

Cultural Heritage, Information Science, and the Creative Process

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Abstract

The creative process has recently garnered research attention in the field of information science. Multiple authors have proposed original research directions and methods relating to the creative process with the goals of preserving, curating and disseminating cultural heritage. This body of research provides empirical grounds for the development of better tools for artistic practice, and, at a theoretical level, brings another interdisciplinary perspective on the creative process. The field of information science investigates the creative process through the lens of different theoretical frameworks, stemming notably from psychology, sociology, and linguistics. Research areas include empirical studies on music information seeking behavior, creative process modeling, digital humanities projects for repertoire analysis, performance documentation methodologies, preservation frameworks, and theoretical investigations of the relationship between creative processes and archival documents. Together, these studies provide new insights into the field of information science by reexamining established categories of inquiry as well as methodologies and ontologies pertaining to the field. The relationship between cultural heritage, information science, and the creative process highlights the singularity of the creative process as an object of research, and provides a new critical perspective on the domains within which it is being investigated.

Keywords

Creative Process; Information Science; Cultural Heritage; Interdisciplinarity

Introduction

There are many definitions of information science (see Bawden and Robinson 2012 for a review). Saracevic (2009) defines it as: “the science and practice dealing with the effective collection, storage, retrieval, and use of information” (p. 2570); Bates (1999) emphasizes the physicality of information by defining the domain of information science as: “the universe of recorded information that is selected and retained for later access” (p. 1040). Some definitions of information science emphasize the technological mediation, tracing it back to Vannevar Bush’s 1945 article on the Memex, a combination of the words ‘memory’ and ‘index’ describing the hypothetical device for storing and linking documents that paved the way for hypertext according to several authors (e.g. Baecker 2008). Other definitions emphasize the central notion of information. Following Buckland’s (1991) seminal paper, these definitions start with information-as-thing (e.g. data or documents) and involve information-as-process—or the process of getting informed, resulting in information-as-knowledge (i.e. mental representation). Research in information science includes various subfields including information seeking behavior, information retrieval, human-computer interaction, as well as bibliometrics, digital preservation, and data curation.

This chapter presents a perspective on the creative process as pertains to information science, especially in relation to cultural heritage, a broad notion that encompasses both tangible (movable and immovable) and intangible heritage. The UNESCO’s Convention for the Safeguarding of the Intangible Cultural Heritage (2003) identified five domains of intangible cultural heritage: oral traditions and expressions; performing arts; social practices, rituals and festive events; knowledge and practices concerning nature and the universe; and traditional craftsmanship. Cultural heritage institutions such as libraries, archives and museums (LAMs), aim at providing long-term access to cultural heritage. As Bishoff and Allen (2004) put it, “libraries, museums, archives, and historical societies—often referred to collectively as cultural heritage institutions—have amassed physical artifacts and information recorded on physical media for the purpose of providing long-term access to them. Collections-based institutions carefully choose objects of value and interest to some intended audience. They preserve or stabilize these objects, arrange them, curate them, and present them to the public in reading rooms, galleries, and traveling exhibitions, as well as through various forms of surrogacy” (p. vi). In this chapter, we consider cultural heritage as mediating between information science and LAMs based on the long-standing relationship of information science with cultural heritage institutions, and specifically with libraries and archives. From an historical perspective, Bawden and Robinson (2012) state that “although there have been librarians and archivists from the earliest days of writing and recorded information, formal information professions and disciplines came into existence only in the 19th century. . . . Information science per se stems from the communication revolution of the 19th century” (p. 9). The digital age brought LAMs closer to one another through converging information technologies (Hedstrom and King 2003) and introduced issues of information management and digital preservation. An example of sustainability issues in the musical domain is the case of musical works relying on technological

components in electroacoustic music and mixed music; deterring factors include the lack of prescriptive notation, the idiosyncrasy of digital instruments, and technological obsolescence.

