

11-25-2011

# Technology Embodiment: The Contribution of Heidegger's Phenomenology

Matt Germonprez

*University of Wisconsin - Eau Claire*, germonr@uwec.edu

Jessie Pallud

*Universite de Strasbourg*, jessie.pallud@gmail.com

Emmanuel Monod

*Dauphine University*, emmanuel.monod@dauphine.fr

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## Recommended Citation

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## Technology Embodiment: The Contribution of Heidegger's Phenomenology

Matt Germonprez

University of Wisconsin - Eau Claire, USA

Jessie Pallud

Universite de Strasbourg, France

Emmanuel Monod

Dauphine University, France

### Abstract

The rapid evolution, expansion, and integration of technology into our everyday lives changes the way that we understand the relationship between technology and people. A dualistic relationship, with technology at one end and people at the other, no longer serves as a clear approach in understanding why and how we engage technology. As such, we must seek new forms of understanding as technology has become truly part and parcel of who we are, how we connect with our past, and how we shape our future. We use Heidegger's phenomenology for understanding the relationship between technology and people, investigating why and how people engage hedonic systems in the formation of embodied technology relationships. In this qualitative study we contribute to research on both hedonic systems and phenomenology, evidencing characteristics of how people constitute an embodied relationship with the technology that has become so pervasive in their lifeworld.

**Keywords:** Embodiment, Phenomenology, Hedonic Systems, Focus Groups

**Permanent URL:** <http://sprouts.aisnet.org/11-152>

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**Reference:** Germonprez, M., Pallud, J., Monod, E. (2011). "Technology Embodiment: The Contribution of Heidegger's Phenomenology ," Proceedings > Proceedings of JAIS Theory Development Workshop . *Sprouts: Working Papers on Information Systems*, 11(152). <http://sprouts.aisnet.org/11-152>

# Technology Embodiment: The Contribution of Heidegger's Phenomenology

*Abstract: The rapid evolution, expansion, and integration of technology into our everyday lives changes the way that we understand the relationship between technology and people. A dualistic relationship, with technology at one end and people at the other, no longer serves as a clear approach in understanding why and how we engage technology. As such, we must seek new forms of understanding as technology has become truly part and parcel of who we are, how we connect with our past, and how we shape our future. We use Heidegger's phenomenology for understanding the relationship between technology and people, investigating why and how people engage hedonic systems in the formation of embodied technology relationships. In this qualitative study we contribute to research on both hedonic systems and phenomenology, evidencing characteristics of how people constitute an embodied relationship with the technology that has become so pervasive in their lifeworld.*

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## 1. Introduction

Imagine living in a world without information technology; a time one thousand years ago in medieval England without your smart phone or laptop. You are yourself, but you are not your modern day, tech savvy self. Productivity is different. Socialization is changed. Free time is altered. Now imagine a more contemporary time, perhaps 1990. In this time, information technology is a tool, but it is a discrete tool that you interact and adapt with. It is separate from you; an object that is sometimes useful but easily cast aside. You are shaped by the technology and the technology shapes you but both are generally independent (Giddens, 1984), however, a duality remains between the person and the technology. Finally, imagine information technology in 2012. It is part of you, part of everyday life, and part of your world. You are able to look beyond any individual technology, hardly seeing technology as a ‘thing’ (Introna and Ilharco, 2004). A technology is truly part of a larger system that is no longer discrete parts but embedded and embodied in our lives.

As we become more inseparable from our technology and the expansive world it enables, we are personified with technology as we navigate our daily activities, not pausing to think of this embodiment. The oft envisioned dualism of people and technology and the need to reduce information systems to variables that remains in today’s thinking is becoming increasingly challenged. The embodied relationship between people and our technologically-laden world is not one of causality, moderation, or structuration as these promote a worldview with a subject-object dualism. As researchers we must consider how systems are used in the creation of the individual self with the interconnected world around us (Orlikowski and Scott, 2008) and treat technology as part of an embodiment of personal experience, reflecting the world we live in (Dourish et al., 2007). We consider the human-computer interaction as an embodied interaction, placing the person at the center of the relationship, to which a computer becomes *part of our lifeworld*; a world of iPods, Droids, and Tweets. This orientation considers the journeys that people make with technology, not using it to get something done, but to reflect who we are, how we engage the world, and how we understand our being (Dourish et al., 2007). Systems are not a lens through which we realize the potential of a piece of software; systems are ways to construct the opportunities and spaces of our own lifeworld.

To investigate embodiment we begin with hedonic systems as “providing self-fulfilling rather than instrumental value to the user” (Van der Heijden, 2004, p. 695). Hedonic systems represent a viable context for studying social and technical boundaries; representing a domain of study where *people* are best understood as *people* reflecting and acting with systems, themselves designing its trajectory and evolution (Germonprez et al., 2011). Hedonic systems allow us to observe the value that people inject into their personal, technically-enabled lives. We attend to the rapidly emerging call to understand the socio-materiality beyond the bounds of the four-walled organization and into the seemingly boundless organization of a person’s lifeworld (Mingers, 2001; Orlikowski and Scott, 2008). Within the context of hedonic systems, we address two key points regarding technology embodiment that remain underdeveloped in the IS discipline. First, *embodiment* remains a general concept in IS, not well supported by empirical studies (Dourish, 2004). We claim that rather than a general conceptual view of embodiment, embodiment should be understood in situations of engagement. Second, we argue that phenomenology (Heidegger, 1962) can be used to understand embodiment. The relationship between embodiment and phenomenology has not been described precisely in IS reference. We use Heidegger’s phenomenology as a source of support in answering our research question: *What is the contribution of phenomenology in the understanding of technology embodiment?*

This research is organized as follows. First, we consider how the literature has dealt with embodiment, using hedonic systems as our context. Second, we present our theoretical framework and justify why Heidegger’s phenomenology may be more relevant than the concept of embodiment for describing people’s engagement with systems. Third, we discuss the methodology used to carry out our study. Fourth, we discuss our findings and contributions made from this study.

