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A User-Centered Perspective on Information Technologies in Museums

Jessie Pallud

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**A USER-CENTERED PERSPECTIVE ON INFORMATION TECHNOLOGIES IN
MUSEUMS**

BY

JESSIE PALLUD

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

Doctor of Philosophy

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ACCEPTANCE

This dissertation was prepared under the direction of Jessie Pallud's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business Administration in the Robinson College of Business of Georgia State University.

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Abstract

A USER-CENTERED PERSPECTIVE ON INFORMATION TECHNOLOGIES IN MUSEUMS

BY

Jessie Pallud

December 2008

Committee Chairs: Dr Monod, Dr Straub and Dr Kalika

Major Academic Unit: Computer Information Systems

Information Technology (IT) has been put forth as a reasonable way to sustain visitor interest and encourage visit repetition in museums. Therefore, IT is becoming more common in museum settings and professionals express their need for more information about how their visitors interact with these systems. This dissertation is an attempt to answer this call. We propose three essays that deal with different aspects of museums and IT from a user-centered perspective.

The first essay is an attempt to determine with a free simulation experiment how IT and more particularly websites can arouse interest for museological content. The second essay relies on a field study to analyze the influence of IT on affective and cognitive reactions during a museum visit, namely perceived enjoyment, perceived authenticity and learning. In the third essay, we use focus groups and questionnaires to explore visitor expectations towards a phenomenological experience and the role played by IT in visitor experience of the past.

This dissertation contributes to research by (1) advancing our knowledge of IT dedicated to the cultural heritage area, and (2) identifying and understanding visitor perceptions of hedonic systems. By proposing a set of key dimensions that could be used for IT evaluation in the cultural heritage, this dissertation also offers actionable advices to museum professionals.

Keywords: Human-Computer Interaction, Hedonic IS, Phenomenology, Authenticity, Aesthetics, Usability, User Experience, Museums.

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Chapter 1 : Introduction

"[Museums] would like information, training, and guidance on how to better assess user needs, including methods of collecting information about the characteristics of users, how they use an institution's technology and digitization services and products, and for what purpose." (Institute of Museum and Library Services 2006, p. 124)

Museums are among the most valued cultural institutions in the world and their attendance has been growing since the end of the 80's (Poulot 2005). Indeed, Poulot (2005) indicates that in developed countries, one third of the population frequently visits museums. Several official studies have also reported an increasing interest in culture and museums (Donnat 2005; Ministry of Culture 2005). For instance, Paris' Louvre reports more than 8 millions entrances for 2007.

What is clear is that even if museum attendance is growing, museums still struggle to accomplish their four core missions of collection, exhibition, education, and communication (Burton and Scott 2003; Hooper-Greenhill 2000). These challenges are partly due to new financial constraints. In point of fact, Poulot (2005) explains that museums that used to be mainly public institutions tend either to become private or to see their governmental funding reduced. Consequently, museums need to raise money and manage their activities more efficiently (Poulot 2005). Two of the principal ways to raise money is through attracting more visitors or finding supporters and grants. Therefore, museums can no longer be elitist institutions and must now try to attract the largest possible client base.

Information Technology (IT) has been put forth as a reasonable way to sustain visitor interest and encourage visit repetition. Several studies and reports advocate IT opportunities for the cultural heritage institutions and their public (i.e., Digicult Report 2002; Fopp 1997; Messham-Muir 2005; Vom Lehn and Heath 2005). For instance, multimedia catalog and audioguides provide background and tutorial aids to visitors (Deshayes 2002; Sparacino

2004). Mobile devices, like GPS or PDAs offer contextualized information (Vom Lehn and Heath 2005; Watson et al. 2004) while virtual reality systems allow visitors to feel more immersed in and concerned about what they see (Lok 2004; Scagliarini et al. 2001). The presence of IT in museums can also result in additional financial resources for these institutions by drawing more visitors and investors (Fopp 1997).

The Institute of Museum and Library Services (IMLS), the primary source of federal support for American museums and libraries, published a study in 2006 on the adoption and use of technology in American museums. This report highlights interesting results related to IT issues explored in this dissertation. Some of these results, however, were clearly contradictory. First, IMLS (2006) noticed that museum implementation and use of technology has increased between 2001 and 2004, but technological equipment consisted mostly of institutional websites and office technologies like email and office productivity software. In fact, only 8.7 percent of museums used virtual reality tours, while 12.2 percent reported use of video tours (IMLS, 2006). This result is confirmed by Bannon et al. (2005) who observe that museums are still relying on traditional media like audioguides and text panels to organize their exhibitions, while a small number invests in the more innovative technologies. Therefore, the type of technologies available for visitors is still limited and this raises the legitimate question about whether visitors are satisfied with only these.

Second, few museums evaluate whether IT is really efficient for their public and if it meets visitor expectations. More precisely, IMLS results show that only 10.6 percent of museums admitted assessing visitor needs towards technology, and more specifically digitalization. However, the organizational need of museums for studies on visitor experience with IT is high, as exemplified in the epigraph at the beginning of this chapter. Museums express their need for more information about IT use in the museum context, and they want to know more about precisely how their visitors interact with these systems. This finding is

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echoed by Pujol Tost and Economou (2007) and Bearman and Geber (2007) who also note the strong interest of museums for research evaluating their technologies.

These contradictions, i.e., that museums express a desire for such studies but few studies have been conducted, suggest that the investigation of visitor interaction with IT available in museums is a relevant topic that deserves further attention. Furthermore, several researchers call for more studies investigating the experience of visitor with technologies (Pujol Tost and Economou 2007; Vom Lehn and Heath 2005).

> *"Bearing in mind that the presence of ICT in museums is already a fact but that we still know very little about their real effectiveness in specific situations, what is needed in the current context of museological research and practice is to start building a wide-encompassing body of empirical knowledge about their use in exhibitions."*
> (Pujol and Economou, 2007, p. 82)

Evaluating visitor experience with technologies can also contribute to a better assessment of museum efficiency. Paulus (2003), who analyzed a list of criteria that serve as a basis for the evaluation of museum performance, noticed that qualitative evaluation criteria such as consumer benefits are still under-used in comparison to more quantitative measures (e.g. costs, revenues, and number of visitors). However, Paulus (2003) thinks that the evaluation of consumer satisfaction towards museum service/equipment is a relevant measure to determine museum efficiency. Therefore, studying the elements that contribute to valuable and enjoyable museum visits can likely identify ways for museums to become more efficient.

Accordingly, there are good reasons to do IS research in the cultural heritage domain, and more particularly in museums. Since little research attention has been paid to the interaction of visitors with IT in cultural heritage both in IS research and in museum studies, our research relies on the following overarching research questions:

➢ RQ 1: In what ways does IT contribute to visitor experience with museological content?

➢ RQ2: What are visitor perceptions and reactions when using museum technologies and IT-based technologies?

To answer these general questions, we propose three essays to deal with different aspects of museums and IT from a user-centered perspective. The dissertation objective is to investigate visitor interactions with museum technology by studying visitor experience, and more particularly their perceptions and behaviors towards IT use.

This dissertation is organized as follows. Chapter Two provides a literature review on museums, visitors (the user-centered perspective) and technologies. It also presents the results of an exploratory study that was conducted with eight museum professionals. Chapter Three introduces the three empirical essays. Chapter Four, is the first empirical essay, deals with the influence of website design on user behaviors. Chapter Five examines the role of authenticity in user interactions with museum technologies. In Chapter Six, we employ a phenomenological framework to investigate visitor experience of the past when using museum technologies. At last, Chapter Seven discusses the contributions and limitations of this dissertation. It also delineates topics for future research.

Chapter 2 : Setting the Scope of the Dissertation

This chapter provides a review of the literature that aims at 1) defining and introducing the concepts used in the dissertation title and 2) setting the scope of the dissertation. Therefore the intent is to show the relevance of our topic by clarifying museum missions, the user-centered perspective and the role of technologies for visitors.

This chapter begins by presenting museums' characteristics and institutional missions. The second section shades light upon the user-centered perspective. We address how the user-centered perspective has been conceptualized both in museum studies and in IS research. The third section gives particular attention to the technologies available for the cultural heritage. More precisely, we present the characteristics of the principal technologies used in museums and provide a definition of IT for cultural heritage. In the last section, we report the results of an explorative field study that consists in seven semi structured interviews conducted with museum professionals.

1. Presentation of Museums

Etymologically, the word museum comes from the Greek "mouseion" and means "Temple of muses" (Gob and Drouguet 2003). Indeed, muses symbolize artist inspiration, so during Antiquity, museums were places dedicated to the celebration of muses and art that gathered artists and scientists (Schaer 1993). Throughout centuries and across countries, museum missions and definitions have evolved as well as the public who attends these institutions. This is the reason why we decided to trace back the evolution of museum roles in Europe. For instance, during the Middle Age, museums principally represented a sign of prestige and power (Gob and Drouguet 2003). Between the XVIIth century and the

Renaissance, museums were considered as source of knowledge and were principally drawing experts. This era also gave birth to the cabinets of curiosities, institutions characterized by their encyclopedic collections (Gob and Drouguet 2003; Schaer 1993). At the end of this period, in 1683, The Ashmoleum Museum was created in Oxford. Researchers consider that The Ashmoleum Museum is the very first museum, namely the one that corresponds the best to our modern museums (in terms of organization and purpose). Before the Age of Enlightenment, museums were mainly open to art connoisseurs. Progressively, during the XVIIIth and XIXth century, public collections became more common and museums were visited by a larger population. In France, this turn toward democratization and nationalized collections is symbolized by the opening of The Louvre Museum created in 1793 (Gob and Drouguet 2003). From the XXth century to nowadays, museum types have multiplied from art and sciences museum, to historical museum and ecomuseum. In addition, museums have received social and economic missions, such as the contribution to societies' development, education and welfare. Figure 2.1 summarizes the evolution of museums through time.
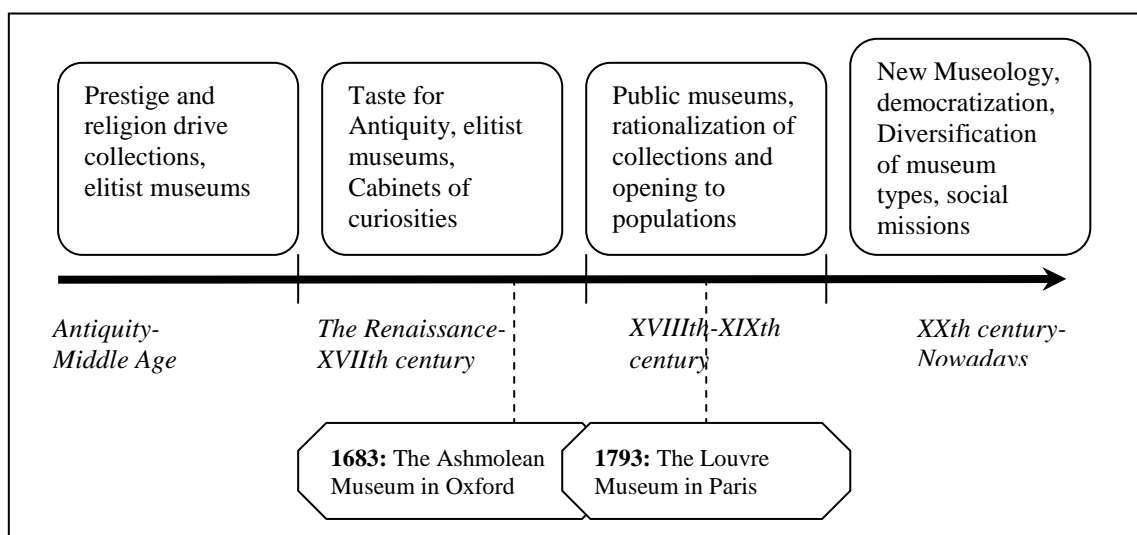
Figure 2.1 The Evolution of Museums through Time
Based on Gob and Drouguet (2003)

It is noteworthy that the definitions and statutes of a museum differ regarding the country. For instance, the French definition of a museum is different from the American one. This is related to both cultural and governmental differences. In the USA, the federal government in the Museum and Library Services Act defines a museum as a

> *"public or private nonprofit agency or institution organized on a permanent basis for essentially educational or aesthetic purposes, which, utilizing a professional staff, owns or utilizes tangible objects, cares for them, and exhibits them to the public on a regular basis."* (American Association of Museums)

In France, the government created a specific label "Musée de France" to designate museums that have "a permanent collection, which assumes a public interest by transmitting knowledge, education and entertainment to the public" (Law of January 4th 2002, Article 1). This label concerns about 1200 museums in France. Furthermore, this group of museums has priority for getting funding from the French government, but these museums are also dependent on the Ministry of Culture's directives. France also counts a number of national museums (44) that are directly managed by the government.

In the USA, half of museums are private, while in France, more than 60% of museums are public (Benhamou 2003, p. 52). But, in both countries, museums are considered non-profit organizations and they generally rely on one or several of the following sources of financing: public funds (subventions), sponsoring and benefits. These sources of financing are not always sufficient to support museum activity. Therefore, museums try to diversify or to extend their sources of financing. For instance, an increasing number of museums rent their works of art to other museums.

The International Council of Museums (ICOM) has helped in unifying the different perspectives on the *raison d'être* of museums. ICOM has established a definition for museums and a list of their core functions: "A museum is a non-profit making, permanent institution in the service of society and of its development, and open to the public, which

acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment." (2002, Statutes, Article 2). This is the definition of ICOM that is considered in this dissertation. From this definition, we notice that museums have four principal missions, which are: (1) acquisition, (2) research, (3) communication and (4) exhibition. At first glance, one can conclude that missions one and two aim at internal public (museum experts), while missions three and four target the external public, which are visitors. However, it is trough acquisition and research that communication and exhibition for the publics can be organized. Therefore these missions are interrelated. Mairesse (2005) also insists on the fact that these missions have an equal importance. In practice, museums tend to balance differently their missions. For instance, some institutions view education as an ultimate goal: 88% of American museums generally provide educational programs to students (Poulot 2005, p. 9) and an increasing number of museums pay more attention to the development of their publics. This focus on visitors and their needs is a trend that we further develop in the following section.

2. Review of the Literature on the User-Centered Perspective

2.1 The User-Centered Perspective in Museum Studies

The user or customer perspective is a prominent trend in several fields, such as marketing, engineering or information systems. In museum studies, the customer perspective is rather called the visitor or audience perspective and it has recently been acknowledged by most of experts as a vital shift for success and sustainability of museums (Falk and Dierking 1992; Goulding 2000a; Kotler and Kotler 2000). Actually, museums used to focus mainly on their collections hence research and exhibitions were their most important activities. Admitting the importance of visitor needs and adding new activities to collection and research has extended the core of museums. Anderson (2004) employs the term paradigm to designate

this core. More precisely, Anderson (2004, p. 1) argues that museum have made a "paradigm shift from collection-driven institutions to visitor-centered museums".

This paradigm shift was noticed earlier by Vergo (1989, p. 3) who labeled it the "New Museology" in comparison to the traditional museology. The "New Museology" also emerged in France a few years later with a collective reflection and redefinition of museum missions led by Desvallées (1992) These researchers encourage museum experts to put more emphasis on both education and entertainment. The convergence of these two fields is also called edutainment (Addis 2005) and represents a twofold target to attract visitors. Ross (2004) identifies accessibility and democratization as other characteristics of the "New Museology" stream. In effect, according to Ross (2004), institutions following the principles of new museology should make more effort to attract a wider public. Consequently, since the twentieth century museum roles have evolved and have been redefined in order to enhance visitor experience (Anderson 2004).

In addition, the issue of a visitor centered perspective in museums has caught the attention of several researchers who have developed a wide variety of frameworks to study visitor needs.

The first framework that we introduce is the one from Kotler and Kotler (2000) who propose three dimensions on which museum professional should focus to improve visitor experience. They are: (1) the variety of visitor experiences, (2) the level and depth of visitor experiences and (3) the design and orchestration of visitor experiences. The first dimension goes from visual and sensorial experiences to enchantment. Kotler and Kotler (2000) do not consider either extreme of this dimension to be good or bad since each type of experience can be valuable to visitors. However in the second dimension, the level and the depth of experience imply an evolution from the less deep experience (objects and collections) to the most intense experience (applied learning). Kotler and Kotler (2000) label the moderate

experience in museums "visitors on their own", while the more intense experience is called

"orchestrated experience". The third dimension refers to services like the availability of

restaurants and other facilities in museums. Figure 2.2 introduces the user perspective

framework developed by Kotler and Kotler (2000). It includes the three dimensions and their

respective degrees.
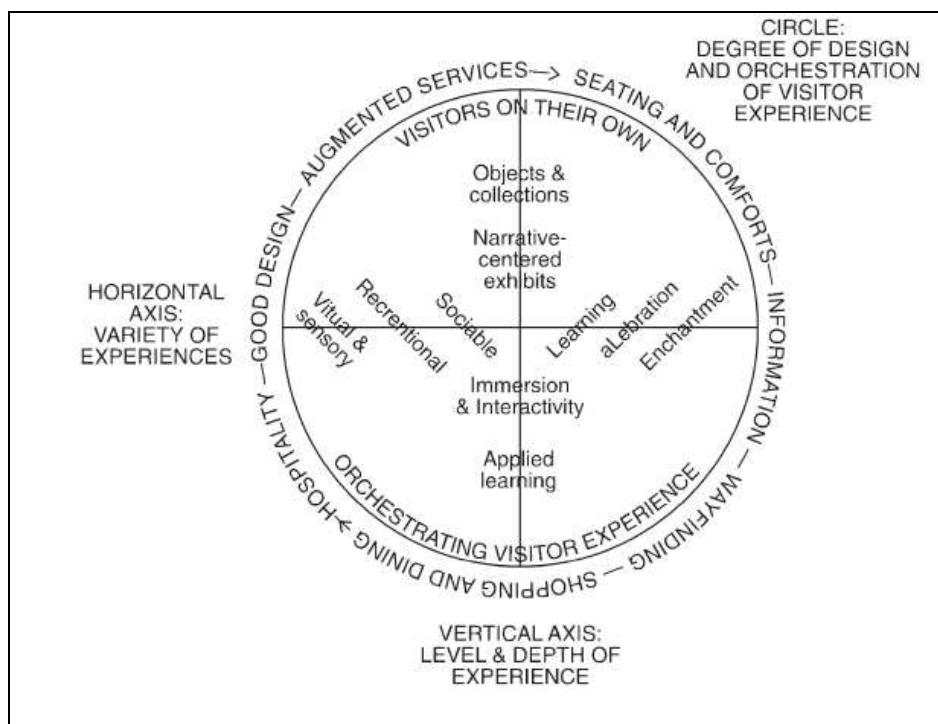
Figure 2.2 Dimensions of the Museum-Going Experience
(Kotler and Kotler 2000, p. 280)

While Kotler and Kotler (2000) principally identify operational levers to enhance

visitor experience, Anderson's framework (2004) points out the organizational functions of

museums that are the foundations to develop a visitor perspective. More precisely, Anderson

(2004) suggests four domains on which museums should rely to reinvent their paradigm and

be visitor oriented: 1) governance, 2) institutional priorities, 3) management strategies and 4)

communication style. The frameworks of Kotler and Kotler (2000) and Anderson (2004)

provide directions to museums but they remain abstract since they have not been empirically

tested neither with museums or visitors. Furthermore, these frameworks are normative as they set rules for how things *should be*.

Contrarily, Falk and Dierking (1992) created a research model, the Interactive Experience Model, based on an empirical study of visitor experience (Figure 2.3). Falk and Dierking (1992) intertwine three different contexts (personal, social and physical) to provide a comprehensive view of visitor experience in museums. Actually, the researchers' objective is to enhance visitor experience in museums. The personal sphere corresponds to visitors' motivations, attitudes and expectations toward museum visits. The social context refers to the persons that accompany the visitor or the other visitors that may communicate and influence the museum visit. The physical context concerns the architecture, the scenography and the museum artifacts that all play an active role in the cognitive and affective reactions of visitors. Falk and Dierking's (1992) argue that these three contexts interact with each other to offer an overall interactive experience to visitors. Falk and Dierking's (1992) research is one of the most known and used in museum studies because of its comprehensiveness, its *visitor perspective* standpoint and the numerous advices that it provides to museum professionals.
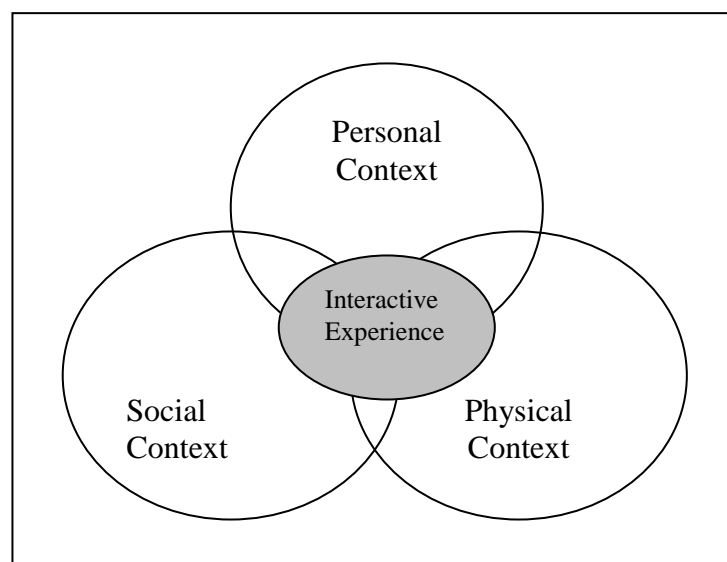
Figure 2.3 The Interactive Experience Model (Falk and Dierking 1992, p. 5)

Although Falk and Dierking (1992) briefly suggest IT as a way to create more meaningful experience for visitors, their research does not explicitly address the role of museum technologies in visitor experience.

The user-perspective has recently been extended to the online context, for which researchers develop frameworks and recommendations as well. For instance, Peacock and Brownbill (2007) created a framework to study the use of museum websites from an holistic perspective. Peacock and Brownbill (2007) suggest intertwining four different levels of analysis to get an integrated view of users of museum websites. The first level is the market level for which demand and competition represent the key knowledge areas. The second level accounts for user motivations and profiles. The third level focuses on the interaction between museum and their visitors revealing their relationships and the process of value creation. The last level deals with the product, specifically website design and usability issues. By examining these four levels, Peacock and Brownbill (2007) argue that museums can obtain a global view of user interaction with their websites. This framework represents one of the several attempts to examine user interaction with museum technologies. However, Peacock and Brownbill (2007) also note that:

"*Despite the large amount of effort going into user research over more than a decade, we still have a very fragmented understanding of users and the 'user experience' on museum Web sites.*"

Therefore, more research on user experience with museum technologies is still needed. We now present how IS has dealt with the user perspective.

2.2 The User-Centered Perspective in IS research

Equally, users have become to the center of several studies in the IS field. The first IS research stream that has promoted the role of users corresponds to the stream of information systems development. In effect, around the 80's several researchers suggested that IS design should not be the outcome of technicians, engineers and designers' work only, but rather IS development should also take into account user voices and needs (Hirschheim 1985; Kling 1977; Mumford 1983). Hence, a number of IS development methodologies that acknowledge the role of users have appeared. For instance, the ETHICS methodology developed my Mumford (1983) accentuates user participation and a united work between technicians and end-users in order to come up with socio-technical solutions in organizations. Relying on this underpinning, Hirschheim and Klein (1994) extended ETHICS by suggesting that participation could also achieve emancipatory goals. More recently, the User-Centered Design (UCD) methodology has gained importance in both research and practice (Mao et al. 2005). The User-Centered Design (UCD) "is a multidisciplinary design approach based on the active involvement of users to improve the understanding of user and task requirements, and the iteration of design and evaluation" (Mao et al. 2005, p. 105).

The user-centered perspective has been widely adopted by IS developers because it has a number of advantages: generally it tends to yield better results for IS success. Hirschheim (1985) conducted twenty interviews with employees in order to better understand the consequences of a user approach. He found that user approach increases IS productivity, enhances social context between organizational members, and decreases implementation time. Similarly, Mao et al. (2005) tried to assess the effectiveness of user approach by conducting a research with 103 professionals. Their survey indicates that UCD improves both IS usefulness and IS usability.

The user-perspective has also been addressed in IS research by creating IT artifacts that serve user needs, which are called customer-centric systems. Alter (2007) explains that

customer-centric systems aim at meeting customer needs, by offering customization and multiple services for instance. In addition, Alter (2007) argues that customer-centric systems can intervene along the entire value chain. As an illustration of customer-centric systems, we present GIST model developed by Albert et al. (2004). Drawing on marketing, data mining and design research, the researchers developed a model called GIST that can be applied to provide customer-centric websites.

The user-centred perspective is valuable for IT management as well. Relying on marketing, Hirschheim et al. (2006) propose a customer-centric perspective for the management of IT departments and IT strategy in order to better meet organization expectations. More particularly, Hirschheim et al. (2006) show that the customer-centric perspective enhances IT roles: technologies can, then, provide more than products by delivering services as well. Hence Hirschheim et al. (2006) believe that adopting such a view can solve the problems of perceptions of the IT function.

Users have also become central in the IS field with the evolution of Human-Computer Interaction issues (Banker and Kauffman 2004). In fact, HCI researchers focus both on the technical and human aspects of information systems as illustrated in Zhang and Li's (2005) framework (Figure 2.4). This framework represents all the topics that are addressed in the HCI stream. The human aspects include demographics, biological aspects, cognition, and emotion / motivation. In comparison to the stream of information system development, HCI researchers tend to have a broader view of users by studying them in depth. For instance, they analyze not only user needs but also user experience with IS, such as cognitive, biological, and emotional reactions to IT use.

This is this latter view of the user-centered perspective that we adopt in this dissertation. We will study user interaction with museum technologies, trying to uncover their perceptions and behaviors. Furthermore, even though HCI research deals with several types of

technologies and different types of context (work and non work environment), the topic of

museum technologies is still under investigated in this area. Therefore, more research on

visitor experience with museum technologies is needed. In the next section, we introduce

these museum technologies.
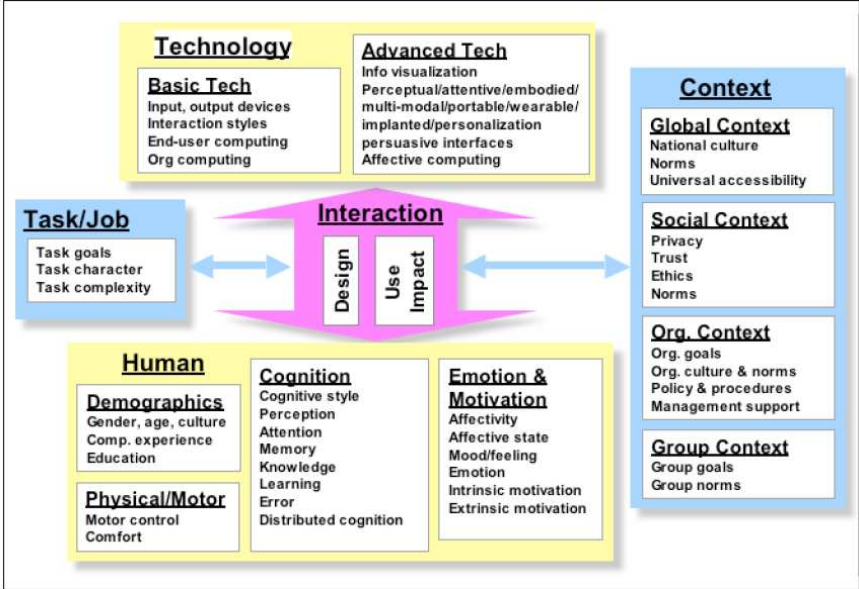
Figure 2.4 An Overview of Broad HCI Issues (Zhang and Li 2005, p. 231)

3. Technologies of the Cultural Heritage Sector: State of the Art and Definition

Several researchers have suggested definitions of Information Systems or Information

Technologies. These definitions also span different epistemologies and there now exists

positivist, interpretive and critical definitions of Information Systems. Table 2.1 introduces

several common definitions of IT/IS.

Table 2.1 General Definitions for IT/IS

References	Labels	Definitions	Paradigm
Zuboff (1988)	IT	"The convergence of several streams of technical developments . . . that dramatically increase the ability to record, store, analyze, and transmit	Positivist

		information in ways that permit flexibility, accuracy, immediacy, geographic independence, volume, and complexity. Information technology has a unique capability to restructure operations that depend upon information for the purposes of transaction, record keeping, analysis, control, or communication." (p. 415)	
Huber (1990)	Advanced IT	"Devices (a) that transmit, manipulate, analyze and exploit information; (b) in which a digital computer processes information integral to the users' communication or task; (c) that have either made their appearance since 1970 or exist in a form that aids in communication or decision tasks to a significantly greater degree than did pre-1971 forms." (p. 48)	Positivist
Hirschheim et al. (1995)	IS	"As Information Systems are widely perceived as providing representations of organizational reality for the purpose of organizational control and problem solving, alternative paradigms highlight the information systems' role in the process of social reality construction through sense-making, or their contribution to the improvement to arguments in the organizational discourse with possible implications for emancipation." (p.5)	Interpretivist
Jasperson et al. (2002)	IT	"From one perspective, IT may be seen as a driver of change in power structures and processes. Alternatively, the creation and introduction of IT can be seen as a process that involves interested parties intentionally using their power to affect the nature of the systems that are put in place. […] IT can be used to create symbols and meaning that reinforce current power structures or to mold altered structures." (p.427)	Critical Social Theory
Reix and Rowe (2002)	IS	"An information system is an ensemble of social actors who memorize and transform representations via information technologies and operatory modes." (p.11)	Interpretivist

From these definitions of IT/IS, we notice that the type of technologies researchers refer to is principally technologies used in work environments. The positivist definitions conceive IT/IS as devices that should help managers doing their work in a more efficient way. For instance, characteristics such as storage, communication, or information are predominant in these positivist definitions. Conversely, the interpretive and critical definitions put the emphasis on other elements, such as interpretation and power. However, all these definitions are too general and second they also have an utilitarian and functional view of IT/IS. As a

consequence, these definitions are not appropriate to describe the technologies used in the cultural heritage, which in addition tend to be hedonic systems.

Van der Heijden (2004) distinguishes utilitarian systems from hedonic systems by showing that these two types of technologies have different purpose. Therefore, they should be evaluated accordingly to their specific characteristics. While utilitarian technologies serve productivity purposes, hedonic technologies generally aim at entertainment. More precisely, Van der Heijden (2004) explains that "the value of a hedonic system is a function of the degree to which the user experiences fun when using the system." (p. 696). Some features of hedonic systems are "animated images, a focus on colors, sounds, and esthetically appealing visual layouts." (p. 696)

It seems that museum technologies correspond more to the type of hedonic IS, than to the type of utilitarian IS. In order to show how museum technologies belong to this category, we provide hereafter a presentation of common technologies that can be found in cultural heritage settings. To identify these technologies, we relied on several reports published by the European Commission that deal with digital cultural heritage (Digicult Report 2002; Digicult Report 2005; DigicultReport 2004). These European reports list a large set of technologies including the ones that can be used by professionals and experts of the cultural heritage sector in their daily tasks. As a result, we will only present the technologies that are implemented for visitor use. Furthermore, we mainly introduce the technologies that have the most potential or that are already widespread in museums. Additional research papers were reviewed to deepen our knowledge of the retained technologies. These technologies are presented in Table 2.2.

Two categories of technologies can be distinguished: devices and applications. The most common devices available in museums are fixed devices such as touch-screen kiosks, computers, televisions, video walls and large screens. Mobile technologies like audioguides,

Tablet PC, handheld devices, and mobile phones are also increasingly available in museums. The applications include video, audio, virtual reality technologies (like 3-D, augmented reality and hybrid environments), haptic applications and networks (like Internet, GPS and UMTS). We make the distinction between programs/applications and devices because the former are generally embedded in the latter. For instance virtual reality can be embedded in kiosks or computers, while Internet can be installed in computers or handheld devices. Our binary classification is relevant in that other researchers also distinguish devices from applications, generally by referring to hardware, software and networks (Laudon and Laudon 2006).

Table 2.2 Presentation of Technologies Used by Cultural Heritage Institutions

	Technologies	Characteristics ("+" designates a benefit and "-" a drawback)	References
DEVICES	Audioguide (first generation)	+ Provides tutorial aid + Gives more autonomy to visitors + Optimizes visitor experience + Selects the most important artifacts to be discovered - Isolates visitors	(Deshayes 2002; Deshayes 2004; Gob and Drouguet 2003)
	Audioguide with images and video (second generation)	+ Images enable visitors to identify the artifacts + Video recreates historical contexts, artifacts history - Isolates visitors	(Deshayes 2002; Deshayes 2004)
	Handheld Device	+ Provides a mobile experience to visitors + Contextualizes information for visitors + Offers more flexibility - Isolates visitors from their companions or group (hinders social interaction) - Makes difficult the coordination between real artifacts and objects displayed	(Digicult Report 2004; Hsi 2002; Hsi and Fait 2005; Vom Lehn and Heath 2005)
	Touch-screens kiosk (or interactive kiosk)	+ Offers dynamic content (content can easily be restructured and changed) + Adds multimedia to texts + Provides interactivity - Leads to queue - Can transform visitors into passive participants (remove the need to look at the real artifacts) - Because of uninterrupted flow, makes it difficult to look at both artifacts and video	(Vom Lehn and Heath 2005)
APPLICATIONS	Internet (Websites)	+ Offers distant access to the museum collections + Provides information before and after museum visit + Personalizes content to fit visitor needs + Museums can also reduce their costs of published materials + Expands access to museum collections + Facilitates the educational and marketing activities of museums	(Ashton and Robertson 2000; Bogdanov 2003; Bowen et al. 1998; Galani 2003; Granlie and Macquarrie 2008; Paterno and Mancini 2000; Tsai and Hsieh 2001)

		+ Introduces museum materials into new social environments + Attracts a greater international audience + Displayable content can expand limitlessly - Offers solitary experience, it is not a social medium - Bandwidth problems: content can be slow to download	
	Haptic Technology	+ Provides a bodily experience to visitors (through the sense of touch) + Improves visitor experience of objects (the sensorial experience with haptic IT can be better than the real interaction) + Allows rare, fragile or dangerous objects to be handled + Enables users to manipulate virtual (or 3-D) representations of objects and artifacts + Facilitates access to information for disabled visitors so widens access to culture + May be more intuitive than speech-based interfaces - Has a prohibitive cost: prices start at around €30 for the simplest device that just provides vibration. But the most advanced haptic interface (with six degrees of freedom) costs 50000 euros - Is not a mature technology, is still in development - Offers a limited cutaneous feedback	(Brewster 2005; Digicult Report 2005)
	Mixed reality (or augmented reality)	+ Allows users to interact with physical and digital information in an integrated way + Enhances social interaction and exchanges + Lets users see each other, along with virtual objects, allowing communication behaviors much more like face-to-face than like screen-based collaboration + Merges dynamic real objects with virtual objects + Improves interactivity and effectiveness + Gives the opportunity to users to handle and feel the real objects while interacting with the virtual objects (more vivid experience) - Creates an artificial separation between real and virtual worlds	(Billinghurst and Kato 2002; Digicult Report 2003; Galani 2003; Lok 2004; Vlahakis et al. 2002; Vlahakis et al. 2001)
	Virtual reality	+ Creates a sense of presence	(Digicult Report 2003; Lok

	(or immersive virtual environment)	+ Immerses users + Helps people to relive historical events in their mind + Offers virtual reconstitution + Offers a vivid experience - Does not offer the possibility to have a bodily experience with the objects (the feeling of touch is absent)	2004; Scagliarini et al. 2001; Sparacino 2004)

The museum technologies introduced in Table 2.2 are characterized by their common goals of communication, entertainment, and education of the publics. Overall, they aim at enhancing visitor experience. This is the reason why these technologies, used in a museum context, qualify more as hedonic IS than as utilitarian IS. Experience can be defined as "the apprehension of an object, thought or emotion through the senses or mind" (The American Heritage Dictionary of the English Language 2000). Holbrook and Hirschman (1982) were the first to point out that experience was part of consumption process. Holbrook (2000) pursued this research and identified further elements of experience. According to Holbrook (2000), experience can be captured through four notions that are experience, entertainment, exhibitionism and evangelizing. These form the four "Es" (Holbrook 2000, p.174) and they all have subdimensions as shown in Table 2.3.

Table 2.3 The Four E's of Experience (Holbrook 2000, p. 178)

Experience	Entertainment	Exhibitionism	Evangelizing
Escapism	Esthetics	Enthuse	Educate
Emotions	Excitement	Express	Evince
Enjoyment	Ectasy	Expose	Endorse

These four dimensions reflect the different manifestations of experience in human lives. We also note that experience includes both cognitive aspects such as "educate" and "expose" and affective aspects such "emotions" and "excitement", which are closely related to museum missions. In fact, museums represent experiential settings (Falk and Dierking 1992; Holbrook and Hirschman 1982; Kotler and Kotler 2000) and the technologies they offer should contribute to the enhancement of experience (Pareto and Snis 2007). Even though museums correspond to experiential settings, it is important to mention that, according to Dewey (1934), experience should not be confined into a particular activity such as arts. But rather it is something that can be encountered by any individual in everyday life.

As a summary, technologies used in the cultural heritage seem to serve different goals than utilitarian technologies used in work environments. Some researchers have phrased particular definitions of IT for the cultural heritage area (Digicult Report 2004; Monod and Klein 2005). For instance, Monod and Klein (2005) use the label "e-heritage systems" to define "the application of IS to communicating cultural heritage" (p. 2871). The European Commission considers that technology "is a tool to enable access, preservation, use and understanding of the heritage." (p. 14)

We rely on these definitions and IT characteristics to provide a more comprehensive definition of cultural heritage technologies from a visitor-centric point of view. Our definition is the following:

IT/IS dedicated to the cultural heritage area represent the group of technologies (devices and applications) whose intrinsic goal is to enhance visitor affective and cognitive experience. These technologies support museums' mission of communication, education and entertainment of the public. More precisely, IT/IS that intervene in the relationship between visitors and museums should assist visitors in interpreting and enjoying cultural artifacts.

4. Exploratory Study

Sections one, two and three of this chapter introduced and defined the concepts used in the dissertation title. We now have a clearer view of the role of museums, their recent focus on visitors and the technologies that can be used by cultural institutions to enhance visitor experience. Following this presentation, we decided to conduct an exploratory study in order to 1) better understand the museum field and 2) discuss the three central themes of the dissertation with museum professionals. Indeed, Miles and Huberman (2003) encourage researchers to become "empirically cultivated" (p. 78) by gaining familiarity with their

research object and their field study. Following this advice, we decided to complete our literature review about museums and IT with an exploratory study.

Furthermore, talking with museum professionals appeared as a good way to identify practical issues, hence ensuring the relevance of our research. Relevance is an issue that has often been raised in the IS field. For instance, Hevner et al. (2004) point out that research, and more precisely Design Science research, should be informed both by relevance and rigor. To establish relevance, researchers should provide answers to business needs and solve practical issues. Even if the goal of this research is not to develop an IT artifact as in Design Science research, Hevner et al.'s recommendation is applicable to this dissertation. Actually, several other IS researchers have also stressed the importance of producing relevant IS research (Lyytinen 1999; Robey and Markus 1998). More recently, Rosemann and Vessey (2008) proposed a methodology to increase relevance in IS research. They suggest using "applicability checks" defined as:

> *"Evaluations by practice of the theories, models, frameworks, processes, technical artifacts, or other theoretically based IS artifacts that the academic community either uses or produces in its research."* (Rosemann and Vessey 2008, p. 2)

Rosemann and Vessey (2008) also identify five steps in the research life cycle where applicability checks can be performed, they are: identification of the research problem, theoretical development, research methodology, data analysis and communications of the findings. Our exploratory study intervened in the first step of the research life cycle, namely the identification of research problems. Actually, in addition to the literature review, we conducted interviews with museum professionals in order to identify relevant research problems.

