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Conceptual analysis and literature review

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Music information seeking behaviour as motivator for musical creativity

Conceptual analysis and literature review

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Abstract

Purpose – The purpose of this paper is to investigate the connection between musicians' information seeking behaviour and the creative process in music, providing a framework for understanding the role of information needs satisfaction in musical creativity. A number of studies in information science literature have been carried out attempting to model cognitive, affective, behavioural and contextual factors associated with music information seeking behaviour. However, only few studies have addressed the relationship between information seeking behaviour and musical creative activities such as composition, performance and improvisation, listening and analysis.

Design/methodology/approach – The focus of this paper is to provide a framework for the study of information seeking behaviour for the purposes of satisfying musical creativity information needs, combining the theoretical basis of an established model of information behaviour developed by Wilson and the theoretical perspectives of a music creative thinking model proposed by Webster. The key features of the two models are synthesized in a unified model of information seeking behaviour for musical creativity and enriched with research findings identified in the literature of both musical information seeking and musical creativity.

Findings – The proposed conceptual framework offers an integrated interpretation of the combinations of information needs, information resources and environmental/personal barriers, which enable musical creativity. In the authors' approach "musical creativity" is treated as a musician's aim or ambition or drive for expression and is influenced by the way musicians seek information for that purpose. Therefore, musical creativity is an intentional behaviour which acts as motivator for information seeking and is affected by the available information and the musician's information seeking profile. The current study include three important findings: first, the design and development of music library and information services for musical creativity; second, the development of music information literacy skills for creativity; and third, the information seeking behavioural perspective for universal musical creativity, and the implications for cultural musical heritage diffusion around the world.

Originality/value – An integrated information seeking behaviour model which includes musical creativity is developed through the synthesis of two already existing approaches, that of Wilson for information seeking behaviour and that of Webster for creative thinking in music. The present conceptual study presents a three stage pattern or process for modelling information seeking for musical creativity: the process initiates with the intention-motivation for creativity, then proceeds to



information seeking behaviour and then concludes with the musical creativity outcomes. This is the first study that seeks to understand the relationships between creativity and information seeking behaviour.

Keywords Internet, Information needs, Information services, Musical creativity, Information seeking behaviour, Musical information

Paper type Conceptual paper

1. Introduction

Information seeking is an important activity in every person's life. In the literature of information seeking and information retrieval a number of broad frameworks have been proposed for understanding user information seeking. These, among others, include Krikelas' (1983) model, Bates' (1989) "berry picking" model of information searching, Ellis' (1989) information searching model, Kuhlthau's (1991) model of the information search process, Dervin's (1992) sense making model, Ingwersen's (1992) cognitive model, Savolainen's (1995) everyday life information seeking model, Leckie *et al.* (1996) model of the information seeking of professionals, Saracevic's model of stratified interaction (1996) and Wilson's (1999) macro-model for information seeking behaviour. The proposed omnibus macro-models of information seeking, however, provide broad perspectives that need further analysis in order to be useful frameworks within different specialized contexts (Bawden, 2006; Wilson, 2006). Further dwelling into specific contexts (music, art, healthcare, etc.) allows linking theoretical considerations for information seeking with real-life situations and, provides the opportunity to develop efficient information services which may have a direct impact on peoples' everyday practical activities as well as their wider personal and work-related goals. For example, a number of research studies have been carried out aiming to understand the information needs and information seeking preferences of different types of artists, such as the work by Hemmig (2008, 2009) on theatre artists or the research conducted by Medaille (2010) on practicing theatre artists and Mason and Robinson's (2011) work with emerging artists and designers. Music information seeking and information retrieval research, in particular, has examined typologies of users and ways of addressing their information needs (Orio, 2006) and addressed the way individuals seek music information and manage collections of musical material (Futrelle and Downie, 2002). However, the music information universe has a significant potential for further research. One pathway for further research includes the study of music information seeking behaviour of different communities (e.g. composers, performers, listeners, musicologists, programmers, information professionals, etc.). In addition, although a wide array of conceptual models of information behaviour have been made available (Case, 2012) the impact of information and information seeking preferences on musicians' everyday practices and more specifically on creativity is rather understudied. Research which examines the information needs and information seeking behaviour in the course of creative work is an underdeveloped area of study and, in general, music information research is geared more towards the theoretical rather than the practical aspects of music work as a creative process (e.g. musicology) (Hunter, 2006).

The issue of the effective utilization of music information is important for all those who are engaged in music professional or leisure activities. Musicians of all levels express themselves through musical creative activities/processes that result to the creation of musical products (Lock, 2011). Webster (2002) identified three basic creative activities: composition, performance and improvisation and listening and analysis,

which may lead to distinct musical creative products. Furthermore, musical creative products can be represented in a variety of ways, through text and symbols (e.g. music notation), sounds (e.g. music listening) or a combination of both (Downie and Cunningham, 2002). Therefore, musical creativity is viewed as a multifaceted process that requires the sourcing of a variety of different types of information associated with variant levels of music-related information needs. These contribute to the fulfillment of the music creative process as a synergic concept which includes different layers of music-related creative activities/tasks (Wiering *et al.*, 2009).

As the universe of online music information is constantly changing and expanding with increasing information availability, the study of music-related information seeking behaviour presents an area of ongoing interest within the broader context of musical creativity. The aim of this paper is therefore to investigate information seeking behaviour within the wider framework of the musical creative process and thereafter provide a conceptual model for understanding the role of music information in musical creativity. To this end, the rest of this paper is organized as follows: The next section (Section 2) includes the theoretical background through a selected literature review of the two major conceptual areas employed, i.e. music information seeking behaviour and the process of musical creativity process. In Section 3 a combined framework for interrelating information seeking behaviour and the creative process is developed and a detailed review of the literature is included for each of the different stages of the conceptual model. A subsequent discussion of theoretical and practical implications of the conceptual information seeking behaviour model for musical creativity is outlined in Section 4. Section 5 includes a number of recommendations for future research and Section 6 summarizes the conclusions of the current study.