In this context, the creative process is an object of research by several authors in archival, library and information science, from multiple standpoints and methodologies. The information science perspective is distinct from other disciplines presented in this handbook, and as such may enrich the definition and the methods of investigation of the creative process. This chapter first presents a synthesis of research questions, methods and goals of investigations into the creative process in the field of information science, in relation to both human and technological mediations. We then discuss this perspective in relation to the introduction of electronics in contemporary music—especially live digital technologies. Finally, we illustrate the extent to which the study of the creative process, in the context of music and other artistic forms, is transforming the field of information science, its assumptions, its concepts and related practices.

Information science, representation, and the creative process

For Buckland (1991), information-as-thing, refers to the physical evidence “from which one becomes informed”. Information-as-thing includes data, objects and documents, which are tangible representations of intangible knowledge, i.e. representations of information-as-knowledge. Buckland’s classification separates the tangible from the intangible: tangible entities are information-as-thing and processing is computerized (information processing); intangible entities are information-as-knowledge and processing requires the human mind to ‘become informed’, that is to say the information-as-process. These different uses of the word information rely on a conceptualization of knowledge as a symbolic representation of the world. It is associated with the metaphor describing the human mind as an information processing system, and falls under the theoretical framework of cognitivism. Research on the creative process in the field of information science is deeply rooted in this cognitivist framework with a focus on the representation and modelling of creative processes and the categorization of agents involved in the creative process, as described below.

Eaglestone et al. (2007) investigated the “cognitive styles” of electroacoustic composers, categorizing composers according to their tendencies to adopt a particular information processing strategy. Their small-scale survey builds on a pilot study by Upton et al. (2005) using interviews with academic electroacoustic composers. Their motivation was to provide composition tools better suited to the different needs of the electronic music community by tailoring them to different “cognitive styles”. The authors of the survey operationalized four cognitive stylesⁱ using the Index of Learning Styles (Felder and Spurlin 2005) and related them to two different approaches to the composition process, namely a) refinement, where “a composer establishes the structure of a composition and then realizes and refines it” and b) synthesis where “composition inductively emerges through experimentation with audio materials” (p. 81). They also related the cognitive styles to different levels of satisfaction with composition software and derived implications to

design software tools supporting a wider range of compositional processes. This relationship between software tools and creative processes can be further related to information science from the perspective of cultural heritage: “heritage has special significance in technical fields because techniques and technology have lingering effects. Once an information system has been adopted, there is a vested interest in it, and little opportunity may be left for alternative designs. . . . We have to live with the consequences of the data collection, data categorization, and data-processing decisions of the past because it is impossible or unaffordable to make retroactive changes.” (Buckland 1999, 4).

The goal of providing tools and services that best meet the needs of specific user groups—in this context, the agents of the creative process—is prominent in information science. Lavranos et al. (2015) investigate the relationship between the information-seeking behavior of musicians and their creative process in activities such as composition, performance and improvisation. They aim to understand the information needs of musicians in order to provide better support for musical creativity through improved music library and information services. Their conceptual analysis integrates a cognitive model of creative thinking coming from music education (namely Webster 2002ⁱⁱ) with an information-seeking behavior model (namely Wilson 1999). This research relies on the information-as-thing perspective, using a taxonomy of “things” that includes text and symbols (e.g. music notation), sound recordings or a combination thereof. This taxonomy comes from the field of music information retrievalⁱⁱⁱ, which focuses on the organization of and access to musical content, and includes topics relevant to the music industry such as automatic classification and recommendation systems. In this view, Lavranos et al. (2015) propose a consumption-oriented approach of a production process that relates to what Bates (1999) calls the “social question” of information science—“how do people relate to, seek, and use information” (p. 1048) – as well as the “design question”—“how can access to recorded information be made most rapid and effective?” (p. 1048). This consumption-oriented approach is circumscribed by 1) the need to “meet individuals’ music information needs”, 2) the idea that individuals’ creativity is measurable, and 3) that the creative process can be adequately represented in formal models.