4.1 Conceptual Framework

Figure 2.5 introduces the conceptual model on which we relied to conduct this exploratory study. This conceptual model does not draw on a particular theory, but rather graphically represents the concepts reviewed in the literature and our initial questions.

This figure is composed of three blocks, one for each theme. First, this explorative study aimed at obtaining more information about museums, more particularly their institutional functions and the decisions related to IT/IS, which are represented in block one. We also wanted to obtain more information about museum visitors such as their profiles, expectations and experience with IT/IS used in museums, which is represented in block two. Block three corresponds to the theme of technologies used by museums. We were both interested in having better understanding of physical technologies and virtual technologies (websites) implemented by museums. These two types of IT/IS are linked by an arrow in Figure 2.5 because more and more museums use their websites as an extension or a complement of the museum visit. For instance, website content can provide additional information to the material of kiosks, audioguides or computers available in museums.

Figure 2.5 is also composed of three recursive arrows to indicate the relationships between the three themes. The recursive relationship between museums and technologies symbolizes the fact that museums generally choose the technologies they will invest in, while technologies can transform museum strategy and organization. Museums are also related to visitors in the sense that visitors are the *raison d'être* of museums. Technologies and visitors are related because technologies' characteristics tend to influence visitor experience and visitor are the ones who use these technologies.
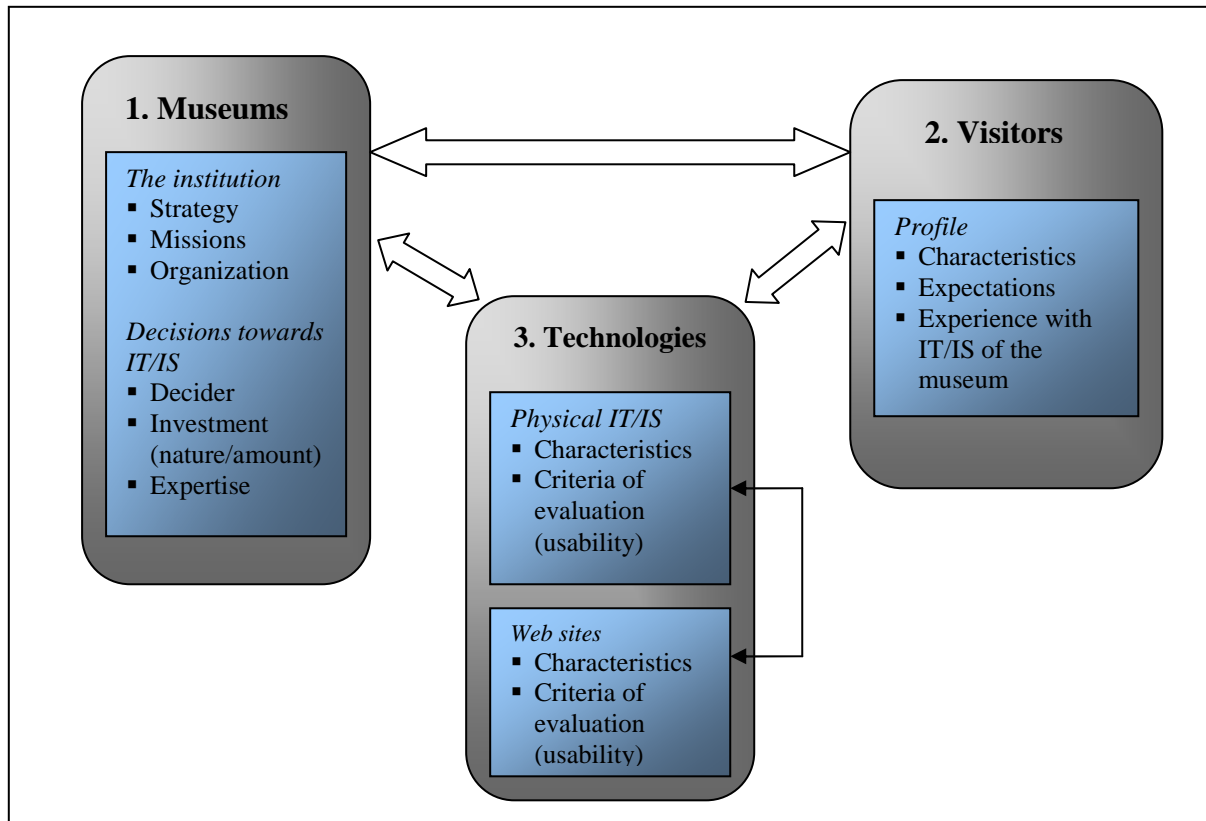
Figure 2.5 Conceptual Model of the Exploratory Research

4.2 Methodology

We relied on a qualitative approach to conduct the exploratory study. We conducted

seven interviews with museum professionals. Miles and Huberman (2003) explain that

instrumentation can be less formalized in exploratory research because the researcher

generally has no research question or little knowledge about the phenomenon. Nonetheless,

we created an interview guide based on the three topics we wanted to address: museums,

visitors and technologies. The interviews were semi-structured in order to give to the

participants the freedom to deal with other issues. The conceptual model was used to develop

the themes and questions of the interview guide, which can be found in Appendix 2A. We

followed the Institutional Review Board (IRB) procedures before launching the study.

A total of seven interviews were conducted with professionals of several museums. Actually, in order to take into account the diversity of museums, we decided to interview museum experts from sciences, art and history museums, which are the three general categories of museums established by Edson and Dean (1996). Similarly, to capture different points of views and add variance in our study, we interviewed museum professionals at different levels in their organization. As a result, our sample includes four webmasters and three directors of museum departments. We first identified the museum professionals, principally those working in an IT department, and then contact was established with the experts either by email or by phone. Because of the predominance of public museums in France, our sample is composed of museums with a public status.

Table 2.4 presents further the characteristics of the sample analyzed in this study. The length of the interviews varied from 45 minutes to 130 minutes.

Table 2.4 Characteristics of the Sample

Museum Number	Museum Type	Interviewee Positions	Interviewee Experience (years)	Length of the Interview
Museum #1	Sciences museum	Webmaster	>5	110 minutes
Museum #2	Sciences museum	Director of the Exhibitions	>10	45 minutes
Museum #3	Art museum	Webmaster	>10	130 minutes
Museum #4	History museum	Webmaster	>5	70 minutes
Museum #5	Art museum	Webmaster and Responsible of Multimedia	<2	110 minutes
Museum #6	Art museum	Director of the Public Department (Evaluation and Prospective)	>5	45 minutes
Museum #7	History museum	Director of the Information Systems Department	<2	100 minutes

We performed content analysis to examine these interviews. The categories that were used to analyze the interviewee's discourse correspond to the labels of Figure 2.5. For instance, museum institutions and museum decisions represent two themes, while strategy,

missions and organization represent codes. Coding is a qualitative technique that helps in classifying segments of discourse (Miles and Huberman 1994).

4.3 Findings

We organize the findings around the three conceptual blocks of Figure 2.5: museums, visitors and technologies. We also provide interviewee quotations to illustrate our points. Since the interviews were conducted in French, we translated all the quotations into English.

4.3.1 Organization of Museums

During the interviews, the museum professionals frequently referred to the missions of their museum. These missions generally represent the basis of the museum actions, so missions promote the museum strategy and decisions. The main missions that the interviewees cited correspond to the official ones highlighted by ICOM, namely education, research, and collection. But other missions more specific to the type of museum were also mentioned. For instance, in Museum #4, a museum dedicated to history, the webmaster presented memory, respect of traditions and authenticity as central objectives of the museum.

This exploratory study also reveals all the consequences and hindrances related to the public status of French museums. More particularly, it seems that these institutions are constrained by hierarchical and routine process, a key characteristic of administration and bureaucracy. Actually, Mintzberg (1979) refers to the machine bureaucracy to designate the organizational configuration that has formalized procedures, routine tasks and centralized power for decision-making. Several interviewees pointed out the difficulty of their job because of the hierarchy and the organizational rules that make decision hard and long to take. As an illustration, at Museum #5, the webmaster explains that she can take decision for the daily tasks on the website, but that any big updates or change on the website have to be validated by a committee composed of several employees and managers of the museum.

> *"The hierarchy makes every decision long to take, we need to wait about three months for a decision to be effective"* (Webmaster, Museum #5)

Regarding the routines, the museum professionals insisted on the fact that innovation was not well perceived in their institution. It is because their executive committees tend to be composed of people who have been working in the museum for more than ten years so they are more resistant to change. One of the detrimental consequences of this routine organization is the outdated image of museum. Furthermore, the interviewees mentioned the difficult process of involving all the departments in decision processes towards IT investment or IT deployment. The main problem is that curators do not have a lot of knowledge and interest in technologies. Therefore, IT projects are often considered secondary.

> *"It is difficult because most of the curators work in this institution for about 30 years so they don't know anything on informatics. And websites are far away from their preoccupation."* (Webmaster, Museum #4)

We also note that museums lack financial and human resources, what constraint the scope of their projects and their room to manoeuvre. At Museum #3, the webmaster particularly highlights the difficulty to obtain budget from the top managers of her museum. Therefore, her first project of website development at the end of the 90's had to be renounced.

> *"We tried to respect the most the budget we were allowed with a total amount of 287000 Francs. But the financial service of the museum said it was too close to 300 000 Francs and it was not possible. So once again, we were stopped even though we had innovative ideas."* (Webmaster, Museum #3)

> *"We've got a lot of ideas, but no financial and human resources."* (Webmaster, Museum #1).

4.3.2 Visitor Expectations and Experience

All the museum professionals that we interviewed acknowledged the fact that their museum had a department in charge of studying the museum public. However, most of our

respondents also mentioned the fact that the studies conducted with the public were focused on attendance aspects or satisfaction with the museum facilities.

> *"We have good knowledge of our publics thanks to some longitudinal studies. Indeed, we conducted surveys between 1994 and 2004 collecting about 100 000 questionnaires. This study helped us determine the socio-cultural profile of our visitors, their cultural practices, their way of life, and their satisfaction.* (Director of evaluation and prospective, Museum #6)

Consequently, the understanding of visitor experience with technologies available in museum seems to be an under investigated issue. Actually, several interviewed professionals, and more specifically the ones in charge of multimedia or technological equipment, expressed disappointment regarding the evaluation of the technologies they had implemented. For instance, they regretted the fact that they could not get any feedback from their visitors on the technologies available in the museums.

> *"After all the different surveys we conducted, we still not have directly evaluated the role of ICT."* (Webmaster, Museum #4)

> *"The Department of Evaluation and Prospective does not evaluate ICT. And in the other departments of our museum, the evaluation of ICT corresponds to a technical control to check statistically if it functions."* (Director of evaluation and prospective, Museum #6)

4.3.3 Physical and Virtual Technologies

We first report the findings related to the physical technologies, the ones that are available in museums. In a second step, we examine the results pertaining to museum Web sites.

All our interviewees presented the technologies that were implemented in their museums. The most common technologies are audioguides, videos and kiosks. There are also auditoriums that principally draw experts or researchers for conference discussions. It is noteworthy that some museums plan to invest in more innovative technologies like RFID technologies, interactive kiosks, or mobile devices. For instance, at Museum #4, a new room

is supposed to open in 2008 that provides an interactive and virtual visit on the life of a historical character. Visitors will be equipped with a RFID audioguide that will launch content automatically to explain the character's history. This audioguide will also be connected to video screens and interactive kiosks. The webmaster of Museum #4 explained to us that an IT-based solution appears as the best way to do an exhibition on the life of the historical character since there remain very few objects of his life. As a result, it is not possible to organize a traditional exhibition (artifacts based). This example perfectly illustrates how information systems give a second life to things that do not exist anymore (Fopp 1997).

Throughout the interviews, the museum experts stressed the important and strategic role of their museum website. According to our interviewees, the main purposes of museum websites are:

- To draw more people to museums,
- To extend museum renown,
- To arouse visitor interest for collections,
- And to provide distant access to visitors who cannot visit the museum.

To the question "Do you think that your website can draw more people to your museum?", the interviewees were quite unanimous about the potential positive effects of this information technology. Museum websites are used as a mean to draw more visitors to the physical museum even if professionals also identify other goals for their websites.

> *"I think that the first goal of our website is to make people come to the museum and to help them prepare their future visit. The website also represents a good way to reach distant publics that may come one day."* (Webmaster, Museum #4)

> *"The website is a call, a window on the museum and we hope it attracts people and incites them to come."* (Webmaster, Museum #1)

At Museum #1, the interviewee explained that the mini websites created for temporary exhibitions also have a positive influence on museum visit.

> *"When we compare the physical visits with the online visits, we immediately realize that they are complementary. I mean that the visits go hand in hand with the website. There is also a real incidence of the mini websites on physical attendance."*
> (Webmaster, Museum #1)

However these statements correspond more to hypothesis than to confirmed results. Actually, the employee mentioned that she was sure the website had an influence but she has not yet conducted any study to test this effect. Therefore the influence of the website is still fuzzy and subjective.

At Museum #5, apart from the audioguides available in the museum, the website is the only technological device provided to the public. The exhibitions of Museum #5 deal with Asian arts and they principally draw an expert public. Therefore, the museum website is bearing an important role that is to arouse visitor interest for the collections in order to attract a wider public.

Regarding the issue of Web site usability and design, we obtain mixed results. On one hand, some museums choose to outsource the design and technical aspects of their Web sites. Therefore, Web agencies take in charge the creation, implementation and maintenance of the museum interface. In this case, the interviewees could not discuss with us the criteria that were retained to design the interface. On the other hand, museum Web sites are developed internally. But, even in this case, the interviewees did not mention applying any particular criteria. Actually, most of these professionals have a sense of what is a well designed website because of their experience as Webmaster or their collaboration with Web agencies. Therefore, making their Web site usable for online visitors appears as an evidence for them.

> "*Of course, we took into account usability principles to design our website.*"
> (Webmaster, Museum #1)

> *"By virtue of my training and my professional experience, I know the literature on Human-Computer Interaction very well. Hence, I know there are a number of principles and criteria that must be respected to design a usable website."* (Director of Information Systems, Museum #7)

We notice that in several museums, visitor perceptions and needs towards the website are not assessed. Generally, the museum experts content themselves with some statistics provided by their Internet Service Providers (ISP), such as number of visits per day and statistics about visited sections. Nonetheless, the museum experts also recognized lacking information on the link between the Web site and the museum as well as on visitor needs towards the Website.

> *"We have never conducted any specific study to examine the role of the website and the level of online traffic. We just have the statistics provided by our ISP."* (Webmaster, Museum #4)

Some professionals seem to get more feedback on Internet through the following sections "contact", "suggestions" or "leave a comment by email". At Museum #7, the Director of Information Systems also uses the visitors' book to collect visitor perceptions at the end of the exhibitions.

> *"We had a little area on the website dedicated to questions and comments « What do you think of the website? » And in fact, this section happened to be very interesting because it is thanks to this email box that we managed to get the feedback of online visitors."* (Webmaster, Museum #3)

Table 2.5 summarizes the main findings of the exploratory study.

Table 2.5 Main Findings of the Exploratory Study

Topic	Findings and Issues that Deserve Attention
Museums	▪ Missions: education, collection ▪ Bureaucratic type: hierarchy, long decision process, routines ▪ Public institutions (limited budget)
Visitors	▪ Wide public, general audience ▪ Individuals and groups ▪ Little knowledge of visitor reactions toward IT use
Physical and virtual technologies	▪ IT diversity in museums: low (mainly audioguides and videos) but higher in sciences museums ▪ Web sites: strategic role, crucial tool for museum communication ▪ No criteria for usability evaluation of IT

4.4   Discussion of the Findings

4.4.1   IT and the Visitor-Perspective at the Heart of Museum Strategies...

The findings of our exploratory study confirm the importance of IT for museum activity. Indeed, technologies are identified as a strategic resource that could re-energize the relationship of museums with their public. The user-centered perspective is also present in French museums: the professionals focus their actions on visitors trying to draw more people to museum and enhance visitors' educational and entertaining experience, through mediation and online communication.

4.4.2   ... But Few Research on Visitor Experience with IT

Professionals are interested in knowing their visitor needs better. But it is noteworthy that the studies conducted by museum experts generally concern the third axis of Kotler and Kotler's (2000) framework called "design and orchestration of experiences". Actually, most of our respondents explained that their surveys were focused on attendance aspects or satisfaction with the museum facilities. Conversely, the two other axes suggested by Kotler and Kotler's (2000), the type and level of visitor experiences, are still under investigated, although they constitute the core of a visitor-centered perspective. This finding confirms the results of the IMLS that highlights the *organizational need of museums for studies on visitor expectations towards IT* (Institute of Museum and Library Services 2006). Furthermore, museums lack rigorous approach to analyze visitor interaction with IT. Actually, these institutions do not necessarily rely on a theoretical background to assess visitor needs.

4.4.3   Limited IT Implementation

Our exploratory research reveals that even if museum professionals perceive the benefits of technologies, IT is still limited in these organizations. Brelot et al. (2005) note

three factors that prevent museums from implementing technologies. They are human, economical and technical factors. The human barriers generally concern the possible fit between the museum exhibition and the technologies. In effect, curators tend to fear that IT disturbs visitors from looking at the collections. Hence, technologies should be implemented to fit and support exhibitions. The economical factor refers to IT cost. Actually the most advanced technologies that may have potential to transform visitor experience also represents expensive devices. The last criterion is related to technical issues. To meet visitor expectations and provide satisfactory experiences, museum technologies must include several features such as video, 3D, mobility, rapidity etc. what is difficult to achieve given museum resources (Brelot et al. 2005). It is worth mentioning that these three factors also play a role in the museums where we conducted our interviews. The traditional positions in museums (curators) represent the human barriers and they tend to be reluctant to the implementation of IT. Economical factors, namely IT costs and limited budget, were directly mentioned by our interviewees that struggle with the administration and the public status of their institution.

5. Summary

This chapter examines the different concepts that will be studied in this dissertation. More precisely, by first pointing out the contemporary mission of museums, we go on to see how the user-centered perspective has progressed to become the dominant trend in the museum field and in IS research as well. Section four of this chapter provides more insight into the *motis vivendi* of French museums. To achieve this goal, an exploratory study was conducted in museums and their technologies. This study also enabled us to identify relevant and under-investigated issues, hence ensuring the relevance of this dissertation. It also sets the scope of the research since we will focus on visitor experiences with museum technologies. Relying on this literature review and the findings of the exploratory study, the next chapter

presents the different issues that will be addressed in this research, namely the three essays

composing the dissertation.

Appendix 2A: Interview Guide

FIRST PART: INTRODUCTION
> ➢ Verbal informed consent (i.e. the verbal consent document)

The employee's role
1. What is your position in the museum? What are your tasks?
2. How long have you been working in the museum?
3. What is your professional background (degrees, experience)?

SECOND PART: MY RESEARCH THEMES

The museum's technologies
4. What physical Information and Communication Technologies (like audioguides) or virtual (like websites) does your museum use?
5. Why did you decide to use these technologies?
6. Can you give an estimation of the amount (or percentage of budget) invested in technologies equipment?
7. How do you evaluate the usefulness and efficiency of these technologies? Do you have criteria to evaluate that?
8. Do you intend to purchase new technologies? If yes, which ones and why?

The museum's website
9. When was your website implemented?
10. Was it developed by the employees of the museum or was its creation outsourced?
11. Why did your museum decide to implement a website?
12. Did your website change since its creation? If yes, what were the principal modifications and why?
13. Do you think that the website could still be improved?
14. Are there special features or tasks that your website's enables you to do? Or are the website's characteristics also available within the museum (or on other supports)?
15. Who are the people who work on the website (do the updates, add content, etc.)?
16. Do you have usability criteria for the evaluation of your website? If yes, which ones?
17. What is the link between the museum and its website? Do you think that the website can play a role in the museum's audience (i.e. make people come)?

The museum's audience
18. Do you organize studies/researches on your visitors (questionnaires, interviews…)?
19. What is the composition of your audience? Do you have a classification of your visitors?
20. Do you know if your online audience is the same than the physical audience?

Chapter 3 : Description of the Three Essays

This dissertation adopts a multi paper dissertation format, meaning that several studies will be used to address the primary research issue. Furthermore, each chapter answers one of the general research questions posed in the introduction by dealing with a facet of museum technologies used by visitors. This chapter gives an overview of the three empirical essays, detailing the approach adopted in each chapter, and how the chapters are related. We also precise the epistemological background of each chapter.

1. Presentation of the Essays

This dissertation is composed of three essays focusing on individual perceptions and experiences with museum technologies. We are interested in the relationships of museums with their visitors, more particularly on how IT can enhance the dual missions of communication and exhibition to the public. Consequently, the potential of technologies for impacting the activities of museum professionals, activities such as archiving, digitalizing or collecting objects, is out of the scope of this dissertation. The focus on visitors and their experience has been advocated by several researchers in the museum field (i.e., Booth 1998; Falk and Dierking 1992; Goulding 2000b; Kotler and Kotler 2000). Conversely, users have become to the central issue in several studies in the IS field, more particularly in the Human-Computer Interaction literature (Banker and Kauffman 2004).

The three empirical essays are organized as follows. The fourth chapter deals with visitor perceptions of website usability and aesthetics and how the design of museum website can influence visitor intentions to return to the website or go to the physical museum. The

fifth chapter addresses the affective (authenticity and enjoyment) and cognitive reactions (learning) of visitors interacting with museum information technologies. The sixth chapter investigates phenomenological criteria that could serve as a basis to evaluate IT in cultural heritage. It also discusses how IT can enhance visitor experience of the past. A preview of each chapter and their respective research questions is provided hereafter.

1.1. Preview of Chapter 4: Stimulating Museum Visits Through More Effective Websites

Museums are popular, leisure-time cultural activities. As is the Internet, another key means by which individuals seek out to occupy and enhance their leisure time. Taking into account both of these powerful trends, it can be argued that museums should have a well-designed website in order to capture visitor attention and encourage them to make a physical visit. What is not clear, however, is whether museum websites succeed in drawing more people to museums or, rather, encourage visitors to come back to the website. In brief, are these substitution or reinforcing effects?

Indeed, website design or usability is not the only factor to have an influence on individual attitudes and intentions. Website aesthetics is another important element, especially we would posit, for museums. Furthermore, for cultural consumption, prior experience with high cultural activities and subjective norms play an important role in predicting individual behaviors.

This study draws on the literatures of human-computer interaction (usability, aesthetics) and sociology of culture (prior experience with cultural activities) to determine the influence of website design on visitor perceptions. To test our hypotheses, two free simulation experiments were conducted with college student subjects in France and the USA. The results provide strong support for all our hypotheses. Indeed, in both studies, website aesthetics was

seen as the most important criterion affecting the quality of a museum website. Furthermore, intentions to return to the website or to visit the museum are jointly predicted by website characteristics and socio-cultural variables.

> ➢ Research Questions to be Addressed by Study 1
>> 1. Which are stronger predictors of intentions to visit physical or virtual museums: website design or socio-cultural variables?
>> 2. How important are aesthetics in comparison with the other usability criteria for museum websites?

1.2. Preview of Chapter 5: The Role of Authenticity in the Experience of Visitors Interacting with Museum Technologies

When people travel, they increasingly engage with cultural activities, a phenomenon that has been called cultural tourism. Two principal reasons for these visits are the need to break with monotony and the search for enjoyment and authentic experiences (MacCannell 1973). Conversely, cultural places such as museums tend to rely on Information Technologies to support their exhibition and communication to the public. Although technology has undeniable advantages for museums and their visitors, it is not evident that IT contributes both to more enjoyment and to an experience of authenticity. Indeed, little attention has been paid to user reactions with hedonic systems available on cultural heritage sites.

The objective of this research is to assess affective and cognitive reactions of museum visitors interacting with IT. We also try to determine the role played by authenticity in visitor interactions with museum technologies. To test our hypotheses, a free simulation experiment with an N of 184 was conducted at a French national museum. The results indicate that technologies are not incompatible with perceptions of authenticity and that IT can contribute to enjoyment and learning.

➢ Research Questions to be Addressed by Study 2

1. What are the affective and cognitive reactions of museum visitors when interacting with museum technologies?

    1.1. Do visitors experience authenticity, enjoyment and immersion when using museum technologies?

    1.2. Does the use of museum technologies facilitate the experience with museological content, more particularly does it lead to an increase in learning?

2. Do all museum technologies contribute in the same way to the experience of visitors?

    2.1. What types of technologies contribute most to enjoyment, immersion, authenticity and learning?

1.3. Preview of Chapter 6: The Application of a Phenomenological Framework to Assess User Experience with Museum Technologies

Providing visitors with a valuable experience of the past has become a crucial mission for cultural heritage institutions. The experience of the past is one where visitors understand the museum's communications about the meaning of artifacts and where visitors undertake an active role in interpretation and reflection on the past. Several studies promote technologies as a good way for museums to reenergize their relationships with their visitors. But even as some research has concentrated more and more on visitor experiences, this work has neither particularly stressed on visitors' experience of the past nor on their evaluation of museum technologies with respect to their potential for engendering a better experience of the past.

Monod and Klein (2005) elaborated a phenomenological framework to evaluate IT used in the cultural heritage. Since it has not been empirically "validated" yet, the objective of

this paper is to employ this framework/criteria with samples of users of museum technologies and in the process determine whether these criteria correspond to visitor expectations and can be met by IT.

Adopting a multi-methodological approach, we propose two empirical studies for investigating visitor expectations towards a phenomenological experience and role of IT in this experience. Our findings confirm the importance of phenomenology as a tool to assess IT user experience in museums. In addition, our field study indicates that technologies available in museums positively contribute to an experience of the past.

➢ Research Questions to be Addressed in Study 3

1. Are visitors interested in having a phenomenological experience in museums? More precisely, are the criteria proposed by Monod and Klein (2005) relevant to assess IT user experience in museums?

2. To what extent do museum technologies contribute to an experience of the past?

1.4. Inter-Relationships of the Essays

The three articles developed in this dissertation are related to each other for several reasons. First, the dissertation adopts a single central focus, that a visitor centric-perspective on IT and museums. Therefore, all three chapters develop the theme of IT and museums, albeit different types of technologies are studied across the articles. Additionally, the three articles narrow in on visitor perceptions and experiences when using IT (online or offline), so the unit of analysis in all cases is the individual. For instance, Chapter 4 addresses visitors' aesthetic experience, while Chapter 5 deals with their experience of authenticity. With respect to Chapter 6, the phenomenological theory employed particularly gives a central role to self and human experience.

Second, the three essays share common characteristics. For instance, the topic of website design at the core of Chapter 4 relies on Human-Computer Interaction foundations and Chapter 5 does when it deals with the enjoyment and authenticity conveyed by IT.

Moreover, the research models used for these two chapters are based on behavioral theories (TRA and TAM). Likewise, both chapters aim to explain visitor behaviors based on user perceptions and attitudes toward IT.

Chapters 4 and 6 are also related in that they both examine the evaluation of museum technologies. Chapter 4 tries to identify the design criteria that play a major role in the assessment of Websites while Chapter 6 focuses on the design criteria of offline technologies for enhancing visitor experience of the past.

Chapter 5 is also linked to Chapter 6 in that they both address visitor experiences. Indeed, Waitt (2000) suggests that authenticity (which is studied in Chapter 5) is a concept closely related to the past (which is studied in Chapter 6). In fact, tourists whose main visit motivation is discovering the past are also the most frequently the ones who value the most authentic perceptions. Finally, Chapters 5 and Chapter 6 were both conducted in the same museum field setting using actual visitors of museums in their sampling. The relationships between the different chapters are represented in Figure 3.1.
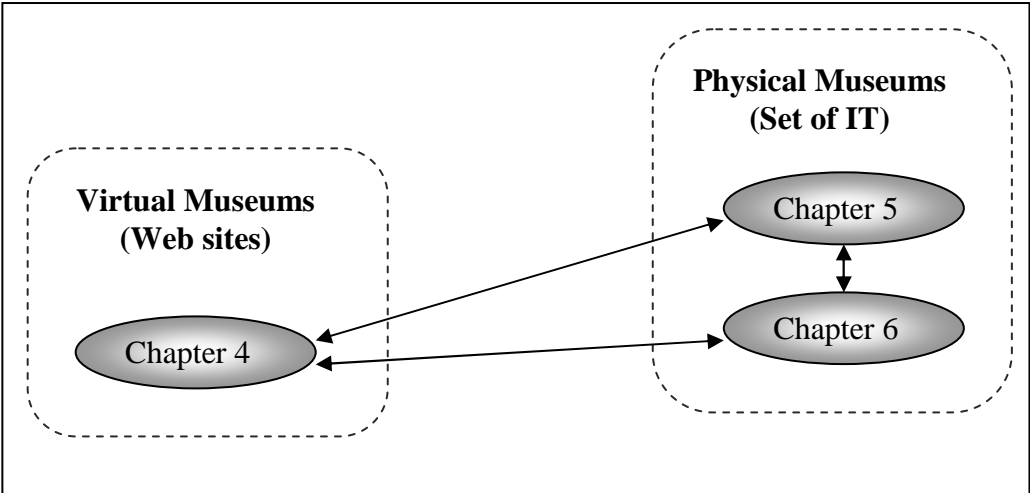
Figure 3.1 Inter-Relationships of the Essays

In order to insure more commonality between our three different chapters, we also decided to study one type of museums, namely history museums. In Chapter 4 we selected two websites belonging to two history museums. The French website is that of the Quai Branly Museum, devoted to the history and arts of Africa, Asia, Oceania and America, while the American website is that of the Atlanta History Center, a museum that addresses the history of Atlanta and its nearby region. Chapters 5 and 6 have in common the same study site, namely the National Center of History of Immigration. This museum presents the history of French civilization and, more particularly, the influence of immigration in shaping French society.

The choice of history museums can be justified by the following reasons. First, we did not want to study types of museums that were highly specialized to the point of idiosyncrasy, as, for example, science museums which generally include a lot of technological equipment and hands-on activities. In such a case we believed that perceptions of authenticity and historicity would be more difficult to measure; they could also be biased in such an environment. Furthermore, this type of museum appears less appropriate to apply the phenomenological criteria, which are related to the history of Being. We also deliberately eliminated art museums since they generally offer less technology to their markets. After visiting several art museums in the Paris locale, our region of residence, we realized that this type of museum was less equipped with technologies. Finally, the choice of the historical setting was instrumental for conducting good research since we were able to obtain a broad license to conduct two of our field studies at the National Center of History of Immigration. Table 3.1 gives an overview of the three chapters.

Table 3.1 Overview of the Three Articles on IT and Museums

Chapters and Short titles	Chapter 4: *Stimulating Museum Visits*	Chapter 5: *The Role of Authenticity*	Chapter 6: *A Phenomenological Evaluation*
Common Glue	Museum technologies (hedonic IT), user experiences, history museum, user perceptions		
Theoretical Background	Usability (Microsoft Usability Guidelines), aesthetics, sociology of culture	Authenticity, emotions in HCI, learning	Phenomenology, experience, historicity, IS evaluation
Epistemology	Positivism	Positivism	Interpretivism
Methodology	Laboratory experiment (free simulation)	Field experiment (free simulation)	Focus groups Field study (survey)
Type of IT	Web site	Audioguides, interactive kiosks and computers	Audioguides, interactive kiosks and computers
Unit of analysis	University students	Museum visitors	University students Museum visitors

This dissertation introduction would not be complete if we do not mention the various epistemological positions of the three studies, as can be seen in Table 3.1. Indeed, epistemology should represent the foundation of doctoral student research (Monod 2002). This aspect of the dissertation will be discussed next.

2. Epistemological Position

Epistemology is defined as "the branch of philosophy that studies the nature of knowledge, its presuppositions and foundations, and its extent and validity" (The American Heritage Dictionary of the English Language 2000). According to Lee (2004, p. 6) an epistemology is also "a broad and high-level outline of the reasoning process by which a school of thought performs its empirical and logical work".

For IS research, this science of knowledge comes from three different streams. In fact, according to Chua (1986), the IS field is composed of three main research philosophies which are positivism, interpretivism and Critical Social Theory (CST). More recently, design research has been presented as a fourth paradigm for IS research (Vaishnavi and Kuechler 2004/5). This dissertation includes two of the four streams: positivism informs Chapter 4 and

Chapter 5, while Chapter 6 is based on an interpretivist position. We introduce hereafter these two epistemological positions, as they have been described in the IS field.

2.1. Positivism

Positivism is an epistemological stream that has its roots in French sociology and more precisely, in the "Course of Positivist Philosophy," as originally articulated by Auguste Comte (1830-1842). Positivists believe that the world exists independently from individual perceptions (Burrell and Morgan 1979). In linked with this statement, positivist assumptions are that a researcher does not have any influence on the world and on his/her object of study. Specifically, positivists claim their neutrality (Orlikowski and Baroudi 1991). Furthermore, positivist researchers are interested in causal relationships and explanation. To achieve this goal, Orlikowski and Baroudi (1991) explain that positivist researchers identify a set of variables that will best reflect the phenomenon of interest. Then, knowledge is created with a standard hypothetico-deductive approach which seeks universal and generalizable findings.

2.2. Interpretivism

Interpretivism has developed in opposition to positivism (Monod 2002). Interpretivist researchers believe that the world cannot exist apart from humans because it is produced by them (Orlikowski and Baroudi 1991). Therefore, interpretivists consider that reality is not objective, but subjective and socially constructed (Burrell and Morgan 1979; Klein and Myers 1999). They also view research process as a social construction because researchers work with subjects in order to understand phenomena. Meaning and context constitute the cornerstone of the interpretivism stream (Monod 2002; Orlikowski and Baroudi 1991). To understand meaning and context, interpretivists tend to employ hermeneutics, which is the science of interpretation. Interpretivists also study texts or languages (Klein and Myers 1999).

2.3. Epistemological Position of the Dissertation

Nonetheless, we disagree with some of these statements by the cited researchers and we prefer to subscribe to Weber's (2004) view of positivism and interpretivism. Weber (2004, p. vi) notes that positivism and interpretivism should not be strongly opposed as they "both seek to improve our shared understanding of the world". In addition, Weber highlights several points on which positivism have changed. For instance, positivist researchers are aware of their bias and their possible influence on research results, they also take into account the limitations of their knowledge, and their object of research is more and more conceived as a social construction (Weber 2004). Weber (2004) concludes his commentary by arguing that positivism and interpretivism principally differ on their methodologies: the latter using more phenomenology and hermeneutics and the former relying more on experiments. Furthermore, Straub et al. (2004) explain that the ""pure" positivist attempt at viewing scientific exploration as a search for the Truth has been replaced in recent years with the recognition that untimately all measurement is based on theory and hence capturing an "objective" truth is impossible."

We will deal with both positivist and interpretive studies: we will use the free simulation experiment for Chapter 4 and 5, and we will also employ an interpretivist research approach in Chapter 6. However, this dissertation will try to follow Weber's (2004) line of thinking for the two positivist chapters.

Chapter 4 and 5 will measure visitor perceptions through a causal model. However, we believe that Chapter 5 is less positivist than Chapter 4 since the authenticity concept that we add relies on a constructivist approach. Chapter 6 uses an interpretivist approach because (1) we use a phenomenological theory and (2) we want to address visitors' experiences from their subjective point of view. Moreover, we are interested in the personal and subjective

perspective. As stated by Robey (1996, p. 406), "theoretical foundations for research and specific research methods are justified by research aims, or purposes." Therefore, this dissertation contains several methodologies and theoretical foundations in order to address our different research questions. Multimethod and/or multiparadigm research appear to yield better results by offering a more comprehensive view on the research object (Becker and Niehaves 2007; Mingers 2003; Monod and Boland 2007).

Figure 3.2 represents the three chapters on an epistemological continuum from positivism to interpretivism. The dissertation begins with a positivist research topic that deals with perceptions or cognitive beliefs of website visitors; and the dissertation ends with an interpretive study that addresses experience of the past. This epistemological variety ameliorates studying individual experience at different levels.
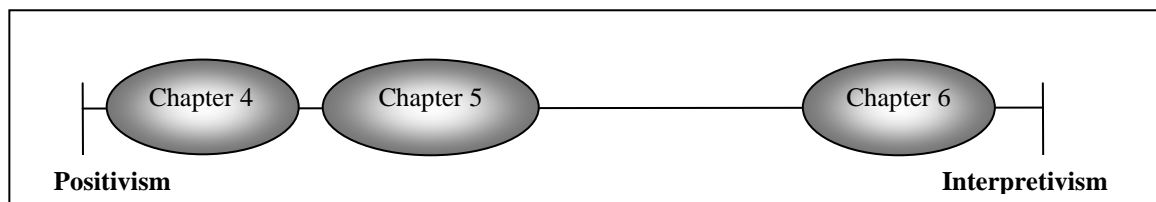
Figure 3.2 Epistemological Positioning of the Three Chapters

Chapter 4 : Stimulating Museum Visits through More Effective Websites

Abstract

Museums are popular, leisure-time cultural activities. As too is the Internet which individuals seek out to occupy and enhance their leisure time. Taking into account both of these powerful trends, it can be argued that museums should have a well-designed website in order to capture visitor attention and encourage them to make a physical visit. What is not clear, however, is whether museum websites succeed in drawing more people to museums or, rather, encourage visitors to come back to the website. In brief, are these substitution or reinforcing effects?

Indeed, website design or usability is not the only factor to have an influence on individual attitudes and intentions. Website aesthetics is another important element, especially for museums, we would posit. Furthermore, for cultural consumption, prior experience with high cultural activities and subjective norms play an important role in predicting individual behaviors.

This study draws on the literatures of human-computer interaction (usability, aesthetics) and sociology of culture (prior experience with cultural activities) to determine the influence of website design on visitor perceptions. To test our hypotheses, two free simulation experiments were conducted with college students in France and the USA. The results provide strong support for all our hypotheses. Indeed, in both studies, website aesthetics was seen as the most important criterion affecting the quality of a museum website. Furthermore, intentions to return to the website or to visit the museum are jointly predicted by website characteristics and socio-cultural variables.

Keywords: Aesthetics; Microsoft Usability Guidelines; museums; prior experience; subjective norms; Website design; Bourdieu.

1. Introduction

Prior research suggests that the Internet is increasingly being used by people in their daily life. For instance, in 2003 more than 80% of American households reported using the Internet for their hobbies, games or entertainment (Hoffman et al. 2004). It follows then that organizations in the leisure and high culture industry (or Web-design firms working for the leisure and high culture industry) need to create a well-designed website in order to catch visitor attention and induce visitors to select their activity rather than another. Indeed, several studies show that website design influences: (1) affect (Chung and Tan 2004; De Wulf et al. 2006; Zviran et al. 2006), (2) cognition (Webster and Ahuja 2006), and (3) behavioral intentions (Ranganathan and Ganapathy 2002; Sanchez-Franco and Roldan 2005; Tan and Lee 2005; Venkatesh and Agarwal 2006; Venkatesh and Ramesh 2006).

In that the Internet is used regularly by individuals to occupy and enhance their leisure time, the present research pointedly targets the design of museum websites. Museums are one of the most preferred cultural institutions in the world (Poulot 2005). After a slowing down of museum visits at the beginning of the twenty first century, the frequenting of museums is on the rise again. For instance, between 2004 and 2005, museum attendance in French museums increased 13% (Firmin-Didot 2006).

Along with this growing interest in high culture institutions, museum websites are grappling with how to improve website design (i.e.Blas et al. 2002; Cunliffe et al. 2001; Kravchyna and Hastings 2002; Marty and Twidale 2004). A 2004 survey conducted by the Institute of Museum and Library Services (IMLS) revealed that 97% of large-to-medium-sized American museums possess a website, while 78% of small museums have one (Institute of Museum and Library Services 2006). For a long time, museum professionals feared that virtual museums would replace physical museums and prevent people from coming to traditional museums (Marty 2004). But nowadays, most museum experts realize that websites

present not-to-be-missed opportunities for drawing people into their museums. Consequently, museums tend to invest more and more money on their websites in order to improve the quality of these virtual interfaces. For instance, in the years prior to 2005, the Louvre spent more than €7 million on its new website (Sauvage 2005). One could predict, therefore, that well designed museum websites should have a real potential to attract Internet visitors. And it is reasonable to believe that visitors may want to return to a "sticky" website (Rosen 2001) or even be induced to go to a physical museum, as a venue for future leisure activity.