2. Theoretical construct and background

2.1 *Conceptual approach for relating information seeking behaviour of musicians and musical creativity*

Information seeking takes place within certain socioeconomic circumstances and involves a process of uncertainty reduction in the current state of knowledge of an individual, for example, when making decisions, when striving to achieve a long- or short-term goal, or when trying to solve a problem (Savolainen, 1995). Individuals seek information within particular work-related or everyday life contexts in order to satisfy specific information needs and generate value within their work roles and everyday life situations (Bawden and Robinson, 2013; Kostagiolas *et al.*, 2015). As such, information seeking can be a structured or unstructured, active or passive process for gathering, retrieving, organizing, interpreting and using information for various purposes, including particular goal-oriented as well as incidental activities (Case, 2012). Effective information seeking has a positive impact on pursuing a wide variety of multidimensional goals, whether those are work related (e.g. specific projects, promotion), educational (e.g. academic achievement), health related (improved health conditions), social and recreational (e.g. social well-being, citizenship related goals) or personal (e.g. sense of accomplishment, achievement). Within the context of artistic/creative work-related situational contexts in particular, which is the point of interest for this paper, information seeking relates to the fulfillment of both aesthetic/emotional as well as practical activity-based goals.

The focus of this paper is, therefore, to provide a framework for the study of information seeking for the satisfaction of information needs aimed at musical creativity, combining the theoretical basis of an established model of information behaviour developed by Wilson (1999) and the theoretical perspectives of a music

creative thinking model proposed by Webster's (2002) in a unified model of information seeking behaviour for musical creativity. The key features of those two models are synthesized and enriched with research findings identified in the literature of musical information seeking and musical creativity.

2.2 Wilson's information seeking behaviour in the musical context

Wilson's approach to information seeking initiates with the generation of information motives and needs within a socioeconomic environment where individuals assume a range of different roles (Wilson, 1999, 2006). Information seeking is conceptualized as a problem solving activity in an effort to satisfy a set of "needs" which are activated by the requirements created within a set of roles and contexts (Wilson, 2006; Bawden, 2006) (Figure 1). Information needs are distinguished into three categories (Wilson, 1999): first, personal (e.g. physiological, affective, and cognitive needs); second, social role related (e.g. individual work life); and third, environmental (e.g. socio cultural and politico-economic environment). When examining these categories via the prism of music information behaviour specifically, a person may assume a number of parallel roles and hence seek music information for recreation, for work-related roles (e.g. a music educator) as a musician performing a particular musical piece or as a scholar carrying out research (Laplante and Downie, 2006). Individuals not only play a range of intertwined roles but also make demands upon formal information systems (such as libraries, on-line services, information centres), upon other sources that may not have information function as their primary goal (professional authorities, offices, music companies etc.), and/or upon other people by exchanging informal information. In the study by Kostagiolas *et al.* (2015) the range of information sources that musicians utilize in order to satisfy their information needs have been categorized as conventional, digital or interpersonal. Digital sources can be music online databases and search engines; conventional sources can be printed material such as printed sheets of music and interpersonal sources can be other musicians and professional networks. In addition, in order to satisfy their diverse information needs, information users may encounter a variety of different barriers which can be of personal, interpersonal or environmental in nature. These act as obstacles to information seeking and obstruct the progress towards addressing users' primary needs (Wilson, 2006).

Although Wilson's model has not been applied or implicitly mentioned as an overarching information behaviour framework in previous research studies focusing on music information seeking behaviour, particular dimensions of the model have become primary points of reference on both the macro information behaviour layer (e.g. at the level of behavioural motives/drivers and the situational context) as well as the information seeking behaviour micro layer (e.g. specific aspects which relate to the

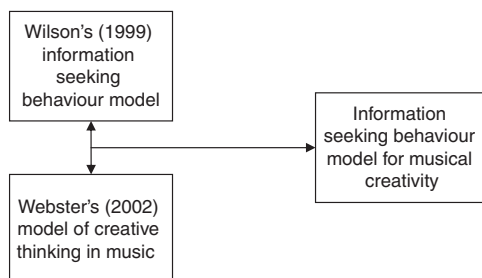


Figure 1. Conceptual approach for the proposed information seeking behaviour model for musical creativity

process of information seeking and searching). For example, Wilson (1999) has presented the general concept of information behaviour in the form of a series of nested fields (Figure 2). Information behaviour has been defined as the general field of investigation with information seeking behaviour is concerned with the variety of methods employed to access and search on information sources. Information searching behaviour relates to the specific information exchanges and interaction which take place between a user and information retrieval system whether these are computerized or interpersonal.

Table I provides a selection of studies in the area of music information related to Wilson's model for information seeking behaviour together with their main findings: the different music information needs have been investigated in the studies by Bainbridge *et al.* (2003), Lee and Downie (2004), Taheri-Panah and MacFarlane (2004), Laplante and Downie (2006), Cunningham *et al.* (2007), Cunningham and Nichols (2009) and Laplante (2010b). Several studies have examined the demographic and socioeconomic influences on information needs generation of different groups of musicians (Laplante, 2010a); other studies address the cognitive layers of music information needs development (Lee and Downie, 2004; Laplante and Downie, 2006; Inskip *et al.*, 2008a, b, 2010; Kostagiolas *et al.*, 2015); others include the role of the individuals' musical background (Lesaffre *et al.*, 2008) while other studies have focused on the process of retrieval, music query creation (Lee and Downie, 2004) and natural language music information retrieval (Bainbridge *et al.*, 2003; Lee, 2010). On the other hand, Laplante and Downie (2006), Inskip *et al.* (2008b), Lai and Chan (2010) and Dougan (2012), have addressed musicians' perceptions concerning the utilization of various online and offline information resources. Furthermore, research by Lee and Downie (2004), Taheri-Panah and MacFarlane (2004), Hunter (2006) and Liew and Ng (2006) has made a detailed categorization of music information resources into conventional, digital and interpersonal. Finally, barriers/obstacles in music information have been specifically studied by Hunter (2006), and Liew and Ng (2006) while enablers including musicians' information literacy skills have been investigated by Manus (2009).