Information seeking behavior (ISB) has spawned several studies in relation to artistic practices^{iv}. While creativity can be approached as a specific type of activity governed by uncertainty (Menger 2009) and involving complex socio-professional interactions^v, creativity is primarily considered in the context of ISB as a property of an individual activity, reducing the social aspect to its context. We argue that these studies consciously move from the notion of the uncertainty of the production in a social perspective to the symmetric notion of the serendipity of the consumption in an individualistic perspective (see Bawden 1986, Cobbledick 1996, Makri et al. 2014 for further discussions on serendipity). Indeed, while the creative process cannot be reduced to this individualistic perspective, information systems can be designed to foster serendipity. Every domain of activity—be it within or outside the artistic domain—leads to a different study of domain-specific needs, such as: the potential impact of information systems on scientific creativity

(Bawden 1986); theatre artists' use of information to accomplish creative activities (Medaille 2010); or the needs of electroacoustic composers (Hunter 2006). The literature in this domain relies on conceptual frameworks for creativity coming from different disciplines, including economics, sociology and psychology^{vi}. In the context of ISB most studies of musical creativity rely on a qualitative approach using interviews or surveys.

ISB investigates information-as-process, but the subsuming discipline of information science has also proposed a perspective on the content (information-as-thing) that is produced during the creative process. Information-as-process and information-as-thing are connected through the question of representation. Representation is addressed directly in several studies that include the creative process to various extents. As a first example, Gracy et al. (2013) involve multiple actors in their model of music composition/production/use, but in their study, the creative process is primarily limited to the re-use of musical material. This approach may be related to others in the visual arts domain, including the Capturing Unstable Media Conceptual Model (Fauconnier and Frommé 2004), as well as the Variable Media Questionnaire (Ippolito 2003) or the Media Art Notation System (Rinehart 2004)^{vii}. A paradigmatic example of the representational approach of the production and creation process is provided by Vincent et al. (2013). In their study, they propose a more or less flexible model to describe production processes using web ontologies^{viii}. This model builds upon the Mustica project (Bachimont et al., 2003), which led to a database of mixed music works, as well as previous research relating to the FRBRoo model^{ix} (Le Bœuf 2012; Bonardi 2015). Vincent et al. (2013) design a domain ontology (differential, grounded in Saussurian linguistics) on top of a formal ontology (extensional, thus providing the representational level), using the methodological framework proposed by Bachimont (2007). The formalization of the creative process is paralleled by a formalization of the works and the multiple documents that it produces. Behind this representation is the desire to capture the composer's intentions, which are, according to this perspective, objectified in the information-as-thing produced during the creative process. The epistemological assumption is thus that an intention may be derived or posited, hermeneutically, from the information-as-thing.

These approaches can be applied to the domain of artistic production with technological frameworks such as the one proposed by Bardiot et al. (2014) for digital performances. In this perspective, documentation processes and production processes are integrated into the same framework, similarly to the Integra Live software tool for contemporary music creation, performance and preservation (Bullock et al. 2008). Bardiot et al.'s tool manages successive versions of the technological framework used by artists and technicians during the production process and proposes several functionalities to access, deploy and build on these different versions. The premise is that the creative process may be analyzed from the documents generated, typically following the information-as-thing approach and potentially providing the physical support for future philological enquiries. Examples of philological inquiries include prior work by musicologist Laura Zattra with respect to computer music, where "the analysis of the creative and

revision processes that [the composer] carried out . . . is made possible by textual criticism and interpretation based on digital and audio sources, sketches, and oral communications” (Zattra 2007, p. 38).

This section presented a research perspective on creative processes articulating tangible information-as-thing and intangible information-as-process, notably in the scope of ISB. Another predominant perspective in Information Science focuses on the articulation between information-as-thing and information processing, and relates notably to the digital humanities.