Whereas well-wrought websites should induce behaviors and inspire visits to physical museums, prior research has not investigated this phenomenon in any depth. Furthermore, in the realm of cultural institutions, socio-cultural variables likely play an important role in future behaviors. Indeed, Bourdieu and Darbel (1969) were among the first scholars to argue that high culture was not equally appreciated across the citizenry. They noted that museum visits were highly dependent on social class and education. Therefore, it may be that the website investments suggested by Schlosser et al. (2006) and others may not be sufficient to truly attract visitors.

In addition, usability characteristics are not the only factors known to influence individual attitudes and intentions. In fact, several researchers have shown that aesthetics also play a role in individuals' attitudes and behaviors, in both offline and online contexts (Lavie and Tractinsky 2004; Schenkman and Jonsson 2000; Tractinsky and Rao 2001). Aesthetics is all the more important for museum websites because these cultural institutions have an educational mission to improve aesthetic tastes (Forbes 1941).

This leads us to our two research questions:

1. Which are stronger predictors of intentions to visit physical or virtual museums: website design or socio-cultural variables?

2. How important are aesthetics in comparison with the other usability criteria for

    museum websites?

Stated more simply, we are studying whether an aesthetically attractive and highly usable website can induce returns to that same museum website and/or draw users to a physical museum. We are also studying whether prior experience with cultural activities is a stronger predictor of these behaviors. Stated in this way, it is obvious that the study focuses on the IT artifact in its aim to "understand the relative importance of IS variables vis-à-vis non-IS variables" (Benbasat and Zmud 2003, p. 192).

To evaluate usability of museum websites, we use a metric based on the Microsoft Usability Guidelines (MUG) that was developed by Agarwal and Venkatesh (2002). Venkatesh and Agarwal (2006) encourage researchers to study usability in different contexts in order to increase the generalizability of MUG. Consistent with this suggestion, our choice is to investigate a new and different context of cultural institutions, and more particularly museums, in order to see the effects of usability and aesthetics in online environment. We also intend to study aesthetics, given that this variable has also been attributed to visitor attitudes and intentions.

This paper is organized as follows. The second section provides the theoretical background of this paper drawn on the literatures of human-computer interaction (usability, aesthetics) and the sociology of culture. The third section presents the research model and the hypotheses. In the fourth section, we describe the methodology that we implemented to test our hypotheses. In the fifth section, we present the results of this research. The sixth section discusses our findings and their limitations and draws implications for practice and research. The last section overviews the study impacts.

2. Theoretical Background

2.1 Theoretical Constructs: Usability and Museum Websites

Usability is defined as the "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." (Karat 1997, p. 34). Usability was first studied by HCI or Human Computer Interaction researchers in the process of their field trying to make artifacts more usable (Venkatesh and Agarwal 2006). Recently, Information Systems (IS) researchers have also investigated usability and issues linked to the design of systems. Given that the Internet has gained so much in importance (Palmer 2002), usability criteria are regularly developed and applied to online interfaces. Our research also studies usability of websites.

Most of prior research on website usability has been conducted on commercial or business websites (i.e., Benbunan-Fich 2001; Everard and Galletta 2005/2006; Flavian et al. 2006). Indeed, the most frequent research outcome has been purchasing behavior. Researchers, for example, argue that usability can increase on-line sales (Kuan et al. 2003; Venkatesh and Agarwal 2006). Only rarely do they focus on non-monetary outcomes.

However, Hoffman and Novak (1996) encourage researchers to study non-commercial activities. Offering a complementary point of view, Pavlou and Fygenson (2006) suggest that purchasing is not the only behavior that should be taken into account in online environment. Their study highlights an additional behavioral variable, namely, acquiring information. Bélanger et al. (2006) also emphasize the fact that most IS research has been focused on e-commerce websites. Consequently, they scope out a taxonomy of website goals that takes into account the wide variety of websites available on the Internet. In addition, Bélanger et al. (2006) explain that the success of each type of website should be assessed via specific criteria. Supporting this view, Schaupp et al. (2006) conducted two surveys with Internet users who

had to browse an Information Specific Search (ISS) website and an Online Community (OC) website. Their results indicate that success measures are context dependent.

According to the aforementioned literature, we tried first to determine specificities or unique features of museum websites before selecting and proposing a set of measures to evaluate their quality. Museum websites are more related to the "Internet presence websites" in Hoffman et al.'s (1995) typology. Indeed, the primary goal is not sales, even if some museum interfaces support purchasing through online boutiques. By way of contrast to commercial sites, "Internet presence websites," like museum sites, aim at advertising and providing information to visitors (Hoffman et al. 1995). This advertising is intended to draw more people to the museum. This supposition is supported by Lagrosen (2003) who looked at how the use of Internet by Swedish museums provided valuable online services to visitors. Indeed, Lagrosen (2003) explains that "it is the visit and the experiences that the visitors have that are the product [of museums]" (p. 134). Consequently, encouraging future visits is an important goal for museum websites. Using Belanger et al.'s (2006) typology, we can elaborate further goals for museum websites. They are "life enrichment, knowledge enhancement, online learning and entertainment". Indeed, these goals are consistent with museum missions of education and entertainment (ICOM 2002).

Based on this logic, the current research does not consider purchase intentions. Rather we investigate the behavioral intentions of returning to the website or a physical museum after visiting a museum website. Going to the physical museum clearly involves more effort than returning to a website since it implies physical travel. But, this outcome is interesting because IS research has not really investigated the link between websites and intentions to visit physical places. Similarly, few IS researchers have paid attention to the design of museum websites.

Now that we have determined the specificities and goals of museum websites, we need to select a metric to evaluate the usability of these interfaces. We note that website design has been evaluated via a wide variety of metrics. However, Treiblmaier (2007, p. 820) notices that "the same scales are developed over and over again" in website design research. Hence, the current research does not propose a new usability scale, but rather will rely on the conceptualization of usability developed by Agarwal and Venkatesh (2002) and adapted from *Microsoft Usability Guidelines* (MUG). This conceptualization employs five categories: content, ease-of-use, promotion, made-for-the-medium and emotion. We chose to use this instrument for two principal reasons. First, its five constructs have acceptable good content validity, as demonstrated by Agarwal and Venkatesh (2002). Second, this metric also provides several dimensions and sub-dimensions which enable a straight-forward assessment of different aspects of website usability. We define each of these dimensions in Appendix 4A and the categories will be also further presented in the hypothesis section. Table 4.1 below introduces prior research that was conducted with MUG and their key findings.

Prior research on MUG has shown that this set of variables play a major role in the overall assessment of a website design (Agarwal and Venkatesh 2002; Venkatesh and Ramesh 2006). We also notice that several studies have been conducted with MUG but they were mainly applied to commercial websites (Massey et al. 2007; Venkatesh and Agarwal 2006).

Table 4.1 Presentation of Previous Studies with MUG

References	Purposes	Types of IS	Key findings
Agarwal and Venkatesh (2002)	Propose a methodology to assess website usability.	21 websites from four different industries (online bookstores, automobile manufacturers, airlines, car rental agencies)	The authors develop and validate the MUG scale composed of five constructs.
Venkatesh and Agarwal (2006)	Predict purchase behaviors in electronic channels	21 websites from four different industries (online bookstores, automobile manufacturers, airlines,	Website evaluation (weights and ratings) is dependent on the type of website. MUG predicts website use and

		car rental agencies)	purchase behaviors.
Venkatesh and Ramesh (2006)	Extend the generalizability of MUG to new settings (new country, new research model and new type of IS)	Study 1: Three websites from the airline industry Study 2: Eight wireless sites and websites from four industries (banking, news, shopping, tourism)	MUG is generalizable to Finland. Weights assigned to the MUG categories in a website setting are different from the ones assigned in a wireless site setting.
Massey et al. (2007)	a) Better understand online customer needs b) Identify the factors influencing the success of online services	Two hedonic websites and two utilitarian websites Access modes: computer and pocket PC	Customer characteristics (their attitude towards Technology Readiness) influence usability perceptions. Additionally, the access mode and the type of website influence user evaluations of usability.

2.2 Aesthetics

Even though the MUG categories are generally applicable to websites, this established set of usability dimensions do not take into account the aesthetic dimension, which likely plays a role in people's perceptions (Lavie and Tractinsky 2004; Tractinsky et al. 2000), especially in the case of cultural websites. Venkatesh and Ramesh (2006) also believe that the MUG categories may not be complete and that, depending on the type of website, weights attributed to the various usability categories could differ. Thus, Venkatesh and Ramesh (2006) encourage researchers to test their validated metrics in new settings.

We propose to add the aesthetic dimension as a usability dimension for cultural settings. The American Heritage Dictionary of the English Language gives this definition of aesthetics: "an artistically beautiful or pleasing appearance'' (cited in Lavie and Tractinsky, 2004, p. 272). Prior IS research has shown that aesthetics influences attitudes and behaviors in both offline contexts and online contexts, as summarized in Table 4.2. We note that researchers tend to use different words to refer to aesthetics but the concept that they study seems to be the same.

Table 4.2 Research Literature on Aesthetics in IS

References	Concepts used for aesthetics	Types of research	Key findings
Hassenzahl (2001)	Hedonic quality	Laboratory experiment: 15 employees used and rated 3 different types of screens.	Ergonomic Quality (EQ) and Hedonic Quality (HQ) are two distinct dimensions. The first refers to task-oriented quality of a product and the second one to non-task-oriented quality of a product.
Hassenzahl (2004)	Aesthetics	2 Experiments - with 33 students who rated MP3 player covers from ugly to beautiful. - with 10 students who used an MP3 player and rated its cover.	There is no systematic relation between usability and aesthetics. ("What is usable is not necessarily beautiful and vice versa" p.331) Aesthetics belongs to hedonic attributes rather than to pragmatic attributes.
Lavie and Tractinsky (2004)	Classical aesthetics Expressive aesthetics	3 surveys: students visited a different type of website for each survey	Aesthetics has two distinct dimensions: a "classical" dimension and an "expressive" dimension. Aesthetics influence users' satisfaction and pleasure.
Lin and Gregor (2006)	Appearance	Explorative interviews with 5 museum experts	The experts believe that appearance is the most important criterion explaining enjoyment of learning on museum websites.
Schenkman and Jonsson (2000)	Beauty	Experiment : 18 students looked at 13 web pages	Beauty plays an important role in predicting the overall impression of a web page.
Skadberg and Kimmel (2004)	Attractiveness	Survey: 272 individuals recruited by email visited a tourism website	Perceived attractiveness influences flow experiences. In addition, attractiveness has a medium direct effect on change of attitude and behavior.
Tractinsky et al. (2000)	Aesthetics	Experiment: 132 students used a computer program which displayed ATM layouts	Users' perceptions of usability are strongly correlated with perceptions of aesthetics. These perceptions last through time.
Tractinsky and Rao (2001)	Aesthetics	Conceptual	The authors argue that web stores have social dimensions, including aesthetics, that could positively influence user attitudes toward the website.
Vance et al. (2008)	Visual appeal	2 free simulation experiments: 116 American and 136 French college students looked at mobile phone screens	Visual appeal positively influences perceived ease of use and trusting beliefs in the IT artifact.

Van der Heijden (2003)	Visual attractiveness	Survey with 828 users of a generic portal	Visual attractiveness increases perceived ease-of-use, usefulness and enjoyment.

As argued previously, museums can be classified as non-task oriented products since they aim principally at the *entertainment and education* of the public (ICOM 2002). Given this overlap of entertainment and education in museum missions, the most important usability categories for such websites highlighted by Zhang et al. (2001), respectively navigation and visual design, will both be relevant for museum websites. In addition, Hassenzahl (2001) points out that hedonic qualities like aesthetics will be more important for non-task oriented products.

Aesthetics should also be included in the design of museum websites because museums are supposed to be beautiful places, so, by transference, visitors will also expect their websites to be beautiful (Marty and Twidale 2004). Forbes (1941) asserts that museums should provide aesthetic experiences to the public in order to enhance learning. He also argues that art museums are the most concerned with aesthetic issues; their chief role is to display beauty to visitors. "To be effective the museum must bring beauty to buildings, their exteriors, their interiors and contents" (Forbes 1941, p. 6). More recently, Bourgeon-Renault et al. (2006) used a multi-methodology approach, relying on questionnaires, interviews and observations, in order to elicit the factors influencing the value ascribed to museums and monuments. They showed that museums able to create emotional and aesthetic visits had a higher value for visitors than places where these dimensions were absent.

As most museums now have an online presence, they should also render beauty not only in their physical displays but also on their websites. Supporting this view, Lin and Gregor (2006) interviewed five museum experts who consider appearance (colors, text, images) to be one of the most important criteria to enhance enjoyment of learning on museum websites.

Surfing on museum websites, one can notice that these interfaces do differ aesthetically from commercial websites. Indeed, museum websites tend to be very colorful: hot colors such as orange, yellow or red are commonly used. Similarly, museum websites distinguish themselves by an innovative and creative design, viz., the website structure is sometimes vertically or horizontally organized as in Figure 4.1 (Pages A and C are vertical; pages B and D are horizontal). Generally, these websites also include a lot of pictures to illustrate museum collections, as evidenced in Figure 4.1 below. These pages illustrate what is meant by aesthetics for museum websites.

A. Guimet Museum (France, museum of Asian arts); B. Van Gogh Museum (Netherlands, museum of art); C. Eternal Egypt (Virtual museum about Egypt); D. High Museum of Art (USA, museum of art)

Figure 4.1 Manifestation / Illustration of Aesthetics on Museum Websites

We believe that, in addition to usability, aesthetics will be an important category for assessing museum website design. However cultural institutions differ from commercial institutions and prior research has shown that in a museum context, socio-cultural variables influence behaviors as well (Bourdieu and Darbel 1969).

2.3 Socio-Cultural Variables

The French sociologist Bourdieu conducted research on a wide variety of topics such as education and school, tribal organization in Algeria, media and arts. His works particularly highlight the mechanisms of *domination* and *reproduction* that perpetuate the advantages of some groups, the dominants, over other groups, the dominated. Concerning the consumption of high arts, Bourdieu (1979) explained that individuals' tastes for culture are determined by economic, social and cultural capital. The more people possess capital like money or education, the more they will be able to develop tastes for culture and will be considered as a member of the dominant classes. Cultural tastes are also determined by individuals' *habitus* defined as a "system of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles which generate and organize practices and representation" (Bourdieu 1990, p. 53).

Regarding museums in particular, Bourdieu and Darbel (1969) studied those who attended European museums in order to determine the typical visitor profile of museums. In 1969, these authors were quite revolutionary in the way they approached this phenomenon. Indeed, they decided to elaborate their theory by relying on a quantitative research methodology using questionnaires and rigorous statistical analyses, while previous sociological studies developing theories about arts were mainly qualitative and much less statistics-based (Heinich 2007). Bourdieu and Darbel's study is also remarkable in the fact that several museums from five different countries were involved, namely, museums in Poland, Spain, France, Netherlands and Greece.

Bourdieu and Darbel's book, *The Love of Art: European Art Museums and their Public, has* three parts. By detailing their socio-demographic profile, the first part presents the social conditions of museum visitors. Bourdieu and Darbel (1969) point out five factors that explain museum visits. They are: education, school, income, socio-professional category and tourism. Their study revealed that the most important predictor of museum visits was

education. The *baccalauréat* French diploma granted at the end of high school is one of the main predictive characteristics of people going to museums.[1] It is also noteworthy that the social conditions of museum visitors were comparable across the five countries.

The second part of Bourdieu and Darbel's book discusses the inequality of people in the presence of high culture. Bourdieu and Darbel (1969) were among the first to argue that high culture was not equally appreciated within the population. Indeed, Bourdieu and Darbel (1969) noticed that cultural behaviors were dependent on the social class of origin. For instance, they argue that people from lower classes are less likely to practice activities like theaters or museums whereas people from upper classes highly value these activities. They explain this phenomenon by arguing that people from lower classes do not have the same "cultural needs" than people from upper classes since the former have not learnt to appreciate and understand classical arts (1969, p. 69). Therefore, people who do not have enough cultural capital (i.e., education, diploma, knowledge in arts) are less likely to visit cultural institutions such as museums. Furthermore, according to Bourdieu and Darbel (1990), "the perception of the work of art is necessarily informed and therefore learnt" and "the love of art is not love at first sight but is born of long familiarity" (p. 54). Consequently, the authors included in their survey several questions about museum practice and more generally prior experience with cultural activities.

The last part of Bourdieu and Darbel's book deals with the laws of cultural diffusion. Bourdieu and Darbel (1969) try to learn why the messages conveyed by museums are not received the same way by their public. They argue that museum messages generally require a baccalauréat to be well understood by their audience. This is the reason why undereducated people find it more difficult to appreciate museums. Moreover, Bourdieu and Darbel (1969) explain that even if the message is unified, given that museum audiences are diverse, it is

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[1] At the time of their study, 55 per cent of museum visitors in France had at least a *baccalauréat* (1969, p. 55).

improbable that the message reception can be the same for everyone. Consequently, they encourage museum curators to personalize their communication by relying on different means to reach higher versus lower classes. However, Bourdieu and Darbel (1969) also think that the principal means of arousing the interest of lower classes in museums and more generally in culture is through education and school curriculum. The authors also observe that social influence and group pressure are particularly important in the consumption of arts. To include this important finding in our research model, we decided to rely on the frequently captured construct "subjective norms". It is defined as "the perceived social pressure to engage or not to engage in the behavior" (Fishbein and Ajzen 1975).

The Love of Art accounts for cultural consumption, but this book has been critiqued by more recent studies. For instance, Prior (2005) wrote a critical essay on Bourdieu's theory of culture by comparing it with more recent postmodern theories. More precisely, Prior (2005) lists and examines three major critiques of Bourdieu and Darbel's book. First, Prior (2005) notes that Bourdieu has a static view of museums since he only presents them as a space of inequalities reproduction. In contrary, Prior (2005) believes that "the processes of commodification have placed museums alongside shopping malls within the realms of consumption and entertainment" (p. 123). Therefore, museums tend to be more accessible.

Second, Prior (2005) challenges Bourdieu's choice to study social class. Indeed, Prior (2005) explains that museum audience could be studied and segmented with other criteria such as "class, gender, sexuality, age and ethnicity" (p. 131).

Third, a new social middle class has appeared since Bourdieu's writings, which is more educated and has more diverse practices (Prior 2005). As a result, it may not be relevant to apply previous findings based on two classes, higher and lower classes, to this new group. Furthermore, the French sociologist Lahire (2004) followed up on Bourdieu's work on culture and came to different conclusions. Indeed, Lahire (2004) found that individuals, whatever

their social class, tend to develop heterogeneous practices. These "dissonant profiles" (p.13) are less determined by their *habitus* and more by the wide varieties of experience they encounter throughout their life (Lahire 2004). Consequently, people from different classes can appreciate the same experiences.

With regard to the aforementioned literature, we will not focus on social class as a factor explaining museum visits since individuals may be less influenced by their *habitus*. But we believe that *The Love of Art* still makes valid points about people's decision to visit high culture, physically or online. To capture this, we introduce "prior experience with cultural activities" and "subjective norms" as socio-cultural variables in our research model.

Table 4.3 below presents the similarities and differences between our research and Bourdieu and Darbel (1969).

Table 4.3 Comparison of our Research with Bourdieu and Darbel

	Differences	Similarities
Theory	We do not try to understand why visitor profiles are different. Actually, this research does not aim at uncovering the mechanisms of the reproduction of inequalities. We do not have a social class approach. We introduce the role played by IT in explaining museum visits and compare it with socio-cultural factors.	Like Bourdieu and Darbel (1969), we try to identify the factors encouraging museum visits. We reintroduce key socio-cultural variables: prior experience and subjective norms.
Methodology	Our research model was tested in an online environment (museum websites and web questionnaire). We were both interested in understanding intentions to visit the physical museum and intentions to return to the museum website.	We relied on a quantitative approach to collect visitor perceptions. We also used some scale items developed by Bourdieu and Darbel (1969).

3. Research Model and Hypotheses

Figure 4.2 is the research model whereby we propose to study the design of museum websites and its influence on visitor behaviors.. This model hypothesizes that usability and aesthetic perceptions form relevant categories from which to assess website design. In turn, website design plus prior experience and subjective norms influence intentions to return to the website and intentions to go to the museum. Website design is conceptualized as a second order factor. Chin (1998a, p. X) defines second order factors as "higher level of abstraction that are reflected by first order factors." Therefore, the measures of website design are formed by all the items of MUG constructs and aesthetics. Chin (1998a) also insists on the need to link second order factors to other variables of the research model in which they are used. We followed this advice by positing website design as one of the predictors of the two outcome variables (intentions).
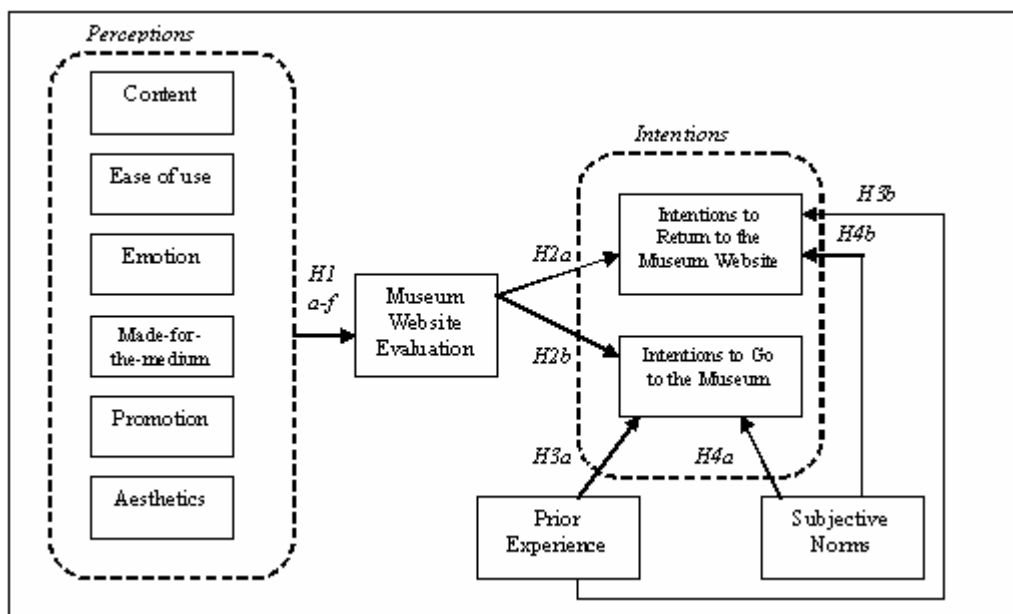
Figure 4.2 Research Model

The proposed research model has embedded within it twelve hypotheses which we introduce next.

3.1 Influence of Microsoft Usability Guidelines on Website Evaluation

3.1.1 Content

Content is the first category of MUG and is composed of four subcategories: relevance, media use, depth and breadth and current information. Gemino et al. (2006) has shown that irrelevant content in technology-mediated environments can distract users and limit their understanding. Relevant content should aim at the core audience (Keeker 1997). The core target of museum websites is people looking for practical information. Indeed, a survey made in the Canadian Heritage Information Network (CHIN) reveals that most museum website visitors are looking for details of information on the physical museum (Thomas and Carey 2005). Lagrosen (2003) also notes that museum websites are "information-intensive" technologies. Consequently, if individuals find relevant information on the museum website, it will give positive credit to the interface design.

Another criteria belonging to content is media use. Several studies account for the positive influence of media use in online environment. For instance, Gemino et al. (2006) suggest that the use of multimedia in technology-mediated collaborative environments enables individuals to enhance their knowledge production. Media use is an important criterion for a museum website since it is a good way to represent artifacts and make them more accessible. Actually, some special features like zoom or 3-dimensional technologies enable visitors to manipulate objects that they could see but not touch in the physical museum (Liew 2005). According to Liew (2005), "the nature of cultural heritage objects in museums, libraries and archives lends itself well to an online presentation. Heritage documents and artifacts are inherently three-dimensional." (p. 6). Research carried out by Vergo et al. (2001) showed that users of museum websites want more video features as they prefer to watch rather than to click. Therefore, multimedia technologies have the potential to enhance online

visits. Nonetheless, animation and multimedia can result in counterindicative effects. Indeed, Hong et al. (2004) found that flash technologies negatively influence focused attention and this technology can prevent individuals from using the website.

Depth and breadth are particularly salient in museum websites. Since museums have a mission of public education and enlightenment, the content of their website should be and generally is rich. Museum websites should try to provide more than practical information otherwise they would be classified as a "brochure museum" in Schweibenz's typology of on-line museums (2004). However, as visitors of museum websites are heterogeneous, too much content can also be confusing (Marty and Twidale 2004), particularly for people who look for basic information and do not have a lot of knowledge of high culture.

The last criterion in content category is current information. Current information reflects the accuracy of information displayed to visitors, information such as dates of exhibitions and actual events (Kravchyna and Hastings 2002). This also represents one of a visitors' expectations, and so this category can also influence their perceptions. Therefore, we propose that:

Hypothesis 1a (H1a). *A positive assessment of website content will positively influence the evaluation of the website design.*

3.1.2 Ease-of-use

The ease of use construct is composed of three measures: goals, structure and feedback. Based on Webster and Ahuja (2006), who found that poorly designed interfaces can lead to user disorientation and less engagement with the website, the structure of a website is particularly important. Webster and Ahuja (2006) go on to suggest that enhanced navigation systems using trees and visible navigation features improve both user orientation and performance with the website.

Feedback was studied in prior IS research under the concept of responsiveness, defined as "the presence of feedback to users and the availability of response from the site manager" by Palmer (2002, p.156). Palmer (2002) showed that the more responsive the website, the more successful it was perceived to be. Accordingly, we hypothesize that:

Hypothesis 1b (H1b). *A positive assessment of website ease-of-use will positively influence the evaluation of the website design.*

3.1.3 Made for the Medium

Made-for-the-medium includes three different dimensions that are community, personalization and refinement.

Museums are social settings (Hood 1983). Indeed, prior research showed that individuals often go to museums with family or friends, liking company while visiting a museum (Debenedetti 2003). When they go alone, they appreciate the possibility of meeting other people and sharing their cultural experiences. In the virtual world of the website, visitors are most often alone when they visit the museum website (Galani 2003), so they may not look for community tools. Nevertheless, the possibility of sharing comments can enhance the virtual visit.

We argue that the personalization category will be all the more important for visitors of museum websites given that museums do not have a homogeneous public. Indeed, their audience includes a wide variety of individuals like "children, students, family groups, older people, people with disabilities, local people, tourists and, people with a range of cultural or religious backgrounds" (Hooper-Greenhill 2000, p.29). Therefore, a unique content will not be attractive to all audiences (Soren 2005). Thus, it is essential to have personalization mechanisms on websites to appeal to these different types of visitors. For example, the possibility of creating a personal account and personalizing one's interface may well be appreciated. However, some individuals can be reluctant to use personalization mechanisms,

particularly when the personalization involves providing personal information (Awad and Krishnan 2006). Thus we propose that:

Hypothesis 1c (H1c). *A positive assessment of made-for-the-medium will positively influence the evaluation of the website design.*

3.1.4 Emotion

Emotion is composed of four subcategories: challenge, plot, character strength and pace.

Marty (2004) argues that with the development of on-line, interactive technologies, museum websites gain in interest and in challenge. Challenge is important because prior research shows that when people perceive a great challenge, this enhances their flow (Novak et al. 2000). Flow is defined as the "holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi 1975, p. 36). In addition, Rand (2000) created a Bill of Rights in order to raise awareness of the visitor expectations that museums should take into account. Challenge was one of these expectations. Indeed, visitors do not want to be treated as passive individuals and they rather appreciate challenging content (Rand 2000).

Plot refers to the capacity of a website story line to arouse visitor interest. It allows visitors to feel more engaged and concerned with the website content. "Clear, simple, and compelling stories and themes are very important. They give users an opportunity to relate to the exhibit content, and lend the exhibit a feeling of credibility and authenticity" (Soren 2005, p. 145). Indeed, Chronis (2005, p. 219) showed that the "cultural narrative" within a museum, which is the narration associated with a cultural artifact, helps visitors enjoy their visit. Therefore, a good plot both in the physical museum and in the website can positively influence individual attitudes.

Character strength relates to the credibility of the website. As trust is an important factor influencing online behaviors (Gefen and Straub 2003; Pavlou and Gefen 2004), conversely there is a link between website credibility and individual responses to the website. Museum websites will be perceived to have higher or lower character strength. Indeed, museums are cultural institutions in which people trust (Anani 2005) because they represent and preserve our history (Rieu 1988). Therefore, museums "have an established reputation for quality of information provision, objectivity, authority and so on" (Cunliffe et al. 2001, p. 229).

The pace of a website refers to its download delays (Palmer 2002), termed also download time (Rose and Straub 2001). Prior research shows that website delays are strong predictors of overall attitudes towards the website. When delays increase, visitor attitudes, intentions and behaviors are negatively impacted (Galletta et al. 2004; Rose et al. 2003; Rose and Straub 2001). Galletta et al. (2004) set up an experiment where they varied download delays from 0 to 12 seconds. They concluded that even small variations have significant impacts on user response. Ryan and Valverde (2006) shed a new light on download delays in online environment. They found that user responses to download delays were more related to the "importance attributed to the task" than to the type of the task (p. 199). In the context of museum websites, the key visitors are those individuals who want to get practical information like hours of entry, prices or programs of exhibitions. Consequently, these visitors do not want to spend too much time on the museum website. Other visitors like researchers or professionals visit museum websites to download resources. They will also be sensitive to download delays. Thus we propose that:

Hypothesis 1d (H1d). *A positive assessment of website emotion will positively influence the evaluation of the website design.*

3.1.5 Promotion

Song and Zahedi (2005) suggest that promotion is particularly important for beliefs about perceived price. As few museum websites support e-commerce transactional activities and as purchasing is not the focus of our research, we do not believe this category will have a great influence on individuals' attitudes toward museum websites. However, prior research with MUG has shown that this variable can play a role in the overall assessment of a website design (Agarwal and Venkatesh 2002; Venkatesh and Agarwal 2006; Venkatesh and Ramesh 2006). Therefore we hypothesize that:

Hypothesis 1e (H1e). *A positive assessment of website promotion will positively influence the evaluation of the website design.*

3.2 Influence of Aesthetics on Website Evaluation

Prior research indicates that users are sensitive to website aesthetics. For instance, Skadberg and Kimmel (2004) highlighted the fact that website attractiveness positively influences the "flow" experiences of users. They also noticed that attractiveness ranks first among the website features that can contribute to the quality of online experiences. Furthermore, Van der Heijden (2003) showed that visual attractiveness is related to increased perceived ease-of-use, usefulness and enjoyment, which suggests mediating effect on attitude. Schenkman and Jonssson (2000) explain that beauty plays an important role in predicting the overall impression of a web page. Likewise, aesthetics influences user satisfaction and pleasure (Lavie and Tractinsky 2004). Therefore, we propose that:

Hypothesis 1f (H1f). *A positive assessment of website aesthetics will positively influence the evaluation of the website design.*

3.3 Influence of Website Design on Intentions

There are numerous studies showing that the efficiency of a website design has positive consequences on behaviors and intentions. For instance, Flavian et al. (2006) studied the reactions of Internet users and found that highly usable websites were positively related to trust and loyalty. Therefore, the more people perceive the website to be usable, the more they will demonstrate their loyalty by visiting it frequently. Likewise, Schaupp et al. (2006) examined the influence of different success measures on intentions to reuse a website. Their results indicate that the design characteristics of a website (in their study, they were information quality, perceived effectiveness, system quality and social influence) significantly impact user satisfaction with the website.

Hypothesis 2a (H2a). *A positive assessment of website design will positively influence intentions to return to the museum website.*

Hypothesis 2b (H2b). *A positive assessment of website design will positively influence intentions to go to the museum.*

3.4 Influence of the Socio-Cultural Variables on Intentions

Bourdieu and Darbel (1990) found that prior experience was relevant in the context of cultural practices. More precisely, they explain that familiarity with cultural institutions is a prerequisite for repeated museum visits. Therefore, our research will try to demonstrate that prior experience with cultural activities is a factor influencing behavior. We hypothesize the following:

Hypothesis 3a (H3a). *The more prior experience with cultural activities, the greater will be the intentions to return to the website.*

Hypothesis 3b (H3b). *The more prior experience with cultural activities, the greater will be the intentions to visit the physical museum.*

Bourdieu's theory accounts for the role played by relatives and other intimates thought to have a disproportionate influence on high culture choices. In a qualitative study, Burton (2003) identified six consumer patterns for leisure consumption. One of them is the category of "peer driven" consumers who rely on others' decisions to choose their cultural activities (p. 66). As a result, friends, family or media can influence intentions, particularly for young people who care about their self image. To capture the role played by those close to an individual, we will take into consideration the concept of subjective norms introduced by Fishbein and Ajzen (1975). Moreover, prior research shows that people often go to museums with family or friends, since they enjoy company while visiting a museum (Debenedetti 2003). Therefore, personal relationships can influence decision to visit a museum. Accordingly, we hypothesize that:

Hypothesis 4a (H4a). *Subjective norms will positively influence intentions to return to the website.*

Hypothesis 4b (H4b). *Subjective norms will positively influence intentions to visit the physical museum.*

3.5 Control Variables

This study takes into account a few relevant control variables, namely, national culture, perceived cost, preference for a type of museum, and demographics (age and gender). We posit that these variables may explain some part of the variance. Therefore, control variables will allow us to compare theoretical antecedents to rival explanations.

Our varied hypotheses are summarized in Table 4.4 below.

Table 4.4 Summary of the Twelve Hypotheses

Hypotheses number	Hypotheses Statement
H1a	A positive assessment of website content will positively influence the evaluation of the website design.
H1b	A positive assessment of website ease-of-use will positively influence the evaluation of the website design.

H1c	A positive assessment of made-for-the-medium will positively influence the evaluation of the website design.
H1d	A positive assessment of website emotion will positively influence the evaluation of the website design.
H1e	A positive assessment of website promotion will positively influence the evaluation of the website design.
H1f	A positive assessment of website aesthetics will positively influence the evaluation of the website design.
H2a	A positive assessment of website evaluation will positively influence intentions to return to the museum website.
H2b	A positive assessment of website evaluation will positively influence intentions to go to the museum.
H3a	The more prior experience with cultural activities, the greater will be the intention to return to the website.
H3b	The more prior experience with cultural activities, the greater will be the intentions to visit the physical museum.
H4a	Subjective norms will positively influence intentions to return to the website.
H4b	Subjective norms will positively influence intentions to visit the physical museum.

4. Methodology

4.1 Research Design

Our research model was tested by means of a free simulation experiment (Fromkin and Streufert 1976), as previously employed in the research of Gefen and Straub (2000) and Gefen and Straub (2003). In this experimental methodology, the researcher has relatively less control over the manipulated independent variables and the subjects' approach to the experimental task (Straub et al. 2004b). Furthermore it is a free simulation because there are not treatment conditions, but rather a stimulation to which subjects can freely respond. Thus, the values of the independent variables can vary freely with respect to subject interactions with the system. Generally, the free simulation experimentation is used when the researcher wants to be as close as possible to the real world. For this study, subjects were stimulated to visit two museum websites. The independent variables that varied freely with their responses were the established usability variables. We also had less control over the subjects since the experimentation occurred outside the laboratory setting.

4.1.1 Stimulus Websites

Two museum websites were selected for the free simulations. One is the website of the Quai Branly Museum, a French museum dedicated to African, American, Asian and Oceania arts and history. This website was chosen because of its numerous features and aesthetical characteristics.

The other interface was the Atlanta Historic Center, an American Museum dedicated to the national and regional history of Atlanta. This second website was a convenience choice since we wanted the second website to be more or less equivalent to the Quai Branly website (dedicated to art/history) and be located in Atlanta. As a result, the Atlanta Historic Center website appeared as the closest to the Quai Branly website. We checked the quality of these two website designs and concluded that both websites satisfied the condition of reasonably good design.

We chose these two countries as settings for our experiments because most of Bourdieu's work on cultural practices has been replicated or extended to the American people by DiMaggio (1982; 1985). Therefore, applying Bourdieu and Darbel's (1969) arguments to the American public is possible.

4.2 Sampling Procedures

The sample of this study consists of 230 college students from two different countries. For the US sample, 97 participants come from a large Southern American university. They were offered course credit for visiting the website of the Atlanta History Center and filling in the Web questionnaire. Most were enrolled in business and computer information systems courses. The second sample was 133 French participants, students at a French university located within Paris. These subjects were invited to visit the Quai Branly website. These students were also principally enrolled in business and management courses. The response

rate was 51.46% for the American sample and 44.52% for the French sample. Student participation was voluntary and informed consents were collected at the beginning of each session. Furthermore, to ensure that the participants would not be reluctant to physically visit the museum because it was too far away, we selected museums that were located near-at-hand.

Therefore our results will mainly be generalizable to other college students, but this sample appears to be relevant for two reasons. First, museums are increasingly targeting young people to broaden their audience and find new donators (Kotler 2001). Second, college students also represent the largest category of Internet users (Hoffman et al. 2004).

4.3 Research Instrument and Experimental Procedures

The data collection technique was a Web questionnaire with a cross sectional design (Straub et al. 2004b). This instrument was developed using existing scales. The MUG items come from Agarwal and Venkatesh's research (2002) but we created another single, reflective item for "promotion." Actually, Agarwal and Venkatesh (2002) just provide one item to assess promotion. The subjective norms construct was adapted from Fishbein and Ajzen (1975), and the intention constructs from Pavlou and Gefen (2004). The aesthetics items were originally developed by Lavie and Tractinsky (2004). And last, "prior experience with cultural activities" was adapted from Bourdieu and Darbel (1990). All the constructs were measured with seven-point Likert scales, except "prior experience" which was assessed with a six-point frequency scale (1= Never, 2=once a year, 3= three or four times a year, 4= once a month, 5= twice a month, 6=once a week). Detailed information about the constructs is provided in Appendix 4B. A pretest with twenty subjects was conducted one month before the launch of the study and led to the reformulation and clarification of some questions.

Using the same technique employed by Agarwal and Venkatesh (2002), there were two stages to the data collection. The first part aimed at assessing the weight of each usability category. Participants distributed a total of 100 points across the five categories of usability plus the additional category of aesthetics. For this trial, therefore, the total was divided by six (and not by five as in Agarwal and Venkatesh, 2002). This first part gave us insight into the relative importance of aesthetics compared to usability categories for museum website evaluation. The second part of the instrument dealt with the other research variables. It enabled us to test our hypotheses and to answer our research questions. Furthermore, several questions were included to control for subjects' interests in museums in general and in particular since there are different types of museums (e.g., art, history, and science museums). Once the questionnaire had been developed, we published it on a website dedicated to our study. This website also offered complementary information to participants, more particularly, the informed consent, some instructions on how to take part in this experiment, and hyperlinks to the museum websites.

Participants were invited to engage with the website as if they were a potential visitor of the museum website. To help them while browsing the website, we suggested four principal sections of the website that should be of general interest for museum visitors. They were: "Practical Information", "Collections", "Games/ Interactive Activities" and the "Museum History". These suggested sections existed on both websites, which enabled us to replicate the same scenario with both samples. However, the participants were also free to visit any other sections that could be relevant and interesting to them. This autonomy is congruent with the free simulation methodology where researchers have less control over participant interactions. Appendix 4C shows some screenshots of our online survey.