## 2. Cognitive Absorption and Escapism

Understanding people’s relationship with technology has long been a focus of Human-Computer Interaction (HCI). Indeed, this stream of research is “concerned with the ways humans interact with information, technologies” (Zhang et al., 2002, p. 335). While cognitive reactions to IT use, such as perceived ease of use and usefulness, have been extensively studied, it is only recently that IS researchers have paid more attention to human emotion phenomena and attempted to integrate this condition into research frameworks (e.g., Agarwal and Karahanna, 2000, Sun and Zhang, 2006, Hassenzahl and Tractinsky, 2006). Studied reactions to IT have included

enjoyment of IT use (Davis et al., 1992) and satisfaction or playfulness with IT (Webster and Martocchio, 1992). According to Agarwal and Karahanna (2000), systems that are useful and easy to use will lead to cognitive absorption, which provides heightened enjoyment to people and, during this time, a focused immersion and temporal dissociation, making them feel that time flies. In a similar vein, escapism is considered a user arousal where the system makes people stimulated or excited and gives them an opportunity to construct fantasies, daydreams, and to augment reality (Holsapple and Wu, 2007).

Absorption and escapism become a “holistic sensation that people feel when they act with total involvement” (Csikszentmihalyi, 1975, p. 36). Absorption and escapism are concepts composed of control, attention focus, curiosity, and intrinsic interest (Webster et al., 1993) and can be considered as an affective reaction affecting people’s behavior (Trevino and Webster, 1992, Finneran and Zhang, 2005). O’Brien and Toms (2008) argue that “the quality of user experience characterized by attributes of challenge, positive effect, endurability, aesthetic and sensory appeal, attention, feedback, variety/novelty, interactivity, and perceived user control” are key in realizing absorption. In these studies, absorption and escapism maintain an artificial separation of people and their technology, where people first engage technology and second escape from the world, living in both a world with and without technology. People are considered ‘technology-free,’ reduced to a subject, only to later become ‘technology-embedded’ as they interact with the said technology. To extend thinking of how people engage technology and blur the boundaries between people and our technology, we turn to embodiment. We understand how people engage technology as part of their lifeworld, in ways that are part and parcel of how people define themselves, and in ways where separation from the technology becomes difficult to discern.

### 3. Technology Embodiment

The evaluation of user interaction with systems deserves more research as encouraged by Hassenzahl and Tractinsky (2006) and Sun and Zhang (2008). Few studies have focused on the specific concept of embodiment that develops when people engage technology. Mingers (2001) writes: “The disciplines of information systems and artificial intelligence need to become embodied — that is, they must move beyond the dualism of mind and body to recognize that human cognition and social action are inherently embodied.” (p. 124). Therefore, this research examines the experience of embodiment that people develop when engaging in the IT-enabled world.

Embodiment is social action “firmly rooted in the setting in which it arises, where that setting is not just material circumstances, but social, cultural, and historical ones as well” (Dourish, 2004, p. 96). Embodiment is about a person engaging technology as part of their world; technology reflecting our world. By being embedded in our lifeworlds, technology fosters embodied relationships. Table 1 introduces representative IS studies dealing with embodiment. Most research on embodiment has been conceptual, discussing the philosophical aspects of systems and embodiment.

<b>References</b>	<b>Research</b>	<b>Technology analyzed/considered</b>
Coyne (1998)	Conceptual	IS in general
Mingers (2001)	Conceptual	IS and artificial intelligence
Dourish (2004)	Conceptual	IT embodied world
Introna and Ilharco (2004)	Conceptual	Screens
Pallud and Monod (2010)	Empirical	Museum technologies
Schultze and Orlikowski (2010)	Conceptual	Virtual worlds
Germonprez, Hovorka, and Gal (2011)	Empirical	Wikipedia

As we move into a deeper understanding of embodiment, we seek to include the relationship of our emotions and our being to our IT-enabled and embodied world. Heidegger’s writings, and more precisely *Being and Time*, offer a phenomenological approach to study this issue.

### *3.1 Technology Embodiment: A Phenomenological Approach*

Phenomenology focuses on the experiences of individuals and aims at studying “phenomena as consciously experienced” (Spiegelberg, 1975, p. 3). This philosophical movement was initiated by Husserl (1936) and his student Heidegger (1962) as they encouraged researchers and philosophers to turn “to the things themselves.” As a matter of fact, people should turn themselves “to the world as it is already experienced” (Ilharco, 2002, p. 304). Other philosophers such as Merleau-Ponty and Sartre also nurture phenomenology with the concepts of self and embodiment (Smith, 2003). Phenomenology was introduced in 1985 in the IS field as “a preferred approach in Information Systems research” (Boland, 1985). Since that inaugural paper, an increasing number of papers have been published using phenomenology for special types of analysis (e.g., Cass, 1998, Haynes, 1999, Introna, 2002).