2.3 Webster's musical creativity process

Musical creativity requires information utilization during the creative process. Several theoretical models have been suggested in the literature in order to model the musical

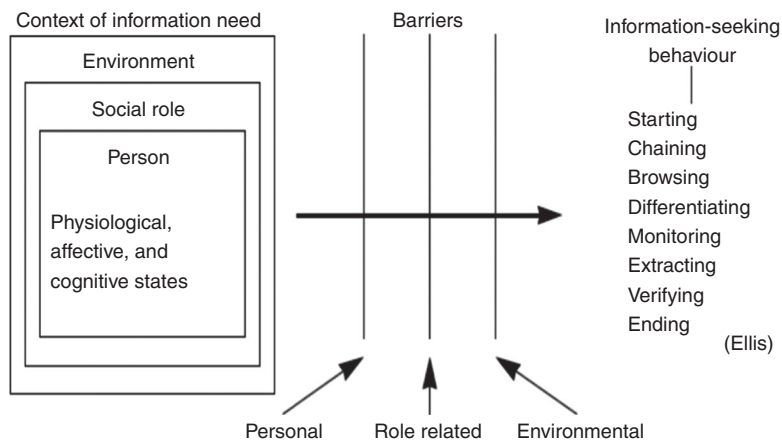


Figure 2. Wilson's model of information seeking behaviour

Source: Wilson (1999)

Paper citation	Type of research	Main findings in relation to Wilson's model of information seeking behaviour
Bainbridge <i>et al.</i> (2003)	Google answers analysis	Description and categorization of music information needs into bibliographic (e.g. performer, title, date, orchestration, collection title, composer, label, link, language), genre, lyric fragment, where heard, affect, tempo, etc.
Lee and Downie (2004)	Questionnaire	Analysis of collaborative music information seeking behaviour, "public information seeking" and the impact of peoples' opinions about music such as reviews, ratings, recommendations, etc. The analysis suggests contextual metadata in addition to traditional bibliographic metadata
Taheri-Panah and MacFarlane (2004)	Questionnaire and interviews	A study of both the impact of musician's lifestyle on music information needs and the importance of social networks in music information seeking
Hunter (2006)	Interviews	This work identifies the information needs of composers of electro acoustic music and the issues that have an effect on their information seeking behaviour. For this group of musicians' interpersonal information resources (colleagues, professors, performers and friends) prevail
Laplante and Downie (2006)	Interviews	This paper suggest that the musicians' "curiosity" is an important motivation factor for information seeking while categorized information resources into informal (e.g. friends, colleagues or relatives), formal (e.g. public library or record store), and at the internet (online information resources)
Liew and Ng (2006)	Interviews	The findings shed light on ethnomusicologists' information needs, preferred information resources (e.g. libraries, archives, museums, professional associations, e-mail and listservs, online search engines, consulting with others and observations, personal collections, etc.) and the barriers they face in information seeking and use (e.g. the unreliability of the internet, the lack of scholarly information available on the internet, the lack of the availability of the materials, the bibliographic control, the language, copyright, cost, etc.). Based on that, the design of specialized information services is suggested
Cunningham <i>et al.</i> (2007)	A three-day diary study	Finding new music has a significant impact on users need for music information, searching mainly on digital sources (music databases, radio, MP3 player, TV, Ringtone, CD, etc.), the internet (e.g. artist and music review web sites, music recommender systems, music databases, etc.), work and public places (e.g. university lecture halls, labs, hallways, workplace, employment outside university, club, pubs, gym, etc.)
Cunningham and Nichols (2009)	Interviews	This study suggest that the main information needs of individuals include listening and recreation, finding music collections, basic song metadata (e.g. artist, title), access to more detailed records (e.g. lyrics, genre)
Inskip <i>et al.</i> (2008a)	Literature review	This work infers on interpreter of music information (author/composer, performer, cataloguer or the listener) and suggests that the distinct roles affect music retrieval and music information seeking behaviour including the preferences of information resources

(continued)

Table I.
Review of studies
implicitly or
explicitly associated
to Wilson's
information seeking
behaviour model

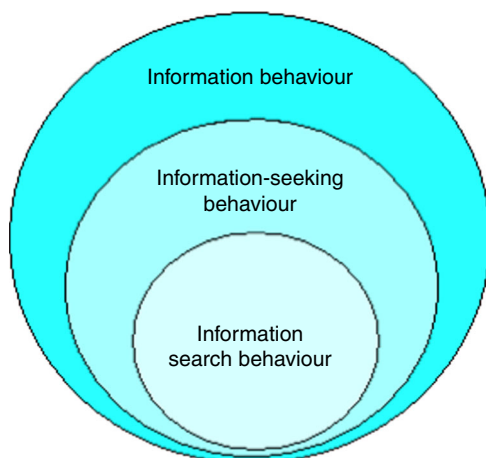
Table I.

Paper citation	Type of research	Main findings in relation to Wilson's model of information seeking behaviour
Inskip <i>et al.</i> (2008b)	Interviews	The author identifies music information needs generated from social interactions, and discusses how the library resources and collection affects the musicians' information seeking
Lesaffre <i>et al.</i> (2008)	Questionnaire	The paper studies the influence of demographic and musical background on the semantic description and understanding of music. The results suggest that gender, age, musical expertise, active musicianship, broadness of taste and familiarity with music influence the semantic description of music
Manus (2009)	Information literacy programme	The study suggests that obstacles related to students' information skills are quite important and information literacy programs can prepare music students for research, writing while at the same time has a positive impact to their performance
Inskip <i>et al.</i> (2010)	Control user query study	The study suggests that socio-cognitive and context based criteria affect the way individuals are seeking unknown musical items (e.g. mood, lyrics, date, artist, song title, production and song subject, instrument, tempo, etc.) as well as seeking non-musical information related to music titles
Lai and Chan (2010)	Questionnaire	The study showed differences in academic library utilization between academic users and users oriented to music performance. Moreover, differences have been identified in their information needs for score genres (formats)
Laplante (2010a)	Interviews	Adolescents primarily discover new music and satisfy their music information needs through interpersonal resources (relatives, friends etc.) and other opinion makers which music experts willing to share information within social networks online
Laplante (2010b)	Interviews	The study showed that musicians use four types of clues to make inferences: bibliographic metadata (e.g. names of contributors, labels), relational metadata (e.g. genres, similar artists), associative metadata (e.g. cover arts) and recommendations/reviews
Lee (2010)	Google answers	This study found that most of the online music information queries were related to known-item searches and most of them contained a wide variety of information
Dougan (2012)	Questionnaire	Students use library and non-library systems and services to access scores and recordings and generally to seek music information for their entertainment and for their studies
Kostagiolas <i>et al.</i> (2015)	Questionnaire	Musicians seek information not only for entertainment but for educational purposes as well as for the acquisition of certain music works. The use of online information systems at the internet as well as the gradual adoption of social networks enables them to access new musical resources

creative process based upon general theories of creative behaviour, including Elliott's (1989) model of musical creativity, Webster's (2002) model of musical creative thinking, Burnard and Younker's (2002) work for the role of creative thinking in research partnerships, Espeland's (2003) model for the compositional process, Hickey's (2003) componential model, Wiggins's (2003) and Collins' (2005) synthesis process model of creative thinking in music composition, to only name a few. The conceptual models mentioned above perceive creativity as a problem solving activity which requires information for reducing uncertainties, in a similar way to Wilson's information seeking behaviour model.

