Retracing an Evolution of Meanings for Design-Driven Innovation

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Abstract: In this paper we explore how to enrich design-driven innovation by considering the dynamic nature of such innovation as a result of history and evolution. Design-driven innovation takes distance from users in their current context, but instead proposes radical new meanings to users that address new potential needs. Here we look at how design-driven innovation can be based on a thorough understanding of a product/service's current meanings and lost meanings of its predecessor(s). We investigate this assertion with an action oriented case study using a research through design approach. Within the context of recorded music, and using script analysis theory to define meaning, we studied the evolution of album covers. As a result, we were able to come up with two radical meaning innovations for album covers. We conclude that the investigation of the evolution of meaning of a series of products/services –from the past up to the present– can help designers to depart from current meanings more radically, and more purposefully. We thus hope to inspire design to go beyond studying meanings in temporal isolation, taking into account meaning as a result of history and evolution for the purpose of design-driven innovation.

Keywords: Design-driven innovation, script analysis theory, evolution of meaning, (design) history.

1   Introduction

1.1   Background

According to Akrich, artifacts contain scripts (messages) from their designer (and other producers) to the user describing the product's intended use and meanings [1]. The term 'script' here is a metaphor for an 'instruction manual' which Akrich claims is inscribed in an artifact. Products/services have meanings inscribed by their designer (and other producers) within the context of production. Within the context of use, these scripts can be: (1) subscribed to, by users, when inscribed meanings are interpreted and accepted as intended by the designer (and other producers); and/or (2)

de-inscribed by users, when scripts of intended meanings are ignored/discarded/rejected/interpreted differently and used for other meaning intentions as intended by the designer. Thus, the meanings of products and services can be found in between a context of production and a context of use [6, 8, 19, 9, 10].

A common assumption has been that the meanings of a design are given; one could attempt to understand them but one cannot innovate on them. Recently, Verganti has argued that meanings can, and should also be innovated upon, using a separate, more culturally informed strategy for innovation [31]. Verganti calls this strategy design-driven innovation and in his book he explains that this is "an innovation strategy that leads to products and services that have a radical new meaning: those that convey a completely new reason for customers to buy them" (p. viii). While Verganti has emphasized that his book is not about design but management, in this paper we are interested in design-driven innovation both from a management and design perspective. The question we ask is: 'How can designers plan for innovations in the meaning of the products and/or services they create?'.

Our research in this direction started by an investigation of what happens when radically new meanings are introduced by a design and designers want to stimulate the adoption of those meanings by users [4]. We worked in the view that meanings of products and services are organized around sociocultural regimes [26, 21, 16]. With this is meant a regulation of the production of cultural symbols, in combination of cultural norms and values in (parts of) society, and artifacts and technologies with particular symbolic meanings [12, 13]. For example, think of the do's and don'ts during a Japanese tea ceremony (regulation), in connection to the etiquette and experience of drinking tea for Japanese users (norms and values), and the symbolic meaning of the used tableware (artifacts and technologies).

In our previous work, we explained that the transformation from one sociocultural regime to a new one could lead to meaning gaps, where radical new meanings are alienating people. The new sociocultural regime is too far from the previous regime, with some existing meanings from a current sociocultural regime being made redundant, causing feelings of culture and identity loss [22, 23]. In addition, we explained how meaning gaps can be bridged through balancing new and existing meanings. From this we learned that the meaning carried by products and/or services have been constructed over a wider, and historical set of predecessors [10]. Meanings evolve over time, and during sociocultural transformations meanings can be: introduced, disposed of, preserved, and/or re-introduced [4].

Yet, in design and innovation research and practice, meanings are often perceived, measured, and dealt with exclusively on basis of a product/service at hand. However, within the current sociocultural regime only part of a product/service's meanings can be perceived, measured, and dealt with. To uncover, and possibly restore all potential meanings of a new design, it is vital that we look to the evolution of designs over multiple sociocultural regimes. We take our inspiration from Aristotle, according to

whom "The essentials of a phenomenon are best understood if one tries to explore their rise from the very beginnings." [3].