Most papers that lean on phenomenology apply it as an "inquiring system" perspective (Haynes, 2002), which is especially suited for the description of social contexts and ethical issues. However, the phenomenology of Heidegger in *Being and Time* is well suited to the analysis of technology embodiment. The phenomenology of Heidegger (1996)<sup>1</sup> suggests that we all struggle against everydayness and averageness. This perspective allows an understanding of hedonic systems, and also an expansion of the HCI, cognitive absorption, and escapism approaches. It allows a reconsideration of embodiment, not as tranquilization, but as a personal search for authenticity.

### 3.1.1 Everydayness and Averageness

*"No one is himself ... every mystery loses its power" (Heidegger, 1996, p. 128)*

Why do we embody systems? What do we feel when we embody systems? Consider an environment suggested by Heidegger: public transportation (Heidegger, 1996). In this everyday situation, we feel that we are not ourselves. We feel that we are not unique, but average: "This everyday indifference of our being is averageness" (Heidegger, 1996, p. 43). We feel that we become indifferent to our being, to the uniqueness of our being. This is the "indifferent way in which we are" (p. 43), what Heidegger calls in-authentic. We are not ourselves. We don't know who we are. We feel that we exist, but without any meaning. Our personal being is dissolved in the others. We are not living in the mode of ourselves, but of 'they-selves.' We feel the "dictature of the they" (p. 127). We feel that we are judged by the others on categories that do not belong to ourselves. We even use these categories that do not belong to ourselves to judge the world and the others. "We read, see, and judge ... the way *they* see and judge" (p. 127). We inhibit ourselves. We maintain ourselves in the averageness because the 'they' defines what is proper, what is allowed, and what is not. We do not take any more responsibility because the 'they' takes our responsibility away from us. This is leveling down our possibilities of being where "every priority is noiselessly squashed... everything primordial is flattened down as something long since known" (p. 127).

As we feel this averageness, everydayness, and in-authenticity, we *can* engage our systems to open new possibilities (Dourish et al., 2007). We may play a game on a mobile device, or listen to music or watch a movie or a video clip on a mobile phone or mp3 player. But what are we searching for? Enjoyment? Satisfaction? Playfulness? Stimulation? Excitement? State of flow?

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<sup>1</sup> *Being and Time* was first published in 1953. We use the 1996 edition translated by Joan Stambaugh (State University of New York).

At first glance, most of us surely think that we seek to have fun in order to make time fly (Agarwal and Karahanna, 2000). We seek a focused immersion in order to feel a temporal dissociation in an effort to escape (Holsapple and Wu, 2007). However, by doing so, we leap from one novelty to another (Heidegger, 1996) and in seeking novelty we are not satisfied any more by the surrounding world, by our personal reflection of the world. We distance ourselves from what is the nearest to ourselves. We cannot stay with ourselves. We are not satisfied with ourselves. We want to be distracted, reshape our lifeworld. But this dissociation can lead us far away from who we are in a relentless search for continual novelty.

The problem lies in where this novelty leads us: to continual flow (Koufaris, 2002), or to the construct of fantasies and daydreams (Holsapple and Wu, 2007). In either case, we never dwell anywhere. Through curiosity we are “everywhere and nowhere” (Heidegger, 1996, p. 173). We are uprooted, and we do not want to see it. We are in a mode busy-ness seeking for tranquilization, a tranquilization of not wondering who we are and what we want. By doing so, we are convinced we withdraw from the mass. But, ironically we withdraw from the great mass the way *they* withdraw (p. 127). We think we are different, but we enjoy ourselves and have fun the way *they* enjoy themselves. We think we escape from being like the others, from averageness, but by doing so, we act like everyone else. We are back to the influence of the ‘they’ where everything is decided by others, and nothing by us. This illusion of separating from the ‘they’ stems from the realization that we cannot expect to find ourselves in the multiplicity of in-authentic experiences: “Authentic being one’s self is not based on an exceptional state of the subject” (p. 130).

### 3.1.2 Authenticity and Historicity

*“Our essence lies in our existence” (Heidegger, 1996, p. 42)*

The distinction of our being is that we do not know who we are. We are continually in quest of meaning. The least we can say about ourselves is that we keep on wanting to be what we are not, and not wanting to be what we are. We never correspond to ourselves. We always project ourselves because of our need to be recognized by others but not all the others; not the ‘they,’ not the society. We seek recognition from those who are important for us: our parents, our friends, our lover, and our children. We expect them to tell us who we are. Our essence is not given, it is emergent. It emerges from our hopes, our failures, our life, our existence. There are many possibilities of existence that occur in our daily life yet we often miss them. We often realize possibilities once they are gone and in response we try to learn from our missed

possibilities. These possibilities were provided by the world, by others and we were unable to distinguish them as possibilities when they were in front of us. Our being lies in the manner in which we neglect or seize our possibilities or existence and define our self in terms of both realized and missed possibilities of existence (Heidegger, 1996).

Our present has no meaning if we disconnect it from our past and our future. Our past informs who we are and our future becomes possibilities of existence. As such, our being is not characterized only by present attributes that are objectively present (Heidegger, 1996). We usually have not consciously chosen our possibilities of existence. We usually have stumbled upon them; we have grown up in them without being aware of them (Heidegger, 1996). We think we 'are' a certain way, and that we 'are' that for a lifetime, without sometimes ever realizing this is just one possibility of existence. But we don't "have" these possibilities of existence; we can only choose ourselves into our being. What we may do is to seek for our "self that has explicitly grasped" ourselves (Heidegger, 1996, p. 129). We continually seek for our authentic self.