Documentation frameworks for cultural heritage: from re-performance issues to digital humanities

Abbott (2014) states that “research into digital representations of various types of live artworks has shown that academic researchers value documentation about the process of creating artworks as highly as documentation of the artwork itself” (p. 66), referring to a survey conducted by Abbott and Beer (2006) in the context of the performing arts. The convergence between documentation methodologies and creative practices has been primarily justified by the open-endedness of the work and the processes of re-installation and re-performance of contemporary works^x. As Rinehart and Ippolito (2014) argue: “in order to salvage the rich array of creative practices born during the last century, society has to move from preserving media to preserving art. In the process, we will have to view change not as an obstacle but as the means of survival” (p. 46). The change, in this context, can be, for example, the replacement of an obsolete technology used in a new media art installation, or the migration of the live-electronics software for a mixed music work. The documentation framework, such as the variable media questionnaire of Ippolito (2003)^{xi}, provides grounds for the sustainability of the works. Documentation becomes instructional and methodological questions regarding its conceptualization touches on the range of agents involved (Huys 2011), the descriptive (Ippolito 2003) vs. prescriptive (Rinehart 2004) dichotomy, and its epistemological grounding (Innocenti 2014).

Most documentation frameworks come from museum studies, but information science started to tackle similar questions with the advent of digital preservation and curation. The underlying argument, in the context of artistic works using new media and digital technology, is that they are at risk of no longer being performed or installed due to, notably, technological obsolescence, an issue thoroughly discussed in digital archiving. The preservation of artworks in the context of digital art, computer music, live electronics, and digital performances, has thus converged with the question of complex objects in digital preservation and curation, a broad field which also encompasses video games, virtual worlds, web archives, and so on. The artwork, in this context, becomes a paradigmatic example of re-use in the lifecycle of the digital object. This approach led to several case studies in the context of research projects such as InterPARES II (Duranti and Thibodeau 2006). Nevertheless, these projects rarely included the creative process with the

exception of *Mustica* (Bachimont et al. 2003), and more specifically, the evolution of *Mustica*'s principles in the latter work of Vincent, Bonardi and Bachimont presented in the previous section.

Abbott's argument about the documentation of the creative process is also present in the digital humanities, where computational tools are applied to scholarship in the humanities. Here, documentation does not necessarily follow the instructional/prescriptive goal but contributes to the dissemination of information-as-thing. In the context of music, some projects include traces of the creative process like drafts and sketches. For example, the Online Chopin Variorum Edition (see <http://www.chopinonline.ac.uk/>) consists of about 6000 images (manuscripts and impressions) of the first editions of Chopin's music and provides personal annotation tools (see Rink 2015). The recently established Beethovens Werkstatt project (<http://beethovens-werkstatt.de/>) plans to combine genetic criticism and music edition as a tool to investigate Beethoven's creative process. However, navigating musicians' working documents is not the sole means for digital humanities scholars who approach the creative process from the perspective of information-as-thing. Weiss and Fujinaga (2015) exploit historical documents available on the web combined with optical character recognition techniques to automatically create a prosopographic database describing relationships between Renaissance musicians. Through information processing, they aim to discover social and professional networks which could provide new insights on the contributions of different actors to the creative process.

In this section, we presented a perspective of the creative process revolving primarily around information-as-thing as a manifestation of creativity. This perspective pertains to the notion of authenticity in archival science, where documents are seen as trustworthy statements of fact (see MacNeil and Mak 2007) and thus, in this context, as evidence of the creative process. Different perspectives are possible—and, we argue, necessary—beyond this representational and hermeneutical perspective. In the most critical perspective, documentation becomes an inherent part of the creative process. For choreographic works, the initial goal of documentation for future performance, carried out by Van Saaze and Dekker (2013), transformed into the creation of “boundary objects”^{xii}, a term conceptualized by Star and Griesemer (1989) as “those scientific objects which both inhabit several intersecting social worlds . . . and satisfy the informational requirements of each of them” (p. 393). For Van Saaze and Dekker (2013), the model of the activity turned into a collaboration artefact among dancers, choreographer and technicians of the company. Another example is to be found in *Anarchive* (Lessard, 2009), a project focusing on creation in new media arts, where “past works are archived in a new creation that delves into the potential of new media to explore preservation interactively” (p. 316). In this project, the dissemination of information-as-thing, presented in relation to the digital humanities, becomes a vehicle to new creative processes rather than a primary goal.