5. Data Analysis

The descriptive statistics were computed using SPSS 12.0 and the other data analyses were performed with SmartPLS 2.0 (Ringle et al. 2005). There are several reasons for using Partial Least Squares rather than other SEM software packages such as LISREL. First, our research model includes a number of formative constructs. Since PLS facilitates the specification of reflective and formative constructs, it better suited the testing of our hypotheses. Second, our two samples were relatively small for LISREL, which generally requires samples larger than 200. Gefen et al. (2000) recommend a minimal sample size of at least ten times the number of items in the most complex construct when using PLS. Our most complex construct, which is "prior experience", has five items so fifty participants is the minimum sample size required for this research. Our pooled sample was composed of 230 participants (97 for the USA and 133 for France), which is well above this minimum. Furthermore, Goodhue et al. (2006) tested the statistical power of PLS with different sample sizes and they found that PLS does not necessarily work better with small sample size. Table 4.5 provides details regarding the profile of our participants.

Table 4.5 Descriptive Statistics

	Study 1 French Sample	Study 2 American Sample
N	133	97
Age (S.D.)	22.59 (4.14)	26.4 (9.27)
% Male	29.3	46.4
% Female	70.7	53.6
% Undergraduate	82	99
% Graduate	18	1
Number of visits to the museum	Quai Branly	Atlanta History Center
- Never (%)	87.2	75.3
- 1-5 visits (%)	12.8	22.9
- More than 5 visits (%)	0	1.8
Familiarity with the website (S.D.)	4.86 (1.10)	5.15 (1.11)
Number of visited	3.32 (0.90)	2.88 (1.10)

sections (S.D.)		
Time spent on the website	0-5 minutes: 16.5% 5-10 minutes: 43.6% 10-15 minutes: 24.8% >15 minutes: 15.1%	0-5 minutes: 17.5% 5-10 minutes: 44.3% 10-15 minutes: 25.8% >15 minutes: 12.4%

We report hereafter the results of our research model testing. Study 1 corresponds to the study conducted with the French participants who visited the French website and study 2 refers to the American students who visited the American website. In this research, we have not posited any hypothesis about national culture even though two different countries were involved. We rather view study 2 as a replication of study 1 in order to extend the generalizability of our results.

5.1 Study 1: Analysis of the Research Model with the French Website

5.1.1 The Measurement Model

The measurement model examines the relationship between the latent variables and their respective items (Chin 1998b). Therefore, to assess the measurement model, we examined the psychometrics properties of our items. More particularly, we determined the validity and reliability of our measures.

Several researchers have encouraged assessing construct validity and reliability of the measures before embarking on hypotheses testing (i.e.Campbell and Fiske 1959; Straub 1989; Trochim 2001). Trochim (2001) argues that it is important to ensure that the measures adequately reflect their latent variables. Therefore, he considers construct validity to be "the overarching quality of measurement". Accordingly, we assessed first the measurement model before testing the structural model and the significance of our hypotheses. Next we report the results of our tests.

Since we had two types of constructs, we had to perform distinct analyses for each type. For instance, we paid attention to loadings when analyzing our reflective constructs and to weights for our formative constructs. Similarly, validity and reliability were obtained with different statistical techniques.

- *Analysis of the reflective constructs*

Chin (1998b) explains that reflective constructs should be validated with PLS through Composite Reliability, Average Variance Extracted (AVE) and Cross-Loadings. More particularly, these tests enable to determine reliability (Composite Reliability) and discriminant/convergent validity (Cross-Loadings and AVE). Gefen et al. (2000) state that convergent and discriminant validity is achieved when "the AVE of each construct is larger than its correlation with the other constructs" (p. 37). Looking at Table 4D.1 in Appendix 4D, we can observe that all the loadings are well above the threshold value of 0.70 recommended by Nunnally (1967). AVEs, ranging from 0.812 to 0.931, are also well above the threshold value of 0.50, demonstrating good convergent validity for each construct. Furthermore, the T-values indicate that the loadings are all significant at a level of $p<0.05$.

Table 4D.2 in Appendix 4D helps to assess the discriminant and convergent validity of our six reflective constructs. All items exhibit high loadings and cross-loadings on their respective constructs and pass the AVE tests for convergent and discriminant validity.

- *Analysis of the formative constructs*

Formative constructs differ from reflective constructs because they are caused by their items rather than be reflected by them (Bollen 1989). Therefore, the items determine the content of the construct. Furthermore, the items represent different dimensions of the formative constructs. For this reason, in case of low validity, they cannot be deleted without theoretical considerations (Petter et al. 2007).Very recently, Petter al. (2007) highlighted the fact that few IS researchers have correctly identified the nature of their constructs, what can

lead to Type I and Type II errors (the error of detecting a significant effect when there are not and vice versa). As a consequence, Petter et al. (2007) propose a thorough analysis of formative constructs by showing their specificities providing a detailed guideline on how to validate and use such constructs. We relied on their suggestions to validate our five formative constructs: content, ease-of-use, made-for-the-medium, emotion and prior experience with cultural activities. We also followed the approach employed by Loch et al. (2003) to construct a Multi Trait Multi Method matrix (MTMM) to evaluate the construct validity of the formative constructs.

Appendix 4E shows that each formative items load more highly on their respective construct than on other constructs. Some values are under the threshold of 0.70 indicated for reflective constructs. However, for formative constructs, we need to analyze the weights and not the loadings. We can see that only one item does not significantly correlate to its construct: it is WCUL2, which corresponds to the weighted item CUL2 (prior experience with concerts). We decided to retain this measure since for formative construct each dimension explains a facet of the construct. This result is not surprising in comparison to Bourdieu and Darbel's (1990) findings because they also found that experience with concerts was the variable that correlated lowest with the other cultural activities.

5.1.2 The Structural Model

The structural model refers to the relationships (paths) between the different latent variables (Chin 1998b). Hence, in this second step, we looked at the path coefficients in order to determine the significance of our hypotheses. Testing the model, we found a reasonable percentage of explained variance for our dependent variables. Explained variances for our dependent variables are the following. "Website evaluation" has an R^2 of 0.996, which is

normal for a second order construct that generally has a value close to 1.0. "Intention to return to the website" has an R^2 of 0.273 and "intention to go to the museum" has an R^2 of 0.238.

As shown in Figure 4.3, all the hypotheses were validated, providing strong support for our research model. Path coefficients range from 0.123 to 0.529 and are all significant at the .05 alpha level. More specifically, the six criteria retained to evaluate the website design all have a significant positive effect on website design, supporting H1a to H1f. We note that aesthetics is the most important variable influencing the evaluation of museum website, as shown by the magnitude of the path (B=0.529, p<0.001).

As hypothesized, positive assessment of the website usability positively influences both intentions to return to the website (β=0.367, p<0.001) and intentions to visit the physical museum (β=0.178, p<0.05). So H2a and H2b are validated.

In addition, the socio-cultural variables play a significant role on intentions. Prior experience has a positive impact on intentions to return to the website (β=0.202, p<0.01) and to go to the museum (β=0.151, p<0.05) supporting H3a and H3b. Subjective norms have a positive influence on intentions to return to the website (β=0.241, p<0.01) as well as intentions to visit the museum (β=0.413, p<0.001).
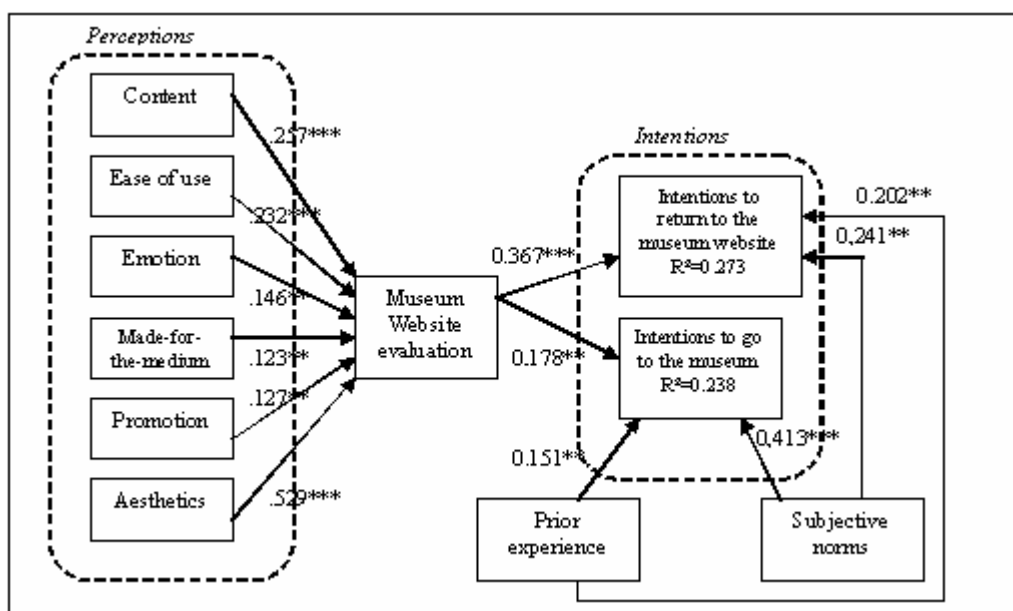
Figure 4.3 Research Model and Path Loadings for Study 1

5.2 Study 2: Analysis of the Research Model with the American Website

We performed identical analyses in study 2. We first validated the measurement model and then the structural model. The formative and reflective constructs also demonstrated good reliability, convergent and discriminant validity. As shown in Figure 4.4, once again all the hypotheses were validated, providing strong support for our research model. Path coefficients range from 0.129 to 0.622 and are all significant at the .05 alpha level. Furthermore, our research model explains a very substantial percentage of variance with $R^2=0.65$ for intentions to visit the website and $R^2=0.54$ for intentions to go to the museum.
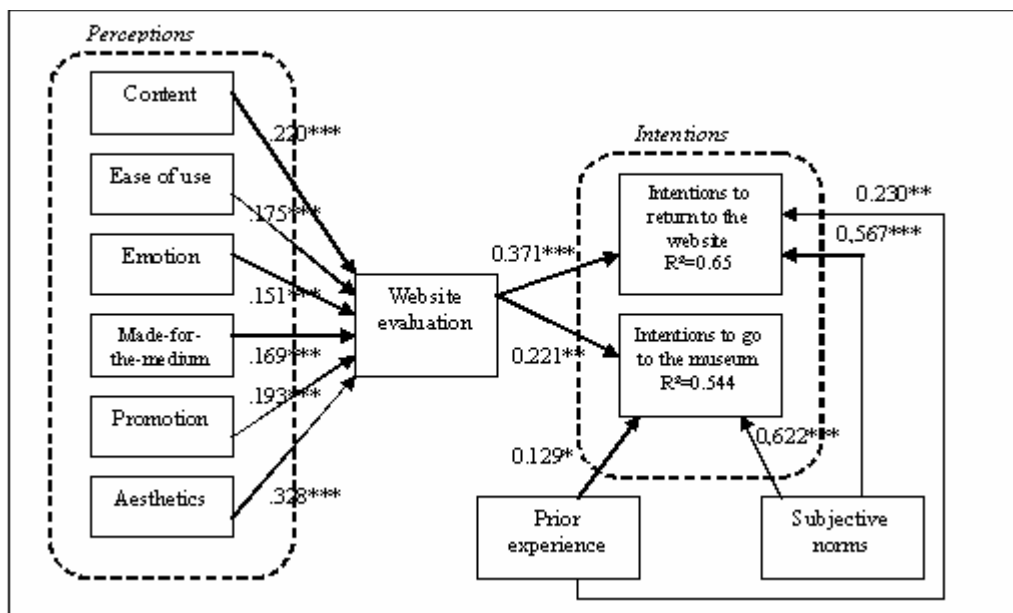
Figure 4.4 Research Model and Path Loadings for Study 2

5.3 Synthesis of the Two Studies

Table 4.6 below summarizes the path coefficients and the significance level for the two studies and show that all our hypotheses are supported in both studies.

Table 4.6 Summary of Path Coefficients and Significance Levels for the Two Studies

Hypotheses	France		USA		Supported?
	Path coefficients	T-value	Path coefficients	T-value	
H1a. Content → Website design	0.257	7.31***	0.220	9.80***	Yes
H1b. Ease of use → Website design	0.232	7.32***	0.175	7.82***	Yes
H1c. Made-for-the-medium → Website design	0.123	2.97**	0.169	7.74***	Yes
H1d. Promotion → Website design	0.127	3.03**	0.193	8.71***	Yes
H1e. Emotion → Website design	0.146	4.14***	0.151	6.42***	Yes
H1f. Aesthetics → Website design	0.529	10.59***	0.328	13.12***	Yes
H2a. Website design → Intention to use website	0.367	5.71***	0.371	5.82***	Yes
H2b. Website design → Intention to visit museum	0.178	2.19*	0.221	2.66**	Yes
H3a. Prior experience → Intention to visit museum	0.151	2.13*	0.129	2.13*	Yes
H3b. Prior experience → Intention to use website	0.202	3.18**	0.230	3.37**	Yes
H4a. Subjective norms → Intention to visit museum	0.413	5.47***	0.622	8.64***	Yes
H4b. Subjective norms → Intention to use website	0.241	3.35**	0.567	7.48***	Yes
Notes: * $p<0.05$; **$p<0.01$; ***$p<0.001$ We used bootstrapping with a 200 re-sampling procedure to determine the T-values of our coefficient paths.					

Before discussing these results, we tested the influence of five covariates on our outcome variables. Table 4.7 displays the significance of these variables for our two samples. Perceived cost of a museum ticket has no significant effect on the intentions. To the contrary, preference for a type of museum (art, science or history) plays a significant role for the two intentions in both countries.

In order to measure the influence of national culture, we pooled our data into a single sample of 230 data points. Then, we created a binary variable, where 1 was used for the American sample and 0 for the French sample. The results indicate that culture plays a role in

intentions to visit museums. The influence of age is significant in our French sample but not in the American one. And last, gender does not play a significant role.

Table 4.7 Influence of the Covariates

	France		USA	
	Intentions to return to the website	Intentions to visit the museum	Intentions to return to the website	Intentions to visit the museum
Perceived cost of museum ticket	-0.003 *(N.S.)*	-0.025 *(N.S.)*	0.022 *(N.S.)*	-0.003 *(N.S.)*
Preference for a type of museum	0.197**	0.487***	0.176**	0.211**
National culture (pooled data: 1=USA and 0= France)	Intentions Website: -0.096 (*N.S.* ; T=1.90) Intentions Museum: -0.176** (T= 3.30)			
Age	0.124*	0.177**	0.084 *(N.S.)*	0.147*
Gender	0.096 *(N.S.)*	-0.015 *(N.S.)*	0.062 *(N.S.)*	0.016 *(N.S.)*

N.S.: non significant at .05 alpha level

We also tested the relationship that intentions to return to the Websites have with intentions to visit the physical museum. More precisely, we wanted to determine whether there was a substitution effect or a reinforcement effect between these two media. In order to test this relationship, we performed a Chi-square test that is a nonparametric test of marginal probabilities.

Table 4.8 Chi-Square Test of the Reinforcing or Substitution Effect Between the Two Media

		Intentions to visit the museum (2 items)		Total
		Low	High	
Intentions to visit the website (2 items)	Low	84	30	114
	High	29	84	113
Total		113	114	227

The Chi-Square test is significant (Chi²= 52,34; df= 1; p<0.000). Therefore, we can interpret the numbers of Table 4.8. We observe that the highest numbers are for low/low quadrants and high/high quadrants, suggesting a reinforcing effect of the two media. Actually, the higher the intentions to return to the website are, the higher the intentions to visit the museum will be. The results off quadrants suggest a substitution effect, but since they are lower it is the reinforcing effect that predominates in this research.

6. Discussion

All our hypotheses were validated in both studies, supporting the thesis that website design influences user intentions with respect to museums. More specifically, in response to our first research question, we see that the strongest predictor of "intentions to return to the website" is the website design for the French participants, while it is subjective norms for the American participants. The strongest predictor of "intentions to visit the museum" is subjective norms for both countries.[2] Therefore, we can assert that well designed websites encourage visitors to return to the website and arouse their interest to visit the museum. And the link between the virtual interface and the physical setting is empirically established. This statement is consistent with recent research that indicated Internet to have a reinforcing effect on physical visits (Griffiths and King 2008). Actually, Griffiths and King (2008) showed that the more people use Internet, the more likely they are to visit in-person museums.

The socio-cultural variables also play a predominant role. Indeed, our research confirms Bourdieu and Darbel's argument that subjective norms influence high culture practice. We reinforce their argument by stressing the fact that a museum visit is a social activity (Debenedetti 2003). Since people go to museums to have a social interaction (Debenedetti 2003), the perceptions of people close to them towards museums are essential. It

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[2] We notice that the results are different between the two countries, revealing one of the limitations of our research and suggesting that national culture should be studied further.

is noteworthy that the role of subjective norms persists even in the online context and is stronger for the American sample. Lahire (2004) explain that the most important characteristics of individuals between 12 and 25 years old are the constraints surrounding and influencing their lives. In effect, young people often face and are influenced by both school constraints, parental constraints and peer constraints.

Unexpectedly, prior experience, which is our other socio-cultural variables, plays a less important role than website evaluation in determining intention to visit museums. The minor effect of prior experience as predictor of museum visits can be explained by the set of activities included in the scale (attendance at theaters, opera, concerts, cinema, monuments, and museums). Actually, it seems that these aforementioned activities are not always relevant to assess cultural capital. More precisely, DiMaggio and Mukhtar (2004) found that arts participation is evolving: "a change is occurring in the composition of artistic cultural capital in response to societal trends towards multiculturalism and greater inclusivity" (p. 190). DiMaggio and Mukhtar (2004) argue that some traditional activities are in decline, such as ballet, while new activities, like computer games and Internet, are increasing. Hence, our scale of experience with cultural activities could be enriched by these elements.

In response to our second research question, our results in both countries indicated that aesthetics is the most important variable influencing the evaluation of museum website. Consequently, this study confirms prior research that reports the importance of aesthetics for hedonic information systems (Valacich et al. 2007; Van der Heijden 2004). Actually, Valacich et al. (2007) explained that "representational delight" (p. 86), which is the aesthetic characteristics of an interface, should be the most important goal for hedonic websites.

6.1 Theoretical Contributions

This research makes several contributions. First, we apply MUG to a new context, namely, museum websites. This contributes to MUG generalizability, as encouraged by Agarwal and Venkatesh (2002; 2006), and it also provides insight into a new domain. Indeed, most research in usability concerns business websites while specific domains in the cultural heritage sector have only been lightly studied. We believe that museum websites represent a new context of technology use that differs from commercial websites. Among others, Orlikowski and Iacono (2001) encourage researchers to study IT in different contexts of use and, by doing so, to analyze the differences produced by these new contexts. "Letting go of a monolithic view of technology implies recognizing that technologies such as the Internet and other distributed applications do not provide the same material and cultural properties in each local time and context of use" (Orlikowski and Iacono 2001, p.132).

Furthermore, we took into account a new variable overlooked in the MUG conceptualization, specifically, the aesthetics of the website. Several studies have already suggested the inclusion of this variable in evaluating websites and our research confirms prior work by showing that aesthetics is as important as usability for potential museum users.

Second, this research integrates IS usability research with the theory of high culture to take into account the richness and specificities of our research context. More particularly, we applied the sociological theory of Bourdieu and Darbel (1969). Bourdieu has already been introduced and used in IS research by researchers such as Kvasny (2002) and Levina and Vaast (2005). This work follows up on these IS studies by legitimating the role played by sociological factors in IS research. However, in the present study, we also explore another facet of Bourdieu's work, which is how cultural practices function and we use his conceptualization to measure its influence on the use of museum websites. In addition, employing Bourdieu's work enabled us to add theoretical grounding for the concept of subjective norms.

6.2 Managerial Contributions

This research also has practical and managerial implications for museum directors and designers of websites. First, the application of MUG to the museum context is a good way to evaluate whether these websites meet visitor expectations. According to the Digicult European Report (2002), visitor expectations for cultural institutions are that they deploy user-friendly applications, produce simple and accessible information and relevant content, show dynamic artifacts, employ interactivity, present full-documented collections in engaging ways, and allow the creation of personal collections. It is noteworthy that these expectations can be addressed through the usability and aesthetics categories being assessed in our study.

Second, we examined whether excellence in the usability designs of museum websites plays a role in attracting new visitors who have never been to the physical museum or existing visitors who have already been to the physical museum. It appeared that websites are a good way of attracting young persons to museums. This result also supports the idea formulated by Kotler (2001) who argues that "building well-designed websites is another pathway to museum experiences beyond museum walls" (p. 422). Indeed, museum websites represent an alternative to people who may be interested in museological content but who are unable or not willing to visit the physical setting. Hence, museum professionals can use their websites to communicate with their public. Furthermore, our results can encourage designers of museum websites to improve the usability and appearance of their online interfaces. If museums want to use Internet effectively as a medium to broaden their audience, they should try to do more than just providing information on the website. Other elements like the use of multimedia, emotional content or aesthetic interface tend to influence attitudes and behavior, as suggested by the positive influence of MUG categories on intentions. However the role of the website can be nuanced since young people seem to be also dependent on the perceptions of those

close to them towards museums. As a result, discount prices for two or more visitors, and a free pass for the accompanying person may be an effective marketing solution suggested by this research.

6.3 Limitations and Future Research

We identify three principal limitations for this research. First, even though we wanted our research design to be as close to reality as possible, the free-simulation experiment does not include any manipulation. Therefore, a true experimental design could be implemented in order to manipulate the characteristics of the website design and see the relative importance of each variable in determining the intentions. Second, we studied two interfaces and measured the influence of several control variables such as the preference for a type of museum. However, it would be very interesting to compare different types of museum websites in order to extend the generalization of our findings. For instance, comparing the websites of science, art and history museums could add a broader perspective. Third, this research did not investigate the affective reactions that can appear with website design. Indeed, several studies showed that website design influences affect (Chung and Tan 2004; De Wulf et al. 2006; Zviran et al. 2006). As a consequence, it is reasonable to think that the design of museum websites can also be related to emotional reactions such as enjoyment and flow on a positive side or frustration and anger on a negative side.

7. Conclusion

In conclusion, this research attempts to determine the potential of museum websites for attracting visitors either to return to their websites or to visit physical museums. As noted, website design has been principally studied via usability criteria on commercial websites. Therefore, we decided to take into account a variable that has recently gained interest in HCI,

namely aesthetics. To enrich this research conducted on museum websites, we also relied on the sociology of cultural consumption, and more particularly on the work of Bourdieu and Darbel (1990).

Future research can extend this research by investigating in greater detail the possible link between prior museum visits to museums and attitudes toward the website. In fact, it is reasonable to think that a museum visit can prompt a website visit because visitors may want to complete their knowledge and obtain further information on the exhibition they have just previewed. But all such assumptions certainly need further testing.

Appendix 4A: Definition of MUG Categories

Table 4A.1 Definition of MUG Categories and Illustration with Features

Constructs	*Items*	*Explanations from Agarwal and Venkatesh (2002, p.176)*	*Possible features on museum website*
Content	Relevance	"The extent to which a Web site offers content that is relevant to the core audience."	Practical information (opening hours, prices, maps, location), "plan your visit", multiple languages, FAQ
	Media use	"The extent to which a Web site uses media appropriately and effectively to communicate the content."	360° virtual tours, audio content, mini website (for temporary exhibition), video content, images/photos, paintings, zoom, possibility to manipulate artifacts, 3-D, plug-in (i.e. Acrobat, Media player, Flash, Quicktime, etc.) with its link to be directly downloaded, print functions.
	Depth and breadth	"The extent to which a Web site provides the appropriate breadth and depth of content."	Variety of information (resources for education, research, entertainment), reports, databases, in-depth studies, glossary, search engine, archives, number of artifacts displayed on the website, games, conferences, history and missions of the museum,
	Current information	"The extent to which a Web site provides current and timely information."	Updated content, calendar with the dates of exhibitions, monthly agenda.
Ease-of-use	Goals	"The extent to which a Web site offers clear and understandable goals."	Promotion of the most exciting content (i.e. presence of a virtual tour on the website or a new exhibition are well announced), distinguishable areas, meaningful label sections.
	Structure	"The extent to which a Web site is well structured and organized."	Presence of (valid) navigation links and buttons, instructions for complex tasks (help facility), possibility to access home page and menu on different pages.
	Feedback	"The extent to which a Web site provides clear and understandable results and feedback regarding your progress."	Provide location feedback (headings, site map), recurring references and themes, warn visitors before long download.
Made-for-the-medium	Community	"The extent to which a Web site offers you the opportunity to be part of an online group or community."	Possibility to send an URL or e-cards to a friend, to recommend pages, presence of blogs or forums to express one's opinion, newsletters.
	Personalization	"The extent to which a Web site can treat you as a unique person and respond to your specific needs."	Special content/organization for each type of target (scholars, students, professionals, family, children…), creation of accounts/profiles, possibility to save favorite content in one's account.

	Refinement	"The extent to which a Web site reflects the most current trend(s) and provides the most current information."	Notifications of new content and modifications on the website.
Emotion	Challenge	"The extent to which a Web site offers you an element of challenge."	Complexity and originality of the website, artifacts are linked (i.e. "see also" sections or related work), search in collections can be made with text, date, or images
	Plot	"The extent to which a Web site provides an interesting story line."	Attractiveness of the script, suspense, interpretation is put forward.
	Character strength	"The extent to which a Web site ties to individuals, within and outside the organization, who have credibility."	Persuasion degree of the narrator, different perspectives for narration.
	Pace	"The extent to which a Web site allows you to control the pace at which information you interact with it."	Download delay, useful and relevant content.
Promotion		"…Captures the advertising of a Web site on the Internet and other media"	Advertisement of the museum on other websites, presence in electronic engines and online directories, electronic banners.

Appendix 4B: Constructs Operationalization

Constructs	Code	Question wording
Content Agarwal and Venkatesh (2002)	CON1	The website offers content that is relevant to the core audience
	CON2	The website uses media appropriately and effectively to communicate the content.
	CON3	The website provides the appropriate breadth and depth of content.
	CON4	The website provides current and timely information.
Made-for-the-medium Agarwal and Venkatesh (2002)	MFM1	The website offers you the opportunity to be part of an online group or community.
	MFM2	The website can treat you as a unique person and respond to your specific needs.
	MFM3	The website reflects the most current trend(s) and provides the most current information.
Ease of use Agarwal and Venkatesh (2002)	EOU1	The website offers clear and understandable goals.
	EOU2	The website is well structured and organized.
	EOU3	The website provides clear and understandable results and feedback regarding your progress.
Promotion PRO1 and PRO2 were developed based on Agarwal and Venkatesh (2002)	PRO1	If I was able to see an advertisement of this website on Internet or other related media (like newspaper, TV, etc.), I would be stimulated to go to this website.
	PRO2	If I was able to see a promotion of this website on Internet or other related media (like newspaper, TV, etc.), I would be motivated to go to this website.
Emotion Agarwal and Venkatesh (2002)	EMO1	The website Web site offers you an element of challenge.
	EMO2	The website provides an interesting story line.
	EMO3	The website ties to individuals, within and outside the organization, who have credibility.
	EMO4	The website allows you to control the pace at which information you interact with it.
Aesthetics Adapted from Lavie and Tractinsky (2004)	AES1	I find that the design of the website looks pleasant.
	AES2	The lay-out of the website is fascinating.
	AES3	I find the design of the website to be creative.
	AES4	The design of the site is aesthetics.
Subjective norms Adapted from Pavlou and Fygenson (2006)	SNW1	Most people who are important to me would visit this website.
	SNW2	Most people who are important to me think it is a good idea to visit this website.
	SNM1	Most people who are important to me would visit the physical museum
	SNM2	Most people who are important to me think it is a good idea to visit the physical museum.
Prior experience Adapted from Bourdieu and Darbel (1979)	CUL1 to CUL5	How many times do you go to theatre/opera, concerts, museums, cinema, and monuments? (6 point frequency scale)
Intentions toward the website	INTW1	Given the chance, I intend to return to the website of this museum.
	INTW2	It is likely that I will actually return to the website of this museum. Adapted from Pavlou and Gefen (2004)

Intentions toward the physical museum	INTM1	Given the opportunity, I intend to visit the physical museum.
	INTM2	It is likely that I will actually visit the physical museum. Adapted from Pavlou and Gefen (2004)

Appendix 4C: Screenshots of the Online Survey

Online interactive games	This section provides two interactive games to discover history in an entertaining way. *Attention: these games require that Macromedia's Flash 7 is installed on your computer (newer versions will work as well).* If the games do not work, you can download the plug-in here: Macromedia	Visit this section
Gardens/houses	This section introduces the gardens and houses that can be visited at the Atlanta History Center. It also provides several digital images of these places.	Visit this section
Calendar	This section presents the upcoming events and exhibitions at the AtlantaHistoryCenter.	Visit this section

❖ **Second step**

After visiting the website, you are invited to fill in an online questionnaire to express your opinion: **SURVEY** (Please make sure that you saved your answers by clicking on the "Save and Finish" button at the end of the survey)

Approximative duration: 10 minutes

Click here if you want to return to the Home page

Enquête sur les Sites Web de Musées / Survey on Museum Websites

Choisissez votre langue / Please choose your language

○ Français
○ English

● Section 3: Evaluation of the Website

Regarding the website you have just visited, please indicate for each statement how you feel about the museum website.

	Strongly disagree	Slightly disagree	Disagree	Neutral	Slightly agree	Agree	Strongly agree
1. The website offers content that is relevant to the core audience.	○	○	○	○	○	○	○
2. The website uses media (video, audio, etc.) appropriately and effectively to communicate the content.	○	○	○	○	○	○	○
3. The website provides the appropriate breadth and depth of content.	○	○	○	○	○	○	○
4. The website provides current and timely information.	○	○	○	○	○	○	○
5. The website offers clear and understandable goals.	○	○	○	○	○	○	○
6. The website is well structured and organized.	○	○	○	○	○	○	○
7. The website provides clear and understandable results and feedback regarding your progress.	○	○	○	○	○	○	○
8. The website offers me the opportunity to be part of an online group or community.	○	○	○	○	○	○	○
9. The website can treat me as a unique person and respond to my specific needs.	○	○	○	○	○	○	○
10. The website reflects the most current trend(s) and provides the most current information.	○	○	○	○	○	○	○

22 %

Appendix 4D: Psychometric Properties

Table 4D.1 Measurement Model of the Reflective Indicators

Construct	Item	Mean	S.D.	Loading	S.E.	T-values	AVE
Aesthetics	AES1	5.02	1.49	0.923	0.129	66.00	0.812
	AES2	4.08	1.43	0.892	0.124	57.35	
	AES3	4.40	1.61	0.900	0.140	52.05	
	AES4	4.91	1.38	0.888	0.122	41.61	
Promotion	PRO1	3.95	1.63	0.956	0.142	18.73	0.826
	PRO2	4.30	1.55	0.859	0.135	9.46	
Subjective Norms (web)	SN1	3.84	1.36	0.955	0.118	65.30	0.883
	SN2	4.17	1.26	0.924	0.109	26.46	
Subjective Norms (museums)	SN3	4.90	1.26	0.955	0.109	69.86	0.887
	SN4	5.18	1.30	0.929	0.113	35.06	
Intentions websites	INTW1	4.45	1.54	0.969	0.133	155.47	0.930
	INTW2	4.39	1.54	0.961	0.134	77.28	
Intentions museum	INTM1	5.46	1.37	0.962	0.119	94.12	0.931
	INTM2	5.32	1.41	0.968	0.122	93.68	
Notes: We used bootstrapping with a 200 re-sampling procedure to determine the T-values. T-values superior to 1.96 are significant (p<.05, 2-tailed)							

Table 4D.2 AVE Statistics and Inter-Construct Correlation

Constructs	CR	CA	1	2	3	4	5	6
1. Aesthetics	0.95	0.92	**0.90**					
2. Promotion	0.90	0.80	0.21	**0.91**				
3. Subjective Norms (web)	0.94	0.87	0.09	0.13	**0.94**			
4. Subjective Norms (museums)	0.94	0.87	-0.10	-0.02	0.50	**0.94**		
5. Intentions websites	0.96	0.93	0.33	0.21	0.31	0.14	**0.96**	
6. Intentions museum	0.96	0.93	0.06	0.14	0.24	0.43	0.44	**0.96**
Notes: CR= Composite Reliability; CA= Cronbach's Alpha								
We computed AVE Square Roots (bold numbers on the diagonal). The numbers off the diagonal are the inter-construct correlations.								

Appendix 4E: Inter-Constructs Correlations

Table 4E.1 Inter-Constructs Correlations for Formative and Reflective Items

	AES	INTW	INTM	PRO	SN	CON	CUL	EMO	EOU	MFM
AES1	**0,922**	0,261	0,007	0,130	-0,036	0,428	0,043	0,301	0,476	0,137
AES2	**0,893**	0,318	0,021	0,211	-0,049	0,459	-0,004	0,271	0,540	0,249
AES3	**0,901**	0,332	0,113	0,210	0,039	0,449	0,056	0,267	0,471	0,247
AES4	**0,894**	0,286	0,087	0,212	-0,010	0,479	0,069	0,255	0,466	0,179
INTW1	0,321	**0,969**	0,384	0,210	0,259	0,341	0,235	0,366	0,227	0,146
INTW2	0,320	**0,961**	0,421	0,193	0,221	0,235	0,233	0,342	0,189	0,097
INTM3	0,053	0,451	**0,886**	0,135	0,354	0,139	0,183	0,236	0,095	0,069
INTM4	0,064	0,407	**0,999**	0,130	0,402	0,117	0,213	0,234	0,096	0,071
PRO1	0,244	0,180	0,111	**0,955**	0,037	0,118	-0,154	0,202	0,146	0,081
PRO2	0,110	0,215	0,140	**0,859**	0,080	0,000	-0,056	0,176	0,024	-0,015
SN1	0,082	0,322	0,268	0,122	**0,818**	0,000	0,139	0,153	0,110	0,057
SN2	0,085	0,250	0,207	0,114	**0,767**	0,035	0,063	0,045	0,046	0,062
SN3	-0,066	0,136	0,448	-0,002	**0,855**	0,050	0,133	0,052	0,019	-0,083
SN4	-0,132	0,120	0,349	-0,033	**0,812**	-0,046	0,130	0,099	-0,048	-0,075
WCON1	0,312	0,142	0,083	0,058	0,006	**0,580**	-0,018	0,170	0,227	0,080
WCON2	0,402	0,269	0,021	0,008	-0,011	**0,715**	0,173	0,226	0,218	0,274
WCON3	0,396	0,221	0,131	0,081	0,022	**0,830**	0,014	0,359	0,299	0,359
WCON4	0,182	0,136	0,087	0,083	0,020	**0,452**	-0,019	0,237	0,077	0,326
WCUL1	-0,022	0,008	0,080	-0,219	-0,002	-0,047	**0,363**	-0,185	-0,088	0,072
WCUL2	0,260	0,113	0,067	0,163	-0,005	0,162	**-0,018**	0,126	0,166	0,007
WCUL3	-0,080	0,197	0,210	-0,113	0,142	0,006	**0,894**	0,026	-0,107	0,060
WCUL4	-0,064	0,012	0,035	-0,120	-0,043	0,216	**0,224**	0,009	-0,127	-0,073
WCUL5	0,064	0,165	0,079	-0,144	0,126	0,021	**0,759**	0,083	0,045	0,099
WEMO1	0,248	0,093	-0,020	0,145	-0,097	0,143	-0,032	**0,586**	0,265	0,006
WEMO2	0,084	0,250	0,239	0,103	0,081	0,198	-0,035	**0,354**	0,073	0,141
WEMO3	0,020	-0,156	-0,375	-0,215	-0,232	-0,094	0,033	**-0,333**	-0,152	-0,129
WEMO4	0,213	0,312	0,217	0,146	0,169	0,334	0,127	**0,817**	0,366	0,259
WEOU1	0,303	0,260	0,196	0,142	0,155	0,241	-0,049	0,264	**0,658**	0,102
WEOU2	0,507	0,144	0,002	0,082	-0,055	0,275	-0,055	0,382	**0,877**	0,165
WEOU3	0,364	0,128	0,090	0,045	0,063	0,219	0,053	0,265	**0,685**	0,252
WMFM1	0,045	0,014	0,006	0,015	0,029	0,263	0,029	0,100	0,058	**0,464**
WMFM2	0,219	0,132	0,041	0,036	-0,005	0,364	0,096	0,219	0,168	**0,878**
WMFM3	0,143	0,069	0,085	0,049	-0,031	0,299	0,044	0,183	0,225	**0,751**

The use of "W" before some items (WCON1, WCUL1, etc.) designates the formative constructs, for which we looked at the weights to assess the validity of their items.

From Virtuality to Authenticity

Chapter 4 focuses on user experience in online environments by studying visitor reactions toward museum website design. We showed that usability, aesthetics, and cultural variables all play a role in explaining intentions to visit museums. Visit is an important issue for museum policy, but as stated by Kimmelman (2001), "the question should not be how many people visit museums but how valuable are their visits". Similarly, Evrard and Médina (2003) encourage researchers to go beyond visit issues by investigating the motivations and values of cultural practices. Moreover, although museum websites have several advantages for the public, they can, only with difficulty, replace physical visits to museums.

Therefore, in the next two chapters, we leave the virtual context to study visitor reactions in real museum settings. These two chapters also scrutinize other elements of visitor experience by examining emotional and personal aspects such as enjoyment, authenticity and history. Our intent is to capture more closely the essence of visitor experience when using museum technologies.

Chapter 5 : The Role of Authenticity in the Experience of Visitors Interacting with Museum Technologies

Abstract

When people travel, they increasingly engage in cultural activities, a phenomenon that has been called cultural tourism. Two principal reasons for these trips or visits are the need to break with monotony and a search for enjoyment and authentic experiences. Conversely, cultural places such as museums tend to rely on Information Technologies (IT) to support the exhibition of cultural artifacts and communications with the public. Although technology has undeniable advantages for museums and their visitors, it is not evident that IT contributes both to more enjoyment and to an experience of authenticity. Indeed, little attention has been paid to user reactions with hedonic systems available in cultural heritage sites.

The objective of this research is to assess affective and cognitive reactions of museum visitors interacting with IT. We also try to determine the role played by authenticity in visitor interactions with museum technologies. To test our hypotheses, a free simulation experiment was conducted at a French national museum where 183 questionnaires were completed. The results indicate that technologies promote perceptions of authenticity and that IT can contribute to edutainment experiences of visitors.

Keywords: Authenticity; enjoyment; human-computer interaction; emotions; learning; immersion; hedonic IS; museum technologies; audioguides; interactivity; edutainment.

1. Introduction

Cultural tourism is an important phenomenon. It reflects the fact that people increasingly include cultural activities during their trips, activities such as museum visits, historic sites or cultural events (NASAA 2004). Indeed, The Travel Industry Association and the Smithsonian Magazine report that in 2002 nearly 118 million American adults experienced an artistic or cultural activity while traveling (NASAA 2004).

This phenomenon is explained by several factors. One that has been particularly studied by researchers working in the tourism area is authenticity. The search of authenticity by tourists takes different forms. People may want to see genuine things (Bruner 1994) or to meet locals and live like them when traveling (Cohen 1988). Tourists seeking authenticity can also be reluctant to interact with virtual copies of artifacts or with any other reproductions (Amirou 2000). Actually, people seem to engage in cultural activities during their trips in order to escape personal monotony and, rather, to have authentic experiences (McCannell 1973; 1976). Furthermore, people are not only looking for authenticity, but long for enjoyment during their leisure time. Therefore, cultural activities should provide entertainment as well as authentic experiences to visitors in order to meet expectations.

Cultural destinations such as museums rely on information technology (IT) to organize their exhibitions and their communications with the public. In effect, several studies promote technologies as a reasonable way for cultural institutions to reenergize their relationships with their visitors (Fopp 1997; Messham-Muir 2005; Vom Lehn and Heath 2005). For instance, the Internet enables distant access to museum resources (Galani 2003) and virtual reality systems contribute to immersive experiences (Lok 2004). Audioguides also provide contextual background to visitors (Deshayes 2002).