We realize we are authentic when our world is reflected back through our being to which our history is heavily tied (Heidegger, 1996). Being ourselves, we simply feel the past as something that pushes us. When we decide to listen to a song or to watch a movie, do we simply want to escape and feel absorbed cognitively? Or do we want to feel ourselves in this grey world? Of course, some songs or movies will definitely fall into the category of pure escapism. But another way to see it is to wonder if there is a development of us, our history, our relationships, our authenticity. In many cases, choosing a song or a movie may conjure a memory as an element of our identity. During the moment we engage our MP3 player to play a song or watch on our mobile player the movie we used to watch with our lover, "We are our past in the manner of our being presently occurs from our past, shaping our future" (Heidegger, 1996, p. 20). Our history does not follow after us but rather is part of us and even ahead of us. The past shapes who we are presently and who we are to become in the future and we should "become historical," coming to the "positive appropriation of the past" (Heidegger, 1996, p. 21). Historicity provides an opportunity to seek a "positive return to the past" (Heidegger, 1996, p. 21) in order to seek authenticity and "disclose the silent power of the possible" (Heidegger, 1996, p. 395). Table 2 summarizes the definitions of the Heideggerian concepts.

Table 2. Definitions of Heideggerian Phenomenological Concepts	
Concepts	Definitions
<i>Averageness</i>	The way we see ourselves in the world, distinguished from others around us. The ways we align with the ‘they’ in the activities that define our personality, our being.
<i>Everydayness</i>	The way we exist in the daily activities of the world. How we spend our time moving through our lifeworld to perform the activities that define who we are and how we interact with others.
<i>Authenticity</i>	The way meaning is given to our existence, defining our essence (identity) and our inter-subjectivity (the way we relate to others). The way we grasp and feel ourselves. The opening towards different ways to live our lives, giving different meanings and making us realize we are the one defining our future and our identity.
<i>Historicity</i>	The way our past is giving meaning to our identity, to the present, making us feel historical. The way we understand that past in shaping our future. We realize that we live one possibility of existence but there are many others built from our past.

We now consider embodiment in light of technology. We look at a specific kind of technology and its relationship to embodiment: mobile music technology. These include MP3 players, such as iPods, cell phones, and smart phones. We consider these technologies useful to examine peoples’ averageness and everydayness as well as their authentic and historical experiences, providing a philosophical foundation for understanding *technology embodiment*. Following this phenomenological approach, the stake of system engagement is not to “have fun” but to engage the world within which we live in an effort to find ourselves. In this respect, time doesn’t “fly” because we seek our identity through our past. Indeed, when we engage systems, we seek ourselves through our past, we seek authenticity through historicity. Therefore, through phenomenology, we do not consider any more the impact of a system on a user, as in HCI or cognitive absorption and escapism approaches. We consider our quest for meaning, our quest for being, and we understand why anything that may contribute to it becomes part of us, which is the essence of embodiment. We return to our research question: *What is the contribution of phenomenology in the understanding of technology embodiment?*

#### 4. Methodology

We explored embodiment with a specific type of system, namely hedonic systems and more precisely mobile music technologies. Hedonic systems have been defined as pleasure-oriented systems which aim at providing self-fulfilling value to the user, as opposed to utilitarian systems oriented towards productivity and which aim at providing instrumental value to the user (Van der Heijden 2004). Hedonic systems provide a useful context as they are recreational, pleasurable,

or entertaining and allow for individual personification, outside of an organizational context. Examining hedonic systems enables us to focus more clearly on systems that are personally and individually embodied.

Prior research on hedonic systems has principally adopted a positivist stance for the evaluation of these systems (e.g., Deng et al., 2010, Holsapple and Wu, 2007, Van der Heijden, 2004, Wakefield and Whitten, 2006). In these studies, the goals are directed towards assessing the impact of IS design on user reactions or determining the factors of adoption of hedonic systems. Consistent with their research objectives, these studies adopted quantitative methodologies such as experiments and surveys to assess user needs (Holsapple and Wu 2007). While uncovering the predictors of hedonic systems adoption has received more attention recently (Deng, et al. 2010, Holsapple and Wu 2007), trying to understand how people have embodied lives with technology has not received the same treatment. Relying on an interpretive framework, we provide a broader ontological approach toward hedonic systems in general and technology embodiment more precisely, expanding our understanding of both issues (Mingers, 2001).

#### *4.1 Focus Groups*

We used focus groups as the approach to validate our phenomenological framework and more particularly to verify whether people had embodied experiences with some technologies. Indeed, Edmunds (1999) presents focus groups as a qualitative methodology that particularly suitable for 1) exploratory studies and 2) research objectives for clarifying concepts. Focus groups remain underused in IS research although this methodology has great potential to draw rich ideas and concepts (Tremblay et al., 2010).

Morgan (1996) defines focus groups as “a research technique that collects data through group interaction on a topic determined by the researcher” (p. 130). Focus groups enable researchers to understand people’s perceptions and the meanings they attribute to phenomena. Participants can express their opinion about a topic and explain to the researchers how they conceive a phenomenon or a concept. This way, the phenomenon under study is approached from the perspective of the participants (Vogt et al., 2004). Furthermore, this lens of observation immerses the researcher into participants’ experience. This experiential utility of focus groups and the inter-subjectivity that they permit qualify them as a phenomenological methodology (Calder, 1977).