Beyond the representation of the creative process: one step further into interdisciplinarity

Whether it relates to music or other artistic forms, the study of the creative process is not just a way to propose a research perspective on artistic practice but also a way to investigate the assumptions of the research field. In this section, we look at the transformative potential of the study of the creative process on the field of information science itself, its assumptions, its concepts and related practices. Information science is intrinsically, and explicitly, interdisciplinary (Saracevic 2009, Furner 2010), as illustrated by the range of theoretical frameworks integrated by information scientists in relation to creativity. However, the relationship between information science and other disciplines within an interdisciplinary framework, and the impact of these interdisciplinary connections in studies on the creative process, have received scant attention. Referring to Barry et al. (2008)'s three paradigms of interdisciplinarity, we argue that the studies reviewed in the above section abide by the *subordination-service* paradigm, in which "the service discipline(s) is commonly understood to be making up for or filling in for an absence or lack in the other, (master) discipline(s) [here, information science]" (Barry et al. 2008, p. 29). In this section, we now present studies that arguably fall under the *agonistic-antagonistic* paradigm, motivated by "a self-conscious dialogue with, criticism of or opposition to the intellectual, ethical or political limits of established disciplines or the status of academic research in general" (p. 29)^{xiii}. These studies question ontologies relating to the object of study and/or the discipline, here the creative process and information science respectively.

Early investigations focused exclusively on composers, with an extension to performers^{xiv} (e.g. Makri et al. 2014, or Medaille 2010, in the context of theatre production) and sound professionals in recent studies. Pras, Guastavino and Lavoie (2013), using a theoretical framework combining communication studies, sociology and musicology, provided an historical perspective on the roles of sound engineers and record producers: "in tandem with technological inventions, studio professions evolved throughout the 20th century from a very technical role to a more artistic role" (p. 618). Pras, Cance and Guastavino (2013) further investigate the collaboration between record producers and musicians during recording sessions and identify various levels of producers' involvement in the creative process. Finally, Pras and Guastavino (2013) manipulated the level of involvement of record producers during actual recording sessions and compared the outcomes. They observe more improvement from one take to the next when producers provided feedback in between takes (than when they didn't), thus highlighting the producers' contribution. This line of research aims to document studio practices in terms of tacit knowledge for professions whose expertise, according to Pras and Guastavino (2013), is at risk of being lost given the current decline of the traditional recording industry. While in line with the cultural heritage tradition of information science, this research questions the traditional divide between music creation and music production, by highlighting the creative role of studio professions and their place in the production of tacit knowledge related to a work.

Focusing on performers, Pras, Schober and Spiro (2017) investigate the intentionality and mutual understanding during free jazz improvisation, using a methodological framework devised by Schober and Spiro (2014) in psychology^{xv}. The 2014 Schober and Spiro study involves the collection of retrospective accounts of a jazz performance by the instrumentalists and a third-party expert listener. The research design relies on recordings of the improvisational activities that are used as prompts to explore the creative process of performers. The analysis focuses on the relationship between performers' intentions, as conveyed through improvisation, and the retrospective accounts of these intentions in the context of free improvisation^{xvi}. Both studies converge to show that fully shared understanding is not needed for free jazz improvisation and that performers can agree with an outside listener more than with one another. They further stress the need to focus the analysis not only on consensual understanding but also on divergences across different actors of the creative process.