Webster (2002) provides a model of creative thinking centering on the conditions surrounding the individual creator. Webster suggests that there are specific enabling skills and conditions that affect an individual's creative potential and believes that this potential is measurable. Webster's conceptual model initiates with the individual's intention to develop creative products such as composed music scores and recordings, recorded performances and improvisations, as well as written analysis and mental representations of the music heard through interplay of divergent and convergent thinking. This is portrayed in Figure 3. Creative thinking in music is defined as a cognitive process that alternates between divergent and convergent thinking, enabled by a person's musical skills as well as external contextual factors (Webster, 2002). The creative thinking process may include all musical activities (Menard, 2013) e.g. composition, performance, improvisation, listening and analysis.

At the centre of the Webster's (2002) model is a four phase creative thinking process. The creative thinking process involves the phases of creative thought originated by Wallas (1926): first, preparation, in which the person begins thinking about creativity and gathers information or ideas; second, incubation which occurs when a person steps away from the creative problem, as this stage is an important time for the brain to do its work; third, illumination, in which an idea suddenly comes to mind; and fourth, verification, which includes information seeking in order to bring the person's ideas together and formulate the creative product. Therefore, a process of "divergent thinking" is taking place which includes originality, musical extensiveness and



Source: Wilson (1999)

Figure 3.
Wilson's nested
information
behaviour model

flexibility, and leads to the “convergent thinking” process for the development of the actual creative products (Kiehn, 2007). The convergent thinking includes finalization of the musical creative products in the form of composition, performance, improvisation and analysis, written or sound (Ryan and Brown, 2012).

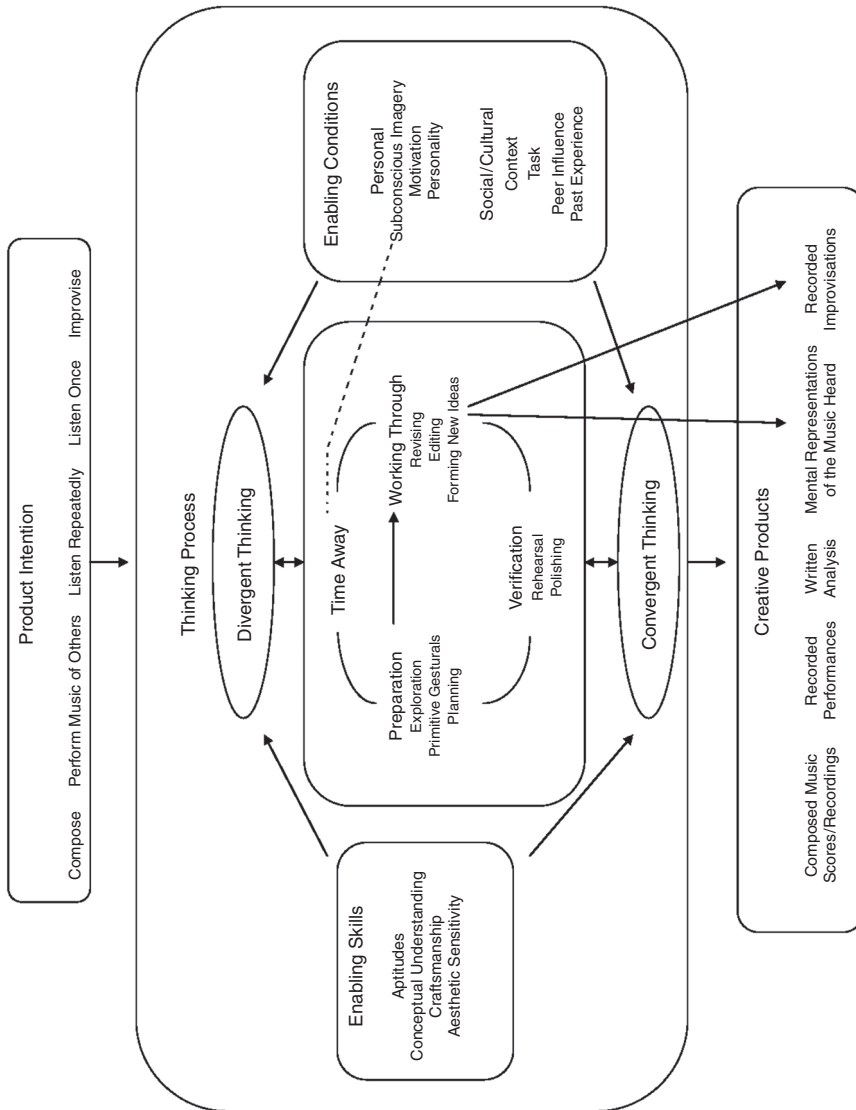
Webster’s model of creative thinking in music focuses on a central process of staged thinking with music information that represents the interplay of divergent and convergent processes, all informed by enabling skills and contextual factors. Based on that, several studies have been made available for musicians’ creativity and a number of different aspects related to the constructs of Webster’s model have been investigated. Table II presents studies related to Webster model for creative thinking in music: Burnard and Younker’s (2002) work confirms and builds upon Webster’s model. Espeland (2003) has contributed a model for compositional process that features personal and compositional actions in the music context, while Hickey (2003) investigates the critical role of socioeconomic contextual factors and intrinsic motivation of musical creativity. Wiggins (2003) has provided a framework for understanding the creative process for individuals and groups of individuals. The author suggests an information dissemination environment with mutual understanding of culture, and compositional problems. Furthermore, Collins’ (2005) creative process model for music composition is presents composition as a process of problem proliferation and successive solution implementation.