1.2 Objective

Inspired by the dynamic nature of meaning and meaning as a result of history and evolution, in this paper we investigate how overall established meanings of a product/service in the here and now, can more thoroughly be understood by studying the evolution of that product/service. I.e. how a product/service has become what it is today. In addition to this, we investigate how a thorough understanding of a product/service as well as related possibly lost established meanings can serve the design of radical new meanings. Finally, we investigate the implications that this approach could have for design-driven innovation.

We have depicted 'album covers' as a product for our research, which we base on an action oriented case study regarding the design of a radical home audio system.

1.3 Structure of this paper

We start by a literature review describing script analysis theory and design-driven innovation. We continue by introducing the case study and our research context and methodology. Then we present the results of our meaning analysis followed by a radical new meaning synthesis. Lastly, we derive conclusions and define our future work.

2 Literature review

2.1 Script analysis theory

A methodological tool that can be used for analyzing and understanding the meaning of products and/or services is the script analysis theory. Madeline Akrich developed this tool within the conceptual framework of actor-network theory (ANT) [1, 2, 18]. ANT is a theoretical framework introduced in the latter half of the 1980s by Bruno Latour, Michael Callon, and John Law to emphasize that technology and society are mutually constitutive, not separate spheres influencing each other [10, 18]. While ANT is concerned with transformation of meaning through artifacts (non-humans as well as human actors) as they form and move through networks and act as mediators, the idea of product script has been developed to facilitate close analysis of how meaning is transported and transformed by products [10].

From a practical and design point of view, we have clarified some terms from the vocabulary of script analysis theory used in this paper. Our clarification is based on the works of Akrich, Latour [1, 2], and Fallan [9, 10] (Table 1).

Table 1. Vocabulary of script analysis theory

Term	Definition	Example
Script	Messages from designer (and other producers) of a product/service to the user describing the product's intended use and meanings	"Heavy keys of hostels" with intention "do not forget to bring the keys back to the front desk" [2, p. 259]
Description	Interpretation of messages of a product/service to generate meanings. This is usually done by the analyst or user and is the opposite movement of inscription	Interpretation of "heavy keys of hotels" would for example be "do not forget to bring the keys back to the front desk" [2, p. 259]
Inscription	Translation of meanings to messages of a product/service by the designer (and other producers)	"Translating the message 'do not forget to bring the keys back to the front desk' by 'heavy weights attached to keys to force clients to be reminded to bring back the keys to the front desk'" [2, p. 259-260]

2.2   Design-driven innovation

Design-driven innovation (a.k.a meaning-driven innovation) is an innovation strategy introduced in 2009 by Roberto Verganti as an addition to the two mainstream and dominant innovation strategies of user-driven innovation (a.k.a. market pull innovation) and technology-driven innovation (a.k.a. technology push innovation) [31]. While user-driven innovation usually departs from user/market studies and technology-driven innovation departs from technological inventions, design-driven innovation departs from the innovator's culture. This strategy is about taking distance from the user/market and sometimes also about the integration of new or existing technology in a new market or sociocultural regime in order to avoid incremental change and aim for change which is more radical. Verganti describes this idea well using his framework on which the different strategies are mapped together with a hybrid strategy what he calls 'Technology Epiphanies' (Figure 1). Technology epiphanies occur when there is radical change interplay between both meaning and technology.