Rix-Lievre (2010) compared three theoretical frameworks pertaining to the study of activity grounded in participants' confrontations to traces of their own activity: Theureau (2010), Vermersch (2009); and Clot (2008). Musicologist Nicolas Donin worked with ergonomist Jacques Theureau to produce an influential methodological framework (Theureau and Donin 2006, Donin and Theureau 2007) to study compositional activities from the perspective of situated action and cognition. Pierre Vermersch applied his explicitation interviewing technique (Vermersch 2009) with composer Philippe Leroux to analyze Leroux's creative process^{xvii}, as documented by Donin and Theureau (2008). Clot's analysis methods build notably on Vygotsky and Bakhtin in the tradition of activity theory (Clot and Faïta 2000). Both Theureau and Vermersch's approaches aim at producing descriptions "as close as possible to the lived experience of the activity" (Cahour and Licoppe 2010, p. e), while Clot aims at fostering "a collaborative development of subjects on their activities" (Cahour and Licoppe 2010, p. e). This distinction has a critical incidence for research in information science, where the goal is not the analysis of the creative process as in empirical musicology^{xviii}, but rather the modalities of the transmission of the work. In this context, Boutard (2016a, 2016b), building on Clot's methodological framework, uses documents on the creative processes (sketches, video recordings of rehearsals and other traces of musical activities) as mediations to the development of practice rather than evidences of practice. The main outcome of this position is theoretical, grounding the notion of creative intention in the dialogical 'reality' of the creative process. In this view, activity is conceptualized in terms of otherness, where "a 'here-and-now' situation . . . is criss-crossed by other places and temporalities, as well as by absent third parties" (Engeström 2014, p. 122). Paraphrasing Deliège and Richelle's (2006) call to get rid of creativity in favor of the investigation of creative acts (p. 2), the goal is to get rid of intentionality, as an abstract concept pervading the work, in favor of the mediation of intentional (dialogical) acts through relevant documentation methodologies. This approach is a departure from both methodological individualism and collectivism, where "various mediations are used to overcome such dichotomies as the structural/processual, and individual/collective in studying human activities" (Paavola, Engeström, and Hakkarainen 2012, p. 2). The practical implications of this

position for the transmission of the work include the design of participatory digital repositories (further discussed in Boutard, in press).

The studies described above illustrate the influence of the disciplinary field and its research questions on the study and the conceptualization of the creative process. Recent theoretical research takes a resolutely opposite approach by investigating how the creative process affects the conceptualization of disciplinary concepts. This approach is best exemplified in archival science with the *Archives et création* project (Lemay and Klein 2014), and, more specifically, in the work of Klein (2014). Klein investigated the use of archival documents by visual artists, building on Walter Benjamin's "dialectical image", to define the archive as a concept, which appears at the meeting point between an object (the document), and a subject (the user in general and the artist in particular). On theoretical grounds, Klein questions the conceptualizations of the temporality of archives: primarily the classical lifecycle theory of the three ages—stemming notably from the first Hoover commission in 1948 (Robek, Brown and Maedke 1987)—that posits that the records' lifecycle can be divided into three ages: active, semi-active and inactive. This research, alternatively, investigates its impact on another conceptualization: the records' continuum, a less linear view of archives' temporal unfolding, and which questions the usual separation between recordkeeping and archival custody^{xix}. Klein's main outcome is the definition of a new ontology of archive/archives as an alternative to the dichotomy between the classical object-driven (or positivist, see Trace 2002) definition of archives and the postmodern subject-driven definition of the 1990s-2000s (e.g., Brothman 1993, Cook 2001)^{xx}. While Klein (2014) does not investigate the musical creative context, examples of archival documents used in composition are numerous in the domain of electroacoustic music: see for example, Georg Katzer's 1983 "*Aide Memoire*", or Luc Ferrari's use of his personal archives in "*Archives Sauvées des Eaux*"^{xxi} (2000) as well as "*Archives Génétiquement Modifiées*"^{xxii} (2000). Other examples in the context of mixed music include Bernd Alois Zimmermann's *Requiem für einen jungen Dichter*, analyzed by Macé (2012) specifically in relation to the inclusion of documents, or Peter Ablinger's *Voices and Piano* cycle of pieces, using archival voice recordings. The paroxysmal example may be found in what Truax (1996) calls the soundscape compositions. These compositions derived from the World Soundscape Project founded by R. Murray Schafer in the late 1960s, whose primary goal was "to document and archive soundscapes, to describe and analyze them, and to promote increased public awareness of environmental sound through listening and critical thinking" (p. 54). At the crossroads of archival and compositional activities, these objects blur the boundaries between objects and subjects, questioning the centrality of the context of emergence of the document.

Conclusion

Based on the last section, we identify three recent directions of research on the creative process in LIS that we believe have critical importance in the field, and may resonate with other research communities presented in this book, providing grounds for further interdisciplinary endeavors. These directions overlap in some of the studies provided as support for discussion.