3. Theory development: a conceptual information seeking behaviour model for musical creativity

A framework for conceptualizing the role of music information seeking behaviour within the creative thinking process in music is developed through the synthesis of Wilson’s (1999) information seeking behaviour model and Webster’s (2002) model of creative thinking in music. Figure 4 portrays the conceptual model which is consists of three major stages and seven distinct constructs as follows: A. Musical creativity impetus (A1. Music information motives for creativity and A2. Creative product intentions), B. Musical information seeking for musical creativity (B1. Music information needs, B2.

Paper Citation	Type of research	Main findings in relation to Webster’s model of creative thinking in music
Burnard and Younker (2002)	Observations, interviews	This study builds upon Webster’s model for the role of creative thinking in music composition with individual students from varied backgrounds
Espeland (2003)	Observations, interviews	This study presents a model for the compositional process that features personal and compositional actions of pupils working in small groups in a public school music context
Hickey (2003)	Interviews	This study investigates the critical role of socioeconomic contextual factors and intrinsic motivation of musical creativity and presents a model of creative thinking in the context of musical composition
Wiggins (2003)	Interviews	This study provides a framework for understanding the creative process for individuals and groups and presents a comprehensive model for understanding children’s creative thinking in music composition
Collins (2005)	Observations, interviews	This study presents a hypothetical model of creative thinking in music, mapping thereby the creative process of musical composition

Table II.
Review of studies associated to Webster’s model for musical creativity



Source: Webster (2002)

Figure 4.
Webster's model
of creative thinking
in music

Music information resources and B3. Music information seeking intervening variables), C. Musical creativity process (C1. Musical creative activities, and C2. Musical creative products). Within each stage of the model individuals perform a number of actions, all of which are integrally contribute to musical creativity. Furthermore, Table III provides an overview of selected studies related to each of the proposed stages and constructs for the information seeking behaviour model for musical creativity. In the first and second columns of the table the stages and the constructs of the synthesized model are presented, while in the third and fourth columns a definition for each of the constructs is provided and an indicative selection of related items is exhibited for measuring each of the constructs. Finally, in the last column of Table III a selection of relevant papers to each corresponding construct is provided. The following subsections provide a detailed analysis for each of the model stages and constructs.

3.1 Musical creativity impetus/divergent thinking

Music information motives. This construct represents the origins or impetus that generates specific music information needs for musical creativity. This includes the motives for music information seeking behaviour which can be based on personal and/or environmental pursuits. Based on this view, when a motive for music information is activated, at the same time an array of information needs is created (Kostagiolas *et al.*, 2015). In this context, as it is suggested in Table III, the motives for music information seeking within the creativity process involve the musicians' aims to satisfy work roles, education/study responsibilities, leisure, collection development intentions, comprehension of specific musical pieces, etc.

Creative product intentions. This construct involves the musicians' intentions and aims for creativity, including composition, performance, improvisation, listening and analysis (Webster, 2002). Therefore, musicians acknowledge the need for music information in order to satisfy their intentions and aims for creativity. In the literature reviewed in Table III, the creative product intentions of Webster (2002) are presented including the composition of a musical work, the performance of the music of others, the improvisation, the listening, etc.

3.2 Music information seeking behaviour

Music information needs. This construct involves the music information needs which have a cognitive, affective and behavioural basis and are related to musical creative aims/intentions satisfaction (Lee and Downie, 2004). Information needs may involve both hedonic and utilitarian contributions to musical creativity. A review is presented in Table III for musicians' information needs which can relate to a specific music collection or music work (e.g. title, composer, performer or arranger, orchestration, lyrics, language or the year of the creation, recordings, music score, etc.), to music genre (e.g. classical, modern, traditional, etc.), music instruments, music theory, musicological, historical, cultural or social information of music, music editions (e.g. books, magazines, etc.), music publications, music news, music editing software (e.g. Finale, Sibelius, etc.), multimedia information (e.g. VLC, media player, etc.), etc.

Music information resources. This construct involves the information resources a musician employs in order to satisfy his/her information needs for musical creativity. The music information space is complex, and involves various online systems, social networks, special library information services as well as intense interpersonal information exchange. The nature of music information, that can be presented in various formats and

Stages	Constructs	Definitions	Items – variables	Indicative references
A. Musical creativity impetus/ divergent thinking	A1. Music information motives	Involves the cause or the event that generate specific music information needs (Kostagiolas <i>et al.</i> , 2015)	Work; education/study; leisure; collection development; information for a specific musical piece	Downie and Cunningham (2002), Webster (2002), Ho (2004), Lee and Downie (2004), Lee <i>et al.</i> (2005), Liew and Ng (2006), Ho (2007), Inskip <i>et al.</i> (2008b), Inskip <i>et al.</i> (2010), Lai and Chan (2010), Lee (2010), Dougan (2012), Savolainen (2014), Kostagiolas <i>et al.</i> (2015)
	A2. Creative product intentions	Involves the musicians' intentions for creativity and these define the creative process aims (Webster, 2002)	Compose; perform; improvise; listen; analyze	Webster (2002), Espeland (2003), Hickey (2003), Collins (2005), Kiehn (2007), Lock (2011), Ryan and Brown (2012), Menard (2013)
B. Music information seeking behaviour	B1. Music information needs	Involves the information needs (cognitive/affective) generated for supporting musical creative aims (Lee and Downie, 2004)	Title of a music collection; title of a specific music work; composer of a music work; performer of a music work; arranger of a music work; orchestration of a music work; lyrics of a music work; language of a music work; year of the creation of a music work; recording of a music work; performance of a music work; music score (e.g. of a particular piece); music genre (e.g. classical, modern, traditional, etc.); music instruments; music theory information; musicological information; historical information of music; cultural information of music; social information of music; music editions (e.g. books, magazines, etc.); music publications; music news; music editing software (e.g. Finale, Sibelius, etc.); multimedia information (e.g. VLC, media player, etc.)	Clarke (1973), Gottlieb (1994), Brown (2002), Cunningham (2002), Downie and Cunningham (2002), Kim and Belkin (2002), Bainbridge <i>et al.</i> (2003), Cunningham <i>et al.</i> (2003), Caw (2004), Lee and Downie (2004), Richardson and Giustini (2004), Taber-Panah and MacFarlane (2004), Lee <i>et al.</i> (2005), Laplante and Downie (2006), Liew and Ng (2006), Orio (2006), Salavuo (2006), Ho (2007), Lee <i>et al.</i> (2007), Hunter (2006), Inskip <i>et al.</i> (2008b), Lesaffre <i>et al.</i> (2008), Tepper and Hargittai (2009), Inskip <i>et al.</i> (2010), Lai and Chan (2010), Laplante (2010a), Laplante (2010b), Lee (2010), Wöllner <i>et al.</i> (2010), Lam (2011), Laplante and Downie (2011), Dougan (2012), Inskip <i>et al.</i> (2012), Lee and Waterman (2012), Kostagiolas <i>et al.</i> (2015)
	B2. Music information resources	Involves specific information resources (e.g. conventional, interpersonal, digital) that are employed towards the satisfaction of musicians'	Personal music collection; music libraries; music archives; music stores; museums; academic music institutions; conservatories; orchestras; philharmonics; choirs; professional associations;	Clarke (1973), Duggan (1992), Gottlieb (1994), Casey and Taylor (1995), Kuyper-Rushing (1999), Cunningham (2002), Downie and Cunningham (2002), Cunningham <i>et al.</i> (2003),

