to tools not commonly in use. As Microsoft discovered from consumer reaction to Windows XP Media Center Edition, customers are also willing to pay for premium configurations [43]. This insight led the company to a strategy that offers six versions of Vista with varied levels of functionality. Vista Enterprise edition offers improved engineering over its predecessor, XP Professional. These improvements include process scheduling, thread pooling and a deadlock protection mechanism. Vista's AeroGlass desktop—which requires hardware upgrades for many existing desktop systems—is billed as a high-quality, fashionable new user interface. Considering both the exclusive nature of early adoption and inclusion of non-basic features, Vista Enterprise is a new luxury product.

Sustainability Analysis. The advantage of computer software is that it has no environmental footprint of its own. However, use of software requires manufactured hardware and consumption of power that do have environmental impact. While Vista is likely to have a relatively long useful life in computing, due to Microsoft's firm hold on the market, the software's arrival may spearhead a surge of hardware obsolescence as users replace their current computer systems with ones powerful enough to run the new O/S [45]. The effect of introducing the software into the consumer market may force the *recycling* or outright *disposal* of working equipment. In this sense, Microsoft violates the design principle above of *promoting renewal and reuse*. Vista does not appear to consume more energy than XP [37], but neither does it address existing consumption. Some critics attribute Vista's potential environmental problems to an intentional market-control strategy attractive to the video industry [51], while rivals to Microsoft claim Vista also violates business ethics by intentionally engineering incompatibilities with other software [52]. Should these dire scenarios play out, Vista may trickle-down a negative environmental impact by forcing other computer companies and consumer businesses to react in equally unsustainable ways.

Exemplar: Windows XP Professional.
Prior to Vista, Windows XP was the Microsoft operating system of fashion. Initially released with just two editions—Home and Professional—XP grew the family of products with specialized versions for different consumers. With its enhanced features, Professional had the higher price tag [43]. Released in 2001, XP was an improvement over Windows 2000 by providing better security, application compatibility, software updates, simplified user administration, and an upgrade to the visual desktop [53].

Luxury Analysis. Windows XP Professional used to be the state-of-the-art operating system for desktop computers. Although future iterations of both software and necessary hardware may improve Vista's performance, early comparisons between new and existing systems show only modest improvements in performance. In fact, some benchmarks show a significant *increase* in processing time for multimedia, possibly attributable to the lack of support for OpenGL graphics library and to the internal memory management of some non-Microsoft applications. As Tom's Hardware Guide concluded, "Vista is the better Windows, because it behaves better, because it looks better and because it feels better. But it cannot perform better than Windows XP" [37]. Windows XP may have lost the exclusivity and fashion now present in Vista, but the operating system is still exhibiting a relative quality that keeps it from being displaced. XP may prove to have a degree of software longevity.

Sustainability Analysis. Environmental complaints, similar to those aimed at Vista, can be leveled at XP, too. A recent analysis put the total cost of wasted energy consumption due to XP's power-saving functions at $25 to $30 billion [30]. As the pervasive system today, however, Windows XP does not require changes to hardware configuration to be used by consumers tomorrow. That was also the case when XP was released six years ago, although upgrades to memory chips and processors were certainly encouraged to boost performance. Existing systems continue to be useable in their current contexts. Since much of the code fed from its predecessors, XP represents, at worst, the *salvage* or *recycling* of existing software. To maintain ties to legacy systems, a feature called "compatibility mode" was included in the XP design to prevent older applications from crashing [14]. Although the contemporary software upgrade model is one that relies on planned obsolescence—thus, intentionally failing to achieve the material effect of *longevity of use*—Microsoft is certainly *promoting the renewal and reuse* of the hardware platforms tied to its operating system.

	Cost of Adoption	Longevity	Use	Consumer Choice
Vista Enterprise (Upgrade Model)	new hardware, for most	intentional obsolescence	fashion, status limited function	more proprietary
Windows XP (Legacy Model)	licensing	continued use, due to Vista bugs	pervasive standard	integrated support

Table 2 Comparing the characteristics of two models of computing software enterprise.

3.3 Design Critical Theme: Music

Music products can be described both in terms of the devices used to listen to music and the storage medium through which music is distributed. Apple's iTunes online music and iPod music players are among the most popular in their respective markets for purchasing and listening to music. Our third application of the framework concerns the systemic relationship between these two products in terms of luxury and sustainability.

Exemplar: Apple iPod.

This exemplar is a product that is part of a systemic music marketing system. The Apple iPod, first released in 2001, has spawned four distinct products, eleven different models and many accessories. Spurred by the holidays, the most recent quarter saw about 21 million units sold as Apple has put nearly 90 billion iPods out into the consumer market [54].

Luxury Analysis. The iPod's unique design and fashionable status within Western popular culture ascribe it status as a luxury item. Since its inception, the iPod has offered a wide range of capabilities and customizations. It evolved from a single grayscale, music-only interface to a diverse assortment of devices, capable of displaying images, video, and games. The iPod's fashion status remains dynamic as increasingly more stylish and personalized models, such as the iPod Mini and iPod Nano, are released. New styles and features render previous models unfashionable, resulting in devaluation. Through this process the iPod achieved its status as an item of new luxury by *"satisf*[ying] *users' desire for beauty and help*[ing] *them to feel individual"* [35]. Dimensions of quality are represented through the iPod's affective surface aesthetics and ease-of-use. However, mechanical problems such as system bugs and diminishing battery life counteract these elements by negating capacity for long lasting use. As a result, the iPod illustrates that new luxury and quality are not necessarily synonymous.