## 4.2 Participant Recruitment

We conducted focus groups with students of a French university located within Paris. These graduate students were enrolled in a master of management of international business program. Participants were also recruited from an American university in Wisconsin. Students from both France and America had a course on information systems and were invited to participate in this study as part of a class activity. In order to better tie the research to the curricula, we gave a brief lecture to the students on the importance and issues of IT design. This lecture was an introduction to the focus group and the need to assess user needs and expectations to improve IT design. Choosing students to conduct our research appears relevant because teenagers and young people represent a common public segment using MP3 players. A recent study conducted by the Pew Research Center reveals that almost one in five (19%) of those under age 30 have iPods/MP3 players (Rainie, 2005). Therefore, young people represent one of the main consumer targets for high tech companies that produce and market MP3 players.

The people who took part in our research had different nationalities; however, this study was not aimed at examining cultural differences. Rather, we were interested by the general types of behaviors that emerge with embodied systems. Since very little is known about people's experiences with embodied technologies, we decided to focus the data analysis on the worldview identification of new experiences with mobile music technology. We focused on "going back to the things themselves" by describing people's embodiment with technologies and highlighting their general patterns of behaviors.

Focus group size varied from 8 to 12 students. No compensation was given to the participants, but this study enabled them to give their opinion about MP3 players and to express their wants and needs regarding these devices. In 2010, 12 focus groups were conducted, with a total of 97 participants. In 2011, we conducted eight focus groups with a total of 96 participants. We took care to choose the same category of participants, namely students, both years so that samples and findings would become comparable and have reduced bias (Tremblay et al., 2010). Each focus group lasted an average of one hour. Table 3 gives further information on the demographics of our groups.

Table 3. Focus Group Demographics		
	Focus Groups 2010	Focus Groups 2011
Number of focus groups	12	8
Number of participants	97	96
Percentage of male/female	Female: 87.2% Male: 12.8%	Female: 81.9% Male: 18.1%
Mean age (Standard Deviation)	22.76 (S.D.= 1.35)	23.13 (S.D.=1.71)
Type of MP3 player owned	iPod: 59% Other MP3 player: 41%	iPod: 79.4% Other MP3 player: 20.6%

### 4.3 Focus Group Procedures

Three researchers led the project and moderated the focus groups. The three researchers had already conducted focus groups in prior research and had good knowledge about the methodological procedures. English was the language used for communication during all the focus groups conducted in France and in the USA to help manage the risk of translation error. We followed a semi-structured approach by using a written guide with prepared open questions. The focus groups were conducted with a hermeneutical approach according to the seven principles of Klein and Myers (1999).

Since this study focuses on user experience with embodied technologies, we asked students to bring their MP3 players to class and to share their music with their classmates, helping facilitate a casual environment. A casual environment was meant to encourage an appropriate style of response and interaction between the participants (Puchta and Potter, 2004, p. 25). After sharing, we stopped music listening and oriented the discussion toward technology embodiment. The first questions of the focus group were aimed at discussion between the participants followed by more precise questions focused on MP3 player embodiment. All focus groups were recorded and transcribed.

The first step of qualitative data analysis consisted of data reduction, which is the “process of selecting, focusing, simplifying, abstracting, and transforming the data that appear in written up field notes or transcriptions” (Miles and Huberman, 1994, p. 10). In order to implement data reduction, we followed the recommendations for qualitative data analysis by implementing open coding, which is the first step of content analysis (Strauss and Corbin, 1998). Open coding helped to categorize the text by identifying relevant segments of texts that answer the research

question and classifying them into codes. Breaking down the text into smaller categories facilitated understanding and comparison between the different transcripts. Furthermore, the technique of open coding allowed a large number of codes to be captured as they emerged from the data. For each code, we created dimensions that reflected the different notions of the concept. Finally, the codes were grouped together to form theoretical categories.

In a second step, we applied axial coding, “which is the process of relating subcategories to a category” (Strauss and Corbin, 1998, p.114). We performed abstraction in order to connect the open codes and their respective dimensions to our phenomenological framework. Informed by our literature review on Human-Computer Interaction and the Heideggerian ideas, we selected and retained the most relevant codes and dimensions. The task of “repackaging and aggregating the data” corresponds to the second step in Carney’s (1990) Ladder of Analytical Abstraction (cited in Miles and Huberman, 1994, p. 92).

## 5. Findings

Table 4 shows that embodied experiences can be described through eight theoretical categories: everydayness and averageness, possibilities of existence, authenticity, historicity, user engagement, state of mind, mutual understanding, and secondary design.

Classification*	Theoretical Categories	Codes	Dimensions
Heideggerian Technology Embodiment	Everydayness & Averageness	– Manifestation of everydayness and averageness	– Search for cognitive absorption – Isolation
	Possibilities of Existence	– Types of possibilities	– Projection of self in the future – Thinking of one’s destiny – Identification of hidden possibilities – Plans for future challenges
	Authenticity	– Meaning given to existence	– Sense of loss – Care
	Historicity	– Projection in time	– Connection to the past – Connection to the present – Connection to the future
Non-Heideggerian Technology Embodiment	State of Mind	– Control of energy	– Readiness – Relaxation
	User Engagement	– Cognitive Absorption – Escapism	– Temporal dissociation – Focused immersion – Curiosity / Exploration
	Mutual Understanding	– Social usage of the MP3 player	– Communication – Social connection – Sharing music
	Secondary Design	– Modification of the technology (different types of design)	– Creation of playlist – Organization of playlist – Update of playlist – Synchronization with computer / online platforms
* The classification is based on the Heideggerian concepts presented in Table 2. The first four theoretical categories are in line with those presented by Heidegger while the second four theoretical categories were emergent in our research.			