(continued)

Table III.
Constructs of the conceptual information seeking behaviour model for musical creativity

Table III.

Stages	Constructs	Definitions	Items – variables	Indicative references
		information needs within the creative process (Lee and Downie, 2004)	research entities; record companies; music publishers; music conferences; music festivals; music seminars; contact with colleagues – friends; online search engines (e.g. Google, Yahoo, etc.); music-related web sites; online digital databases (e.g. YouTube, Daily Motion, Metacafe, etc.); social networks (e.g. Facebook, Google+, Twitter, LinkedIn, Myspace, etc.); general music magazines; scientific music magazines; mass media; cinema	Caw (2004), Ho (2004), Lee and Downie (2004), Richardson and Giustini (2004), Taheri-Panah and MacFarlane (2004), Laplante and Downie (2006), Liew and Ng (2006), Orio (2006), Salavuo (2006), Cunningham <i>et al.</i> (2007), Ho (2007), Hunter (2006), Inskip <i>et al.</i> (2008a), Inskip <i>et al.</i> (2008b), Lesaffre <i>et al.</i> (2008), Cunningham and Nichols (2009), Tepper and Hargitai (2009), Inskip <i>et al.</i> (2010), Laplante (2010a), Laplante (2010b), Lee (2010), Lam (2011), Laplante and Downie (2011), Dougan (2012), Inskip <i>et al.</i> (2012), Kamniskas and Ricci (2012), Lee and Waterman (2012), Kostagiolas <i>et al.</i> (2015)
	B3. Music information seeking intervening variables	Involves the barriers (e.g. environmental, role related, personal, information literacy) that musicians face when seeking for information within the creative process (Manus, 2009)	Cost; copyright; lack of time; lack of special libraries; lack of music information services; lack of familiarity how to search for music information; lack of familiarity with computers; lack of familiarity with music software; lack of scholarly information available on the internet; unreliability of the internet; mistrust on electronic information; large volumes of unorganized electronic information; understanding the information in a foreign language; lack of music information literacy skills	Hunter (2006), Liew and Ng (2006), Cunningham and Nichols (2009), Manus (2009), Wöllner <i>et al.</i> (2010), Kostagiolas <i>et al.</i> (2015)
C. Musical creativity/convergent thinking	C1. Musical creative activities	Involves the actions of individuals for developing new music ideas and other musical products (Ryan and Brown, 2012)	Composing; performing; improvising; listening; analyzing	Webster (2002), Espeland (2003), Hickey (2003), Collins (2005), Kiehn (2007), Lock (2011), Menard (2013), Ryan and Brown (2012)
	C2. Musical creative products	Involves the outcomes of the creative process as final products from the creativity process (Webster, 2002)	Composed music scores; recorded performances; recorded improvisations; mental representations of the music heard; written analysis	Webster (2002), Espeland (2003), Hickey (2003), Collins (2005), Kiehn (2007), Lock (2011), Menard (2013), Ryan and Brown (2012)

expressed as sound and text, involves the development of special music information technologies, channels and sources. Usually a combination of information sources is involved within the creative process (Lee and Downie, 2004) in relation to the different information needs. Certainly, internet and online information systems and services have played a catalytic role in music information dissemination and musical creativity. Table III, based on the literature, provides an overview of music information resources which can include personal music collections, music libraries and archives, music stores, museums, academic music institutions, conservatories, orchestras, philharmonics, choirs, professional associations, research entities, record companies, music publishers, conferences festivals, seminars, contact with colleagues-friends, online search engines (e.g. Google, Yahoo, etc.), music-related web sites, online digital databases (e.g. YouTube, Daily Motion, Metacafe, etc.), social networks (e.g. Facebook, Google+, Twitter, LinkedIn, Myspace, etc.), general or scientific music magazines, mass media, cinema, etc.

Music information seeking intervening variables. This construct involves the barriers that musicians face when seeking musical information and the enablers of information seeking within the creative process. The barriers/obstacles can arise from the work environment or can be related to musicians' information literacy skills (Manus, 2009). Music information literacy includes skills for the determination of the information quality and quantity required for a particular task, identification, location and retrieval skills, as well as the development and implementation of successful information queries in the appropriate online information resources (Manus, 2009). Table III provides some of the barriers/obstacles musicians face when seeking information, such as cost, copyright, lack of time, lack of special libraries or music information services, lack of familiarity with how to search for music information, lack of familiarity with computers or music software, lack of scholarly information available on the internet, unreliability of the internet, mistrust of electronic information, large volumes of unorganized electronic information, understanding the information in a foreign language, etc.

3.3 Musical creativity/convergent thinking

Musical creative activities. This construct includes creative actions involving the development of new music ideas, musical material and other forms of musicianship (Ryan and Brown, 2012). These activities, according to Webster (2002), come as a result of convergent thinking in contrast to divergent thinking which is best suited for poorly defined or unstructured problems. As it is shown in Table III, musical creative activities include composing, performing, improvising, listening and analyzing.