In more recent work [32] on design-driven innovation Verganti has proposed a hermeneutic framework to look at radical innovation of meanings based on the two main acts of 'interpreting' and 'envisioning'.
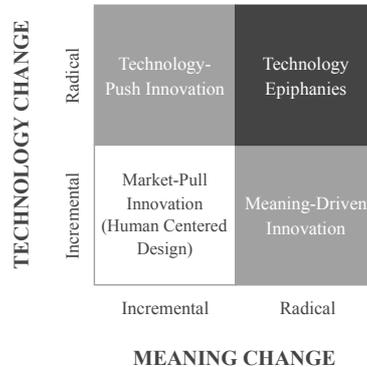
Figure 1. The two innovation dimensions and related innovation types adopted from Norman & Verganti [25]

In this work Verganti has also provided a clarification on how he defines a 'product meaning'. Namely: "To clarify, when we mention 'product meaning', we relate to the purpose of a product/service as perceived by the user. It is about the purpose for why a product is used, not how it is used (the user interface), nor what the product consists of (its features)". The hermeneutic framework and definition of product meaning brings design-driven innovation close to design. However, up to now, the research on design-driven innovation has been based on post-hoc analyses of selected cases in design, rather than on a design activity that synthesizes new proposals that will depart from current meanings.

3   Research context and approach

In this paper we focus on two 'how' questions: (1) Understanding how the meanings carried by a product/service have been constructed over a wider, and historical set of predecessors?; and (2) How insights from such a study, can be beneficial for and used to design radical new meanings?.

In order to answer these questions a 12-week action oriented case study in the form of a design research project was set up between the Industrial Design Department of Eindhoven University of Technology and the Department of R&D&I of Philips and executed by the first author in 2006.

3.1   Design case study and research focus

The design brief for the practical case above was to design a 'radical' home audio system. By 'radical' we mean a product/service created from a radical meaning and possibly technology interplay innovation. In particular, we were interested in a differentiation from existing home audio systems (in 2006) by means of what Verganti later called a 'technology epiphany' (Figure 1) [31].

For the sake of clarity, within this paper we only focus and report on the 'album cover' relating parts of the radical home audio system that was designed. This means: (1) understanding how the meanings carried by album covers have been constructed over a wider, and historical set of predecessors; and (2) how insights from such a study, can be beneficial for and used to design the next generation album cover with radical new meanings.

3.2   Research approach

This case study was based upon a 'research through design' approach and reflective practice. In this approach design action and reflection on action are considered creators of knowledge, and the design outcome is considered the physical proof of the knowledge generated [23, 28, 11, 17].

Our research through design approach was also supported by desk research. Within this desk research predecessors of album covers were selected and described by the design researcher using various documentations on the Internet relating to album cover history [1]. In total a number of 25 predecessors from 1870s up to 2006 were selected and described.

To complete our research for reporting, we also performed a post-hoc informant inquiry using social media in which we asked informants: 'What do album covers mean to you?'. This question was answered by a number of 32 informants who did not have any knowledge about script analysis theory; i.e. they informally described what album covers mean to them and motivated these descriptions.

4   Results

We start by a summary of the informal (i.e. not based on script analysis theory) meaning descriptions inquired from informants through our social media inquiry (Section 4.1). Then we present the evolution of album cover meanings described based on a desk research using script analysis theory (Section 4.2). This is followed by a reflection of the designer on both the informant and meaning evolution descriptions towards forming a strategic design vision (Section 4.3). Finally we present a radical new meaning for album covers within the radical home audio system that was designed (Section 4.4).

4.1   Album cover meaning descriptions from informants

Table 2 provides a summary of the analyzed results. In total a number of 13 meanings (The center column) were described by the 32 informants (random mixed group) that participated in the explorative study.

Table 2. Summary of the album cover meaning descriptions from informants

Description example	Meanings	# of informants that provided this meaning in their description
"They say something about the artist and the environment where the music has been created."	Artist/Band Expression	9
"The best ones I sense as graphic poems."	The Album Message/Story	7
"If the album cover has more bright colors it tells me the music is more light…"	(Emotional) Representation of the Songs/Content	6
"Album covers mean forgotten faces, lost memories, and that we are growing old."	Cues for Memories	6
"If the album cover is ugly I would not buy it."	Aesthetic Art; Personal Identification	5
"They should have a relation with the songs."	Visual Representation of the Song	3
"Album covers are fun."	Fun; Enjoyable	3
"They gave me a feeling of what type of music I can expect."	Reflection of the Album Style/Genre	3
"I always look at the album cover to see if there has been enough care put into creating it. That says something about the quality of the work and whether I would buy it or not."	Trigger for Sales	3