### 5.1 Heideggerian Technology Embodiment

Technology embodiment helped us to consider why people engage mobile music technologies, beyond the type of experience largely supported by traditional information systems research on *cognitive absorption and escapism*. More precisely, when our participants engaged their mobile devices, it was not always to escape time or have fun (Agarwal and Karahanna, 2000); it was to recover time, to revisit a time that belonged to them, or design an embodied space. To extended technology embodiment beyond an HCI view, we first present four categories of *Heideggerian technology embodiment (HTE)* that we observed in our focus groups. We follow this with four emergent categories of *non-Heideggerian technology embodiment (Non-HTE)*.

### 5.1.1 Everydayness and Averageness (HTE)

MP3 players are used to fight everydayness and averageness. For example, everydayness can correspond to taking transportation every day and averageness can be represented by small talk with other passengers. People reject situations that they perceive as forced and boring and isolate themselves by using their MP3 player.

*I listen to rap music on my MP3 player. It makes me feel relaxed and I can avoid talking to people in the subway because I don't like that much talking in the subway*

To understand averageness is the realization of being like everybody else. Indeed, people do not look for differentiation and are easily influenced by group pressure. As an example, the motivation for possessing an MP3 player was to be like everybody else and to avoid being rejected.

*When I was younger I never owned an MP3 player and I never really wanted one, but then when you go to school and everyone has one. You almost feel left out...and you feel 'well everyone is going to have an IPOD'...once you get it, you are equal with everyone, and if I lose it I'd feel like I'm left behind again*

Everydayness and averageness are important in understanding technology embodiment because they represent ways that people engage their lifeworld with technology, augmenting many of our routine endeavors.

### 5.1.2 Possibilities of Existence (HTE)

MP3 players were used to discover new possibilities of existence. Indeed, people take advantage of their isolation with their MP3 player to think about their future and what they can become. Listening to music provides an opportunity for reflection about one's self, one's identity, one's career or future projects:

*While listening to my MP3 player, I expect some inspiration for the challenges in my life*

*The music that you listen to can be an image of the person you want to be*

*I think about my past... plans that I will build for the future. I also think about my personal projects and my dreams*

The possibilities of existence provided through the embodiment with MP3 players gives people the prospect of changing who they are and their representation in the world. It gives people the ability to reflect and act on potentials in their lifeworld.

### 5.1.3 Authenticity (HTE)

The sense of authenticity is manifest when the participants show that they care for their MP3 player and it represents a part of who they are as people. Participants responded that if they lost their MP3 player that they would:

*Cry, feel like I lost a relative, and feel like I lost an old friend*

The embodiment is so strong that the participants feel like the device is a person, a relative, or an old friend. People also talked about their hopes and energy for the future or even part of themselves if they were to become unattached or lose their MP3 player:

*I would lose energy for the future; it is like taking something from you*

Often, the MP3 player was used to provide a sense of self, as a form of personal expression that helped guide a person through their day. Much like a friend or a family member, the MP3 player helped establish an internal representation of who a person was to themselves. The MP3 player allowed individuals to rediscover the meaning of their being so that they could see the world differently.

### 5.1.4 Historicity (HTE)

Participants referred to going back in time when using their MP3 player. This is their time, their past, and the time that has a meaning to them. We observed a connection with time, rather than escapism from time. A world around that lost any kind of meaning in the everydayness of life, recovered a meaning because people found themselves again, because they understood the world through themselves, and themselves through the world. This understanding was fostered through their connection with time, especially through the past and the renewed meaning of the world enabled them to see possibilities of being:

*It transports me to a kind of another world. I go back to memories, past experiences*

*It makes me feel close to my good memory of the past*

*All the music I listen to reminds me of someone I love*

*When I listen to music on my MP3 player, I feel I am going back to the past and it makes me dream*

*It brings me the best memories of my life*

This embodiment is linked to meaning and historicity as the past shapes the present:

*Even if I listen to songs from past, I think it's shaping my present feeling and ideas*

*I am looking for some associations with my life, with the memories concerning the events or people in past and in present*

As references to the past occur, so too did possibilities of the future. The future per the embodiment with the MP3 player appeared in a neutral or uncertain way:

*It makes me think about the good things waiting for me in the future*

*I am looking for a story which is close to my real experiences. It helps me to link the past with my present and future in order to remember to myself memories and emotions*

*It reminds me college life... and friends... I wonder where they are and where I will be in the future*

While the future was a less represented form of historicity, historicity represented one of the strongest categories associated with *Heideggerian technology embodiment (HTE)* as evident in various forms across all focus groups. The HTE categories represent our first extension toward understanding technology embodiment beyond the HCI aspects of fun and time flying. We next present four emergent categories that further extend the thinking on technology embodiment.

## *5.2 Non-Heideggerian Technology Embodiment*

The four aforementioned theoretical categories represent Heideggerian technology embodiment, as they were represented in Heidegger's writings. In addition to those, we found four emergent, Non-Heideggerian technology embodiment (Non-HTE) categories that occurred without being linked to our Heideggerian framework, namely state of mind, user engagement, mutual understanding, and secondary design.

### 5.2.1 State of Mind (Non-HTE)

The MP3 player is closely related to individuals' willingness to change their state of mind and control their energy. On one hand, some of the individuals engage their MP3 player as an energy booster in order to get ready for the day. Indeed, readiness emerges as one of the main reasons explaining why MP3 players are used. What is very specific with listening to music on MP3 player - in comparison to listening music on the radio - is that people can make a selection of their favorite music and play the songs according to their state of mind. For instance, when in need of energy, people state that they search their MP3 player to find electro, funk, pop, or rock music. The experience of listening to their MP3 player was so powerful that people could move from inertia to energy.