Nevertheless, even though these technologies have undeniable advantages for museums and their visitors, it is not evident that they contribute both to a deeper sense of flow and authenticity. First, research in museums and tourism has focused on authenticity without taking into account the presence of technologies in cultural settings. Conversely, IS researchers have not paid a great attention to visitor experiences with technologies in the cultural heritage area.

Second, the effect of technology on authenticity perceptions is ambiguous. Actually the word "technology" seems to jar with the word "authenticity" in the sense that technology connotes things that are fake or simulated whereas authenticity connotes things that are natural and real. According to Simon (1969), technologies belong to the artificial realm because they are "man-made as opposed to natural" (p. 4). Furthermore, the pervasiveness of screens in our world, as explained in the phenomenological study of screens carried out by Introna and Ilharco (2004), can have diverse effects, some negative, on visitor reactions.

Our argument takes a middle ground with respect to this critique. On one hand, we argue that visitors who value authentic experience may want to avoid using technology during a cultural activity. Indeed, as said earlier, people seeking authenticity can be reluctant to interact with virtual copies of artifacts (Amirou 2000). On the other hand, we believe that progress made with technologies like virtual reality and 3-dimensions makes images more authentic. In addition, people get used to the presence of technology in their lives and do not always perceive it as inauthentic. For instance, Bruner (1994) studied professionals' and visitors' perceptions of authenticity in the New Salem historic site, Abraham Lincoln's home village. He came to the conclusion that "technology can be seen as evil or as progress and that many visitors hold both views simultaneously" (p. 411).

Therefore, the research questions with the respective sub-questions that guide this study are the following:

1. What are the affective and cognitive reactions of museum visitors when interacting with museum technologies?

    a. Do visitors experience authenticity, enjoyment and immersion when using museum technologies?

    b. Does the use of museum technologies facilitate the experience with museological content, more particularly does it lead to an increase in learning?

2. Do all museum technologies contribute in the same way to the experience of visitors?

    a. What types of technologies contribute the best to enjoyment, immersion, authenticity and learning?

Given that the consequences of visitor interactions with IT during their cultural trip or visit are not clear, we formulate a research model to assess visitor interactions with IT in the museum context. This paper draws on the human-computer interaction (HCI) literature and its recent movement towards affect and experience for assessing visitor reactions. We also rely on the concept of authenticity, and more particularly on the constructivist view of authenticity.

This essay is organized as follows. First, we examine the concept of authenticity. Second, we consider how the HCI literature has dealt with user affective reactions. The third section introduces our research model and its set of hypotheses. Fourth, we describe the methodology that was implemented to collect data. In the fifth section, we perform data analysis and report the results. Section six discusses our findings, while the last section concludes with limitations and potential contributions.

2. Literature Review on the Concept of Authenticity

First there are typically two components of visitor experience in museums, education and entertainment. Historically, the emphasis on education has been the first preoccupation of museums, and more recently enjoyment has become the second. Nowadays museums treat both on an equal footing in order to meet visitor expectations. The convergence of education and entertainment is called "edutainment" (Addis 2005). In addition to enjoyment and learning, it seems that visitors also expect to have an authentic experience in museums. In the next section, we review the concept of authenticity and identify its characteristics.

2.1 Authenticity in Tourism Research and Museum Studies

Authenticity is a key concept in tourism research and museum studies. The word authenticity was first used in the museological literature where it is defined as a situation…

> "*where persons expert in such matters test whether objects of art are what they appear to be or are claimed to be, and therefore worth the price that is asked for them – or, if this has already been paid, worth the admiration they are being given*" [Trilling 1972, p.93, as cited in Wang (1999)].

This definition of authenticity corresponds very well to the situation of 19th century museums. Indeed, Poulot (2005) explains that authenticity of the collections was one of the first preoccupations of museums during this era. It is linked to the fact that prestige and renown of museums were closely related to the authenticity and quality of their artifacts.

The definition of authenticity changed later when it was introduced into tourism studies by MacCannell (1973; 1976) as part of his Staged Authenticity Theory. According to MacCannell (1973), people are in search of authentic experience because their life in an industrialized society is inauthentic. Cohen (1988) also points out that modern life is alienated. Therefore, these authors argue that individuals travel to discover new places that

will be more authentic and natural. However, MacCannell (1973; 1976) explains that authenticity in tourist settings is all staged. Indeed, tourist locales represent the front stage trying to recreate an "atmosphere" of authenticity normally found in the back stage. Tourists, who do not have enough knowledge and expertise to recognize real authenticity, do not manage to perceive this subterfuge (MacCannell 1973).

According to MacCannell (1973), authenticity corresponds to human beings' desire to escape monotony and modernity. But the search of authenticity as experienced by tourists has other characteristics and takes different forms in the tourism literature. People who look for authenticity may want to see genuine things (Bruner 1994), meet locals, and live like them when traveling (Cohen 1988). Tourists seeking authenticity can also be reluctant to interact with virtual copies of artifacts or with any other reproductions (Amirou 2000). According to Sigala (2005), authenticity should be synonymous with a meaning-making experience, which enhances visitor learning and understanding.

Several researchers also note the multidimensionality of authenticity since it encompasses such different manifestations (Reisinger and Steiner 2006; Wang 1999). For instance, Wang (1999) identified three types of authenticity: objective, constructive, and existential authenticity. Indeed, Wang (1999) explains that objective and constructive authenticity deal with "object-related situations" and cannot account for all tourist situations (p. 350). Therefore, Wang (1999) proposes an existential authenticity that is independent from objects and linked, rather, to human beings. Subsequent to this work, Reisinger and Steiner (2006) highlights four perspectives on the different schools of authenticity thought. More particularly, these authors make the point that modernists, realists and objectivist consider authenticity to be an objective fact judged by experts and independent from tourist perceptions. Disagreeing with this perspective, constructivists argue that authenticity is a social interpretation which depends on context and personal beliefs (Reisinger and Steiner

2006). In the postmodernist school, authenticity is competing with inauthenticity because some tourists are satisfied just as much with inauthentic experiences.

The fourth perspective introduced by Reisinger and Steiner (2006) is Heideggerian. It suggests that authenticity is always there because individuals perceive as authentic everything they encounter in the world. In Appendix 4A, we review several studies that illustrate these different schools of thoughts dealing with authenticity in cultural heritage sites.

Given this prior work, we believe that our research cannot ignore these different points of view. For this reason, we rely on the constructivist approach. Indeed, the other schools of thoughts were not compatible with the present work. Since we intend to assess visitor perceptions, objective authenticity is not an appropriate framing. Furthermore, it would not be fitting to study existential authenticity because it is related to natural, outdoor activities like "camping, wilderness or mountaineering" (Wang 1999, p. 360), clearly a setting that is extremely different from our museum context. Conversely, constructivists believe that authenticity is a feeling and a negotiable process dependent on visitor judgment (Cohen 1988). Therefore, this research takes into account two manifestations of authenticity: (1) authenticity as disposition and (2) authenticity as emotion.

2.1.1 Authenticity as a Disposition

Cohen (1979) asserts that authenticity is not perceived unilaterally by tourists. In fact, he argues that some tourists seek authenticity and value such experience whereas other tourists do not have such expectations and will appreciate both authentic and inauthentic experience. As a result, Cohen (1979) sets up a classification of tourist dispositions toward authenticity. He distinguishes five different types of tourists on a continuum. These are: existential, experimental, experiential, recreational, and diversionary tourists. Existential and experimental tourists are most concerned with authenticity because when traveling they want

to embrace new cultures and live like the natives (Cohen 1988). Cohen (1988) defines experiential tourists as individuals willing to "participate in the authentic life of others" (p. 377). Last, recreational and diversionary tourists look more for enjoyment and entertainment than authenticity in cultural settings (Cohen 1979). They will also be easily satisfied with staged authenticity.

2.1.2 Authenticity as an Affective State

Selwyn (1996) argues that authenticity can be "hot" when it is considered to be a feeling or "cool" when it is viewed as knowledge (Wang 1999, p.351). Since "cool authenticity" refers to an objective experience, we adhere to the "hot authenticity" that accounts for authenticity as an affective state. Furthermore, Chhabra et al. (2003) note that as people feel more nostalgic and more concerned with the past, what is important for them is not an objective authenticity but a perceived authenticity that will be consistent with their emotional state.

The next section introduces how the concept of authenticity has been studied in IS research and more generally in the context of IT use.

2.2 Authenticity and Information Technologies

At first glance, one might think that with the continuous progress being made in technology development, there is no need to study perceptions of authenticity when users interact with IT. However, given that Featherman et al. (2006) have shown that perceptions of authenticity can influence IT usage, the issue of authenticity does seem to deserve attention. Featherman et al. (2006) studied perceptions of authenticity in the context of e-services, and advanced the insight that when users perceive e-services to be artificial and non-authentic, their risks perceptions increase. Additionally, Featherman et al. (2006) showed that perceived authenticity can explain technology adoption.

Authenticity with IT has also been lightly addressed in the context of cultural heritage. These studies can be classified into two categories: the ones that focus on how to design technologies in a way that they will contribute to higher authenticity and the ones that only discuss the potential of IT for authentic experiences. We begin by introducing the first group of research dedicated to design issues.

Several researchers have proposed features or design characteristics for IT in order to improve user experience of authenticity. For instance, Epstein and Vergani (2006) relied on the theoretical background of authenticity to develop their IT artifact. A mobile technology named the "History and Unwired Media," it assists individuals visiting Venice, Italy. Visitors particularly appreciate the interactivity of the device that enables intimacy and immersion in the environment, but also connection with the Venetian characters (Epstein and Vergani 2006). The authors point out that their device also includes video, audio content and a narrative structure.

Another artifact developed for a museum exhibition on medieval music also follows an approach of authenticity. More precisely, Wolf et al. (2007) identify three characteristics of a good interactive exhibit in museum: it should have the goals of education, entertainment and authenticity. Authenticity was achieved by designing "the instrument replicas to sound and feel like real instruments" (Wolf et al. 2007, p. 1889) and by using sensors and software.

The research that is the closest to that of the present study is the evaluation of cultural heritage websites by Sigala (2005). Adopting the constructive perspective on authenticity, Sigala (2005) applies it to the evaluation of IT. More precisely, she addresses how authenticity is constructed in online environments while highlighting the main features that facilitate an authentic experience with websites. The findings of this research lead to the conclusion that the principal features which contribute to meaning-making experiences of online visitors are: search, navigation, multimedia and personalization (Sigala 2005).

Nonetheless, our research departs from hers in that we do not address websites, nor do we highlight features of technology. Rather, we focus on user reactions to authenticity perceptions, focusing particularly on the consequences of authenticity for user interaction with IT.

Other researchers discuss the potential of technology to enhance visitor experience of authenticity. Eco (1986) believes that tourists prefer hyper-reality and simulations rather than reality. This can be explained by the fact that technology sometimes contributes to a more authentic experience and has the potential to transform inauthentic into authentic (Fjellman 1992). Additionally, Reisinger and Steiner (2006) assert that interpretive materials like audioguides or computers can positively influence a tourist's experience of authenticity. Furthermore, Cohen (2002) argues that visitors will want to use IT and be satisfied with simulated experiences when they realize that accessing the real object is impossible because of time or place constraints. Taylor (2001), taking the example of the Maori culture, notes that old media like brochures or postcards tend to display stereotypes or fixed ideas, like "ceremonial costumes or cooking scenes" (p. 20). Conversely, Taylor (2001) thinks that IT has the potential to display dynamic images, videos or audio documents that will better account for an authentic culture.

These aforementioned studies suggest that authenticity and IT have a mutual relationship: IT can influence authenticity perceptions and conversely authenticity perceptions can influence user interaction with IT. In Table 5.1, we summarize the principal studies dealing with authenticity in the context of IT use.

Table 5.1 Research Dealing with Authenticity in the Context of IT Use

References	Context of research	Types of IT	Suggestions to enhance authenticity	User reactions to authenticity
Cass (1998)	Every day life	Web	Web should respect human processing limitations, disseminate considered thought and clear purpose. Users should assimilate content.	*An authentic life helps human beings actualize their upmost possibilities for existence.
Epstein and Vergani (2006)	Cultural heritage	Mobile multimedia guide	Interactivity, video, audio and narrative structure	Intimacy, immersion and connection with the characters
Featherman et al. (2006)	Commercial e-services	Websites	Mix tangible and intangible process	Low perceptions of authenticity increase risk perceptions
Sigala (2005)	Cultural heritage	Websites	IT features like search, navigation, multimedia and personalization	* Meaning-making experiences (easier learning)
Trant (1998)	Cultural heritage	Websites	Create links between online materials and physical objects	* Low perceptions of authenticity can lead to disorientation of website users
Wolf et al. (2007)	Cultural heritage	Replicas of an instrument	Sensors and software	* Entertainment and education
* These studies indicate only potential user reactions. Actually, empirical testing with subjects is still needed.				

We conclude this literature review by noting that, in the context of IT use, research on authenticity is still limited. Nonetheless, as suggested in the literature, authenticity plays a significant role in user interactions with IT. Furthermore, the school of constructivism views authenticity as an affective reaction. Therefore, we need to show how this emotion can be embedded in IS frameworks and linked to other emotional reactions of IT users.

3. Emotions in Human Computer Interaction

This research aims at measuring visitors' affective (i.e., entertainment and authenticity) and cognitive (i.e., education) reactions when they interact with technology. Since studying human interaction with technologies is at the heart of HCI, the questions

addressed by this research falls directly into the HCI sub-discipline. 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 emotional phenomena, integrating this variable in research framework (Agarwal and Karahanna 2000; Sun and Zhang 2006).

It is noteworthy that many studies focus on the arousal of emotions in an online context (Agarwal and Karahanna 2000; De Wulf et al. 2006; Ethier et al. 2006; Koufaris 2002; Mathwick and Rigdon 2004; Skadberg and Kimmel 2004; Zviran et al. 2006). More precisely, the Internet appears to be an important setting in which to study the affective consequences of user interactions with computer technologies. For instance, Skadberg and Kimmel (2004) tried to further the understanding of the nomological net of the flow construct. They highlighted the antecedents and outcomes of flow by studying visitor experience with hedonic information systems, namely tourism websites. While Ethier et al. (2006) analyzed the influence of Web site design on user emotional reactions, De Wulf et al. (2006) showed that emotions, specifically pleasure, play a crucial role in Web site evaluation and they also represent predictors of Web site success. Conversely, little attention has been paid to user emotional reactions in an offline context.

Sun and Zhang (2006) elaborated a model of Individual Interaction with IT (IIIT) to assess both affective and cognitive reactions of users interacting with any type of technology. Since their paper focuses on the arousal of emotions in a context of IT use, this framework deserves to be introduced.

The IIIT model is the result of a comprehensive analysis of the literature on affect. Pointedly, Sun and Zhang (2006) reviewed several disciplines including psychology, marketing, consumer research, and organizational and social psychology in order to clarify the core affect concepts generally used in information systems. This led to a first abstract

conceptualization entitled "Model of the Individual Interacting with Object" (IIO). Sun and Zhang (2006) present IIO as a general model since it describes linkages between traits, affective reactions, cognitive reactions and behavioral intentions, and it reflects individuals' interactions with any object they encounter. Sun and Zhang (2006) provide a more specific model for IS research, the IIIT model, in which individual's interactions are created through information technologies. This model is composed of four categories: (1) trait, (2) affective reactions toward using IT, (3) cognitive reactions toward using IT, and (4) IS use. Each category includes several variables that have been extensively studied in the IS literature. Trait has been studied in IS either by referring to computer playfulness or personal innovativeness of IT. The affective reactions toward using IT cover eight variables. These are: perceived affective quality, perceived playfulness, cognitive absorption, perceived enjoyment, attitude, satisfaction, flow and computer anxiety. The cognitive reactions toward using IT include computer self-efficacy, perceived ease-of-use and perceived usefulness. Finally, IS use is composed of behavioral intention and actual usage.

The IIIT model makes several contributions for IS research. First, it distinguishes both affective and cognitive reactions toward using IT plus it shows that these reactions have a reciprocal relationship since they are influenced by each other. Second, the IIIT model relies on solid theoretical foundations since Sun and Zhang (2006) employed the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM) to build their framework. As a result, the IIIT helps us identify the relevant variables to be studied in order to assess user reactions towards IT use. In that the IIIT model includes a large number of variables, we will only focus on those that are the most salient for the purposes of our research, i.e., personal innovativeness with IT, enjoyment, cognitive absorption (immersion) and ease of use.

Personal innovativeness with IT helps us to determine the profile of museum visitors and more precisely how they generally behave with IT, independently from museums. Ease of use has been used in several studies that show its relevance for evaluating technologies usability (Gefen and Straub 2000).

Enjoyment and focused immersion are the concepts used to measure the entertainment aspects of visitor experience. Perceived enjoyment is a relevant predictor for hedonic information systems use as shown by Atkinson and Kydd (1997) and Van der Heijen (2004). Furthermore, Shaw (1985) produces evidence that enjoyment is one of the most important dimensions for people during their leisure time. Since the present research addresses IT use in a cultural context of leisure, which is the museum itself, perceived enjoyment will also be salient. Enjoyment is also one of the eleven visitor "rights" when going to cultural heritage sites, as highlighted by (Rand 2000). Similarly, immersion is supposed to reflect an entertaining aspect of visitor experience (Belaen 2003).

Although the IIIT model provides strong support for our research, we think that Sun and Zhang (2006) leave out other important variables such as learning. In effect, Sun and Zhang (2006) only identify one outcome of the interaction process, IS usage. IS usage is a key construct that needs further research as pointed out by several researchers (Barki et al. 2007; Burton-Jones and Straub 2006), but learning appears to be a more relevant outcome variable in the context of museum technologies, which, as noted earlier, have a mission of education. Indeed, a survey conducted with 6000 American households report that more than 87% households view learning as the principal outcome of their museum visit (Griffiths et al. 2007). Therefore, determining the role of IT in the learning experience of visitors makes sense.

The next section introduces our research model that draws from the literature on authenticity and the literature on affect in HCI.

4. Research Model and Hypotheses

4.1 Research Model Rationale

We propose a research model (Figure 5.1) that includes a user trait, personal innovativeness, which is posited as predictor of ease of use. The latter represents the cognitive reaction towards using IT and it has direct influence on enjoyment and focused immersion. We also hypothesize that the affective variables (enjoyment, authenticity and focused immersion) are direct antecedents of learning. The constructivist view of authenticity is represented in the model by 1) perceived authenticity, which reflects the emotional aspects of authenticity, and 2) authenticity disposition, which accounts for *a priori* visitor attitudes towards museum technologies.
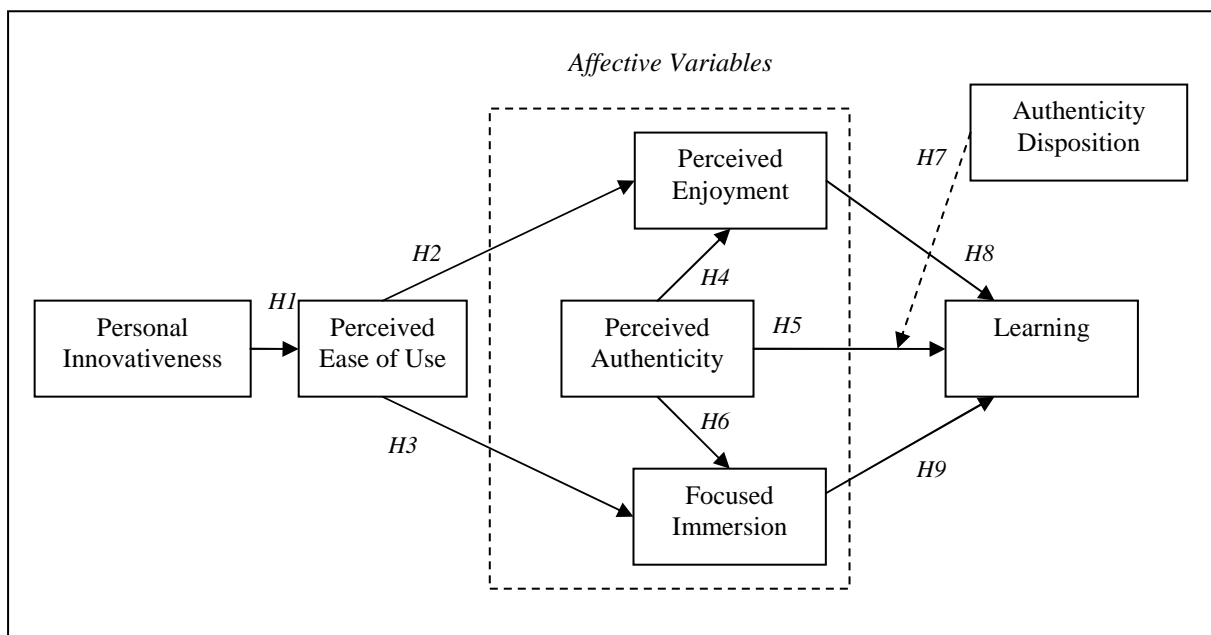
Figure 5.1 The Research Model

4.2 Hypotheses

Personal innovativeness with IT has been posited in several IS research projects as a predictor of perceived ease of use (Lewis et al. 2003; Sun and Zhang 2006; Yi et al. 2006). In

the IIIT conceptual model, Sun and Zhang (2006) present personal innovativeness as an individual trait that influences cognitive and affective reactions towards IT. Empirical research supports this hypothesis. For instance, Lewis et al. (2003) investigated the factors influencing technology beliefs, namely ease of use and usefulness. Their results show that personal innovativeness is a factor influencing ease of use. Yi et al. (2006) conducted two field studies and their results also confirm the fact that personal innovativeness has a positive influence on perceived ease of use. Hence, our first hypothesis reflects this belief.

Hypothesis 1 (H1). *A positive assessment of personal innovativeness with IT will positively influence perceived ease of use.*

Several studies provide support for perceived ease of use as a predictor of perceived enjoyment (e.g. Davis et al. 1992; Igbaria et al. 1995). Actually, it is reasonable to posit that users will better appreciate their experience with technology if the latter is easy to use. Furthermore, Hsu and Lu (2004) showed that easy-to-use technologies also encourage flow experience, composed of enjoyment and concentration. Hsu and Lu's examination (2004) of the behaviors of users of online games indicate that ease of use is a significant predictor of flow. Consequently, the aforementioned literature seems to warrant the following hypotheses:

Hypothesis 2 (H2). *A positive assessment of perceived ease of use will positively influence perceived enjoyment.*
Hypothesis 3 (H3). *A positive assessment of perceived ease of use will positively influence focused immersion.*

Perceptions of authenticity tend to positively influence visitors' affective and cognitive reactions. Indeed, Chhabra et al. (2003) showed that visitors who perceived authenticity during cultural heritage visit were also more satisfied with their experience. In addition, perceptions of authenticity were correlated with increased expenses. User perceptions of authenticity in the context of IT use have been heavily studied by researchers

who develop and assess virtual reality systems. For instance, Hughes et al. (2005) studied how visitors perceived mixed reality technology, which takes place in hybrid environments where visitors can look at real and virtual objects created at the same time (Lok 2004; Sparacino 2004). Conducting their study in a science center, they showed that mixed reality enhances the experience of visitors. More precisely, 98% of the visitors were inclined to stay longer in the museum because of the mixed reality technology. Similarly, visitors recognized the cognitive and affective benefits of the technology. They felt that they learned more thanks to the technology. They also believed that they had an entertaining experience. Following this proposition, Sigala (2005) suggests that authenticity can lead to meaning-making experiences, enabling visitors to better understand cultural content. Therefore, we propose that:

Hypothesis 4 (H4). *Perceived authenticity toward IT positively influences enjoyment.*
Hypothesis 5 (H5). *Perceived authenticity toward IT positively influences learning.*
Hypothesis 6 (H6). *Perceived authenticity toward IT positively influences focused immersion.*

As explained in section 1.1, Cohen (1979) highlights five different types of tourist experiences of authenticity. All individuals can perceive authenticity (rightly or wrongly), but not all individuals are influenced by their own perceptions of authenticity. In fact, it seems that existential and experimental tourists are those who are the most sensitive to authentic experiences (Cohen 1979). Similarly, Goulding (2000) notes three different types of experiences of authenticity in the museum context. In point of fact, she identifies three types of visitors with different expectations towards authenticity. From the more exigent to the less exigent, they are: the existential, the aesthetic, and the social visitors. Additionally, Bruner (1991) found that the bulk of tourists do not feel alienated by modern life and do not search for authenticity during their cultural travels. Tourists are aware that they are surrounded by reproductions, but they will accept "fake" as long as it is well represented (Bruner 1991). Therefore, perceived authenticity of the experience toward using IT can be at a low level, but

if an individual has a poor disposition toward authenticity, this will not influence her/his learning experience. Conversely, if the individual is an existential or an experimental tourist, the level of perceived authenticity will have a greater influence on her/his learning experience. As an extension of H5, we hypothesize the following:

> Hypothesis 7 (H7). *Authenticity disposition moderates the relationship between perceived authenticity and learning.*

Literature suggests that immersion and enjoyment represent one of the preconditions for a positive learning experience. Actually, immersion and enjoyment correspond to two dimensions of the flow construct, which has been conceptualized as a predictor of learning. The flow experience can be defined as the "holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi 1975, p. 36). Several researchers have studied the consequences of flow and increased learning appears as a significant outcome variable of flow. For instance, Ghani (1995) identifies the flow variable, composed of enjoyment and concentration, as a significant antecedent of learning. Indeed, the more users enjoy their experience and feel immersed in their activity, the more likely they are to increase their knowledge. Hoffman and Novak (1996) also posit flow, including enjoyment and immersion, as an antecedent of learning. Skadberg and Kimmel (2004) invited their participants to visit a tourism Web site and the results of their survey indicated that visitors who experienced flow also gained more knowledge about the place they visited online. Therefore, we hypothesize the following:

> Hypothesis 8 (H8). *A positive assessment of enjoyment will positively contribute to increased learning.*
>
> Hypothesis 9 (H9). *A positive assessment of focused immersion will positively contribute to increased learning.*

Table 5.2 synthesizes the different hypotheses.

Table 5.2 The Set of Hypotheses

Hypotheses number	Hypotheses statement
H1	Personal innovativeness with IT positively influences ease of use.
H2	Perceived ease of use positively influences enjoyment.
H3	Perceived ease of use positively influences focused immersion.
H4	Perceived authenticity positively influences enjoyment.
H5	Perceived authenticity positively influences learning.
H6	Perceived authenticity positively influences focused immersion.
H7	Disposition toward authenticity moderates the relationship between authenticity and learning.
H8	Perceived enjoyment positively influences learning.
H9	Focused immersion positively contributes to increased learning.

5. Methodology

5.1 Research Design

This research was conducted at the National Center of the History of Immigration (NCHI), a French museum located within Paris. The NCHI recently opened its doors in October 2007 and celebrated 100,000 visitors in July 2008. This museum was selected as the setting for our field study for several reasons. First, it falls into the category of history museums, so it is well aligned with our dissertation objective of studying history museums. Second, the learning and affective experience are among the objectives of this museum, which aims at *educating* the public and providing an *emotional experience* on the history of immigration. "Our mission is to transmit knowledge, sharing experiences and emotions" as stated by the Director of the Museum (Coroller 2008). The various theoretical features of authenticity are also addressed by the museum in its approach to present people's traditions, memories and history. Hence, the museum goals align well with our research variables. Third, the presence of technologies in the museum setting was requisite in order to assess visitor reactions to IT. The NCHI offers different types of IT for public use, they are: audioguides, computers, videos, and interactive kiosks.

To gain access to this setting, the director of the IT department was first contacted by email in April 2008 and then we met face-to-face to introduce the project. We obtained the agreement to conduct the study a few weeks later and then launched the field study at the end of May 2008. We received an official badge as a sign of our professional affiliation to the museum. The museum collaboration and support gave more credibility to the study when surveying the visitors.

The methodology that we implemented was a field study and more specifically a free simulation experiment (Fromkin and Streufert 1976). In this experimental methodology, participants are studied in a closed setting such as a museum. However, in this technique, we have relatively less control over the manipulated independent variables and the subjects' approach to the experimental task. In fact, there are no treatment conditions, but rather an experimental stimulation to which subjects can freely respond (Straub et al. 2004). Thus, the values of the independent variables can vary freely with respect to subject interactions with the system.

For this research, the stimulation given to the subjects was their interaction with the museum technologies. The independent variables that varied freely were the affective and cognitive reactions to IT use, namely authenticity and ease of use. Although personal innovativeness with IT is an independent variable in our research model, it is not included in the aforementioned list because it corresponds to a user trait rather than to a reaction to IT use (Sun and Zhang, 2006).

5.1.1 Stimulus Technologies

As explained previously, the stimulation was the subjects' interaction with the technologies available at the NCHI. However, we did not survey visitor perceptions of each

tool provided by the museum. We decided to focus on two types of technologies: the audioguides and the set of interactive kiosks and computers.

The audioguide is the central technology of the museum since its use is mandatory to hear the content of the videos and audio kiosks. Actually, the permanent exhibition has been designed in a way that gives limited space to text panel. The intent of NCHI is to provide an immersive and interactive experience to visitors so a large part of the museum content is diffused through the audioguide. Furthermore, the audioguide appears to be a relevant digital technology since this technology combines mobility and interactivity. Indeed, NCHI audioguides are linked via infrared in order to let content diffuse automatically. They also include a stylus that visitors can use to target and launch content of interest.

The second class of technologies that we included in this research is the set of interactive kiosks and computers. These interactive kiosks and computers are available at the end of the visit and provide more details and information about the history of French immigration. They are also based on a question-answer approach: visitors select a question in the computer menu and obtain an answer. Visitors use a stainless steel keyboard to interact with these tools.

It is noteworthy that even though the questionnaire focused on two types of IT, the visitors were free to interact with all the museum technologies and so they had the choice to watch videos, read text panels, listen to audio content, and interact with computers and kiosks.

5.2 Research Instrument

Our data collection technique was the questionnaire (Straub et al. 2004). The questionnaire distributed to visitors was composed of existing scales for the primary IS constructs. Learning was measured with the self-reported learning and learning interest scales of Alavi (1994). Perceived ease of use items were originally developed by Davis (1989) while

we borrowed the items of perceived enjoyment from Davis et al. (1992). The PIIT items and focused immersion were adapted from Agarwal and Karahanna (2000). Perceived authenticity scales were adapted from Featherman et al. (2006). Relying on the literature and the help of three judges, we developed new scales for authenticity disposition. The operationalization of our constructs is described in Appendix 5B.

Special care was taken to include reversed scales in our instrument in order to make sure visitors paid attention to the items. Since the questionnaires were self-administered, it was also a good way to ensure that participants carefully filled in the questionnaire.

The scales specification does not entirely justify the format of our questionnaire; hence we provide hereafter further details. First, it is important to mention that the questions were the same for the entire sample. In fact, even though we used exactly the same items, we surveyed visitors about their interaction with two different types of technologies: a) the interactive audioguide and b) the set of interactive kiosks and computers. Second, this questionnaire was distributed exclusively in French. Indeed, we did not translate it into other languages because the NCHI principally draws francophones. This is related to the fact that the museum content (video, audio and text panels) are only available in French.

5.3 Sampling and Experimental Procedures

We followed the following approach to surveying NCHI visitors. In order to include the maximum of persons, the researcher was positioned at the museum entrance where visitors borrow the audioguides. Thus, we stayed behind the desk with the employees in charge of 1) providing guidance to visitors and 2) of distributing the free audioguides required for visiting the permanent exhibition.[3] This positioning was strategic because visitors had to return to this desk at the end of their visit to give back the audioguides. We took advantage of

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[3] At the time of the study, the museum was also offering a temporary exhibition that did not require audioguides. Additionally, this temporary exhibition was principally text based so it did not provide any technological device.

this time to ask visitor feedback regarding their interaction with the museum technologies. Surveying the visitors just at the end of their visit appeared also to be a good way to ensure that their experience was still clear and present to them. The questionnaires were self-administered, meaning that each participant filled in the questionnaire by herself, but we stayed close to the participants in case they need assistance. We decided to distribute the questionnaire about audioguides during the first three weeks and the questionnaire about interactive kiosks and computers the last three weeks of our field study.

Administration of the instrument to the sample was randomized to the greatest extent possible. We conducted the study during weekends and weeks so that different types of visitors would be included. During the week, the NCHI is principally visited by students and retired people while during the weekend, families and working class represent the main audience. In order to encourage people taking part in this research, we also used incentives of free NCHI branded notebooks. Actually, the communication department of the NCHI gave us these notebooks to facilitate our field study and thank visitors for their help.

In sum, we collected 183 questionnaires over a period of one month and a half (eighteen days of presence at NCHI). This pooled sample includes 113 questionnaires dealing with the museum audioguide and 70 questionnaires pertaining to the set of interactive kiosks and computers.

6. Data Analysis

The descriptive statistics of our sample were computed using SPSS 12.0 and the other data analyses were performed with SmartPLS 2.0 (Ringle et al. 2005). When using PLS, Gefen et al. (2000) recommend a minimal sample size of at least ten times the number of items in the most complex construct. Our most complex construct, which is "learning", has five items so fifty participants is the minimum sample size required for this research. Our

sample was composed of 183 participants, which is well above this minimum. To conduct the analyses, we had to delete some questionnaires that were unusable because of too many unanswered questions. Hence, our final sample is composed of 174 experimental instruments.

The descriptive statistics indicate the participation of a larger proportion of females, with 64.4% women compared to 35.6% men. This result is not surprising, however, because French statistics on museum attendance also report a higher percentage of women in museums (Cardona and Lacroix 2007). Our results also reflect our desire to represent the larger public as much as possible with a sample of participants aged from 18 to 73 years-old. The mean age was 37 years-old. In Appendix 4C, we also provide charts about the socio-demographic composition of our sample.

Most participants were first-time visitors (92%), which also explains why the majority of NCHI visitors spent more than one hour in the museum. More precisely, 47.1% visited the museum between one to two hours, while 39.1% spent more than two hours at NCHI. Table 5.3 summarizes the profile of visitors who took part in this research.

Table 5.3 Profile of the Visitors

Categories	Statistics of the pooled sample
Sample size (N)	174
Mean Age (S.D.)	37 (15.94)
Male (%)	35.6
Female (%)	64.4
Never visited NCHI (%)	92
Have already been to NCHI (%)	8
Time spent in the museum (%)	
- Less than 30 minutes:	0
- 30 minutes to 1 hour:	13.8
- 1 to 2 hours:	47.1
- More than 2 hours:	39.1

Figure 5.2 is a classification of the technologies used by our sample in ascending order, from the most used to the less employed during the visit. The audioguide is the main technology used by visitors, but this is linked to the fact that the entire exhibition relies on this

device, as explained previously. Surprisingly, the two technologies that are supposed to be the

most fun and interactive, namely the "Videomaton" and the computer are lesser used

technologies. The "Videomaton" is a computer equipped with a webcam that allows visitors

to record a video comment at the end of their visit.
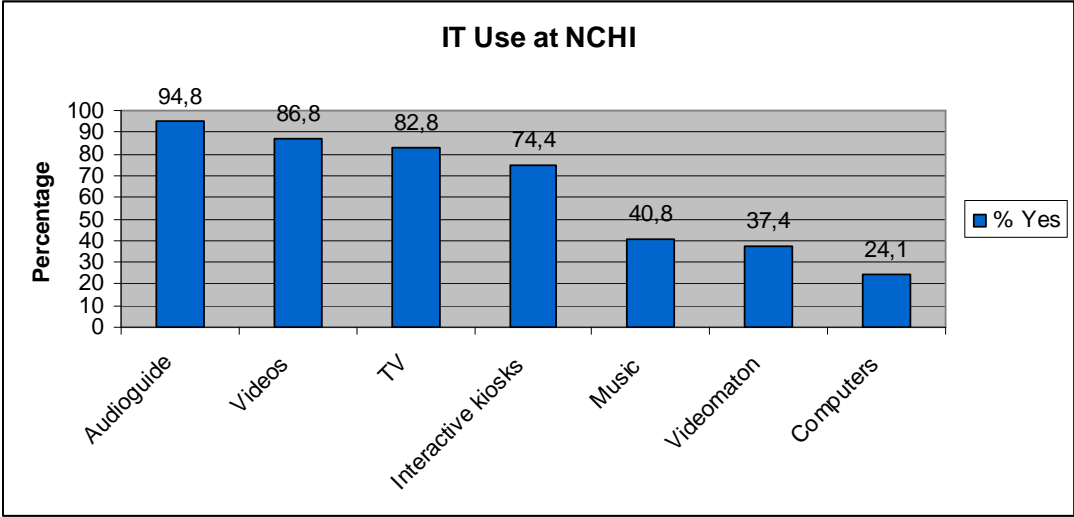
Figure 5.2 Proportion of IT used by NCHI visitors

6.1 Measurement Model

The measurement model examines the relationship between the latent variables and

their respective items (Chin 1998b). Therefore, to assess the measurement model, we

examined the psychometrics properties of our items. More particularly, we evaluated the

validity and reliability of our measures.

Several researchers encourage assessments of construct validity and reliability before

embarking on hypotheses testing (i.e.Campbell and Fiske 1959; Straub 1989; Trochim 2001).

Trochim (2001) argues that it is important to ensure that the measures adequately reflect their

latent variables. Therefore, he considers construct validity to be "the overarching quality of

measurement". Accordingly, we first assessed the measurement model before testing the

structural model and the significance of our hypotheses. We report hereafter the results of our tests.

Chin (1998b) explains that reflective constructs should be validated with PLS through Composite Reliability, Average Variance Extracted (AVE) and Cross-Loadings. More particularly, these tests enable to determine reliability (Composite Reliability) and discriminant/convergent validity (Cross-Loadings and AVE). Gefen et al. (2000) state that convergent and discriminant validity is achieved when "the AVE of each construct is larger than its correlation with the other constructs" (p. 37).

Looking at Table 5.4, we can observe that three loadings are not above the threshold value of 0.70 recommended by Nunnally (1967). These items, PA1, FI2 and AD3, were thus deleted from the remaining analysis. Except for the three aforementioned items, the T-values indicate that the loadings are all significant at a level of $p<0.05$. AVEs, ranging from 0.670 to 0.827, are also well above the threshold value of 0.50, demonstrating good convergent validity for each construct.

Table 5.4 Measurement Model of the Reflective Indicators

Construct	Item	Mean	S.D.	Loading	S.E.	T-values	AVE	AVE after deleting items
Ease of Use	EOU1	5.45	1.51	0.907	0.019	48.73	0.827	0.827
	EOU2	5.31	1.47	0.929	0.016	57.13		
	EOU3	5.17	1.56	0.892	0.027	33.61		
Focused Immersion	FI1	4.97	1.48	0.783	0.056	13.97	0.553	0.695
	FI2 deleted	3.96	1.73	0.611	0.094	6.49		
	FI3	4.62	1.56	0.823	0.042	19.81		
Perceived Authenticity	*PA1 deleted*	5.54	1.60	0.346	0.125	2.76	0.572	0.817
	PA2	5.15	1.41	0.893	0.024	37.39		
	PA3	5.19	1.35	0.895	0.022	41.66		
Perceived Enjoyment	PE1	5.67	1.21	0.892	0.024	36.91	0.670	0.670
	PE2	5.84	1.44	0.744	0.071	10.44		
	PE3	5.04	1.47	0.813	0.031	26.61		
Learning	LEA1	4.82	1.49	0.837	0.027	31.05	0.683	0.683

	LEA2	5.50	1.19	0.740	0.049	15.26		
	LEA3	5.34	1.35	0.882	0.018	48.98		
	LEA4	5.36	1.37	0.824	0.030	27.96		
	LEA5	5.43	1.35	0.838	0.029	28.83		
Personal Innovativeness with IT	PIIT1	4.81	1.60	0.930	0.025	37.60	0.681	0.681
	PIIT2	4.85	1.76	0.781	0.072	10.93		
	PIIT3	3.75	1.71	0.725	0.106	7.04		
Disposition toward Authenticity	AD1	5.30	1.41	0,869	0.025	34.26	0.652	0.807
	AD2	5.36	1.26	0,892	0.025	35.28		
	AD3 deleted	4.62	1.70	0,635	0.087	7.32		

Notes: We used bootstrapping with a 200 re-sampling procedure to determine the T-values. T-values superior to 1.96 are significant (p< 0.05. 2-tailed).