"A good cover adds another layer to the album experience."	Another Layer to the Album Experience	2
"They protect the CD or LP."	Protection of the Recordings	1
"They help me navigate through my iTunes library."	Affording Navigation	1
"I like the lyrics so that I can sing with the music."	Container of Lyrics	1

In order to give a good indication of how the study was done, we have depicted and included a description example for each described meaning (The left column). In the right hand column, we have indicated the number of times that a certain meaning was referred to in the informant descriptions.

Most of the informants describe the meaning of album covers from the artist point of view; i.e. as a platform where the artists can express themselves. Moreover, album covers can be seen as a channel through which artists can tell a story about themselves and/or their work. From the audience point of view however, the informants described album covers as a representation of the music and an aesthetic art form that when owned can be used to identify oneself towards other people and when seen serve as a cue for memories.

4.2   Evolution of album cover meanings

This study was framed only around artifacts relating to 'audio storage' in order to focus on album covers. By audio storage we refer to techniques and formats used to store audio with the goal to reproduce the audio later using audio signal processing to something that resembles the original [29]. Due to this focus, the time scope of our study has been from 1870s up to 2006.

Table 3 provides a summary of our analysis of audio storage and their carried meanings. In total a number of 25 audio storage artifacts, categorized into 12 categories, were described for meanings. This resulted in a list of 7 meanings (Left hand column). These are: (1) 'Record Label Marketing', referring to the way that record companies used an album cover to market their brand; (2) 'Packaging & Protection of the Recordings', referring to the way in which album covers were a package for and protected the recordings; (3) 'Event Support', referring to what kind of role album covers played in supporting music events; (4) 'The Ability to Identify',

referring to how album covers supported finding/recognizing music (from a collection); (5) 'Artist Branding', referring to the ways in which the artists branded themselves by means of album covers; (6) 'Compilation Albums' referring to ways in which a bundle of tracks known as an album came to existence; and finally (7) 'Self Artwork', referring to how album covers meant as a platform for personal expression for self made compilations for example.

In order to indicate how the artifacts carry and make these meanings available in culture for people, we have also provided an overview of meaning inscriptions for each category (Bottom left corner of the table). As an example for the category of the phonograph cylinder we can see that meaning (4) 'The Ability to Identify' for example, has evolved as following: phonograph cylinders were packaged and protected in cardboard tube boxes with printed logos of the record company on both the cardboard tube boxes and the cylinders themselves. At first, phonograph cylinders could only be identified through a small paper insert with written information about the content of the phonograph cylinder, inside of the package. Later, people started to write this information on the labels by hand. This influenced the record labels to decide to stamp this information on the top lid of the phonograph cylinders. At a certain moment, the new packaging included a printed label on the lid, which could also be cut out to use for specific phonograph cylinder collection storage furniture. These early artifacts more or less initiated the rise of the first album cover that came out in 1909 [27].

Once the meanings of album covers were described from all relevant audio storage in the history of recorded music culture, we performed an analysis of how these meanings evolve over time. More specifically, we looked at the presence of meanings in culture related to the rise and endurance (existence) and discontinuation (sometimes perish) of some audio storage artifacts in time. Table 4 summarizes this analysis, which provides interesting insights. The evolution of meanings can one by one be explained as following:

(1) Record Label Marketing: The first audio storage artifact, the phonograph cylinder, was a technological invention by Thomas Alva Edison also known from the Edison Records. When analyzing the evolution of the 'Record Label Marketing' we see a decrease in the role of record labels, especially after the introduction of compact cassette, compact disc, and most influential of all, the MP3.