The first branch questions established categories (such as music creation and music production) which may constrain the investigation of the creative process at the level of the research design (see for example, the literature review by Lavranos et al. 2016, which poses the separation among composition, performance, analysis). These constraints may result in the systematic oversight of certain stakeholders in the research design or certain agents of the creative process. For example, cultural heritage and sustainability issues in computer music and more specifically in mixed music, have brought to light the collective production and transmission process of a work at the intersection of human practices and objects (live electronics software but also traces of the activity including ethnographical documents like video recordings of musical practice).

Following this argument, the second branch of research questions the methodologies within the disciplinary field in relation to the question of cultural heritage. It emphasizes the relation between the epistemological grounds and the conceptualization of the notions of transmission and cultural heritage. Once again, the case of live electronics in contemporary music has brought to light the mediations between multiple agents involved in the transmission of the repertoire, emphasizing the active role of technology. The critical effect of technological obsolescence on the three pillars of written music transmission—i.e., organology, score, and teaching—provides us with a “real-time” version of the concomitant disappearance of objects and practices that Hennion (2016) discussed for Baroque music^{xxiii}. This disruption induced by technology, specifically digital technology, led to the re-examination of the roles and the modes of operation of cultural heritage institutions. In this domain, museum studies and museum institutions confronted with similar questions (Serexhe 2013), developed several seminal projects and produced important theoretical frameworks^{xxiv}, pursuing a long-lived discussion on stakeholders in cultural heritage. In the context of music, the development of post-cognitivist methodological frameworks for the investigation of creative processes results from this branch of inquiry.

The third research branch questions the ontologies of the discipline in relation to the creative process. Discussing core notions of information in information science, or archives in archival science, these studies use the creative process as an object that challenges methodological assumptions and fosters new practices in information science and cognate fields investigating cultural heritage. As mentioned previously, the case of mixed music with live electronics is a particularly revealing case for cultural heritage, a case to be extended in view of the pervasiveness of digital technologies in contemporary creative activities. In the field of information science, technological obsolescence, especially in the digital age, critically fostered the development of investigations in the fundamentally antithetical management of information-as-thing and information-as-process. The transformative power of the creative process on information science thus lies in its inherent uncertainty, which epitomizes the question of idiosyncrasies in relation to cultural heritage, particularly with the increasing use of digital technologies. In light of this, we argue that it is critical to address and build upon idiosyncrasies in creative processes,

circumventing the tendency of several studies, presented above under the representational approach, to propose strategies to elude this question.

As several authors have emphasized (for example, Deliège and Richelle 2006, Donin 2015), the study of the creative process requires contributions from multiple disciplines. Research in—or related to—information science has laid the foundation for several strategies discussed in this chapter to investigate the creative process. To do so, information scientists have brought together perspectives from different fields, both on theoretical and methodological grounds, notably under the overarching perspective of cultural heritage. Due to the interdisciplinary nature of information science, the field lends itself to the exploration of such an interdisciplinary object as the creative process. The recurring question of sustainability in digital cultural heritage has fostered increased research attention in the creative process, on the premise that it gives access to the conception of the work. In this context, traces of (creative) activity play a critical role in the research process, and information science provides new insights into the tension between the creative process, its representation, and the traces that mediate its investigation.

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ⁱ Cognitive styles are listed as: 1) global/analytic; 2) imager/verbalizer; 3) intuitive/sensing; and 4) active/reflector.

ⁱⁱ A model grounded in Guilford's (1967) classic distinction between convergent and divergent thinking. The model builds on five elements: (1) a problem solving context, (2) convergent and divergent thinking skills, (3) stages in the thinking process, (4) some aspect of novelty, and (5) usefulness of the resulting product.

ⁱⁱⁱ For a general perspective on Music Information Retrieval, see (Byrd and Crawford, 2002). Lavranos et al.'s (2015) taxonomy may be put in perspective with Zattra (2015)'s more comprehensive review of the topic from a musicological perspective.

^{iv} See Cobblestick (1996) for an example of library practitioner-conducted exploratory research addressing the impact of artists' information seeking behavior on library services.