The two following tables help to assess the discriminant and convergent validity of our reflective constructs. As shown in Table 5.5 and Table 5.6, all items exhibit high loadings and cross-loadings on their respective constructs. It means that the items converge more on their own construct than on the other constructs present in our research model.

Table 5.5 Factor Loadings and Cross-Loadings

Construct	Item	1	2	3	4	5	6	7
1. Authenticity	PA2	**0.905**	0.408	0.494	0.409	0.493	0.405	0.142
	PA3	**0.903**	0.369	0.437	0.483	0.563	0.514	0.261
2. Immersion	FI1	0.361	**0.788**	0.503	0.364	0.413	0.299	0.186
	FI3	0.338	**0.822**	0.402	0.216	0.302	0.249	0.056
3. Learning	LEA1	0.403	0.470	**0.836**	0.395	0.402	0.299	0.124
	LEA2	0.376	0.456	**0.742**	0.378	0.435	0.335	0.171
	LEA3	0.424	0.453	**0.884**	0.527	0.558	0.406	0.206
	LEA4	0.507	0.448	**0.823**	0.423	0.465	0.300	0.177
	LEA5	0.414	0.372	**0.841**	0.438	0.423	0.268	0.243
4. Disposition	AD1	0.442	0.283	0.454	**0.890**	0.478	0.373	0.412
	AD3	0.444	0.327	0.490	**0.907**	0.507	0.498	0.408
5. Enjoyment	PE1	0.549	0.386	0.521	0.496	**0.893**	0.555	0.204
	PE2	0.383	0.301	0.371	0.456	**0.739**	0.499	0.194
	PE3	0.486	0.363	0.462	0.398	**0.816**	0.557	0.188
6. Ease of use	EOU1	0.442	0.282	0.328	0.442	0.620	**0.907**	0.224
	EOU2	0.486	0.297	0.366	0.477	0.591	**0.929**	0.259
	EOU3	0.458	0.341	0.376	0.411	0.579	**0.892**	0.241
7. PIIT	PIIT1	0.308	0.253	0.299	0.516	0.295	0.303	**0.933**
	PIIT2	0.051	0.039	0.115	0.259	0.160	0.156	**0.782**
	PIIT3	0.082	-0.030	0.027	0.249	0.038	0.131	**0.747**

Table 5.6 AVE Statistics and Inter-Construct Correlation

Constructs	CR	1	2	3	4	5	6	
1. Authenticity	0,90	**0.90**						
2. Immersion	0,82	0.43	**0.83**					
3. Learning	0,91	0.52	0.53	**0.83**				
4. Disposition	0,89	0.49	0.34	0.53	**0.90**			
5. Enjoyment	0,86	0.58	0.43	0.56	0.55	**0.82**		
6. Ease of use	0,93	0.51	0.34	0.39	0.49	0.66	**0.91**	
7. PIIT	0,86	0.22	0.16	0.22	0.46	0.24	0.27	**0.83**
Notes: CR= Composite Reliability We computed AVE Square Roots (bold numbers on the diagonal). The numbers off the diagonal are the inter-construct correlations.								

6.2 Structural Model

The structural model refers to the relationships (paths) between the different latent variables (Chin 1998b). Hence, in this second step, we looked at the path coefficients in order to determine the significance of our hypotheses. We first tested the research model without the moderator.

Testing the model, we found a reasonable percentage of explained variance for our dependent variables. Explained variances for our dependent variables are the following. "Ease of use" has an R^2 of 0.07, "immersion" has an R^2 of 0.194, "enjoyment" has an R^2 of 0.515 and "learning" has an R^2 of 0.451. It is noteworthy that our research model accounts for more than 45% of the explained variance of the outcome variable, which is learning.

As shown in Figure 5.3, eight out of nine hypotheses were validated, providing strong support for our research model. Except for H3, which is not significant, path coefficients are significant at the .05 alpha level. More specifically, PIIT positively influences ease of use (B=0.265, p<0.001), validating H1. Perceived ease of use has a strong positive effect on enjoyment (B=0.485, p<0.001) but no effect on immersion (B=0.158, p>0.05). As hypothesized, a positive assessment of perceived authenticity has a positive influence on enjoyment (B= 0.337, p<0.001) and immersion (B= 0.339, p<0.001). So H4 and H6 are validated. The affective variables retained to evaluate the entertainment aspect of museum

visit (authenticity, enjoyment and immersion) all have a significant positive effect on learning, supporting H5, H8, and H9.

In order to assess the effect of the moderator variable, disposition towards authenticity (H7), we performed an effect size test (Carte and Russell 2003; Mathieson et al. 2001). This test compares the variation of explained variance between a) the model that includes the moderator and b) the original model and determines the level of significance of the moderator effect. We used the formula proposed by Mathieson et al. (2001): $f^2 = (R^2 \text{ full model} - R^2$ partial model$) / (1 - R^2 \text{ full model})$.

We first measured the variation of change in R^2 and second we tested the significance of this change. The change in R^2 is 0.62 and the effect size (f^2) is 0.124, so the inclusion of the moderator in the research model leads to a medium effect size.

We report hereafter the results of our research model testing.
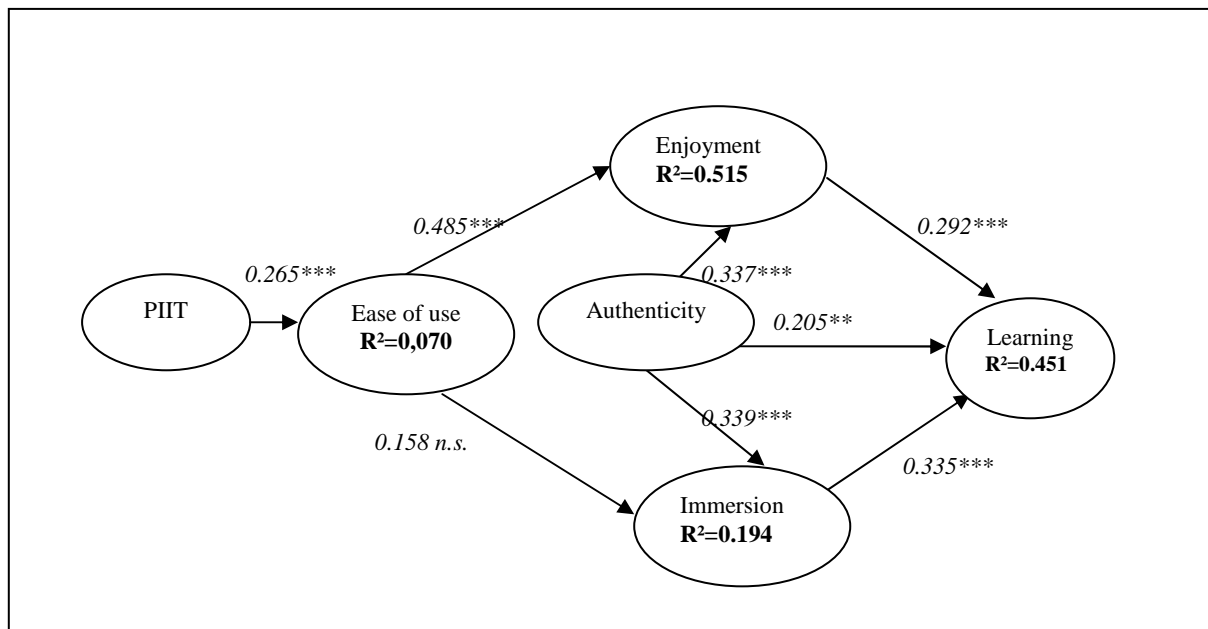
Figure 5.3 Research Model and Path Loadings without Moderator
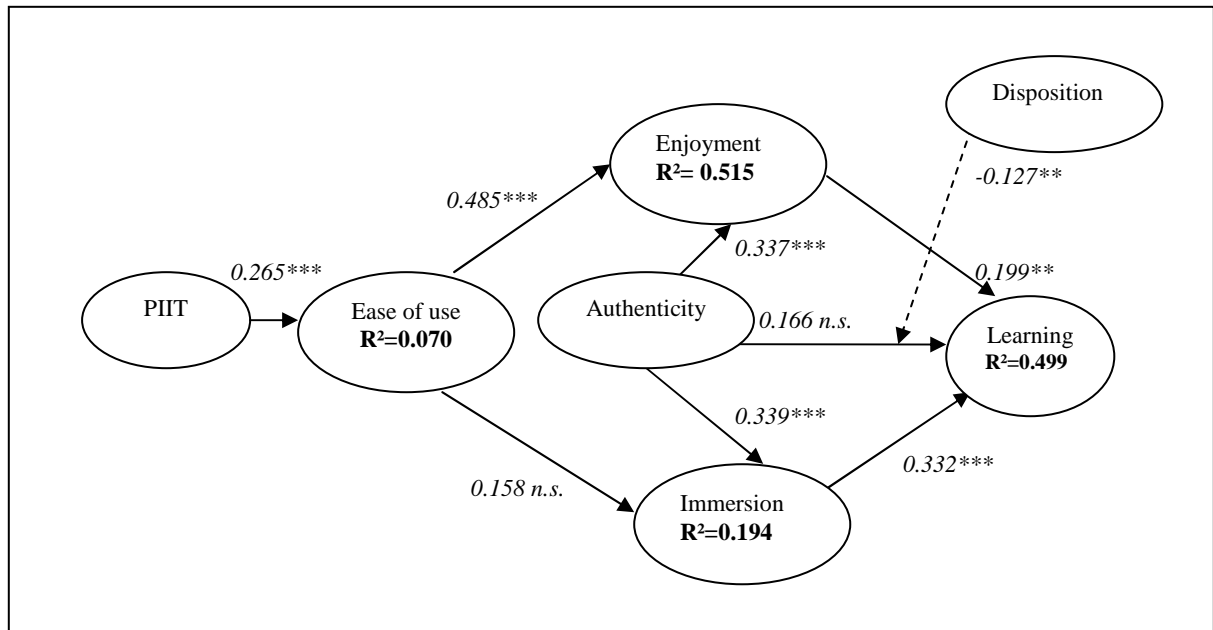
Figure 5.4 Research Model and Path Loadings with the Moderator

The research model demonstrates good explanatory power what supports the crucial roles played by each variable. We summarize the path coefficients and significance levels in the following table.

Table 5.7 Summary of Path Coefficients and Significance Levels

Hypotheses	Path coefficients	T-value	Supported?
H1: Personal Innovativeness → Ease of Use	0.265***	4.02	Yes
H2: Ease of Use → Enjoyment	0.485***	6.97	Yes
H3: Ease of Use → Immersion	0.158 n.s.	1.95	No
H4: Authenticity → Enjoyment	0.337***	4.90	Yes
H5: Authenticity → Learning	0.205**	2.68	Yes
H6: Authenticity → Immersion	0.339***	3.43	Yes
H7: Disposition → Relationship between Authenticity and Learning	-0.127**	2.39	Yes
H8: Enjoyment → Learning	0.292***	2.83	Yes
H9: Immersion → Learning	0.335***	4.50	Yes
R² Ease of use = 0.07 R² Enjoyment = 0.515 R² Immersion = 0.194 R² Learning = 0.499			

In order to answer the second research question regarding the reactions provoked by different types of technologies, we performed ANOVA tests. The ANOVA test measures the

difference of variance between two quantitative variables and so it enables us to compare means between several groups of variables. In this research, two groups were involved: 1) the visitors who assessed the audioguides and 2) the visitors who evaluated the set of interactive kiosks and computers. In Table 5.8, we provide the means and standard deviations for the cognitive and affective variables that the visitors rated depending on IT type.

Table 5.8 Means and Standard Deviations for the Cognitive and Affective Variables

	Audioguides		Interactive kiosks and computers	
	Mean	Standard Deviation	Mean	Standard Deviation
Authenticity	5.12	1.28	5.23	1.22
Enjoyment	5.40	1.24	5.70	0.88
Focused Immersion	4.24	1.17	4.84	1.12
Learning	5.07	1.17	5.61	0.96

Table 5.9 indicates the results of the ANOVA tests. The mean difference is significant between the two groups for enjoyment (F=2.93, p<0.10), focused immersion (F=10.74, p<0.001), and learning (F=10.22, p<0.010).

Table 5.9 ANOVA Results for our Two Technologies

	Audioguides vs. Interactive kiosks and computers	
	F	*p*
Authenticity	.302	.583
Enjoyment	2.93	.89
Focused Immersion	10.74	.001
Learning	10.22	.002

7. Discussion

This research investigates the affective and cognitive reactions of visitors interacting with museum technologies. We showed that the use of technologies contribute both to

learning and enjoyment for visitors. More precisely, the visitors who interacted with the audioguides, interactive kiosk and computers all perceived authenticity during their visit. Parry (2005) analyzed the evolution of theories in the "museum computing" sub-field and he highlighted two different discourses on IT. While some researchers encourage the presence of IT in museums, others also view technological equipment as a source of inauthenticity and anxiety for the public. This research shows that the use of IT during a museum visit is not incompatible with perceptions of authenticity.

Authenticity serves different functions and has a number of advantages for the cultural industry. For instance, Taylor (2001) indicates that authenticity adds value to objects or cultural sites, and, therefore, is used by visitors as a sign of quality to evaluate cultural artifacts or places. Similarly, perceptions of authenticity are associated with better evaluations of the heritage site (Naoi 2004). This study adds a new contribution to authenticity. It shows that authenticity is also associated with learning. Furthermore, disposition towards authenticity represents a significant moderator. This implies that experiential visitors will be less influenced by the effects of authenticity on learning. To the contrary, visitors that are the most in search of authenticity [the existential in Cohen's (1979) classification] will be more influenced by their perceptions during their museum visit.

Hypothesis 3 was not validated suggesting that ease of use does not influence visitor perceptions of immersion. This result can be explained by the particular setting that we used to conduct our field study. As it turns out, NCHI is a museum that puts forward immersion and its exhibition has been designed in a way that visitors have the sensations to be projected into the past from the beginning of their visit. For instance, the museum displays video of immigrants and audio content in the entire museum. The curators have also privileged a dark atmosphere in order to create a feeling of intimacy. As a result, even if technologies are not easy to use, we can understand that visitors still felt immersed during the exhibition.

We present hereafter the theoretical and managerial contributions of this research, as well as its limitations.

7.1 Contributions

7.1.1 Theoretical Contributions

First, this research makes contribution in several ways to the body of IS research that investigates user reactions towards using IT. Actually, our research model includes several cognitive and affective variables and examines their relationships. For instance, we highlighted a new antecedent of perceived enjoyment and immersion since perceived authenticity has a strong influence on these variables. According to Boehner et al (2007), emotions are an interactional phenomenon. Actually, Boehner et al. (2007) calls into question the informational stream that views emotions as an objective phenomenon that should be measured in laboratory. Conversely, the authors believe that emotions are complex phenomena that are socially constructed and that emerge in interactions. This interactional thesis that Boehner et al. (2007) promote can lead to a renegotiation of technologies roles. Boehner et al. (2007) explain that technologies should help individuals express and understand their emotions. The current research also shows that the use of the technologies available in the museum, namely audioguides interactive kiosk and computers, encourages emotional experiences. Therefore, this study contributes to the body of IS research that investigates emotional reactions. Furthermore, most of research dealing with emotions arousing during computer interaction has not examined the particular area of cultural heritage. This research addresses this gap.

Second, several researchers in the HCI field call for more studies measuring IT phenomena in a natural or real-world context. For instance, Finneran and Zhang (2005)

encourage more research on the experience of flow occurring in a naturalistic context. Boehner et al. (2007) also urge researchers to assess emotions as they occur in daily life.

> "*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. 2007 p. 289)

By surveying visitors in a real museum setting, the present research contributes to 1) the study of emotions as lively experienced by visitors and 2) the study of information systems in their context of use. In the study, we measured visitor perceptions towards IT actual use. Generally research assessing visitor reactions towards IT has relied on laboratory experiments, which simulates user environments. These studies also measure intentions rather than actual behaviors. By surveying visitors who interacted with IT in a natural life context (leisure time), we are very close to real life experiences. Consequently, this research can contribute to building the IS and HCI research traditions in natural contexts.

While previous HCI research has mainly focused on computers in a business context, this study includes other types of digital technologies dedicated to entertainment and education, namely audioguides, interactive kiosks and computers. These technologies are particularly common in tourist and cultural settings and represent relevant hedonic information systems to be studied.

Chhabra et al. (2003) noticed that there are few quantitative studies dealing with the relationships between visitor perceptions of authenticity and their satisfaction. Furthermore, it seems that prior research on authenticity has ignored the fact that more and more cultural visits rely on technologies. Wolf et al. (2007), who are HCI researchers, also point out the issue of authenticity as a key component of user interactions with information systems. They suggest an approach to include this concept in IT artifacts. We provide further knowledge on the effects of authenticity on user reactions.

7.1.2 Managerial contributions

According to the International Council of Museums (ICOM 2002), enjoyment and education of the public correspond to the core missions of museums. This research examines both entertainment aspects (enjoyment, authenticity and immersion) and learning reactions of visitors. These factors are also important for cultural institutional business. Markedly, Chhabra et al. (2003) observes that individuals who perceive a high degree of authenticity during their visit tend to spend more money in the cultural setting. They even purchase objects to keep a souvenir of their authentic experience. Even while the aim of cultural institutions is not to profit, they still need to raise money over and beyond expenses to satisfy new goals for efficiency in the modern era. Our study also show that positive reactions towards IT contribute to increased learning.

This study can also guide museum policy with respect to IT. Indeed, our results show that different types of technologies do not have the same contribution to elements of visitor experience. It seems that the set of interactive kiosk and computers contribute better to enjoyment, immersion and learning than the audioguides. However, there is no difference between these two technologies regarding their contribution to authenticity.

7.2 Limitations and Future Research

Although using real museum visitors to test our research model adds value to this research, it also added complexity to our research methodology. More precisely, because the participants were tired at the end of their visit or had little time to participate in the research, we had to create a short instrument. The result of this was that we were unable to include all the variables identified by Skadberg and Kimmel (2004) or Sun and Zhang (2006) as playing a role in people's interactions with technology. Furthermore, our research model principally

accounts for positive reactions towards IT use. However, IT use in museums may produce negative outcomes like anxiety, frustration or distrust. Future research should investigate this other side of visitor experience by including negative reactions and extending the set of variables. We also decided to focus on learning instead of IT use as outcome variable. Nonetheless, extent of use and frequency of use are relevant dimensions to be assessed in future research.

Another limitation that can be mentioned is the scale used to measure perceived authenticity. To be sure, we wanted to rely on an IS scale to assess this construct, but the scales provided by Featherman et al. (2006) may not be very descriptive of authenticity as it was experienced by our participants. Future research should try to improve these scales by adding other facets of authenticity like escapism. Moreover, this research only takes into account the constructive perspective of authenticity. It would be interesting to study existential authenticity.

We also point out that this research employs subjective scales to assess learning. Consequently, we did not use objective measures for the outcome variable.

8. Conclusion

In conclusion, this paper proposes a new model to assess visitors' interactions with technologies in museum setting. We introduce the concept of authenticity, a concept whose origin lies in museum and tourism studies, but one that is also relevant for IS research. In employing the constructivist view of authenticity, we augment two variables to the existing IS research. These are: perceived authenticity and authenticity disposition. We argue that authenticity has the potential to influence people's interactions with IT in cultural settings such as museums. Relying on the framework of Sun and Zhang (2006), we outlined a set of nine hypotheses that were tested via a free simulation experiment in a museum setting. Our

research model was generally supported, a fact that leads to numerous and interesting

implications for managers and scholars alike.

Appendix 5A: Review of the Literature on the Concept of Authenticity

This review of the literature distinguishes between tourism and museum research according to the type of authenticity that was studied, the context of the research and the methodology that was applied. We deduce also the main contributions or principles that were addressed in the research. We reviewed nine papers that adopt the constructivist perspective, five papers that addresses the existential authenticity and one paper taking the point of view of the objective authenticity.

References	Type of authenticity	Context and methodology	Contributions and main ideas
Amirou (2000)	Constructive authenticity	Conceptual book in the tourism area	People travel to discover the beauty and the authenticity of things. The quest of authenticity is a nostalgic search for real life in ancient or exotic societies. This quest has also for consequence visitors' reluctance to interact with virtual copies or numerical images of chef d'oeuvres (p. 30). Authenticity refers to antiquity.
Brown (1999)	Constructive authenticity	Conceptual paper in the tourism area	Fake authentic experiences and fake objects become the norm. Actually tourists tend to enjoy fake and staged experiences, while pilgrims also try to demystify these types of inauthentic experiences. Therefore, tourists as well as purists tend to develop parallel behaviors regarding authenticity. In certain circumstances, these two groups develop common behaviors: they enjoy or reject the inauthentic experiences.
Bruner (1994)	Constructive authenticity	Application to the New Salem historic site (Abraham Lincoln village) Observations of visitors and interviews with employees of New Salem	Professionals' perceptions of authenticity modify the way the historical site is managed. According to New Salem professionals, authenticity has four different meanings, whose the most important is credibility. In order to reach credibility and enhance visitor experience, New Salem professionals do not hesitate to modify and enhance the way people used to live in the past. Finally, the recreated site is better than the original.
Chhabra (2005)	NA	Retail outlets/ festivals 15 phone interviews with vendors based in the US and in Canada, 250 questionnaires sent to vendors	Vendors consider that authenticity is a consumer demand. However, it is producers of heritage objects who are perceived as the determinants of authenticity. Vendors tend to have the same perception of authenticity whatever their nationality or sociodemographic background. Authenticity means for vendors "produced in the place of origin"

		selling Scottish merchandise	(not outsourced).
Chhabra et al. (2003)	Constructive authenticity	Application to the Flora Macdonald Scottish Highland Games (Survey)	Authenticity is perceived by tourists as a sign of product quality. Visitors' expenses tend to increase with high perceptions of authenticity. Authenticity is also a determinant of tourist satisfaction.
Cohen (1988)	Constructive authenticity	Conceptual paper in the tourism area	Authenticity is emergent: each tourist has her/his own view of authenticity. Five types of tourists are identified: existential, experimental, experiential, recreational, and diversionary tourists. A tourist can perceive something as authentic/real even if it is not an authentic object according to experts.
Goulding (2000a)	Constructive authenticity	Application to a living museum in UK (interviews, focus group, observations)	Authenticity means escaping from the everyday life, looking for what is extraordinary. Heritage experience is linked to perceptions of authenticity. Three different groups of visitors are identified with their own view of authenticity. 1) existential: alienated in the present, look for pleasure and escape 2) aesthetic: imaginative escapism (do not want informers or tutorial aids) 3) social: develop social and entertaining experience
Kim and Jamal (2007)	Existential authenticity	Application to a Renaissance festival (highly simulated period theme park) In-depth interviews and participant observations	In opposition to the doxa, participation to festivals can contribute to existential authenticity. Festivals help building both interpersonal and intrapersonal authenticity.
MacCannell (1973; 1976)	Objective authenticity	Conceptual papers in the tourism area	People travel and engage in tourist activities because they feel alienated in modern societies. However, it is difficult for them to reach an authentic experience when traveling. Indeed, authenticity is most often staged; meaning authenticity in tourist places is reinvented and presented like a spectacle.

McIntosh and Prentice (1999)	Constructive authenticity	Three "19th century" British period theme parks (40 semi-structured interviews, 1200 questionnaires)	Authenticity is described as the completeness of the experience: how museum manages to convey ideas convincingly. Authenticity depends as much on the presented interpretation of the display as that of the viewer. Hence, visitors take part in the production of their authentic experience. Visitors' experience includes two elements: a cognitive one (thoughts) and an affective one (emotions). An authentic experience is one for which visitors had fun, learnt new things and enjoyed theirselves.
Naoi (2004)	Constructive authenticity	Historical quarter located in Chugoku-Shikoku District, Japan 323 questionnaires (open-air survey)	The results of the principal components analysis indicate that authenticity is composed of five items: artificial/natural, ordinary/unique, touristic/not touristic, decorated/undecorated, and modern/antiquated. Perceptions of authenticity represent the most important factor in visitors' overall evaluation of the historical quarter.
Pine and Gilmore (2007)	Existential authenticity	Conceptual paper in the museum area	Perceptions of authenticity are the new consumer sensibility. To enhance these perceptions, museums should "render themselves, phenomenologically authentic" (p. 78) Museums can improve authenticity by "being true to what they say they are" (p. 79) Consequently the use of technologies and other media need to be thought in terms of museum image. Will they contribute to better perceptions of authenticity or will there be a mismatch with the museum mission/ communication?
Steiner and Reisinger (2006)	Existential authenticity	Conceptual paper in the tourism area	Tourists looking for authenticity prefer simple experiences (without artifices) and are uninterested in a tour guided explanation. In contrary, inauthenticity is link to artificial, lack of distinctiveness, and passivity (visitors do not want to interpret by themselves). This raises questions regarding the role of media and guides: should they encourage self-interpretation or should they interpret for others?

Taylor (2001)	Existential authenticity	Conceptual paper in the tourism area	The search of authenticity performed by tourists represents a "violation for the locals" who are visited. Taylor advocates a search for sincerity, instead of a search for authenticity because tourists and locals can have "an interactive sharing of experience". With sincerity, communication between the 2 groups is allowed and the search for authenticity is not made at the expense of the locals. Taylor studies the authenticity of self (tourists) and other (locals)
Waitt (2000)	Constructive authenticity	Application to a heritage neighborhood, The Rocks, Australia (Survey)	Authenticity is used by marketers to attract visitors. Marketers distract visitors' attention from real history and they assign political or commoditized meaning to artifacts. Authenticity should be seen as a process of negotiation that lead to multiple versions of history. Gender, age and place of residence influence perceptions of authenticity.
Wang (1999)	Existential authenticity	Conceptual paper in the tourism area	He highlights 3 types of authenticity: (1) objective authenticity plus (2) constructive authenticity, which are object-related, and (3) existential authenticity that is activity-related. Tourists are interested in finding their true-selves. Nature (mountains, parks, etc.) helps in reaching this state. Existential authenticity can be subdivided into two categories: _ intrapersonal authenticity: bodily sensations, identity _ interpersonal authenticity: community, social bonds

Appendix 5B: Measurement Items for Constructs

Featherman et al. (2006) explains that artificiality and authenticity are on a same continuum. As they decide to focus on perceived artificiality, they reword all their items in a negative form. Since this research addresses perceived authenticity, we simply use the affirmative form of the existing metric and kept a negative form in order to have a reversed scale in our scale. We also adapted the scales to the museum context.

Table 5B.1 Scales of Artificiality

Perceived artificiality (Featherman et al. 2006)
Do not seem real to me
Do not appear to be authentic
Seem artificial
Seem like illusions
Do not feel genuine

The following table summarizes the measurement items used for each construct of the research model. In the questionnaire distributed to visitors, the word technology was replaced by a specific type of IT (audioguides or interactive kiosks and computers).

Table 5B.2 Constructs Operationalization

Constructs	Code	Question wording	References
Perceived authenticity	PA1	I found it artificial to discover the history of immigration through technologies. *(reversed)*	Adapted from Featherman et al. (2006), reversed scale
	PA2	Discovering the history of immigration through the technologies gave me an authentic feeling.	
	PA3	Discovering the history of immigration with the technologies was a natural process for me.	PA3 was reworded after pretest
Learning	LEA1	The use of IT helped me identifying central issues about immigration.	Adapted from Alavi (1994)
	LEA2	IT allowed me to better understand the history of immigrants.	
	LEA3	The technologies allowed me to deepen my knowledge about the history of immigration.	
	LEA4	The use of technologies aroused my curiosity for the history of immigration.	
	LEA5	My visit with the technologies aroused my interest for the history of immigration.	
Perceived ease-of-use	EOU1	The technologies available in the museum were easy to use for me.	Davis (1989)
	EOU2	My interaction with the technologies available in the museum was clear and understandable.	
	EOU3	I find it easy to get the technologies available in the museum to do what I wanted it to do.	
Personal innovativeness with IT	PIIT1	If I heard about a new information technology, I would look for ways to experiment with it.	Agarwal and Karahanna (2000)
	PIIT2	In general, I am hesitant to try out new	

		information technologies. *(reversed)*	
	PIIT3	Among my peers, I am usually the first to try out new information technologies.	
Focused immersion	FI1	While using the technologies, I was absorbed in what I was doing.	Agarwal and Karahanna (2000)
	FI2	While using the technologies, I was not able to block out most other distractions. *(reversed)*	
	FI3	While using the technologies, my attention did not get diverted very easily.	
Perceived enjoyment	PE1	I find using the technologies present in the museum to be enjoyable.	Davis et al. (1992)
	PE2	The actual process of using the museum technologies is unpleasant. *(reversed)*	
	PE3	I had fun using the museum technologies.	
Authenticity disposition	AD1	Technologies provide me with good support to experience museum content.	3 items were developed with judges
	AD2	Generally, seeing museum artifacts with the help of technology is the best way to see them.	
	AD3	Most of the times, I prefer to visit museums without technologies. *(reversed)*	

Appendix 5C: Socio-Demographic Information of our Sample

The visitors of the NCHI are principally local visitors coming from Paris (35%) or its suburb (3-%), totalizing 71% of the museum audience. The group of "tourists" is composed of the visitors living in other French regions (22%) and of individuals living abroad (7%).
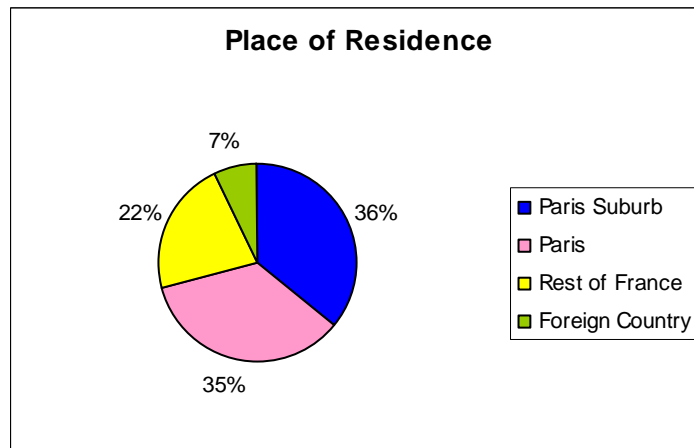
Place of Residence

Figure 5C.1 Place of Residence of NCHI Visitors

We can also notice that the visitors of the NCHI are principally educated and intellectual people. Actually, the two main audiences are Students (32%) and Officials and Managers (31%). Operatives and craft workers are still under represented in the museum attendance, as pointed out by the low percentage: they represent less than 5% of the NCHI public. Two job categories were not represented in our sample, it is: laborers and not working people.
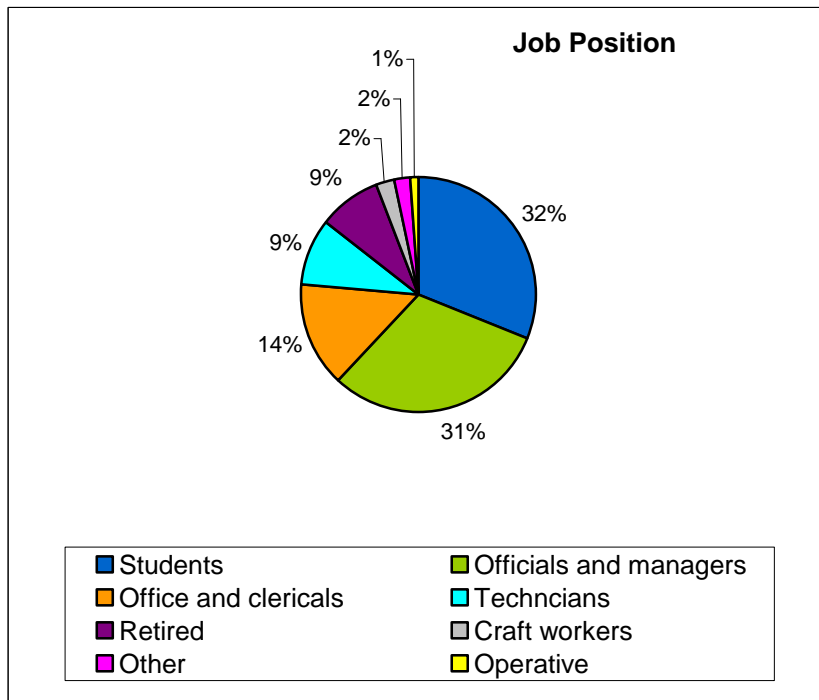
Figure 5C.2 Job Position of NCHI Visitors

From Authenticity to Historicity

Chapter 5 deepened our understanding of the role played by IT in visitor experience. We showed that IT use can contribute to better immersion, enjoyment, authenticity perceptions, and an increased learning experience. These aspects of enjoyment and education are fundamental missions of museum towards the public. However, we cannot forget that the original mission of museum is also to conserve and transmit our past.

Chapter 6 addresses this historical perspective by studying how IT can enhance visitor experience of the past. More precisely, relying on Monod and Klein's (2005) framework, we try to identify the relevant criteria to assess the potential of information technologies for cultural heritage interpretation. We also examine the role played by IT in the experience of historicity, which is the understanding of self as historically constituted. As a result, the next chapter provides an empirical analysis of a phenomenological framework.

Chapter 6 : The Application of a Phenomenological Framework to Assess User Experience with Museum Technologies

Abstract

Providing visitors with a valuable experience of the past has become a crucial mission for cultural heritage institutions. The experience of the past is one where visitors understand the museum's communications about the meaning of artifacts and where visitors undertake an active role in interpretation and reflection on the past. Several studies promote technologies as a good way for museums to reenergize their relationships with their visitors. But even as some research has concentrated more and more on visitor experiences, this work has neither particularly stressed on visitors' experience of the past nor on their evaluation of museum technologies with respect to their potential for engendering a better experience of the past.

Monod and Klein (2005) elaborated a phenomenological framework to evaluate IT used in the cultural heritage. Since it has not been empirically "validated" yet, the objective of this paper is to employ this framework/criteria with samples of users of museum technologies and in the process determine whether these criteria correspond to visitor expectations and can be met by IT.

Adopting a multi-methodological approach, we propose two empirical studies for investigating visitor expectations towards a phenomenological experience and role of IT in this experience. Our findings confirm the importance of phenomenology as a tool to assess IT user experience in museums. In addition, our field study indicates that technologies available in museums positively contribute to an experience of the past.

Keywords: Museum technologies; evaluation; past; experience; phenomenology; Heidegger; embodiment; historicity, multi-methodology; focus groups.

1. Introduction

Museum studies in a wide range of journals have noticed individuals having an increased interest in the past in general (Liew 2005), and more specifically in heritage sites (Poria et al. 2006). The principal motivations for heritage site visits are the desire to connect with one's heritage and the desire to learn more about history (Poria et al. 2006). According to Kimmelman (2001), "we go to museums to remind ourselves [about] who we are". There are many benefits that visitors gain from heritage sites, from connections with the past and identity finding (Chronis 2005) to a "nostalgic bonding" linked to the recollection of things belonging to the past (Holbrook and Schindler 1994). The past is a valuable experience because of its civilizing effects and the extent to which it becomes a highly personal experience for the participant. It is one where visitors understand the museum's communication about the meaning of artifacts and where they undertake an active role in interpretation and reflection on the past.

Consequently, providing visitors with a valuable experience of the past has become a crucial mission for cultural heritage institutions. Technologies have been presented as the panacea to enhancing visitor experience. In point of fact, numerous studies promote technologies as a reasonable way for museums to reenergize their relationships with their visitors (Fopp 1997; Messham-Muir 2005; Vom Lehn and Heath 2005). For instance, virtual reality technologies can represent "items which have not survived, creatures which are extinct, the visions of great men which were never realized or even the imagination of artists and thinkers" (Fopp 1997, p. 146). By displaying events from the past, virtual reality helps people relive historical events in their mind. Furthermore, the "first-person perspective" (Lok 2004, p.50) enables visitors to feel more concerned by what they see and so to project themselves in history. Hybrid environments or mixed reality simulators, devices that enable visitors to look at real and virtual objects in the same time (Lok 2004; Sparacino 2004),

reduce the distance between past and present objects by allowing visitors to directly compare objects belonging to two different eras. More common museum technologies like audioguides, interactive and multimedia kiosks generally provide historical background and tutorial aids to visitors.

However, even while some prior research has focused on visitor experience, there has been neither a particular stress on visitor experience *of the past* nor on an evaluation of the technologies that are proposed to enhance better experience of the past. In effect, museum professionals have few guidelines on how to assess visitor experience, particularly in the context of IT use (Institute of Museum and Library Services 2006; Pujol Tost and Economou 2007).

Monod and Klein (2005) have proposed a phenomenological framework to evaluate IT used in the cultural heritage. Nonetheless, this framework has not been empirically tested and the criteria have not been operationalized with subjects. As a result, we do not know whether the concepts suggested are meaningful for users of museum technologies. Therefore, this research aims at examining these phenomenological concepts. The subsequent research questions that guide this study are the following:

1. Are visitors interested in a phenomenological experience in museums? More precisely, are the criteria proposed by Monod and Klein (2005) relevant to assess IT user experience in museums?

2. To what extent do museum technologies contribute to an experience of the past?

To answer these research questions, we adopt a multi-methodology approach and propose two empirical studies that examine visitor expectations towards a phenomenological experience and IT role in this experience. Our findings confirm the value of a phenomenological approach in assessing visitor experience in museums. As it turns out, the

participants of the focus groups think that context, embodiment, self-projection, possibilities of Being and historicity are fundamental in a cultural heritage visit. Reactions were mixed for re-enactment, which is the sixth criterion. Furthermore, our second study, conducted at the National Center of History of Immigration, indicates that technologies available in museums positively contribute to an experience of the past.

This research is important because "guidelines for future museological design and self-evaluation are increasingly requested by professionals and institutions within the field" (Pujol Tost and Economou 2007, p.82).

This paper is structured as follows. First, the context of the research is set out by analyzing the relationships that exists between museums and their visitors. We highlight the gap that exists in the literature with respect to evaluating visitor experience with IT. Subsequently, in the third section, we introduce the phenomenological framework developed by Monod and Klein (2005). Fourth, we present our two studies, the focus groups and the field study, and report their results. Fifth, we discuss the empirical and theoretical contributions, as well as the limitations of this research. The last section concludes this work.

2. Context Presentation: Museums and their Visitors

2.1 Definitions and Missions of a Museum

Several practical definitions of museums are available. The one that is the most recognized and widely used in the museum field is that of the International Council of Museums (ICOM). According to the statutes of ICOM, "A museum is a non-profit making, permanent institution in the service of society and of its development, and open to the public, which acquires, conserves, researches, communicates and exhibits, for purposes of study, education and enjoyment, material evidence of people and their environment." (ICOM 2002, Article 2). Consequently, museums have four principal goals: (1) acquisition, (2) research, (3)

communication and (4) exhibition. These missions are aimed at the education and enjoyment of the public. So museums stand squarely between the two domains of education and entertainment, also called "edutainment".

The well-known museologist Sola (1997) provides another definition of museums that adds a new perspective to that of ICOM: "A museum is a non-profit institution which collects, analyses, preserves and presents objects belong to cultural and natural heritage in order to increase the amount and quality of knowledge. A museum should entertain its visitors and help them to relax. Using scientific arguments and modern language, it should assist people to understand the experience of the past. In its mutual relationship with its users, it should find in past experience the wisdom necessary for the present and the future" (Boylan 2002).

In the last part of this definition, three important points that support the ideas underlying this paper are presented. First, museums should assist people during their visit . In this way these institutions take on the role of facilitator by helping visitors to understand their past. Second, Sola (1997) contends that museums and their visitors have a mutually beneficial relationship. Consequently, museums should try to develop ties with their visitors, which supposes that this implies a two-way relationship. Museums communicate and exhibit their artifacts to the public. Conversely visitors should be able to communicate and share their thoughts with museums.