(2) Packaging & Protection of Recordings: The packaging and protection of recordings was a meaning present from the beginning of audio storage history, i.e. the phonograph cylinders, but became more and more present through the introduction of the 8-track in 1960, the compact cassette in 1963, and the compact disc in 1979. This meaning started to decrease in product form with the introduction of MP3 in 1995, which managed to dominate the compact disc as an audio storage artifact. Nowadays, this meaning, in product form, is only carried by digital content storage devices such as USB keys or compact discs, and to the extent that they exist, some other classical

audio storage artifacts. This meaning however, has migrated from products form to online service forms like Myspace.

(3) Event Support: Events were probably one of the first places where music captured on audio storage was sold. While this already took place during the phonograph cylinder era, with the invention of gramophone record in 1895 and later the invention of the album cover in 1909, event support as a meaning started to increase its presence in culture. This increase of meaning presence was even more after the invention of vinyl records that became widely spread and popular in the society. Nowadays, album covers are still used to support events. They often even match event posters, tickets, etc. with regard to their visual identity.

(4) The Ability to Identify: Due to differences in packaging inherent to technological innovation this meaning has had ups and downs throughout the history. Record packaging for example, provided a much larger surface for album art compared to Phonograph Cylinders, compact cassettes, or compact discs. Vinyl records, due to a much better endurance than Gramophone Records, became more and more accessible for people and present in the culture. People have been using album covers for years to browse through music collections and identify music. Album covers have also been used as artifacts for self-expression towards other people. The dominance of compact cassette decreased the presence of this meaning from a 'higher' visual sense but the invention of compact disc and related artist booklets contributed to an increase of this meaning presence again. From 1995 on, when MP3 was invented, there has been a radical change in the inscription of identification, from a mainly visual medium to a mainly textual medium. Inventions like cover flow introduced in 2006 by Apple Computers Inc., re-introduced some of the visual aspects of album covers in digital spaces [7].

(5) Artist Branding: This meaning more or less came to existence after the invention of album cover in 1909. Later it increased presence due to the introduction of the vinyl records but really gained importance after the invention of the compact cassette and especially compact disc and related booklet. With the rise of Internet and invention of the MP3, artist branding started to migrate as a meaning from the compact disc booklets into artist websites and social media websites such as Myspace that focus on music [7]. Nowadays artist branding is almost an indispensible meaning in recorded music culture.

(6) Compilation Albums: The word compilation comes from the era that a couple of records were literary bound by an album. The invention of reel-to-reel and the increase of space for audio content on storages contributed to the creation of compiled albums with multiple songs.

(7) Self Artwork: The introduction of compact cassette in 1963 was the beginning of 'Self Artwork' as a meaning related to album covers. From then on people could easily record a compilation on a blank compact cassette, which had a template

including boxes for writing down the tracks and a surface for artwork that could be created by people themselves. The introduction of the compact disk in 1979 continued to support this meaning presence along with the introduction of the MP3 in 1995. A couple of years after that though, 'Self Artwork' became less present as a meaning due to the decrease of tangible audio storage and an increase of digital audio storage formats that do not really support it. Nowadays people seldom create 'Self Artwork' for their digital music content and 'Self Artwork' has remained limited to tangible audio storages.

In general what we can learn from the analysis shown in table 4 is that both 'Record Label Marketing' and 'Packaging & Protection of Recordings' as meanings are becoming less present while 'Artist Branding', 'Compilation Albums', and 'Event Support' meanings of album covers are becoming more present in culture. 'Self Artwork' and 'The Ability to Identify' are also interesting to look at since both of them are less present, probably inherent with 'Packaging & Protection of Recordings' since the audio storages of today have mainly been dominated by the MP3, which is a digital audio storage.

Table 3. Audio storage, the described meanings, and their inscriptions per category.