*My MP3 player gives me energy, and then I feel like dancing*

*It makes me ready for the day and for upcoming events because the music I listen to is dynamic. So it gives me energy when I feel sleepy and need to do something instead*

*It helps me get ready for the day when I'm tired. I make it very loud and lively, my MP3 player can be like my coffee*

MP3 players represented a way for people to gain control of their emotions. Indeed, some describe how their MP3 player helped them to relax, to calm down, or even to find peace. MP3 players isolate users from noise, distractions, and disturbances in reaching a relaxed state of mind:

*It makes me feel relaxed when I am stressed*

*I think is the best way to let myself calm down and to relax myself*

### 5.2.2 User Engagement (Non-HTE)

User engagement is the second emerging, Non-HTE category. User engagement can be understood through exploration and the curiosity or the action of finding new music or new artists thanks to the MP3 player. In this, user engagement is different from curiosity in that it is about discovering and finding new paths and connections. Using an MP3 player offers such an opportunity:

*It makes me explore... I listen and it helps me to discover different kinds of music*

*Create things in my head*

User engagement can be linked to emotional state. For each different emotion participants have different music. User engagement enables people to align their world before facing another day. It enables a person a sense of engagement with the world around them through an embodiment with technology.

### 5.2.3 Mutual Understanding (Non-HTE)

The experience of MP3 player is not only personal, as it can also be driven by others. Indeed, social groups, such as relatives, colleagues, or friends can intervene in the experience of technology embodiment; people adapt their usage of the MP3 player to accommodate their social surroundings:

*I use my iPod when I'm in the car: you can plug it to the car radio and then everybody can listen to your iPod playlist. It is the only time when I share music.*

MP3 players are also used to reach mutual understanding, in the form of emotions and feeling, with others:

*I share my music from my MP3 player with my friends especially when I travel so I can share my feelings with them*

The mutual understanding is not negotiated between two people but is instead an opportunity for *you* to understand the state of mind *I* am in. The surrounding social setting affects embodiment in that it creates an environment where the group of people can interact through acts of mutual understanding.

#### 5.2.4 Secondary Design (Non-HTE)

Secondary design is about the creation of a space around a person. It is modifying technology in the context of engagement to make it fit with who you are, where you are at, and what you hope to become. In the context of MP3 player usage, secondary design enables a device to be a personal reflection. Some people commented on the time they spent to create their own music environment. As some of these environments required resources (time, effort, and money), people also tend to be proud of their secondary design. They also treasure it and fear losing it:

*I like putting my iPod and my music to kind of show off with my playlist and try to be the DJ for a moment*

*You actually put a lot of time into like doing, putting these songs on there, finding which ones you want. Like making playlists*

*I think I got a lot of music from friendship and places that it would be hard to replicate that and make a new collection*

The experience of technology embodiment is here reflected in the internal design that people create - a design that reflects their identity, their mood, their self.

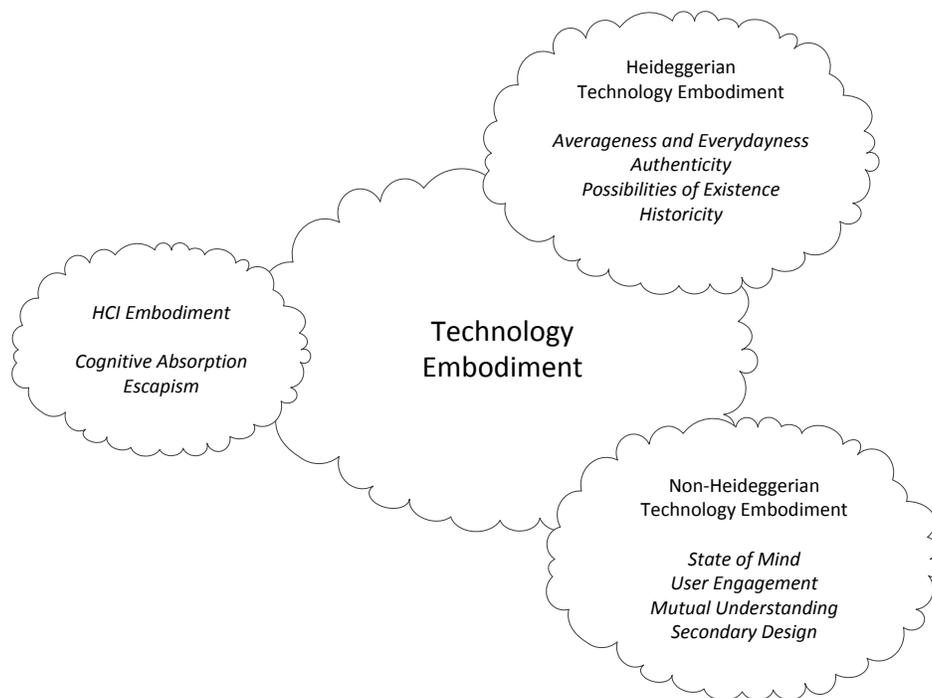
Throughout the findings, we have presented eight categories that help explain technology embodiment beyond the earlier work on hedonic systems, cognitive absorption, and escapism. We showed how turning to Heidegger's phenomenology and our methodological approach both served as catalysts in shedding new light on understanding embodiment.