Musical creative products. This construct involves the outcomes of the creative process as final "products" (Webster, 2002). According to Webster (2002), musical creative products (Table III) take the form of written compositions (e.g. composed music scores and recordings), performances of music both pre composed and improvised (e.g. recorded performances and improvisations), and listening and analyses (e.g. written analysis and mental representations of the music heard).

4. Discussion: theoretical and practical implications

The proposed information seeking behaviour model for musical creativity (summarized in Figure 5 and Table III) is based on a synthesis of Wilson's (1999) information seeking behaviour model and Webster's (2002) model of creative thinking in music. In our approach "musical creativity" is treated as a musician's aim or ambition or drive for

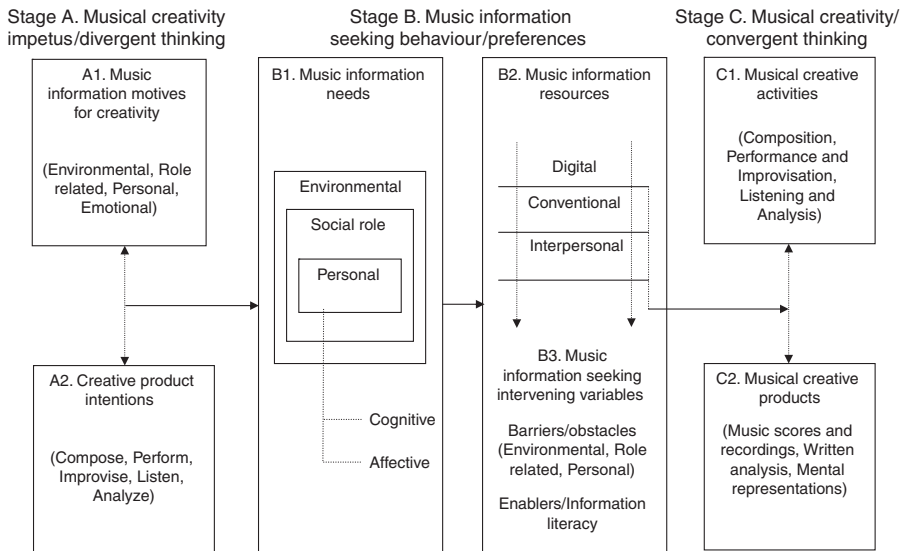


Figure 5.
A conceptual
information seeking
behaviour model for
musical creativity

expression and is influenced by the way musicians seek information for that purpose. In addition, musical creativity is affected by the availability of information sources and the musician's information seeking profile. The proposed conceptual framework offers an integrated interpretation of the combinations of information needs, information resources and environmental/personal barriers, which enable musical creativity. A detailed analysis of all the above would be out of the scope of this conceptual analysis. However, in the following paragraphs we focus on three important findings that are discussed in somewhat more detail: first, the design and development of music library and information services for musical creativity; second, the development of music information literacy skills for creativity; and third, the information seeking behavioural perspective for universal musical creativity, and the implications for cultural musical heritage diffusion around the world.

4.1 Implications for information services and internet technologies for musical creativity

The purpose of music information services, both conventional and digital, is to support the development of a proper music information environment (Bryant, 1985) via the collection, processing, maintenance, preservation and dissemination of music information in order to meet individuals' music information needs (Inskip *et al.*, 2008a, b; Lai and Chan, 2010). Our approach demonstrates that understanding the process of creative thinking in music and focusing on distinct creative intentions can significantly inform the design of both online and traditional information services aimed at individuals who work with music. Musicians have an array of complex information needs (Figure 5: Stage B.1) and the creative thinking process includes the selection of different information sources (Figure 5: Stage B.2) to support their creative intentions. Our model positions music information needs and information seeking behaviour at the centre of the musical creative thinking process, demonstrating that a relationship exists between the different layers of musical creativity intentions (such as composition, performance and improvisation, listening and analysis) and the utilization of different music information

resources (digital, conventional, interpersonal) (Figure 5: Stage B). According to musicians' preferences, different information services and systems may be more suitable for distinct information needs and creative intentions (Figure 5: Stage B.2). For example, for orchestral music performance a printed music scores and parts may be more convenient for everyday practice; while an online system may be more convenient for searching and retrieving lyrics and performances for information on particular instruments, musicians may use textbooks from a personal library and/or information from other colleagues (especially is the composition is done in collaboration); for information on current trends and events they may consult the internet and particular web sites of professional organizations and other individuals.

The final stage of our model (Figure 5: Stage C) suggests that these preferences have an impact on the final musical creativity products. Therefore, the design of online music information retrieval services and systems should go beyond the utilitarian facet to embrace the musical creativity universe. In other words information system design should take into account the musicians' information behaviour patterns and thus explicitly support musical creativity. Previous research in this area, such as the work by Eaglestone *et al.* (2007) examined the requirements of information systems designed to support individuals' creative activities and identified issues that may apply to many areas of artistic creativity (e.g. musical composition). The design of such mechanisms constitutes an important issue for the configuration of music information services and ongoing behavioural investigations are key for those involved in the management of music information (Futrelle and Downie, 2002).

A large body of literature gravitates towards studying the adoption of musical online services/systems in isolation. The information seeking behaviour perspective for creative thinking in music, however, implies that one should first theorize about the unique contextual aspects and the underlying information needs that direct musicians to choose specific combinations of information resources among competing information channels (or sources). Understanding the selection process and the factors that differentiate the information resources preferences can drive information scientists to the development of musicians' oriented information services or online information networks. The role of musical libraries is quite important for musical information dissemination in both printed and electronic formats (Bradley and Coover, 2000). The development of music information infrastructure in libraries includes musical material and software, content development, internet technologies and other information systems. Indeed, as our model suggest, music libraries (Figure 5: Stage B) could shape a range of services to satisfy users' information needs around their creative intentions (Figure 5: Stage A) and thus act as enablers of musical creativity for its users further empowering their impact and role in the music communities they serve. In that framework initiatives can be developed by various institutions and organizations within the private and the public sector (Flanders and Unsworth, 2002) for the development of music information centres. Music information centres can also be a vehicle for the dissemination and popularization of creativity-friendly music information technologies, and innovation in music information research (Lee, 2010).