Timeline of audio storage media (with icons):

1870s Phonograph Cylinder · *1895* Gramophone Record · *1930s* Write Recording · *1940s* Reel-to-reel Audio Tape Recording · *1948* Vinyl Record · *1960s* 8-track · *1963* Compact Cassette · *1969* Micro Cassette · *1970s* Elcaset · *1979* Compact Disc · *1985* AIFF · *1987* Digital Audio Tape (dat) · *1990s* Digital Compact Cassette · *1991* Minidisc · *1992* WAV · *1992* Artist Website · *1995* MP3 · *1996* DVD Audio · *1999* Windows Media Audio · *2000* Flac · *2001* AAC · *2002* Ogg Vorbis · *2002* Last FM · *2003* Myspace · *2006* Cover Flow

MEANING INSCRIPTIONS IN AUDIO STORAGE MEDIA

DESCRIBED MEANINGS	Phonograph Cylinder (*1870s*)	Gramophone Record (*1895*)	Write Recording (*1930s*)	Reel-to-reel Audio Tape Recording (*1940s*)	8-track (*1960s*)	Compact Cassette (*1963*)	Compact Disc (*1979*)	AIFF (*1985*)	Minidisc (*1991*)	MP3 (*1995*)	Last FM (*2002*)	Cover Flow (*2006*)
Record Label Marketing	Printed logo of the record company on the tube box and the cylinder	Printed logo of the record company on the sleeve and the record	Printed logo of the record company on the box and role	Printed logo of the record company on the cardboard box and role	Printed logo of the record company on the box	Printed logo of the record company on the box and booklet	Printed logo of the record company on the box, the disc, and the booklet	-	Printed logo of the record company on the box, the disc, and the booklet	-	Digital logo of the record company on the website; online ads	Digital logo of the record company on the digital cover
Packaging & Protection of Recordings	Cardboard tube	Cardboard sleeve	Cardboard box/metal can	Cardboard box	Plastic box	Plastic box in box	Cardboard/ plastic box	-	Plastic box in box	-	Cloud service	-
Event Support	For sale	Cover art posters; for sale	-	-	Cover art posters; for sale	Cover art posters; for sale	Cover art posters; for sale	-	-	Sample downloads	Sample streaming	-
The Ability To Identify	Small paper inserts with written info inside the package; written on the labels by hand; record label stamped on the top lid; printed labels on the lid	Printed textual and visual artwork on a big surface and on record stickers	Handwritten text on the packaging and role sticker	Handwritten text on the packaging and role sticker	Printed textual and visual artwork	Printed/ handwritten textual and visual artwork	Printed textual and visual artwork	Digital text	Handwritten text	Digital text; digital cover image; ID3	Digital text and artwork	Digital text and artwork
Artist Branding	-	Cover art	-	-	Cover art	Cover art; tape booklet	Cover art; cd booklet	-	-	Digital text	Online ads	Cover art
Compilation Albums	-	Albums with multiple records	-	A tape with multiple recorded songs	A tape with multiple recorded songs	A tape with multiple recorded songs	A burned disc with multiple songs	-	A tape/disc with multiple recorded songs	A directory with multiple audio files; long audio file with multiple songs	Playlists; playlist sharing	A folder with multiple songs
Self Artwork	-		-	-	-	Blank tapes template	Blank discs with template	A directory with multiple audio files	Blank tapes/ discs with template surface	Digital template	-	-

Table 4. Album cover evolution and described meanings. High intensity green = more present. Low intensity green = less present. Green frame = influential artifact.

Timeline artifacts:

- *1999* Windows Media Audio
- *1996* Dvd Audio
- *2006* Cover Flow
- *1995* MP3
- *2003* Myspace
- *1992* Artist Website
- *2002* Ogg Vorbis
- *1969* Micro Cassette
- *1992* WAV
- *2002* Last FM
- *1948* Vinyl Record
- *1987* Digital Audio Tape (dat)
- *1963* Compact Cassette
- *1979* Compact Disc
- *1991* Minidisc
- *2001* AAC
- *1870s* Phonograph Cylinder
- *1895* Gramophone Record
- *1930s* Write Recording
- *1940s* Reel-to-reel Audio Tape Recording
- *1960s* 8-track
- *1970s* Elcaset
- *1985* AIFF
- *1990s* Digital Compact Cassette
- *2000* Flac