Third, it seems that looking at the past can help to build for the present and the future. In effect, museums show to visitors their past, so that they can better appreciate their present and their life (Anani 2005). Therefore, museums are linked to history in that one of their principal missions is to collect and conserve the heritage of the past, but they are also turned toward the future by inducing reflection by coming generations. According to Rieu (1988), museums should try to show the future of our societies through objects of the past. Therefore, the temporal dimension is closely related to the *raison d'être* of museums.

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2.2 The Relationship of Museums with their Visitors

The aforementioned definitions of museum lead inevitably to the conclusion that this institution can play an important role in the temporality of individuals. The institution shows the past, and thereby it can influence individuals' present and future (Monod et al. 2006). Additionally, visitor interpretations of objects encountered during a visit as well as their experience of past are important to see how this transformation takes place. This mutual relationship is supported by other researchers who also view this mode of functioning as ideal for museum and visitor experience (Hooper-Greenhill 2000; Kotler and Kotler 2000, p. 170). For instance, Hooper-Greenhill (2000) encourages museums to change their one-way communication with visitors to a two-way communication in order to foster visitor interest. "The emphasis is on the review and reconceptualisation of the museum audience relationship, and the direction of change is to bring these two poles much closer together." (Hooper-Greenhill 2000, p.28)

Therefore, this paper assumes that there is (or should be) a two-way relationship between visitors and museums, one which supports the "mutual relationship" concept articulated by Sola (1997). The contour of this relationship between museums and their visitors is elucidated below. The first relationship concerns the role played by museums and artifacts, while the second relationship refers to visitor interpretation of museum artifacts.

2.1.1 Relationship #1: The Role Played by Museums and Artifacts

Artifacts represent all tangible and intangible things that have a human trace (Rieu 1988). Museological objects are artifacts that do not have an instrumental goal anymore because they belong to a past era. Indeed, they are valuable not for what they can accomplish, but for what they represent *per se* (Rieu 1988*)*. Generally, these museological objects are

"unique, typical or representative of an era, a period, a school, a culture" (Rieu 1988, p.1705). Therefore, they are different from common objects used in our everyday life.

For a long time, a museology based on objects was dominant. In other words the objects were supposed to speak for themselves (Gob and Drouguet 2003). More and more, curators became conscious that just displaying objects was not enough and that they needed to give them meaning. Therefore, in addition to collection and documentation of artifacts, curators also adopted a mission of communication. Today museums provide information in order to make objects more accessible (Hooper-Greenhill 1990).

Moreover, it seems that museums and their artifacts can have an influence on our identity and existence. Objects can influence visitors and more precisely their "personal reality" by touching them emotionally or making them think (Schärer 1996, p.9). Carr (2001) asserts that "our experiences change and reconstruct us. More than schools, museums help to transform us into what we are meant to become, because we willingly dwell in them out of a deeper, more integrated need in our lives" (p. 174). In effect, one of the museums' evolving missions is to conserve historical objects in order to make the public conscious of their past (Poulot 2005). Museums are leisure places where individuals seem more disposed to remember their experiences and to apply the knowledge acquired during a visit to their lives.

In phenomenological research on visitor experiences, Hicks (2005) showed that visitors still remember their past visit to a museum more than thirty years later. Furthermore, some of the research participants recognized that their museum visit had a long-term impact on their lives. In some cases, for instance, it affected their choice of job or their attitudes toward cultural institutions in general. For young people, museums also represent a way of "growing up as exhibitions can broaden new perspectives and worlds" (Hicks 2005, p.77). Consequently, it is important that exhibitions stay connected with people (Ross 2004).

2.1.2 Relationship #2: The Role Played by Visitors

Museums have been influential institutions for a long time, since they were the only means of conveying meaning to artifacts. The communication in this tradition was one-way and visitors did not really have the chance to express themselves (Hicks 2005; Hooper-Greenhill 2000; Ross 2004). But nowadays, the power equation between curators and visitors is beginning to be better balanced. Museum experts increasingly acknowledge that visitor interpretation plays an important role in their experience. Curators also have become "visitor-centred" (Ross, 2004, p. 86) by putting more emphasis on visitor interpretation than on artifacts.

Furthermore, visitors are increasingly undertaking an active role within museums (Cameron 2005). They try to give meaning to objects and not just accept curator interpretations. Indeed, museum visits are more and more often perceived as an opportunity for individuals "to explore and make up their own minds, to test their own interpretations against the experts" (Hooper-Greenhill 2000, p.30). For instance, Cameron (2005), who led several focus groups with museum visitors in Sydney, showed that about 25% of the participants expect museums to be places for historical reflection. Visitors want to be able to develop their own thinking about phenomena or objects.

Figure 6.1 summarizes the relationship of museums with their visitors and it also introduces the role of IT. It is more and more often the case that providing visitors with a valuable experience of the past has become a crucial mission for cultural heritage sites, which increasingly rely on IT to achieve such an aim. Unfortunately, whereas IT can influence the experience of the past, few studies have paid attention to this phenomenon. We present in the next section a review of the literature on the evaluation of user experience with IT.

1. Vestiges of the past, give meaning to visitors' history

| Museums (historical artifacts) | Information Technologies | Visitors (historical beings) |

2. Creators of artifacts, give meaning to artifacts
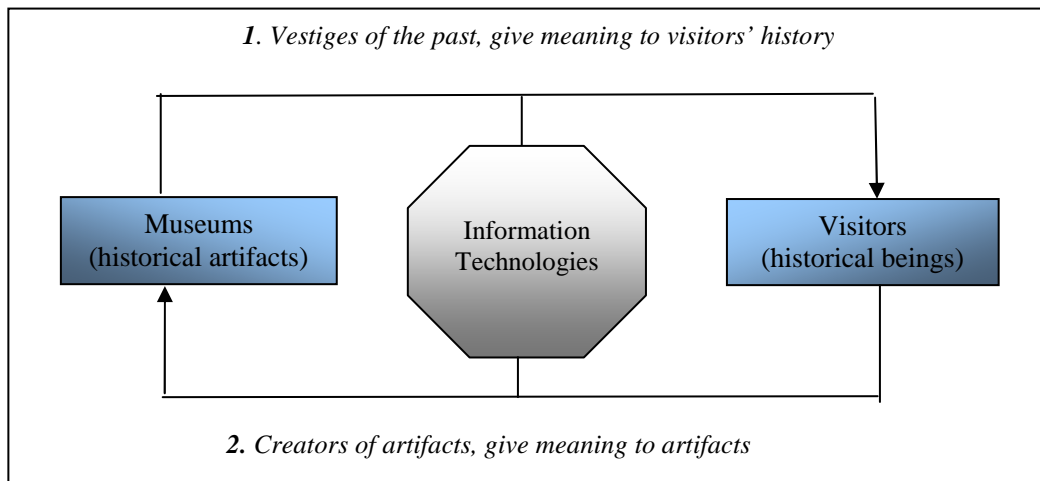
Figure 6.1 The Museum-Visitor Relationship Mediated by IT

3. The Evaluation of Visitor Experience

Researchers from different disciplines have developed a wide variety of frameworks to study visitor needs and to provide directions to museums (Anderson 2004; Kotler and Kotler 2000). It is noteworthy that these frameworks have remained conceptual since they have not been empirically tested within museums or with visitors. Furthermore, they do not explicitly address the role of technologies in museums. For instance, the marketing researchers Kotler and Kotler (2000), propose three dimensions on which museum professionals should focus in order to improve visitor experience. They are: (1) the variety of visitor experiences, (2) the level and depth of visitor experiences and (3) the design and orchestration of visitor experiences. While Kotler and Kotler (2000) principally identify operational levers to enhance visitor experience, Anderson's framework (2004) points out the organizational functions of museums serving as a foundation to develop a visitor perspective. More precisely, Anderson (2004) suggests four domains on which museums should rely in order to be visitor oriented: 1) governance, 2) institutional priorities, 3) management strategies and 4) communication style.

Certainly, a number of empirical frameworks do address visitor experience and some examine visitor experience with technologies (Falk and Dierking 1992; Peacock and Brownbill 2007). But even while these studies do focus on visitor experience, there has been neither a particular stress on visitor experience *of the past* nor on an evaluation of the technologies that are thought to lead to a better experience of the past for visitors.

Additionally, museum professionals have few guidelines on how to assess visitor experience, particularly in the context of IT use (Institute of Museum and Library Services 2006; Pujol Tost and Economou 2007). According to a recent report,

> *"[Museums] would like information, training, and guidance on how to better assess user needs, including methods of collecting information about the characteristics of users, how they use an institution's technology and digitization services and products, and for what purpose."* (IMLS, 2006, p.124)

Information systems evaluation is an important research stream for the IS discipline and it has given rise to several frameworks, such as the IS Success Model (Delone and McLean 1992; Delone and McLean 2003) and the Task-Technology Fit (Goodhue and Thompson 1995). This issue has also been addressed in several IS journals and in special issues (e.g., Irani and Fitzgerald 2002).

In short, there has been a corpus of research in which the evaluation of IS aims at measuring utilitarian systems and their contributions to organizational or individual performance (Delone and McLean 1992; Goodhue and Thompson 1995; Kéfi and Kalika 2004). For instance, Kéfi and Kalika (2004) proposed a research model with structurationist underpinnings to measure IS performance. More precisely, they investigated how technologies, actors, institutional properties and tasks interact with each other to augment IS performance. Kéfi and Kalika (2004) adopt a contingency approach that includes the influences of environmental factors. Employing a longitudinal methodology, Kéfi and Kalika

(2004) applied their evaluation framework to the datawarehouse of a financial company. Their results indicate that IS performance can be measured through three criteria: 1) degree of IS use, 2) system and information quality and 3) perceived impacts. Furthermore, these performance dimensions confirm previous research, namely the IS Success Model of Delone and McLean (1992), which identifies information quality, system quality, user satisfaction and IS use as key antecedents of IS success. Delone and McLean (1992) elaborated the IS Success Model in order to determine the factors that play a role in IS success. This model was refined in 2003 to include other variables and new linkages that appear to be important in the assessment of IS. Recently, Petter et al. (2008) in their meta-analytical review of the IS Success Model highlighted the fact that this research model has mainly been applied to utilitarian contexts.

> "*What still remains to be discovered is if the D&M model is appropriate for hedonic IS. Some of the dimensions may no longer be relevant or may need to be measured differently for gaming, social networking, or other types of IS used for enjoyment.*"
> (Petter et al. 2008, p. 258)

Consequently, prior research dealing with evaluation has mainly focused on a utilitarian perspective of IS evaluation, that is trying to determinate how IS can increase organizational or individual performance. Appropriate for this utilitarian context, users are often represented by managers or employees.

What is different about the cultural heritage context, however, is that IT users are best compared to visitors but visitor performance does not appear to be as important as in company settings. Rather, enhancing user experience by providing entertainment, education, and a good experience of the past are the crucial targets for museums. Moreover, museum technologies tend to serve hedonic purposes. Therefore, the evaluation of IS deployed in cultural heritage institutions should be done in accordance with these cultural objectives.

Some researchers who have paid attention to hedonic information systems (Van der Heijden 2004; Wakefield and Whitten 2006) show that they require specific criteria for their evaluation. For instance, Van der Heijden (2004) highlight the fact that enjoyment and ease of use are more relevant in the assessment of hedonic technologies. The Human-Computer Interaction subfield has also devoted part of its research attention to hedonic systems. User reactions, such as cognitive and affective reactions, have been conjointly analyzed to better evaluate the efficiency of information systems (Sun and Zhang 2006).

Even if cultural heritage research focused more on visitor experience, there is neither a particular stress on visitors' experience of the past nor on evaluations of the technologies with respect to their potential for engendering this better experience of the past. Furthermore, Monod and Klein (2005) explain that the frameworks that exist to evaluate IT in cultural heritage are mainly driven by technological determinism. In fact, these models generally postulate that the implementation of IS in museums will positively impact visitor satisfaction and experience even while there is little verification of whether these technologies really achieve their goal (Monod and Klein 2005). In the next section we present a framework that addresses many of these gaps by evaluating user experience with IT from a phenomenological point of view.

4. The Value of Phenomenology in Studying Visitor Experience: Introduction of the Conceptual Framework

4.1 Phenomenology: How this Philosophy Particularly Fits Museums

Phenomenology is the "science of phenomena" (Heidegger 1962, p.50). This is also a philosophical movement that appeared in the first half of the 20th century (Spiegelberg 1975). It focuses on the experiences of individuals. Indeed, it aims at studying "phenomena as

consciously experienced" (Spiegelberg 1975, p. 3). This philosophical underpinning was initiated by Husserl (1936) and his student Heidegger (1962). 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 like Merleau-Ponty and Sartre also nurtured phenomenology through the concepts of self and embodiment (Smith 2003). While these other philosophers are important in the development of the philosophy of phenomenology, our research follows Heidegger's view as it was developed in his book *Being and Time* (1962).

Phenomenology aims at studying individual experiences. Heidegger (1962) contended that human beings need action and praxis with objects (i.e., to engage with them) in order to feel closer to these things (Smith 2003). Therefore, individuals cannot see an object or imagine it in order to understand it because it is only a "representational form of intentionality" (Smith 2003). This argument leads to conclusion that being able to touch things or to manipulate them contributes to a better experience and to better interpretation.

As indicated in the title of his book, Heidegger (1962) addresses the question of time and its relation to being. Heidegger asserted that time has an ontological function since it constitutes being (Dastur 1993). Indeed, "we are temporal beings not because we exist in time but because time is really what composes our beings" (Dastur 1993, p. 301). Temporal beings are open because individuals are always turned towards the future and the past, and their self-meaning is not fixed (Lyotard 1992).

Additionally, it seems that history plays a role in people's existence as it can shape their present and future (Monod and Klein 2005). In effect, historical objects represent remains of the past and consequently, they give to people their historical dimension. It is thanks to these remains that individuals know that something before them existed (Heidegger

1962). However, these historical objects have a secondary historicity; they are historical because they belonged to a past humanity and were created by historical beings (Lyotard 1992).

According to Heidegger (1962), Dasein is a "being-in-the-world", meaning that human beings cannot be studied without including the world that surrounds them (Smith 2003). In a similar vein, individuals need to take into account their context and the relations they have with objects to understand their actions and interpret what exist in the world (Smith 2003). Given that individuals are not responsible for their own existence (others gave them life), they always try to interpret what existed before them and what they encounter in the world (Dastur 1993).

In that Heidegger's phenomenology puts a special emphasis on time (history), human existence and experience seem to be perfectly appropriate to the study of cultural heritage institutions, whose goals are to display past heritage and focus on visitor experiences.

4.2 Phenomenological Framework: Presentation of the Criteria

Based on Heidegger's concept of historicity, Monod and Klein (2005) elaborate a framework to evaluate e-HS (Table 1). E-HS are "applications of information systems to communicating cultural heritage" (Monod and Klein 2005, p. 2871). The framework aims to determine whether technologies, by meeting user requirements, have interpretive characteristics, and whether IT contributes to a good experience of past. Appropriately, visitors are central to Monod and Klein's research.

In their original framework, the authors included eight criteria: re-enactment, embodiment, context, self-projection, possibilities of being, historical self, inquiring being, and universality in uniqueness. These criteria were reduced to six in a more recent version (Monod et al. 2008), and the framework now focuses on context, embodiment, self-projection,

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re-enactment, possibilities of being, and historicity. These criteria are defined in greater detail

hereafter.

Table 6.1 Interpretive and Phenomenological Framework for the Evaluation of e-Heritage Systems (based on Monod et al. 2008, p. 16)

Criteria	Question for Evaluation
Context	Do e-heritage systems give an occasion for a "reflexive experience of history"? Do they provide tutorial aids to acquire the necessary background knowledge? Do they lead the user to engage in hermeneutic circles, which reduce the distance between the present and the past contexts of understanding?
Re-enactment	Do e-heritage systems help the visitors to re-live the historical events in their mind? Do e-heritage systems help them to picture themselves as part of the historical events? Can visitors grasp the mindset of the historical characters?
Embodiment	Do e-heritage systems give an opportunity of a bodily experience of the past to the visitors?
Self-projection	Do e-heritage systems stimulate visitors to project themselves into the past so that the past gives meaning to their current conditions of existence?
Possibilities of being	Do e-heritage systems present the past "in terms of its many possibilities" so that visitors are lead to wonder what specific historical characters could have done and what the constraints of their situation were?
Historicity	Do e-heritage systems help the visitors understand themselves as historically constituted so that they can learn the possible meanings of their existence from the values, actions and life situations of historical characters?

4.2.1 Definition of the Phenomenological Concepts

- Context

The first criterion proposed by Monod et al. (2008) to provide IT users with a

phenomenological experience is *context*. According to Monod et al. (2008), context is

represented by the shared values, overarching values and beliefs that contribute to meaning-

making experiences. Indeed, without cultural and historical context it is difficult for

individuals to have a comprehensive understanding of their personal history and of history in

general. It is very frequently true that in cultural heritage sites, visitors do not understand the

purpose of an object or even realize its historical importance. In fact, Schärer (1996) contends

that information provided within museums is generally more structural (some general

indications) than cultural (information on the earlier context of use). Indeed, museums tend to

forget the role played by context to facilitate visitor understanding. The German philosopher Schleiermacher (1810) is one of the first to acknowledge this dual facet of interpretation. More precisely, Schleiermacher (1810) identifies a "grammatical interpretation", one which focuses on the context of language, and a "psychological interpretation." This interpretation pointedly focuses on the thinking of the author (Monod 2004, p. 119). As museums often neglect one or both of these interpretations in exhibitions, visitor experience with the past is limited. In addition, some artifacts remain obscure and the point of view of an expert is required to engender meaning (Deshayes 2002). Therefore, even if visitors take on a more active role, they still need mediation and some support before building their own reflections.

- Re-enactment

Re-enactment is the second criterion identified by Monod et al. (2008). "Re-enact" in a literal sense means to "perform again" or "to go through a second time" (The American Heritage Dictionary of the English Language 2000). Collingwood (1946), who studied philosophy of history and devoted a lot of his research to re-enactment issues, also employs terms like "re-construct", re-think" or "re-live" (Nielsen 1981, p. 2). Collingwood (1946) argues that the work of historians should be seen as an imaginative reconstruction. In point of fact, re-enactment was first set forth as an important capability for historians since these scholars need to relive historical events in their mind in order to interpret history and to better convey it to people (Collingwood 1946). Consequently, re-enactment can be viewed as a methodology to produce historical knowledge (Nielsen 1981). It is noteworthy that this possibility of reenactment should also be at visitors' disposal in order to enhance their experience of the past (Monod et al. 2008). Indeed, if visitors can relive historical events in their mind, they will be projected into the past and are more likely to understand historical personalities, for instance, or way of life in the past.

- Embodiment

The third dimension deemed to be important for IT user experience is *embodiment*. Embodiment is a notion that was developed principally by Merleau-Ponty (1962). *The Cambridge Dictionary of Philosophy* (1999) gives this definition of embodiment:

It is "*the bodily aspects of human subjectivity. Embodiment is not a concept that pertains to the body grasped as a physiological entity. Rather it pertains to the phenomenal body and to the role it plays in our object-directed experiences.*"

Mingers (2001) also examined the concept of embodiment and its implications for IS research. According to Mingers (2001), embodiment resides in the fact that "our basic attitude is always (except in pure contemplation) one of doing, acting, having some aim in mind, having some concern" (p. 108). His explanation sheds more light on the definition of *The Cambridge Dictionary of Philosophy*. From this observation we can conclude that embodiment designates the sensory experiences that an individual may have with objects encountered in the world.

The opportunity to have a bodily experience can be conveyed by the use of the five senses. Joy and Sherry (2003) showed that museum visitors appreciate the possibility of engaging physically with artifacts, as it leads to a better comprehension of works. In the same way, Hall et al. (2001) interviewed museum experts who asserted that touching artifacts enables visitors to better understand the history of an object. Visitors can, for example, get insight in how objects were used in the past by touching them.

Some technologies particularly contribute to embodiment. For instance, haptic technologies, which give the ability to visitors to feel and manipulate artifacts, enable visitors to sense the feel of artifacts, as well as to manipulate them (Brewster 2005). Similarly, virtual reality systems, in that they offer a simulated interaction with objects, have been suggested offered as supporting technologies for embodiment experiences (Mingers 2001). Mingers

(2001) particularly insists that the design of information systems should "make more use of people's bodies" (p. 122)

- Self-projection

Monod et al. (2008) proposed self-projection as a fourth criterion. Self-projection works by allowing one to put oneself mentally in the shoes of historical characters and by imagining what one could and would have done in another's situation. This type of self-projection has both cognitive and emotional aspects. The cognitive aspects are linked to the deliberations that lead to decisions and actions actually taken whereas the affective aspects are related to emotions such as love, anger, surprise, joy, etc.

The self-projection concept proposed by Monod and Klein (2005) takes root in philosophical developments dealing with empathy. The German school, lead by Friedrich Vischer (1807-1887), his son Robert Vischer (1847-1933) and Theodore Lipps (1851-1914) particularly contributed to developments of empathy (Verducci 2000). They define empathy, "Einfühlung" in German, as an affective state that makes people project themselves into the lives of other people. Adopting an historical perspective on empathy, Verducci (2000), explains that these German philosophers consider empathy to be a "phenomenon that is projective, imaginative, and primarily affective in nature" (p. 68). Therefore, as defined by Monod and Klein (2005), self-projection appears to be synonymous with the empathic process.

- Possibilities of being

Possibility of being is the fifth phenomenological criterion. According to Monod et al. (2008), a phenomenological experience helps people realizing the constraints that have been created by the past and the impacts on their present life. This leads to the realization that the present could have been different, too, had the past been different. Reflecting on alternative pasts, individuals come to realize how the present could have been different, too. Monod et al.

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(2008) argue that cultural heritage sites, and more precisely historical characters, represent an important vehicle for inspiring this process.

- ▪ Historicity

The last criterion, historicity, is the most conceptual and existential dimension. Historicity refers to the understanding that we are fundamentally historical beings and that the meaning of our action and of our existence, is linked to history.

In *Being and Time*, Heidegger (1962) devotes the entire section "The Vulgar Understanding of History and the Occurrence of Da-Sein" to define history properly. Heidegger insists that the term "history" should be distinguished from the term "past" in that history represents the influence and consequences of past on the present and the future: "Thus history does not so much mean the 'past' in the sense of what is past, but the *derivation* from it" (Heidegger 1962, p. 347). Heidegger also uses words such as "move, rise, fall, connection, change and transformation" to designate history (p. 347). These words capture the dynamic nature of history. It is noted that history is a specific component of human beings, or "Dasein," since it constitutes our lives. Therefore, to capture history in a meaningful way, we argue that individuals need to be confronted with a dynamic representation of history by understanding the influence of past events on their personal existence.

Even though not grounded in a phenomenological framework, other studies validate the importance of these six phenomenological criteria for IT users' experience.. For instance, Pujol Tost and Economou (2007) surveyed visitors of the Ename Museum (Belgium) about their favorite rooms and devices at the end of their museum visit. The applications that were designated by visitors correspond to the ones that were able to convey context, empathy, interactivity, and sensations. More precisely, Pujol Tost and Economou (2007) found that context is one of visitors' most important expectations. Moreover, empathy contributes to

visitor engagement and satisfaction. The dimensions of interactivity and sensations (described by the participants as the possibility to touch) also led to better learning.

Hence, the phenomenological criteria developed and identified by Monod and Klein (2005), then refined by Monod et al. (2008) appear to be of great importance to visitor experience. This framework fits particularly well with the context and objective of the current paper which is investigating visitor experience of the past. Furthermore, as Monod and Klein have not verified their framework in the field, the present research will extend their work empirically through two field studies with museum visitors.

5. Methodology

We conducted two studies to apply the phenomenological framework. The first study uses the focus group methodology, a qualitative approach, in order to probe the relevance of the phenomenological criteria and to see how visitors value them in their museum experience. The second study builds on the results of the first study to further test these criteria. In this second step, we distributed questionnaires to visitors of a French museum, hence employing a a field study methodology. The purpose of this second study was to propose an operationalization of the phenomenological criteria and also to evaluate the role of IT in visitor experience.

To summarize, the first study addresses the first research question: "Are visitors interested in a phenomenological experience?" while the second study focuses on the second research question: "To what extent do museum technologies contribute to such an experience?"

The multi-methodological approach have been promoted by several IS researchers as a way to create a deeper comprehension of the research objectives (El Amrani et al. 2006;

Kaplan and Duchon 1988; Mingers 2003). Furthermore, Morgan (1996), reviewing the application of focus groups in sociological research, showed that focus groups are often mixed with another approach in order to yield better results. For instance, conducting a survey after a focus group also expands the study population.

5.1   Field Study One: The Focus Groups

5.1.1   Justification of the Methodology

We used focus groups to validate the phenomenological framework and check whether people were interested in having a phenomenological experience in museums. Indeed, Edmunds (1999) argues that focus groups are particularly well suited for: 1) exploratory studies and 2) research objectives stating that the goal is to clarify concepts. Since the framework proposed by Monod and Klein (2005) has not been applied earlier, this research is clearly exploratory and focus groups thus appear to be an appropriate methodology.

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 also enable researchers to better understand people's perceptions and the meaning they give to phenomena. Keep in mind that our study has the same aim.

5.1.2   Recruitment of the Participants

We conducted focus groups with students of a French University located in Paris. Graduate students in management had had a recent course dealing with "culture and museums," a course with regular visits to museums. Although the course content required students to engage in museological experiences, conversely the students were not generally

experts in either arts or museology. Therefore, this sample appeared to offer good representativeness of the average museum visitor. Furthermore, we chose this target in accordance with the priority of museums. Museums increasingly target young people in their communication (Kotler 2001).

Specialists in focus group methods also recommend paying attention to a certain number features when creating the groups. These are group size, compensation, the number of groups, the degree of acquaintance of the group members, and the degree of social homogeneity (Duchesne and Haegel 2006). Our group sizes varied between nine and thirteen students. No compensation was given to the participants, but this study enabled them to give their opinion about the culture course and to express their interest in future museum visits. Three focus groups were conducted over a period of one month with a total of 33 subjects interviewed. Each focus group lasted on average one hour. Two groups of participants belonged to the same cohort since they were attending the same class and they all had in common the experience of museum visits (Group 1 and Group 2). However, these students were not necessarily friends. Finally, our groups were socially homogeneous, a nicety that avoids domination effects (Duchesne and Haegel 2006). Nevertheless, the socio-demographic diversity was ensured with samples including both men and women.

Table 6.2 Socio-Demographic Information of the Groups

	Focus Group 1	Focus Group 2	Focus Group 3
Number of students	13	9	11
Mean Age (S.D.)	23.07 (0.86)	22.62 (0.77)	21.91 (1.3)
Percentage Male	46.2%	22.2%	36.4%
Percentage Female	53.8%	77.8%	63.6%

5.1.3   Procedures

The dissertation author was in charge of the management and animation of the focus groups. We followed a semi-structured approach, using an interview guide with prepared open questions. The same interview guide was deployed across the groups to ensure comparability of results. The interview guide was composed of two parts, as shown in Appendix 6A. The first part aims at explaining the purpose of the focus group and better "knowing" the participants. The second part focuses on participant experience in museums. Specific questions connected to the phenomenological criteria were also asked in order to gain insights into visitor expectations about historicity.

Phenomenology informs the theoretical backgrounds of this research, but not its methodology. The focus groups were rather conducted via a hermeneutical approach according to the seven principles of Klein and Myers (1999). Hereafter, we explain in more details how we applied the qualitative principles to our research.

Before conducting the interviews we took into account the context of our participants, as explained in the recruitment process. The subjects were university students attending museums as a result of both a personal agenda and as part of their university degree program.

At the end of each focus group discussion, participants were invited to synthesize their thoughts and list the most important ideas. This way, we mixed two types of exercises and gave ideas still be communicated the opportunity to surface. Furthermore, we did not want to be blinded by our research instrument, as cautioned by Miles and Huberman (1994). Therefore, the participants were also free to discuss other topics related to the museum and its technologies. This freedom of expression was an attempt to deal with the social construction of our research object. Even though several researchers served as managers of the focus groups, subjects were considered to be the experts and to lead the interview in order to let

their full experiences emerge (Thompson et al. 1989). This also had the desirable effect of creating a dialogical reasoning.

At the end of each session, researchers involved in the focus group management carried out a debriefing in order to elicit further participant responses. While two other IS researchers assisted in data collection, the focus groups they managed are not reported in this research. Another advantage of a multi-researcher approach is that we obtained a range of interpretations. This is consistent with Thompson et al. (1989) who argue that "critical hermeneutics allows the text to yield a multitude of equally adequate interpretations" (Thompson et al. 1989, p. 141). It also helped in detecting potential biases in this research. More precisely, by discussing participant answers among the several researchers, we came to realize that the Louvre experience dominated their discourse.

The phenomenological framework of Monod and Klein (2005) was used to analyze the verbal and written data. Therefore, abstraction and generalization of focus group findings was framed through a phenomenological perspective.

Hand-written notes and tape-recorded focus groups were also analyzed and transcribed during the same week. The "hermeneutical circle" principle was taken into account in two different ways. First, we tried to relate participant experience to the context of occurrence (Vaast and Walsham 2005), namely through the museums they visited. Second, we tried to apply the hermeneutic circle in analyzing interview data. To accomplish this, we performed an intra-analysis of the discourses. After coding each focus group, we analyzed the whole discussion to see how the parts combined to create the whole (Thompson et al. 1989). The inter-analysis of the focus groups permitted a comparison of the three groups for emergent general patterns of experience (Thompson et al. 1989).

5.1.4   Main findings

Regarding the phenomenological framework, most of the participants talked (indirectly, of course) about the phenomenological concepts in their responses. For instance, recurring words like "explanation," "context" and "understanding" were spontaneously used by the students, words that are associated with the phenomenological category "Context". Besides, this criterion is the most important for our participants because historical context is presented as the basis to understand and have a valuable experience in museums. In effect, many students explained that without context, it was difficult for them to enjoy their visit and to realize the importance of the historical artifacts. Some even said that they hated their visits at some museums because contextual presentation was absent. Consequently, context is a relevant concept in the proposed framework.

Other researchers have also paid attention to this user requirement, noting that museums often neglect to provide adequate information to visitors. For instance, Hooper-Greenhill (2000) argues that:

> "*The social and cultural aspects of the process are not considered. The communication process is one-way. The focus on exhibition technology excludes the visitor, proceeding with no consultation as to whether the selected approaches will be familiar or unfamiliar, or will be accessible to those who do not already recognize the display codes and the art historical references*." (Hooper-Greenhill 2000, p. 17-18)

Re-enactment, possibilities of being and historicity are the other concepts related by the students as being meaningful for a satisfactory experience in museums. Students showed interest in possibilities of being and the capacity to understand the connection between the past events and the current situation. Similarly, the multiplication of points of view on a same topic appears to be an important perspective that curators should adopt in exhibits. Reactions for re-enactment were mixed.

Overall, students expect an historical experience in museums. They also perceive the link between past representations and their own life. However, some collections were more

successful than others in conveying this feeling. For instance, the Greek civilization that is closer to the French culture than the Egyptian one was often quoted as a referent by the students who have been to the Louvre.

Conversely, embodiment and self-projection were not perceived as being indispensable to a positive experience in museums. However, some of the explanations given by the students are very specific to the type of museums they most frequently visit. Indeed, they made several visits to the Louvre, a museum which attracts a lot of visitors and which has a very prestigious image. Therefore, the students explained that embodiment would not be appropriated in this setting, particularly touching the artifacts. It is reasonable to think that interacting with objects in other places such as science museum/centers would be more acceptable to the students. Nevertheless, we could infer that the participants' reluctance to interact with museum objects paradoxically reflects embodiment. Indeed, Mingers (2001) explains that "Dasein is characterized by a general attitude towards the world of objects — that of *concern* — as in 'to be concerned' that something is going well" (p. 109). And yet, at the same time, the reactions of our subjects demonstrated a special caring for the artifacts. Therefore, we conclude that embodiment is another relevant criterion for visitor experience.

The students also complained about the noise and the crowd at some museums such as the Louvre, a condition that prevented them from having a self-projection experience. These perturbing elements may not be true in less renowned museums. Other students managed to project themselves into history and felt that this issue was important to fully enjoy their visit. For instance, better understanding the lives of other civilizations and trying to put themselves into the shoes of historical characters appeared as a common process for some of our participants.

In conclusion, context, possibilities of being, re-enactment, embodiment and historicity are the five phenomenological criteria that were revealed in visitor expectations, while self-projection appears to be more remote to our subjects.

Table 6.3 below summarizes the findings of the focus groups and presents relevant quotations from the participants for each phenomenological criterion.

Table 6.3 Findings of the Focus Groups and Evaluation of the Interpretive and Phenomenological Criteria

Phenomenological Criteria	Quotations from Focus Group 1	Quotations from Focus Group 2	Quotations from Focus Group 3	Criteria expected?
Context → Tutorial aids, background knowledge to understand	"We enjoy the visit at the Louvre because we have a guide that explains us everything. I don't like going alone to museums because then I don't get any help." (M. 23) "A guide is alive, it's better than a book. Even if we have some written materials, there are so many works of art that we don't know where to go." (F. 23) "Apart from class, museums are often inaccessible." (M. 23) "One of my main expectations is context, that the museum provides explanation. But often museum provides a lot of blabla, it should be more synthetic." (F. 23)	"It's great because our guide gives us explanation to understand the works of art." (F. 23) "Participating, answering questions is a better way to remember our visit." (F. 22) "When we are alone we look at the works of art but we do not have any guide to understand." (F. 22) "Museums like The Louvre don't provide enough information, there are just some cartels with title and date" (F. 23) "It is always very interesting to know the context or the history of the works: who offered the works of art? Who was the owner? (F. 23) "Last year, I visited "Trésors engloutis d'Egypte" at the Museum Grand Palais and I enjoyed this exhibition because the works of art were replaced in their historical context." (M. 23)	"Some museums provide explanation and context but in a bad format: I went in a museum where they gave me a big book of 20 pages. I began to read and stopped after two pages. That was a waste of time" (M. 22) "A small cartel with five lines, it is not enough to understand a work of art" (M. 22) "The Museum of Art and History of Judaism has an interesting scenography. When you enter in a room, there is big panel that explains the context, the artistic streams, the cultural heritage etc. The Prado does it well also" (M. 22) "For beginners, we are easily lost, there is only the title of the works of art and then we have to understand alone." (F. 21) "There are a lot of hidden meanings in works of art, and we miss all that." (F. 20) "Sometimes, we don't see the link between the different works of art and we got lost" (F. 21)	**Yes**
Re-enactment → Possibility to relive the historical events in one's mind		"Yes, sometimes I try to put myself in the shoes of historical characters like Cleopatra. In fact, Egypt particularly suits to this reasoning because we study familial affairs and there are a lot of stories that arouse our imagination". (F. 23) "Egypt makes you dream." (F. 22)	"I can understand her point of view on the Prado museum. Generally, it is easier to like departments in which life is recreated. It is more accessible and we don't need to have background knowledge on history of art." (F. 21) "I like the Egyptian department because it is accessible to a large public. You don't need to know a lot of	**Yes**

			things about history of art and you can enjoy looking at mommies, tools, and kitchenware of the past. These elements recreate the modes of life of Egyptian people. Everything has been very well preserved. Finally, it was easy for me to imagine how they used to live, their utensil, their chairs" (F. 21) "Exactly, they recreated all the life of the Egyptian era. When I arrived at the Louvre museum I thought that this department would only exhibit steles, but they managed to recreate all the life of the Egyptian Empire. There were tunics, combs etc. in very good condition. That was impressive" (F. 21)	
Embodiment → Possibility to have a bodily experience	"It's important to have an interactive experience." "What I like in science museums is the possibility to touch everything. It helps to get in the thick of things." "Some works of art really appeal to the senses, like the Venus of Milo" (M. 23)	"For me, smells and costumes are necessary to be able to project myself into the past." (F. 23) "Sometimes, I would like to touch the materials". (F. 23) "I don't want to touch because it will damage the artifacts. But I enjoy watching them and being close to them". (F. 22) "I don't want to touch the artifacts, kind of respect" (M. 23)	"The last time I visited the Louvre, in one of the rooms, the gallery behind the stairs there was a horrible smelling because of recent water damage. That was terrible!" (M. 22)	**Yes**
Self-projection → Projection into characters' life, empathy	"I like Musée Guimet (Museum of Asian arts) because I am Japanese so I feel more or less involved. For instance, there are new things that I discover about my religion" (F.22) "It depends, in the Egyptian department I feel more projected into the past than in the Renaissance department". (F. 22) "There are too many people at the Louvre. It is difficult to project into the past because there are so many people. The crowd is an	"Yes, sometimes I try to put myself in the shoes of historical characters like Cleopatra. In fact, Egypt particularly suits to this reasoning because we study familial affairs and there are a lot of stories that arouse our imagination". (F. 23) "We are fourty when we go to the Louvre so it is difficult to feel implicated". (F. 22)	"By looking at these objects and discovering the life of civilization of the past, I wondered how peoples could do all this with so few resources. I would not have survived!" (F. 21) "Civilization of the past had wonderful techniques for building. Their architecture was wonderful, but it is now considered too expensive so we use modern techniques". (M. 22)	**Mixed**

	hindrance. I was tired at the end of every visit." "We are 40 so we are too many to experience self-projection". (M. 23) "I have visited museums abroad and there was music so it was easier to project myself into the past but at the Louvre it is difficult" (F. 24)			
Possibilities of being → Presentation of the past in terms of its many possibilities	"During the visit, I appreciated the fact that I could see the evolution of art and the link between the different departments." (F. 22)	"Basically, I prefer to have different versions of the past. For example, some historical facts are questioned and historians can disagree on what happened exactly. I think it is interesting and it's a good way to form your own opinion." (F. 23) "I think it is important to link the past and the present and to explain why humans act this way today". (F. 22)	"Civilization of the past had wonderful techniques for building. Their architecture was wonderful, but it is now considered too expensive and we use modern techniques". (M. 22)	**Yes**
Historicity → The capacity to understand oneself as historically constituted	"I am Asian so visiting the Asian collections generally speaks to me. Sometimes I learn new things on my religion and my traditions." (F. 22) "No we have not had any course on civilization. For Egypt, we only focused on gods and heroes and we did not pay attention to everyday life so it is more difficult to make connections with our own life." (M. 22) "I think it is difficult to make any link between the visits and our life. These are isolated points." (F. 22)	"Discovering the past is a good way to understand how our civilization has evolved, how things were discovered and what improvements were made." (F. 23) "Museums visits do not help me in understanding the meaning of my existence." (F. 23) "I really believe that we receive values from historical characters, even if we are not aware of that." (F. 22)	"Finally I realize that time is something that is very short. There are some objects that have not changed at all across time. I have ambivalent feelings: in one hand some things look so modern and others so outdated and antique". (F. 21) "Visiting museums is like a return to basics, to one's personal history." (F. 21)	**Yes**

We indicate gender and age at the end of each quotation. F= Female, M= Male

5.2   Field Study Two: Field Study at NCHI

The first study indicated that individuals are in search of a phenomenological experience in museums so that they can fully benefit from their visit. This second study aims at empirically examining the extent to which museum visitors believe the phenomenological concepts are being facilitated by the museum technologies. This second study also has an objective of testing a scale for representing the phenomenological concepts, as well as testing the framework with a larger sample than the focus groups. Focus groups results served as a means for developing the content of our questionnaires, which is a common practice in research (Morgan 1996; Straub et al. 2004a). Even while we are utilizing a quantitative methodology, this study does not ground itself in positivism. We do not test a research model with a set of hypothesis, but rather view the questionnaires as an opportunity to obtain more qualitative data. Moreover, Mingers (2003) asserts that "the tendency to link quantitative methods with a natural science (positivist) approach, and qualitative methods with a social science (interpretive) approach" corresponds to a "crude dichotomy" (p. 236). Similarly Niehaves (2005) argues that a methodological type should not be restricted to a particular epistemology. The questionnaire methodology was also more convenient to implement at our field study because visitors did not have much time to spend in interviewing.