4.2 Implications for music information literacy skills

Our model highlights the presence of music intervening variables during the process of musical creativity development, which appear as either barriers or enablers (Figure 5: Stage B3). Information literacy is highlighted as a key enabler in musical creativity as musicians alternate between divergent and convergent thinking for the development of

musical creative products (e.g. music scores and recordings, written analysis, mental representations) (Figure 5: Stage C2). Information literacy helps musicians to overcome a number of significant barriers to musical creativity such as problems in identifying good quality online information, lack of familiarity and confidence in searching for information on various media and other limitations created by ineffective information seeking for different creative product intentions (Figure 5: Stage A2) such as lack of time, electronic information mistrust and information overload. Information literacy in the context of musical creativity therefore acts as a vehicle for the reduction of a number of personal and environmental barriers encountered in the process of information seeking.

As the amount of the available music information expands, the ability to search, find, access and evaluate constitutes a key component of individuals' everyday life music information seeking behaviour (Lee and Downie, 2004). The development of individuals' music information literacy skills includes the ability of a person to recognize the need for information in order to be creative, within a specific socioeconomic setting, and to have the ability to utilize information systems efficiently in order to satisfy his/hers primary goals (Martin, 2011). In general terms, the basic characteristics of information literacy skills include: first, the determination of the nature and the extension of the information needed; second, the effective and efficient access to the needed information; third, the critical evaluation of information and its resources and the ability to incorporate selected information into her/his knowledge base and value system; fourth, the effective use of information to accomplish a specific purpose individually or as a member of a group; and fifth, the understanding of the economic, legal and social issues surrounding the ethically and legally access and use of information (Bawden, 2001). Manus (2009) defines individuals' music information literacy skills through the following elements: first, definition on music information needs; second, accessing music information; third, evaluation of music information; fourth, presentation of music information; and fifth, comprehension of ethical use of music information.

The information behavioural perspective of musical creativity incorporates the importance of developing music information literacy skills for the purpose of critical information gathering and thinking about a musical performance, a musical composition or score, a theoretical analysis, a historical inquiry or a musicological analysis. Information literacy can also help musicians employ information systems and services effectively and discover a wide range of musical practices and the relationships among performance, improvisation, composition and written/oral reflection of music. Moreover, information literacy skills give support to the understanding of how music information is organized for research purposes, what types of music information can be obtained from online resources, the various formats that contain performance works and how to access them, and the differences among the various formats and how they suit differing research needs (Lee and Downie, 2004).

These information literacy skills enable musicians' to find basic reference resources, musical compositions and performances, reviews of live performances and recordings, music journals, databases for musical subjects, multimedia materials online as well as musical text materials (Cary and Sampsel, 2006). Finally, music information literacy skills help recognizing the differences between original and interpretive work and understanding the definition of a primary resource in the performing arts. Music information literacy skills also include the presentation of music information, the selection of the most appropriate types of media to best convey information or illustrate a point, the best method for presenting excerpts of recorded work, as well as for copying portions of recorded work to another medium (Ashley *et al.*, 2012). Finally, ethical use

includes the musician's ability (Manus, 2009) to demonstrate the awareness of fair utilization of music information within the musical creativity process, the knowledge of when permissions or royalty fees are required, the understanding of legal and illegal methods of obtaining multimedia clips from the internet, and the understanding of appropriate methods of citation for media and for electronic resource materials.

4.3 Implications for musical cultural heritage diffusion

The present conceptual study also suggests that music information contributes to the dissemination and sustainability of cultures (and indeed musical cultures) around the world (Lam, 2011). Music knowledge is music information in context (Omekwu, 2006) and can contribute to wide range of cultural phenomena and art events. Indeed music information and knowledge are implemental to the development of social structures, building relationships between individuals and bridging peoples' cultural value systems. Information and information seeking for creative activities includes patterns of individual behaviours reflecting peoples' ideas and values (Omekwu, 2006). In that respect, our model suggests a spiral of musical genre or specific tradition sustainability or growth through the development of different creative products (Figure 5: Stage C), by supporting the motives and intentions of individuals (Figure 5: Stage A) and by satisfying their information needs through engagement with suitable information resources and effective information seeking patterns (Figure 5: Stage B) for different levels of musical creativity (shown in Figure 5: Stage C). Effective music information seeking and information literacy for creativity purposes constitutes the means for cultural preservation, enrichment and growth as individuals become acquainted with their tradition and identity (or with other traditions and identities) through effective music information assimilation. In addition, using information becomes public knowledge that is shared among the world's music cultures in a constant dialogue with creativity. mapping which creates collective music knowledge and culture.

5. Future research

The present conceptual study presents a three stage pattern or process for modelling information seeking for musical creativity: the process initiates with the intention-motivation for creativity, then proceeds to information seeking behaviour and then concludes with the musical creativity outcomes. As a next step, further qualitative and quantitative results may reveal relationships among the different model constructs and construct items. Based on the work and literature review presented, some quite interesting arguments for further research can be developed and eventually quantified through the constructs and construct items of the proposed model. These, indicatively include the role of musician's information satisfaction as a facilitator of musical creativity, the musician's information profile that enables creativity, the contributions of libraries and information services in musical creativity, the role of the internet in musical creativity, the design of musical information systems and internet technologies that actually contribute to musician's creativity and others. To our knowledge, this is the first study that seeks to understand the relationships between creativity and information seeking behaviour and the theoretical analysis can hopefully make available avenues for further research even beyond the musical context.

6. Conclusions

The present study focused on the catalytic role of information and musicians' information seeking behaviour in musical creativity by combining two well-known conceptual

frameworks, i.e. Wilson's information seeking behaviour model and Webster's model of creative thinking in music. The proposed framework is rather omnibus and a context specific version can include additional items for specific musical settings. However, the very fact that the model is implicit stimulates further research for context specific music information seeking motives, creativity intentions, information needs, information resources and intervening variables of the musical creativity process. Therefore, a framework for understanding the role of information seeking in musical creativity is provided and a review of the relevant literature is taking place. The implications of this conceptual pathway may, among others, embrace online and offline information systems design, information literacy skills and musical heritage management issues. Indeed, musical creativity cannot be the same without music information.

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