DESCRIBED MEANINGS	PRESENCE OF MEANINGS IN CULTURE OVER TIME														
	1870	1800	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
Record Label Marketing															
Packaging & Protection of Recordings															
Event Support															
The Ability To Identify															
Artist Branding															
Compilation Albums															
Self Artwork															

4.3   Designer's reflection

In this section we provide a summary of the designer's reflection based on the earlier results (Section 4.1 and 4.2). Looking at the rise of the album cover phenomena from the very beginning, brought us back to 1870s when the phonograph cylinder was introduced as the first audio storage artifact ever, that radically changed the culture of music experience. This radical innovation of meanings brought about change, which was both appreciated, and not appreciated at all by people during that time. A more positive received new meaning carried by phonograph cylinders was for example, the possibility that people could suddenly listen to music from the other side of the world without traveling to see a live event. A less positive received meaning carried by the phonograph cylinders was the separation of the music from its artist. In fact, back then, many artists were objecting to this meaning. When looking at the evolution of album cover meanings from a birds eye perspective what can be seen is that album covers came to existence due to the separation of artist from its music. In fact, the album cover throughout the years has become like a stage for the artist to somehow have a presence next to the recorded (and playing) music. The large Record covers, the compact cassette and the compact disc booklets, along with the ID3 tag of the MP3 and the Artist Website are all artifacts with inscriptions that support this meaning in various ways causing it to be sometimes more and sometimes less present in culture. This conclusion can also be triangulated with the conclusions of our informant meaning exploration study using social media, as 'Artist/Brand Expression' was mentioned as a meaning of album covers by most informants. But what the album cover has also been throughout these years is a way for people (the audience) to display and browse through their collections in both individual and in social settings. This is however, is a meaning that has been less facilitated due to the digitalization of audio storage. Our current (2006) audio systems unfortunately are all based on text browsing and have neglected album covers; an artifact, which has been carrying many interesting meanings in the culture of music experience. Moreover, an artifact of which its development (meaning innovation) has not been utilized yet.

In sum, we can say that the meaning of album covers on a more deep level, i.e. a conclusion based on an analysis of over a century and three decades, actually is 'a medium that affords interaction between the artist and the audience'. What if, we can envision a future audio system that is designed based on this understanding? In the following section we present NAVA, a home audio system that we designed based on this vision.

4.4   Design-driven innovation: interactive album covers

In this section we first introduce a radical home audio system, which was designed based on the evolution of recorded music culture meanings. In specific, we introduce two design-driven innovations (radical meaning innovations) for album covers, integrated in this system. Both innovations were driven by our study of the evolution of album cover meanings.

Figure 2. The NAVA social home audio system (left); QR code for a video of the NAVA (right)

What follows is a presentation of the results by answering the 'why' and 'what' questions based on our evolution study. The 'how' question, i.e. how the meanings were inscribed, will not be discussed in the present paper.

NAVA (in Farsi 'nava' means tone/tune; it is also a principal mode of Iranian traditional music) is a home audio system in the form of a coffee table. Digital (music) content can be uploaded wirelessly and displayed on the NAVA, which provides an inviting interaction that affords a social music experience (Figure 2).

This then newly designed home audio system was quite radical for its time, and to some extent, can still be considered radical innovation of meanings (Figure 1). Below we describe two new meanings that we introduced in the NAVA social music table. Both of these meanings are related to album cover meanings:

(1) Intuitive multi-user digital music browsing and playing: The NAVA is designed in such a way that more than one user can operate it. Moreover, it allows for multi user-, and therefore social-, interaction. The NAVA allows for a rich visual and almost tangible interaction with digital (music) content. People can sit around the NAVA and experience music on different levels by interacting with the digital (music) content on its touch screen display. (Figure 3). Furthermore, people can share their digital (music) content with others by uploading it to the NAVA where it can be browsed and played intuitively, and experienced socially.