Sustainability analysis. Although the iPod eliminates some material effects by diminishing the necessity for products such as compact discs, it also requires the purchase of, among other things, FM-modulator radio transmitters, battery packs, specialized speakers, and microphones. The sense of personal attachment evoked by the product's surface aesthetics has the potential to promote *longevity of use*. However, instances in which iPods break typically require lengthy repairs requiring the acquisition of additional components. In this case, the result is *disposal*, or at best, *remanufacturing for reuse*. Furthermore, because the iPod is a self-contained artifice that cannot be physically modified, people are compelled to purchase entirely new models as advanced features obsolete older products. This dynamic of apparently planned—or at least thoughtless—obsolescence operates in antithesis to the design principle of *linking invention and disposal.*

Exemplar: Apple iTunes.

This exemplar is a service relating to the theme of music. iTunes began its life as SoundJamMP before it was purchased by Apple and tied to another product, the iPod. iTunes—ported to the Windows platform in 2003—has several features, including custom playlists and compatibility with many audio and video formats. As a digital music outlet, iTunes Store is a top-three seller of music in the U.S.

Luxury analysis. If viewed as stand-alone service, iTunes cannot be deemed a luxury. Use of the software is free and open to any computer owner to use. However, iTunes creates an exclusive situation that drives consumers to use Apple products over that of competitors—the proprietary .m4p music file format is only playable in iTunes or on iPods. Although third-party tools exist to convert .m4p files into more widely accepted formats, such as .mp3, iTunes is intentionally designed to restrict the manner in which people consume music. This restrictive nature transforms iTunes

into a new luxury—one that is defined by its exclusion of those who do not own iPods.

Sustainability analysis. The iTunes service has facilitated wide-scale adoption of the compressed digital audio file as the music medium of choice. This may have positive effects for sustainability by reducing the manufacture and disposal of compact discs, cases, and paper inserts. Because the music is purchased and downloaded through the Internet, environmental costs of transportation are avoided. iTunes also prevents wasteful purchases by making the customer more knowledgeable. A person can preview and select individual songs, rather than purchase entire albums. The degree to which iTunes shifts focus to the service of listening to music rather than the manufactured product has been described as a potential model of a sustainable product service system [23].

Conversely, the restrictive nature of iTunes may inhibit sustainable practice. The ecological relationship formed by iTunes with the digital music market is representative of what Klaus Krippendorff describes as "dominant-competitive," in which Apple has created its own format to "piggyback" on the success of its iPod technology [16]. As a result, iTunes compels people to exclusively purchase iPods, which may be less modular or enduring than other devices, rather than having the freedom to use other products.

4. Summary

We began this paper with an intention to distinguish design notions of luxury, new luxury, quality, and equality in the context of sustainable interaction design. We conclude by summarizing our initial thinking about the research questions we posed in Section 2, as a foundation for further inquiry:

(i)   Luxury is exclusive and new luxury less exclusive. Quality need not be exclusive, and equality of experience is the antithesis of exclusivity.

(ii)   Luxury is oftentimes correlated to quality. However, where quality implies longevity, luxury does not necessarily imply longevity. The new luxury may serve to intensify this asymmetry in a manner that promotes unsustainability.

(iii)   Luxury is demographically and culturally relative, as is new luxury. Quality and equality are much less relative.

Implications. To participate as an agency of sustainability, proponents of new luxury must take into account the same principles of sustainability that apply to other design of products and services. These include the linking of invention and disposal, the promotion of renewal and reuse, and the promotion of quality and equality. This may be accomplished by understanding new luxury not in terms of enterprise models that drive the consumption of new products at the expense of premature obsolescence or disposability of old ones, as illustrated in our criticism of the iPod and the Virgin Mobile Kyocera disposable phone. Rather,

(i)   by promoting *services over new physical materials,* as illustrated in the potential relationship of iTunes to iPods if such a relationship had been con-

structed with an eye towards environmental sustainability and responsibility—that is, if the iPods/iTunes relationship had been engineered to promote high quality enduring devices perhaps by emphasizing content licensing as a matter of fashion and status over physical artifice,

(ii)   by *promoting upgrades of existing products* with minimal environmental impact rather than replacement, as illustrated in the potential relationship of Vista to XP, if such a relationship had been constructed with an eye towards environmental sustainability and responsibility—that is, if the new operating system had been engineered to work well within the capabilities of existing hardware platforms, and

(iii)   by *promoting concern for secondary markets* as a matter of promoting equality of experience, as illustrated in the Vodacom Community Service Phone Shops exemplar.

To these illustrated examples and alternatives, we might add several other means of sustainability-compatible new luxury, namely

(i)   the *promotion of quality* over trends or new features as a matter of fashion,

(ii)   the *promotion of maintenance* of existing physical products,

(iii)   *emphasis on the value of content* over the value of physical materials, while understanding the relationship between content consumption and the consumption of physical materials including the materials used in the construction of content delivery devices and the power consumed in their use at both the server and client sides of the system, and

(iv)   the *use of modularity of construction* as a technique of upgrade-ability and in preference to the trends toward miniaturization that drive non-modular design and engineering of physical interaction devices.

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