^v See the interactionist theorization of Becker (1982), where "every art . . . rests on an extensive division of labor. That is obviously true in the case of the performing arts" (p. 13).

^{vi} For a review of theories of creativity in psychology, see Clarke's chapter in this book.

^{vii} See Dekker (2013), for a thorough review and a critical analysis of the conceptual frameworks that emerged from these projects.

^{viii} Ontology is here defined from the point of view of computer science, as "an explicit specification of a conceptualization" (Gruber, 1993, p. 199). Web ontologies are thus conceptual frameworks made of categories and links between categories implemented in a machine-readable language that is designed to be processed computationally in order to produce inferences based on formal logic.

^{ix} Functional Requirements for Bibliographic Records-Object Oriented (FRBRoo) is a formal ontology for bibliographic and museum information designed as an attempt to harmonize library and museum modelling frameworks into a unified model.

^x Bénichou (1994) remarks that, "extremes in the combining of genres and practices are becoming the main characteristic of current artistic production. Description of these disparate and hybrid elements is very delicate, and any attempt at definition seems invalid" (p. 1).

^{xi} The Variable Media Questionnaire builds on eight characteristics of new media works: installed, performed, reproduced, interactive, contained, duplicated, encoded, or networked (Ippolito, 2003).

^{xii} Another example of reference to boundary objects can be found in information science in Boutard (2016a) as a relevant concept for documentation methodologies of multi-agent creative processes with non-stabilized practices.

^{xiii} Barry, Born and Weszkalnys's third paradigm is not referred to in this paper. It is the *integrative-synthesis* paradigm, where "interdisciplinary work should be judged according to the criteria of the 'antecedent disciplines' and the value will be assessed in terms of these additive criteria" (p. 28).

^{xiv} Féron and Boutard (2017) is an example of research on musical performance at the crossroad of musicology and information studies.

^{xv} Schober and Spiro's (2014) research is primarily interested in how performers articulate their understanding of their performance from a linguistic point of view, and the level of agreement they reach on each other's statements.

^{xvi} This relationship is debatable, as emphasized in the previous study by Schober and Spiro: "a larger number of disagreements (17 [out of 35 statements]) strike us as resulting from differing ideological stances about the nature of intention and causality in jazz improvisation" (2014, p. 10).

^{xvii} Vermersch's method (2009) builds on introspection as a tool for fostering an awareness of the pre-reflective lived experience.

^{xviii} Defined here broadly as empirically grounded approaches to musicology, following the definition and discussion of Cook and Clarke (2004).

^{xix} For an overview of all these archival concepts, see Millar (2010), for example.

^{xx} As depicted by Klein (2014), the classic view of archival science is object-driven. It envisions the archives as an authentic representation of the activity it purports to document. Cook and Schwartz (2002) describe it, in relation to theorist Hilary Jenkinson, as an activity "where the archivist would remain a passive guardian of evidence, a neutral custodian never doing appraisal, and a selfless devotee of Truth" (p. 175). On the contrary, the so-called postmodern vision is subject-driven. It emphasizes the social construction fostered by archival practice. In this context, Cook and Schwartz (2009) argue that "the principal impact of postmodern theory on archival practice would be to acknowledge the central role of the archivist as mediator and interpreter" (p. 183).

^{xxi} Archives saved from drowning (our translation).

^{xxii} Genetically modified archives (our translation).

^{xxiii} Hennion distinguishes between two modes of transmission: "The first of these modes of musical transmission is based on human practice handed down from one generation to the next: although these practices are always open to betrayal, they are nevertheless 'living'. The second of these modes of musical transmission is direct and based on objects: this discontinuous and authentic—but 'dead'—process of archeological reproduction is founded on the scholarly interpretation of the messages that our ancestors left behind them, a few centuries ago, through media which have withstood the passage of time, whether this was fortuitous or deliberate" (Hennion, 2016, p. 170).

^{xxiv} For example, investigating, in the context of representation, bottom-up processes like folksonomies as opposed (or complementary) to taxonomies (see Rinehart and Ippolito, 2015, p. 59-60), and the role of curators in installation works (e.g. van Saaze, 2009).