Consequently, we adopt a multi-methodology approach to investigate our research object, but we keep the same phenomenological underpinnings across the two studies.

5.2.1   Presentation of the Site

The research site was the National City of History of Immigration (NCHI), a public museum located in Paris, France. This museum, inaugurated in October 2007, deals with the

history of immigration, tracing back its evolution in France from the ninetieth century to the present. NCHI exhibitions also show how immigration has contributed in shaping French society. Indeed, NCHI has set as its core mission to change the public's perceptions of immigration by explaining to visitors how immigrants add value to society. As stated by the Director of the Information Systems Department, "immigration is still a controversial topic. Therefore it is necessary to change mentalities in order to encourage a collective appropriation of history." Accordingly, NCHI actions should reinforce social cohesion between French citizens. It is noteworthy that this NCHI mission is a long term objective that concerns both individual and national identity.

In research conducted before the opening of NCHI, potential visitors expressed strong expectations about historicity and an experience of the past. In fact, Poli et al. (2007) showed that potential visitors expected that NCHI would: 1) deepen their knowledge about history of immigration, 2) offer new perspectives on their personal history, 3) contribute to identity building and 4) explain the consequences of immigration on the world of today.

In addition to dealing with history, this museum uses modern media to communicate with its public. NCHI is equipped with common museum tools such as televisions, RFID audioguides, but also more recent technologies such as computers, Webcam, and interactive kiosks with both audio and video content. This set of technologies is interesting in that it supports a two-way communication with visitors. Indeed, the audioguides, televisions and videos tend to support the communication of NCHI to its visitors. In contrast, the interactive kiosks and the computers transmit the visitor voice to NCHI professionals by offering visitors the privilege of expressing their opinions and reactions to exhibitions. More precisely, the Videomaton© (a computer equipped with a Webcam) allows visitors to leave a video comment.

Overall, NCHI appeared to be an adequate setting for examining the historical and phenomenological concepts, as well as to evaluate the contribution of IT to an experience of the past.

To gain access to this setting, the director of the IT department was first contacted by email in April 2008. He then met face-to-face with the dissertation researcher to introduce the project. An agreement to conduct the study was reached a few weeks later. This allowed the field study to be launched at the end of May 2008. An official badge was issued as a sign of professional affiliation with the museum. This extensive museum collaboration and support gave more credibility to the study when surveying the visitors.

5.2.2   *Set of scales to Measure the Phenomenological Criteria*

Based on the literature review, the phenomenological framework and results from the focus groups, we developed scales for each phenomenological concept. Additionally, we followed advice for scale development (Lewis et al. 2005; Moore and Benbasat 1991; Straub et al. 2004a). Generally, three steps are suggested for construct development: 1) review the literature to determine the content domain of the constructs, 2) formulate the items for each construct and 3) test the psychometric properties of the scales.

The literature was employed as a rigorous benchmark to evaluate the content of our scales, while the focus group discussion helped us identify the terms that could be used to capture the meaning of the concepts in a concise and meaningful way for the subjects. In the final analysis, we retained three sentences per concept. After defining the domain of our constructs and developing the scales, we pre-tested the scales with the students of focus group number three, after which we refined some sentences. A few months later, a pilot study was also conducted with

twenty visitors at NCHI. Visitor comments were taken into account and we modified some sentences for a second time in order to fit better the research context. The final operationalization of the phenomenological concepts is presented in Appendix 6B.

5.2.3   Sampling and Selection

We used the following procedure for surveying NCHI visitors. The researcher was positioned at the museum entrance where visitors borrow the audioguides in order to induce participation by the maximum of persons. Thus, the dissertation researcher stayed behind the desk with the employees in charge of 1) providing guidance to visitors and 2) of distributing the free audioguides required for fully understanding the permanent exhibition.[4] This positioning was strategic because visitors had to return to this desk at the end of their visit to return the audioguides. We took advantage of this time to garner visitor feedback regarding their interaction with the museum technologies. Surveying the visitors just at the end of their visit appeared to also be a good way to ensure that their experience was still clear and present to them. The questionnaires were self-administered, meaning that each participant filled in the questionnaire by herself, but the researcher stayed close to the participants in case they needed assistance.

Administration of the instrument to the sample was randomized to the greatest extent possible. We conducted the study during both weekends and weekdays so that different types of visitors would be included. During the week, the NCHI is principally visited by students and retired people while during the weekend, families and working class were the main audience. In order to encourage people to take part in this research, we also used incentives of free NCHI branded notebooks. The communication department of the NCHI donated these notebooks to

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[4] At the time of the study, the museum was also offering a temporary exhibition that did not require audioguides. Additionally, this temporary exhibition was principally text-based so it did not provide any technological device.

facilitate our field study and to thank visitors for their help. Finally, we collected 111 questionnaires over a period of one and a half months.

5.2.4 Data Analysis

The descriptive statistics of the sample were computed using SPSS 12.0. To conduct the analyses, we had to delete questionnaires that were unusable because of too many unanswered questions. Hence, we collected 111 questionnaires but our final sample was 106 questionnaires.

The descriptive statistics indicate a higher proportion of females than men, with 66% women and 34% men. This result is not surprising, however, because French statistics on museum attendance also report a higher percentage of women in museums (Cardona and Lacroix 2007). The reasonable sample size is a simple reflection of the need to draw from as large a group representing the general population of 18 to 74 year-olds as possible. The mean age was 39.

Most participants were first-time visitors (90.6%), which also explains why the majority of NCHI visitors spent more than one hour in the museum. More precisely, 50.9% visited the museum between one to two hours, while 32.1% spent more than two hours at NCHI. Table 6.4 summarizes the profile of visitors who took part in this research.

Table 6.4 Visitor Profile

Categories	Statistics
Sample size (N)	106
Mean Age (S.D.)	39 (17.25)
Male	34%
Female	66%
Never visited NCHI	90.6%
Have already been to NCHI	9.4%
Time spent in the museum	
- Less than 30 minutes:	0%
- 30 minutes to 1 hour:	17.0%
- 1 to 2 hours:	50.9%

- More than 2 hours:	32.1%

Figure 6.2 is a classification of the technologies used by the sample. It is in ascending order, from the most used to the less used during the visit. The audioguide is the main technology used by visitors, but this is linked to the fact that the entire exhibition relies on this device, as explained previously. Surprisingly, the two technologies that are supposed to be the most fun and interactive, namely the "Videomaton" and the computer were lesser used technologies. The "Videomaton" is a computer equipped with a webcam that allows visitors to record a video comment at the end of their visit.
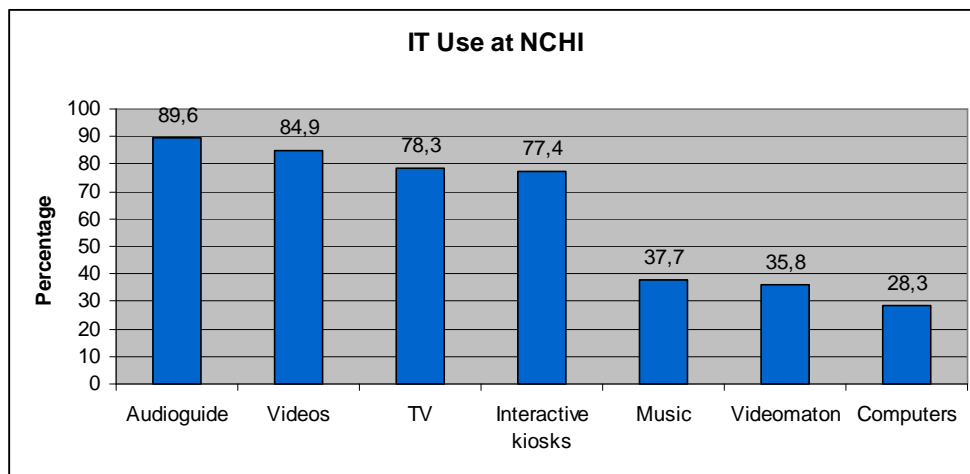
Figure 6.2 Proportion of IT used by NCHI visitors

Next, let's analyze visitor responses in order to establish the psychometric properties of the constructs. Five out of the six developed scales demonstrate good psychometrics properties, as indicated in Table 4. Except for self-projection with a Cronbach's alpha slightly lower than

0.70, the other scales range from the acceptable 0.735 to 0.889. However, Nunally (1967) considers that the 0.6 level is acceptable for exploratory research.

Table 6.5 Psychometrics Properties of the Constructs

Constructs	Items	Mean	S.D.	Cronbach's Alpha
Context	CON1	5.21	1.44	0.874
	CON2	5.27	1.45	
	CON3	5.42	1.28	
Embodiment	EMB1	5.87	1.03	0.735
	EMB2	5.38	1.35	
	EMB3	5.21	1.49	
Self-projection	SP1	5.64	1.44	0.678
	SP2	5.51	1.40	
	SP3	5.57	1.21	
Re-enactment	REC1	5.32	1.18	0.782
	REC2	5.40	1.26	
	REC3	5.33	1.34	
Possibilities of being	POB1	5.10	1.54	0.860
	POB2	4.91	1.58	
	POB3	5.46	1.28	
Historicity	HIS1	4.71	1.66	0.889
	HIS2	4.05	1.63	
	HIS3	4.00	1.79	

We also conducted a Principal Component Analysis, with a VARIMAX rotation. The results are displayed in Appendix 6C. As explained by Moore and Benbasat (1991), the number of eigenvalues greater to 1.0 represent the number of factors to be retained for the VARIMAX rotation. Out of the 18 items, four components had an eigenvalue greater than 1.0. Therefore, the VARIMAX rotation was done with four factors, which account for 44.5% of explained variance. Four factors emerged instead of six. Actually we notice that context, re-enactment and embodiment did not emerge as separate factors. Therefore, these different constructs seem to be related and may have a causal relationship. For example, we can imagine that reliving historical

events in one's mind and having a sensorial experience can be antecedents of context. And vice versa, the more historical context is provided, the easier it is to relive historical events and have a bodily experience. Both relationships make sense so future research will have to investigate the type of relationships that these constructs could have.

Data analysis also helps in determining the role of IT in visitor experience of the past. Indeed, Monod and Klein's (2005) phenomenological framework aims at evaluating user experience with IT. The focus groups provided support for the retained phenomenological criteria, but in this first study we were not able to assess the contribution of IT to such an experience. To reach this goal in study 2, we asked NCHI participants to rate their experience with the museum equipment using Likert scales. Since NCHI offers several types of technologies, we decided to survey the museum equipment globally. Hence, we cannot assert which technology contributes the most to the phenomenological criteria.

The mean of each phenomenological construct is reported in Table 6.6. We also provide a ranking of these constructs from the one that is the best reached through IT to the one that is the less achieved.

Table 6.6 Ranking of the Phenomenological Constructs

Construct	Mean	Standard Deviation	Ranking
Self-projection	5.57	1.05	1
Embodiment	5.47	1.04	2
Re-enactment	5.35	1.05	3
Context	5.30	1.24	4
Possibilities of being	5.16	1.30	5
Historicity	4.25	1.53	6

Unexpectedly, it is self-projection that is the criterion that best describes the NCHI technologies. Recall that this criterion did not feature prominently in study 1. This means that the

visitors who used the set of technologies found that these devices helped in projecting themselves into the shoes of the characters. More precisely, 13.2% visitors strongly agree with the fact that IT improves their self-projection, 34% visitors agree and 28.3% slightly agree with this assertion. Visitors likewise felt empathy for the different portraits of immigrants displayed at NCHI through the videos and interactive kiosks. IS research has already shown that IS can provoke emotional reactions (Messham-Muir 2005; Sun and Zhang 2006), such as flow (Koufaris 2002; Skadberg and Kimmel 2004) and enjoyment (Lin and Gregor 2006; Van der Heijden 2004). However, affective behavior like self-projection (or empathy) has been lightly studied in the context of IT use.

Embodiment comes second. In fact, the sensory experience offered at NCHI was quite highly rated. Most of the devices convey visual materials (videos, pictures and texts), the audioguides and the TVs diffuse audio content, while the interactive kiosks give an opportunity to have a physical interaction. The visitors cannot really touch the museum artifacts, but very few objects are exhibited in this museum since the scenography relies on IT. Therefore, the possibility to touch is offered through computers and kiosk. Smell and tastes were the two missing senses but it seems that visitors appreciated the variety of sensory experiences. Visitors also agree with the fact that the technologies allow them to relive the historical events in their minds. The mean value for this construct is 5.35 and the levels of satisfaction are the following: 42.3% slightly agree, 27.9% agree and 9.6% visitors strongly agree that NCHI technologies contribute to re-enactment.

Context appears as the fourth construct achieved by the NCHI technologies. Surprisingly, we would have thought that context would be the easier criterion to be met by the NCHI technologies. Tellingly, one of the chief roles of Information Systems is to transmit information to users. But our empirical results contradict this assertion. Nonetheless, the results also indicate

that visitors were not entirely satisfied with the cultural and historical background presented by the technologies. These findings support prior research that points out the lack of understanding and context presentation in museums (Hooper-Greenhill 2000; Schärer 1996).

When we scrutinize the ratings in Table 6.6, we clearly see that the most advanced (and conceptual) criteria, namely possibilities of being and historicity, are also the ones that are the most difficult to reconstitute with IT for museum visitors. It is noteworthy to note that historicity is last in the minds of the visitors, but it represents the ultimate step towards a phenomenological experience in the philosophical literature. Pointedly, 34.4% visitors are neutral and 30.1% disagree with the statements that NCHI technologies contribute to historicity. Therefore, roughly 65% visitors think that NCHI technologies do not convey a sense of historicity.

What is clear in the potential use of IT in museums is that technologies that support all the criteria, like those suggested in Monod and Klein's (2005) framework, are rare. Furthermore, since few technologies have all the characteristics described in the phenomenological framework, museums need to combine multiple devices in order to meet the overall objective of full coverage of the criteria (Monod et al., 2006). For instance, project SHAPE, begun in the United Kingdom, fulfills several of the Heideggerian criteria but these span different technologies, specifically. RFID tags, 3-D historical reconstitutions, simulations, hybrid artifacts and interactive installations (Bannon et al. 2005). The combination of these different technologies in the same visit leads the visitor to an immersive experience and a better understanding of the past. In addition, Sparacino (2004) showed that by combining multiple technologies in the same exhibit, individuals feel that their visit became more active and enjoyable. Thus, this can contribute to the edutainment mission of museums.

NCHI provides several technologies to its visitors, but the types of IT implemented do not provide an entire satisfactory experience of the past. More advanced technologies such as 3D or virtual reality systems are an option to address this lack. It may also be that technologies cannot replace the physical objects displayed in the museums and this explains why visitors have difficulties feeling historicity. The IT role should be to support the visit, enhance the appreciation of the artifacts, but not to enclose visitors in a virtual world (Ciolfi and Bannon, 2002). Indeed, Hsi (2002) showed that when there are no real counterparts of museum objects, visitors find it difficult to understand virtual representations.

6. Discussion

Discussed next, this research makes a number of contributions. We also cover the limitations and the opportunities for future research.

6.1 Contributions

6.1.1 Theoretical Contributions

Several researchers have already pointed out the potential of phenomenology for user-driven research and information systems in general (Boland 1985; Introna and Ilharco 2004; Mingers 2001; Monod and Klein 2005). This study confirms this assertion of prior research by showing how phenomenology presents a viable perspective for assessing visitor experience with museum technologies. This research indicates that the intrinsic potential of phenomenology for user-driven research may help this methodology to qualify as a preferred methodology for evaluating hedonic technologies. Indeed, phenomenological principles invite us to look at

technologies as interpretive support of the type of being-with-others that is more centered on authentic user needs.

This study also contributes to the body of research on interpretive evaluations of information systems. Klecun and Cornford (2005) identify four types of evaluation that rely on different interpretive theoretical underpinnings. They are: critical, socio-technical, social constructivist and hermeneutic evaluation. The hermeneutic evaluation corresponds to the evaluation of individual users and to the examination of their daily experiences with the system. Since, we adopt an individual perspective and we investigate user experience with the technology, this research shares some principles of the "hermeneutic evaluation" category, which is a close stream to phenomenology. Hermeneutic and phenomenological evaluation of IS are still under-used types of evaluation (Monod et al. 2007).

Furthermore, Petter et al. (2008) acknowledge the fact that the criteria selected for IS evaluation should be dependent on the organizational context, meaning that the criteria should fit the type of IS under evaluation as well as the type of organization: "The selection of success dimensions and specific metrics depend on the nature and purpose of the system(s) being evaluated." (p. 239)

Museums represent distinctive institutions and the technologies they provide to visitors generally aim at presenting history, creating reflection, enhancing knowledge and entertaining. Consequently, we decided to rely on Monod and Klein's (2005) phenomenological conceptualization, a framework which proposes a set of criteria relevant for assessing e-heritage systems. But, even though we rely on this new framework for IS evaluation, links can be created to existing scales. For instance, the criterion "context", which is the most important for museum visitors, can be related to the IS variable "information quality". Information quality includes

notions such as "relevance, understandability, completeness and accuracy" (Petter et al. 2008, p. 239) and it represents a strong predictor of user satisfaction. Our results indicate that context provided by IT is an important factor in hedonic context as well. Therefore, this research can contribute to the evaluation of other hedonic systems (Van der Heijden 2004) and in future research our phenomenological items could be merged or inserted into existing scales that serve for the evaluation of hedonic information systems.

Monod and Klein (2005) applied their phenomenological framework to the evaluation of the Archeoguide system, a technology used in a Greek archaeological site. The current research extends the domain of application of the framework by applying it to museum technologies. We also investigated visitor perceptions in order to check the relevance of this framework to user requirements.

Finally, the methodology as implemented enabled us to have a more comprehensive view of user perceptions and experience. We adopted a multi-method approach, namely focus groups and questionnaires, in order to examine historicity. Multi-methodology and methodological pluralism have been promoted by a number of IS researchers (Becker and Niehaves 2007; Mingers 2003). Moreover, the field study at a museum setting also permitted to capture visitor experience in a real "life situation" (Miles and Huberman, 1994, p. 6) in order to better fit phenomenological theory promoting the study of lively experiences.

6.1.2 Managerial Contributions

This research has practical contributions. First, the findings suggest some pragmatic guidelines for museum professionals. Relying on Monod and Klein's (2005) phenomenological framework, we recommend that museum professionals assess visitor experience of the past via

six criteria. Additionally, our operationalization of these criteria in the final instrument can serve as a practical tool to assess visitor perceptions. We proposed a set of 18 items that can be used by museum professionals to conduct further visitor studies. These criteria provide a more comprehensive evaluation of visitor experience with IT than traditional constructs such as attitude or satisfaction.

Our measures are also well adapted to the preoccupations of cultural heritage institutions. Indeed, the phenomenological constructs capture the experience of historicity at a time when museums are being more and more asked to participate in history building and diffusing a sense of belonging (Krebs and Maresca 2005). Poulot (2005) also points out the necessity for history museums to offer to visitors a perspective on history and identity by "collecting elements of the past and making people aware of them" (p. 28).

Second, our results support and legitimize the presence of IT in museums. More precisely, the technologies surveyed at NCHI do contribute to a positive experience of the past. Our results are related to a set of specific technologies, which are televisions, RFID audioguides, computers, and interactive kiosks. Therefore, this research could be pursued by other studies that will examine more closely the role of each type of technology in the process of historicity. People have grown increasingly interested in history (Liew 2005) and museums also represent a place where people look for experience (Carr 2001) and meaning. Thus, if museum professionals manage to meet visitor expectations and put the emphasis on validating visitor experiences, museums could increase and broaden their audience.

6.2 Limitations and Future Research

This research does not measure the effects of a specific type of technology but rather the contribution of the set of technologies that were available at NCHI. Similarly, we do not know the features of IT that best helped in conveying the phenomenological experience. Is it video, audio, interactivity, or what? Therefore, we cannot draw conclusions about the role played by each type of technology. However, we know that, overall, their presence facilitates visitors in having a phenomenological experience. The set of IT at NCHI contribute most to context, embodiment, self-projection and re-enactment, while the contribution to possibilities of being and historicity is lower. It is noteworthy that visitor perceptions do not necessarily match the researcher evaluation of IT provided by Monod et al. (2006). More precisely, Monod et al. (2006) consider that onsite computers in cultural heritage sites generally offer limited access to an experience of the past.

We followed the three stages suggested by Lewis et al. (2005) to develop MIS constructs: 1) we established the domain of the ideas, 2) developed the constructs, and 3) evaluated the measurement properties. But in the third stage, we only conducted exploratory assessment. As a result, we need to conduct a confirmatory analysis, which consists of a second testing of the scales.

Another limitation pertains to the investigation of the relationship of museums with their visitor. In fact, this study does not fully explore how IT can intervene in the relationship of museums with their visitors. NCHI technologies support a two-way communication, particularly the Videomaton technology that allows visitors to leave a video comment. Hence future research could investigate why and when visitors appreciate this technological option.

We are cognizant that to more fully capture visitor experience, in-depth interviews would have been more suitable than questionnaires. Future research should try to employ semi-structured interviews as the means to draw out the experiences of the visitors who use e-HS during their museum visit.

Future research can also compare visitor responses across two groups: one group that uses the museum technologies and another that visit the museums without IT.

To these methodological limitations, we add the theoretical limitation of the absence of a nomological net. Indeed, we did not examine how the phenomenological constructs could be inter-related. In fact, they may be interdependent and some criteria may represent a necessary condition for others to appear. For instance, context seems to be the essential element in IT experience for museum visitors. Therefore, without some historical context, it may be difficult for people to project themselves in the past or to see the possibilities of being. We have not investigated this issue, but future research should try to show the relationships between these phenomenological constructs and establish a set of propositions.

7. Conclusion

In conclusion, this research investigated a set of phenomenological concepts that can serve as a basis of IS evaluation, and more precisely cultural heritage systems. These criteria were originally developed by Monod and Klein (2005) but had not been empirically tested. We conducted three focus groups that reveal the importance of an experience of the past for museum visitors. The second study, conducted through a survey in a museum setting, showed that technologies can contribute to enhance visitor experience. This research contributes to IS

research on interpretive IS evaluation, hedonic systems and user experience. The phenomenological scales that were developed represent potential guidelines for museum professionals.

Appendix 6A: Interview Guide for the Focus Groups

➢ **Introduction**

- Creation of the groups (8-10 participants)
- Presentation of the animator (name, researcher at X institution, research interests, etc.)
- Explanation of the study purpose. Just give some general elements: We would like to understand your experience when you visit a museum, such as the Louvre (as part of your university curriculum) and your expectations regarding museum offer.
- Explanation of the organization of a focus group. We use a semi directive approach so there will be questions from the interview guide and we will also let people participate freely if they have any idea or suggestion that come to their mind.
- Introduction of the IRB principles. Explain to the participants that tape-recording is used to analyze the data. We will use the information strictly in a research context, and the results will be reported in a general way (names will not be used and identities will stay anonymous)
- Beginning of tape recording.
- Participants' introduction (round table). Each participant gives his/her name, age, a few elements about their degree/major and experience with museums (how often do you go to museums?)

Section 1: Experience and Visit Satisfaction with Museums

1. Generally, do you enjoy your museum visits? (yes/no) and Why?
2. Which collection/area do you prefer the most (at the Louvre)?
3. Do you feel involved about what you see during your visits?
4. Do you put yourself into the shoes of the historical characters during your visits?
5. How important is discovering ancient cultures (cultures of the past) for you? Why?
6. Have you learnt new things about history/ancient civilizations during your visit?
7. In general, what type of experience are you looking for when visiting museums?
8. Do you think that your visits at museums go beyond these expectations?

➢ **Conclusion**

Summarize the main ideas, thanks the participants, stop the tape recorder.

Appendix 6B: Operationalization of the Phenomenological Criteria

The questionnaire below measures the different dimensions that compose the phenomenological experience. More precisely, for each of the six phenomenological criteria, three items have been developed in order to help visitors determine if the technologies enhance their experience of the past. To help respondents express their opinion, seven-point Likert scales are proposed.

Questionnaire

Pheno. constructs	Items developed for each construct (and adapted to the NCHI context)	Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
Context	1. The technologies provided enough details about the historical context of the artifacts or characters (e.g. author's history, artistic era, way of living at that time, etc.).							
	2. You found that the technologies of NCHI explain well the cultural, geographical and historical context of French immigration.							
	3. The technologies helped you getting information about artifacts (i.e. their importance and singularity, their relationship with other works of art, information about their author).							
Self-projection	4. While interacting with the technologies of NCHI, it was very common for you to feel empathy with the characters displayed in museums.							
	5. You managed to put yourself in the shoes of historical characters during your museum visit.							
	6. Using the museum technologies to know more about historical characters provoked you emotional reactions such as joy, sadness, surprise or anger.							
Embodiment	7. The technologies aroused your senses (tactile, visual, and auditory).							
	8. Your visit with the technologies emotionally affected you.							
	9. The NCHI technologies content appeal to one of your senses.							
Re-enactment	10. Looking at the artifacts displayed by the technologies you managed to recreate the environment that used to surrounding the objects.							
	11. The museum technologies contributed to your self							

	projection into the past.							
	12. While discovering the life of immigrants through the technologies, you imagined yourself living in the past.							
Possibilities of being	13. The technologies helped you understand the history of immigrants and so to understand the present state of the world.							
	14. The use of NCHI technologies explained to you the consequences of immigration on today's world.							
	15. The use of NCHI technologies offered you a reflection about how the past could have been different.							
Historicity	16. The history of artifacts and characters displayed in technologies gave more meaning to your existence.							
	17. The content diffused by NCHI technologies helped you realize the big picture of human history and to better understand your life.							
	18. The use of NCHI technologies provided you with an opportunity to better understand history.							

Appendix 6C: Principal Component Analysis

Table 6C.1 Eigenvalues and Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	**8.005**	44.469	44.469	8.005	44.469	44.469
2	**1.678**	9.322	53.791	1.678	9.322	53.791
3	**1.382**	7.679	61.471	1.382	7.679	61.471
4	**1.235**	6.860	68.331	1.235	6.860	68.331
5	0.943	5.237	73.568			
6	0.859	4.770	78.338			
7	0.729	4.052	82.389			
8	0.576	3.202	85.592			
9	0.466	2.587	88.179			
10	0.366	2.032	90.211			
11	0.331	1.840	92.051			
12	0.320	1.776	93.828			
13	0.262	1.457	95.284			
14	0.237	1.315	96.599			
15	0.184	1.021	97.620			
16	0.163	0.907	98.527			
17	0.153	0.851	99.378			
18	0.112	0.622	100.000			

Table 6C.2 Rotated Component Matrix

	Component			
	1	2	3	4
CON1	**0.837**	0.036	0.147	0.269
CON2	**0.647**	0.105	0.296	0.360
CON3	**0.704**	0.026	0.392	0.277
SP1	-0.005	-0.168	0.604	**0.509**
SP2	0.076	0.276	0.507	**0.450**
SP3	0.302	0.164	0.118	**0.795**
EMB1	**0.461**	0.271	0.387	0.079
EMB2	**0.223**	0.422	0.088	0.664
EMB3	**0.516**	0.284	0.238	0.422
REC1	**0.558**	0.511	-0.196	0.155
REC2	**0.760**	0.441	0.140	-0.019
REC3	**0.501**	0.395	0.361	-0.171
POB1	0.262	0.364	**0.743**	0.031
POB2	0.281	0.233	**0.790**	0.118
POB3	0.477	0.136	**0.581**	0.193
HIS1	0.277	**0.688**	0.347	0.070
HIS2	0.090	**0.853**	0.156	0.248
HIS3	0.150	**0.853**	0.207	0.211

Chapter 7 : Conclusion

In this conclusion, we review how the three essays try each to answer our general research questions that are:

➢ RQ 1: In what ways does IT contribute to visitor experience with museological content?

➢ RQ2: What are visitor perceptions and reactions when using museum technologies and IT-based technologies?

As a reminder, Chapter 4 is an attempt to determine how IT and more particularly websites can arouse interest for museological content. Chapter 5 studies the influence of IT on affective and cognitive reactions during a museum visit, namely perceived enjoyment, perceived authenticity and learning. Chapter 6 explores visitor expectations towards a phenomenological experience and the role played by IT in visitor experience of the past.

First, we sum up the contributions of each essay and then deduce the general contributions of this dissertation. Second, we point out the limitations of this dissertation and identify issues for future research.

1. Contributions

1.1 Contributions of Each Chapter

In answer to the first research question, we can say that IT positively contributes to user experience with museological content. Our three essays showed that IT can contribute to user experience when it conveys a sense of aesthetics, of authenticity and of historicity. The consequences of these different IT roles for user experience correspond in fact to answering the second research question. Our three chapters investigated visitor perceptions and reactions to IT

use. Indeed, in Chapter 4 we showed that website encouraged people to visit the museum and to return to the website. Therefore, we highlighted the role of IT on behaviors, but socio-cultural factors are also important and they can challenge IT influence. In Chapter 5, we observed that visitors who used IT during their museum visit and perceived its authenticity, experienced enjoyment, immersion and learning. At last, in Chapter 6, we indicated that visitors were expecting a phenomenological experience in museums. At NCHI, visitors also perceived the set of technologies as contributing to context, re-enactment, embodiment, self-projection and possibilities of being.

Each essay also has specific contributions that we summarize in Table 7.1 below.

Table 7.1 Summary of Contributions for Each Chapter

Chapters	Theoretical Contributions	Managerial Contributions
Chapter 4	▪ Extends MUG generalizability ▪ Offers a new context for website usability research ▪ Supports research in aesthetics ▪ Integrates IS usability research with the theory of high culture	▪ Highlights important criteria for the design of museum websites ▪ Identifies levers to increase museum audience
Chapter 5	▪ Contributes to IS research on affect (and lively experience) ▪ Provides a new application of the concept of "authenticity" ▪ Examines the influence of hedonic IS	▪ Guides museum policy with respect to IT ▪ Provides information and results on the use of audioguides and interactive kiosks
Chapter 6	▪ Validates Monod and Klein's (2005) framework ▪ Contributes to phenomenological underpinnings of IS ▪ Supports interpretive evaluation of IS	▪ Shows IT role in visitor experiences of the past ▪ Provides a set of criteria and an operationalization of constructs that can be used by museum experts for evaluation

1.2 General Contributions of the Dissertation

We can also deduce contributions for the overall dissertation. The research topic and the way it was addressed through a multi-paper based dissertation leads to a number of contributions.

1.2.1   A Cross-disciplinary Dissertation

This dissertation can be characterized by its cross-disciplinarity since we take into consideration theories and concepts developed in the cultural heritage area and we apply them to IS artifacts and settings. For instance, chapter 4 deals with cultural practices, which is a concept well-studied in arts and museum studies. Authenticity, addressed in Chapter 5, has been studied for decades in both museum and tourism studies. Chapter 6 deals with the past, what is also one of the principal concerns of cultural heritage research.

Kevin Desouza in an ICIS panel asserts that trans-disciplinarity promotes research with greater impacts (Desouza et al. 2006). Therefore he encourages IS researchers to include other disciplines in their work. Similarly, Miles and Huberman (1994, p. 38) point out that a good research is one that uses "a multidisciplinary approach, as opposed to a narrow grounding or focus in a single discipline". Our research particularly takes into account this element by blending literature and issues of information systems and museology fields.

This dissertation does fall well within the boundaries of IS, however, since our main focus in the different chapters is on the role played by information technology for the museum public. Likewise, we are interested in visitor perceptions and experiences, but those that are influenced by IT. Furthermore our different conceptual frameworks rely on IS underpinnings. For instance, Chapter 4 relies on a nomological net of usability and website design. Chapter 5 draws on Sun and Zhang's (2006) model of Individual Interaction with IT. In Chapter 6, we apply an IS framework developed by Monod and Klein (2005) to evaluate cultural heritage technologies. As a consequence, our research can also be classified in IS subdomains. Banker and Kauffman (2004) identify five streams for the IS field: decision support and design science, human-computer systems interaction, value of information, IS organization and strategy, and economics

of IS and IT. According to this classification, this dissertation seems to belong best to the stream of human-computer systems interaction. Banker and Kauffman (2004) explain that the HCI stream tends to have a user focus and relies on behavioral decision theory. This description suits Chapter 4 and 5 in which we are particularly interested in individual behavior.

1.2.2   The Contribution to Research

This dissertation contributes to research by (1) advancing our knowledge of IT dedicated to the cultural heritage area, and (2) identifying and understanding visitor perceptions when they use IT in a museum context. IS researchers are increasingly interested by a wider types of organizations like healthcare and governmental institutions. Similarly, we hope cultural institutions such as museums to become an interesting area for IS research. Indeed, museums represent important organizations and their roles in our societies is described as crucial for several reasons. First, museums, and in general, cultural heritage sites, can have therapeutic effects (Amirou 2000). Second, museums represent settings that gather people around a theme, so they can help in the construction of social bonds and in building bridges between different cultures (Amirou 2000). Poulot (2005) also argues that museums encourage citizenship behaviours and participation in today society.

Furthermore, this dissertation contributes to the body of research on user experience with hedonic technologies. User experience concerns the research that "goes beyond the purely cognitive and task-oriented perspective" that is generally taken when studying information systems (Hassenzahl and Tractinsky 2006, p. 92). The environment that we selected to conduct our research has encouraged us to look at other topics than commercial (buying) or work issues (efficiency). In contrary, we analyzed the role of aesthetics for IT interfaces, which is identified as a key dimension of user experience (Hassenzahl and Tractinsky 2006). We also examined the

affective reactions of visitors, which falls within the user experience realm as well. Since user experience is still an under investigated issue in HCI and IS research (Hassenzahl and Tractinsky 2006), this dissertation can make a contribution in this field.

Our research also taps into three of the four categories of experience identified by Holbrook (2000), as shown in Table 7.2. More precisely, we address 1) the category of experience and its sub-dimensions escapism, emotions, and enjoyment, 2) the category of entertainment and its sub-dimensions esthetics, excitement and ectasy and 3) the category of evangelizing and its sud-dimension educate.

Experience was illustrated in the three essays in this way. Chapter 4 relies on the Microsoft Usability Guidelines, which include a metrics on the *emotional* characteristics of website. We also added the concept of *aesthetics* and showed that it influences users of museum websites. Chapter 5 addresses authenticity (the desire to escape modern life), which is a concept closely related to *escapism*. Additionally, authenticity is an *emotion* in itself. This chapter also includes other emotional reactions such as *enjoyment* and *immersion,* and cognitive reactions such as *learning*. In chapter 6, we examined a set of phenomenological constructs. This philosophical underpinning acknowledges the importance of experience for human beings. Furthermore, constructs such as self-projection (empathy) or embodiment (senses and care for others) reflect emotional aspects.

None of our three essays deal with the category of exhibitionism, nor do they examine the power issues of the evangelizing axis. However these dimensions can be valuable to study visitor interactions with cultural heritage technologies. Overall, this dissertation contributes to the body of research on user experience.

Table 7.2 The Categories of Experience Addressed in this Dissertation

(Holbrook 2000, p. 178)

Experience	Entertainment	Exhibitionism	Evangelizing
Escapism	Esthetics	Enthuse	Educate
Emotions	Excitement	Express	Evince
Enjoyment	Ectasy	Expose	Endorse

1.2.3   The Contributions to Practice

We are cognizant that this dissertation does not help museum professionals in selecting a specific type of IT or even in managing costs since we did not perform any economic analysis. For instance, we cannot advise on the most efficient technologies at the lowest cost that should be implemented. Nonetheless, our three essays have practical contributions. We showed that traditional IS constructs that generally fit utilitarian systems are not the most adequate to survey user experience with museum technologies. This dissertation examined the role played by a number of technologies used in an hedonic context. Van der Heijden (2004) also pointed out that hedonic IS differs from utilitarian IS. In that, they require specific dimensions of evaluation.

Museum managers still don't know how to measure visitor experience with museum technologies. Hence, they seek for guidelines and instruments that they could implement in their institutions to survey regularly visitor experience with IT (Institute of Museum and Library Services 2006; Peacock and Brownbill 2007; Pujol Tost and Economou 2007). By proposing a set of key dimensions that could be used for IT evaluation in the cultural heritage, this dissertation offers actionable advices to museum professionals. These criteria to be included in IT evaluation are aesthetics, authenticity and the phenomenological grid. These decisive factors were studied either in the online (Chapter 4) or the offline context (Chapters 5 and 6). But, each criterion has the potential to be relevant in both contexts since museum technologies have the

same overall objectives of education and entertainment. Future research will have to investigate this issue.

Most of museums know that information technologies represent a key resource for their activity and their communication with the different publics. Hence, museum experts multiply calls for IT implementation and adoption. For instance, the online journal of the Association of American Museums, called Aviso, recently reported the talk of a strategist named Robert L. Dilenschneider towards the museum community. Robert L. Dilenschneider views IT as the future paradigm of museums:

> "*The paradigm is rapidly shifting in your world, and you must prepare for a great leap forward using technology as a teaching tool […] You must use new technologies wisely and identify the problems of concern to your communities and to our nation that you are uniquely positioned to solve.*" (Aviso Online, 2007).

We think that to reap the benefits of IT implementation and to have a wise use of technologies, museums professionals also need to know how their visitors interact with these devices and the types of experience IT can convey in order to meet visitor needs better. In this way, this dissertation can contribute to professionals.

2. Limitations and Future Research

This dissertation leaves a lot of issues open for future research about IT from a visitor-centered perspective. First, we do not take into account cultural differences among museum visitors. However, a large number of museum visitors are tourists. So the influence of national culture on people's interactions with IT seems to warrant more research.

Likewise, we focus only on individuals, but research shows that visitors are often accompanied when they come to museums (Debenedetti 2003; Falk and Dierking 1992; Griffiths et al. 2007). These groups of visitors may have different interactions with IT than individual visitors. For instance, groups can be accompanied by guides who explain the museum content so visitor interactions with IT can be modified by the presence of mediators. Social groups also communicate in order to share their experience. Hence the use of IT can appear as an enabler or disabler of these communications. For instance, Vom Lenh and Heath (2005) studied visitor interactions with museum technologies, namely PDA and interactive kiosks, and they came to the conclusion that IT had a negative influence on social interactions. As a result, future research on user reactions towards IT in museums should study another unit of analysis like dyads or groups.

Museum professionals have recently been concerned by social inclusion/exclusion issues (Anable and Alonzo 2001; Brown and Gerrard 2006; Kirk 2001). Indeed, there are still some groups who do not have an easy access to museums because of sociological barriers (i.e. language, education, culture, income or physical handicap). It could be interesting to study how IT can facilitate museum visits by including these marginalized individuals. Furthermore, this issue of exclusion has also become a topic of interest in IS research. For instance, in 2006 two major IS conferences, IFIP 8.2 and ICIS, had a call for papers respectively on "Social Inclusion" and "IT for Under-Served Communities". Paterno and Mancini (2000) insist on the fact that museum host different types of visitors. Thus, they encourage adapting and personalizing the various museum technologies to the needs of visitors. This call for more personalization in IS design appears also as a way to fight against exclusion of underserved communities by providing to each audience an adequate experience.

Future research could also investigate how IT can help museum professionals in their mission of enhancing visitor experience. Actually, technologies represent a powerful tool to analyze visitor characteristics and expectations. For instance, Tobelem (2004) suggests datamining as a way to identify and segment visitor types in order to better meet visitor needs. Datamining is a solution among others, so further research is needed to suggest and test other IT-based solutions.

In conclusion, we believe that cultural heritage area represents an interesting and wide domain of research for IS academics. IT users in the cultural heritage have specific expectations and perceptions towards IT that we illustrated in this dissertation. Affective perceptions (emotions, aesthetics, authenticity, and historicity) and cognitive perceptions (learning) do play an important role. Technologies seem to hold several benefits for heritage sites and could be the key to promote human interest for culture. But further research is needed in order to determine precisely and accurately the role played by IT in cultural activities.

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