## 6. Discussion

This research contributes to the IS literature in three different ways. First, we extend the conceptualization of technology embodiment by highlighting two types of technology

embodiment beyond an HCI view of technology embodiment, namely Heideggerian technology embodiment and non-Heideggerian technology embodiment. While previous research has mainly focused on technology embodiment through a cognitive lens by examining peoples' cognitive absorption and escapism with information systems, our research indicates that people engage with embodied systems in multiple ways and that Heidegger's phenomenology can help to grasp this issue. Indeed, our findings indicate that peoples' overall experiences of MP3 players are richer than what have been advanced in prior research.

Research on IT types and their role in user experience has been dominated by a hedonic vs. utilitarian technologies debate. Our study shows that MP3 players, which could at first sight be classified as hedonic technologies, seem to qualify better as embodied systems. As a matter of fact, our subjects rarely mentioned playing or having fun with their MP3 player (hedonic characteristics), but rather referred to a type of experience that is closer to embodiment (finding meaning, being one's self, recalling the past, and projecting in the future). Figure 1 provides a representation.



**Figure 1: Conceptual Map of Technology Embodiment**

Second, our research makes a contribution to theory by indicating that embodiment can help to understand and deepen our knowledge of the hedonic user experience. As illustrated, our findings showed evidence of embodiment, but they also indicated emerging categories, not

accountable under the Heideggerian phenomenology. The analysis of the focus groups led to the emergence of four distinct categories, namely state of mind, user engagement, mutual understanding, and secondary design.

In our research, we turned to hedonic systems to inform our style of thinking and orient ourselves as to how people consider their relationship with technology. In particular, we considered key hedonic categories in an embodied relationship but our findings did not necessarily support these directly. We believe these differences to be best explained through a two-part argument. First, prior research on hedonic systems has generally taken a dualistic approach toward people and their embodied relationships with technology. This approach has often resulted in testing predetermined variables to explain user behaviors with hedonic systems where a person remains distinctly separated from the technology. As a result, these categories have become institutionalized in hedonic systems thinking. Our qualitative approach never assumed a duality in order to offer an enriched account of embodiment with hedonic systems. As such, our approach yielded the eight aforementioned categories.

The second part of the argument illustrates how, in spite of differences in approaches, our study extends, not falsifies, thinking on hedonic systems. The non-Heideggerian technology embodiment categories that emerged from the focus groups appear to be related to hedonic categories found in prior research, and the meaning assigned to them enrich our understanding of classic hedonic categories. Table 5 shows the more contemporary view of the hedonic categories as well as non-Heideggerian technology embodiment categories.

Table 5: Relationship between Non-HTE Categories and HCI Concepts		
Non-Heideggerian Embodiment Categories	Related Hedonic Categories	Comments
State of Mind	Focused Immersion Time dissociation	State of mind is getting ready for the world around you, knowing who you are and what you plan on doing. It is about living in the moment, preparing for what you are about to engage in. Some individuals engage their MP3 player to channel their energy, relax or find peace.
User Engagement	Curiosity	Does not only refer to “individual’s sensory and cognitive curiosity” which is the understanding of curiosity given by HCI researchers. User engagement is also about creating new paths of discovery, new ways of finding music, and new ways of finding themselves.
Mutual Understanding	Control	Sharing is about sharing who you are with others around you or letting others know that you are familiar with who they are, providing a sense of control of the social setting. It is about communicating uniqueness, individuality, and discovery to others around you.
Secondary Design	Personalization	Secondary design is about the creation of a personal space around you. Modifying technology in the context of engagement to make it fit with who you are, where you are at, and what you hope to become.

Finally, our approach contributes to a pluralistic view of technology embodiment by contributing to a sequential line of research. We build from work on phenomenology (Boland1985) and hedonic systems (Agarwal and Karahanna, 2000) similar to the sequential lines of research that built an understanding of media richness (Daft and Lengel, 1986, Ngwenyama and Lee, 1997, Carlson and Zmud, 1999). Through each, pluralism emerged from community engagement, not singular research teams, extending the inquiry of particular systems phenomena. Our research is positioned to contribute to both pluralism and to an understanding and explanation of technology embodiment. In doing this, we precisely adopted a qualitative research approach to reveal, not determine, values of technology embodiment as technology embodiment is naturally in its early stages within information systems research. Our position, as researchers, to demand what embodiment should be and must be is misplaced. As we inquire what new information systems phenomena are via sequential streams of research, we occasionally have to reset our approach, reveal new values, and reorient ourselves. In understanding and explaining technology embodiment, we are not building on hedonic systems research or phenomenology; we are building from them.

Pluralism requires that we, as academic researchers, uphold an ethical standard to approach phenomena that are beyond our domain of control (Davison and Martinsons, 2011). Controlling and determining the engagement with MP3 players is an unsatisfactory proposition and exclusiveness toward a positivist epistemology could very well impoverish our understanding and explanation of how they are used in people's everyday lives. We responded to this concern and adopted on the social change necessary to address this, reveal new values, realize methodological pluralism, and create an enriched understanding and explanation of information technology embodiment from which new research can sequentially build. The non-Heideggerian technology embodiment categories that emerged, although related to some HCI concepts, provide an improved understanding of how people interact with embodied systems; addressing the call that "given the pervasiveness of computing technology in our everyday lives and its concomitant societal impact, it is essential that we address people's actual lived emotional experiences." (Boehner et al., 2007p. 289).

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