(2) Interactive album covers for music context experience: Next to digital music content (digital audio), music context (information that one used to find in CD booklets and can now find on the Internet) is represented by means of dynamic and interactive album covers. This enables fans to stay in touch and up to date with the artists, and artists to regularly express themselves and interact with their audience. Since the album or track content with regards to both music content and music context is dynamic and changing, the experience is always unique (Figure 3).

Figure 3. Example of a dynamic and interactive album cover: 50 Cent interactive album cover (left); The NAVA's multi-user interface (right)

Both meanings are based on innovating the meaning of album covers from physical or digital static artwork, which is designed, sometimes printed, and sold, to digital and dynamic artwork which can continuously change and be updated from the artist side and interacted with from the audience side providing services since the NAVA social music table is connected to the internet. Although Apple Computer Inc. has introduced 'Cover Flow' in 2006 and Microsoft Inc. has introduced the 'Surface Table' in 2007, this is a meaning innovation, which is to date (2013) a potential radical innovation of meaning for the recorded music culture or more specific the home audio system market [27, 24].

5   Conclusion and discussion

We have shown how meanings of a product/service can more deeply and thoroughly be understood. This was done using script analysis theory to describe meanings from predecessor artifacts evolved over time and through a meaning evolution exploration in which one can investigate how the presence of meanings carried by artifact in a certain culture changes inherently with those artifacts over time.

Also supported by our previous work [4], we conclude that the discovery of these more deep and thorough meanings can support a more radical and purposeful design-driven innovation strategy: (1) One could easier select which existing meanings to preserve, re-introduce, or dispose; and (2) Which new meaning to introduce next to the existing meanings in such a way that one creates design-driven innovations that are truly sustainable (in the sense of people, planet, and profit; i.e. innovations that develop our culture and society) and have a higher chance of adoption [9].

A weakness of our current research approach is that the description and analysis of album cover meanings evolution was only done by one person, the first author of this paper. The social media meaning exploration study shows that such description and analysis studies can benefit from a more holistic approach. The reason for this is

twofold: First, the meaning description and meaning evolution analysis can be done by more than one person and preferably through the involvement of actors or interpreters related to the target culture for innovation. Multiple expert perspectives can enrich the study and increase its quality [30, 5]. Besides, sometimes a one-man job is not even possible due to the complexity of the project and/or lack of expertise in a certain project context (target culture for innovation) [5]. Second, one should not forget that all actants, human or non-human (artifacts), are entangled in the world [15]. Moreover, they form a sociocultural regime that one could see as a products service system or ecosystem. This stance, i.e. knowing that an artifact is part of a bigger landscape, could have a significant change of how the meanings of an artifact could be defined and perceived [14, 33].

6   Future Work

We plan to continue our research by exploring how meanings can be described and inscribed from a product service system perspective. Moreover, how designers can work in co-operation with interpreters (human actors who can contribute to the meaning, description, creation, inscription, and realization of design outcomes) during early developmental stages of projects to benefit from objectivity and their resources for operationalizing innovation concepts.

While our focus within this paper has been more on the meta level and from an innovation design strategy perspective, we would also like to explore how existing and new meanings can be inscribed into products/services. Moreover, in this paper we have focused on the 'what' and 'why' questions regarding meanings (which meanings and why) while we can also focus on the 'how' question regarding meanings (how can radical new meanings be inscribed with combination of existing and past meanings) [20, 4].

Furthermore, we believe that our approach of investigating the overall established meanings of a product, service, or phenomena in the here and now as a result of history and evolution, also has potential for dealing with societal challenges a.k.a. wicked problems (e.g. aging). Therefore, we are pondering how this approach can be used for addressing societal challenges and also used for the development of phenomena in sociocultural regimes.

7   Acknowledgements

8   References

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