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The orchestra of ideas

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The orchestra of ideas:
Using music to enhance the 'fuzzy front end' phase of product innovation

Abstract

This paper, by introducing music composition theory, offers a new perspective from which to understand the 'fuzzy front end' (FFE) phase of product innovation with regard to both value outcomes and the innovation process. Focusing on ideas co-created by consumers, we draw on an ethnographic study to examine how young consumers tackled a real-life challenge to produce a digital product that would engage audiences in classical music. Working with two organizations, one a city symphony orchestra, the other a global technology corporation, this work bridges innovation and aesthetics and challenges the established mind-set of the science-art schism in business management. The findings contribute to innovation theory by introducing a hybrid model that structures FFE activities based around the composing process. We also illuminate how music can facilitate and bring greater value for the consumers as 'the composers of ideas'. Managerial implications and future research are also suggested in this paper.

Key words: fuzzy front end, consumer co-creation, experiential value, flow experience, music composition, music value.

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1. Introduction

The world of the arts and the world of science, and by implication, management science, have predominantly been viewed as opposites. Science, its ontology, methodologies and practices based on hard, cold data derived through 'scientific' means is generally regarded as belonging to the world of objective reason. The arts, on the other hand, are considered to be firmly rooted in the realm of subjectivity, emotions, and aesthetics. Yet this schism, when examined, is not quite so clear cut. For instance, the observational techniques needed to perform modern science came from the skills introduced by Renaissance artists in their attempts to mirror and reproduce nature in its most precise and accurate form (Douglas, 2004). Possibly one of the most celebrated boundary crossers, Leonardo da Vinci, despite producing two of the most famous paintings ever, the Mona Lisa and The Last Supper, was not confined to or constrained by the category of artist. On the contrary, he crossed the boundaries of science, art and nature, leaving thousands of pages of observations, sketches and blueprints that have subsequently been examined and studied by physicists, anatomists, botanists, mathematicians and engineers (Bulent, 2004). Despite this, history, and in particular 'Enlightenment' philosophy and the modernist drive towards science, rationality, objectivity and reason, has seen the expulsion of imagination and aesthetics from scientific enquiry (Daston, 1998; Luhnmann, 2000). This in turn has resulted in the bifurcation and polarization of science as the arbiter of analysis, and art as the process of synthesis. However, in reality, the scientist and the artist engage in both (Bulent, 2004; Douglas, 1989). As Smith (1970: 493) noted, the study of the interplay between art and science "is not only interesting, but is necessary for suggesting routes out of our present social confusion".

Recent shifts in academic thought have sought to challenge such strict binary divisions within the field of management and marketing. This is evident with the emergence of critical schools within the disciplines, cross disciplinary research, the growth of interpretivist approaches and, a growing appreciation and understanding of what the arts can bring to bear on organizational performance at all levels (Darso, 2004). These interdictions may be seen in the spirit of late modernity's increasing tendency towards de-differentiation - the erosion of "effacement and elision of established boundaries - high and low culture, education and training, politics and show-business - and the blurring of what were formally clear cult entities (philosophy and literature, author and reader, science and religion etc.)" (Brown, 1995:197). But to suggest that there is some happy harmonious relationship whereby the arts and the natural sciences are today collaborators working together to determine the most rounded solutions to problems, both academic and practical, would be either misleading or wishful thinking. There are numerous initiatives such as the Welcome Trusts 'Sciart' programme which sought to implement C.P Snow's notion of 'Two Cultures' to frame the interaction of artist and scientists as interdisciplinary collaborators (Yang, 2015). However, "communities of scientists and artists put considerable work into maintaining their disciplinary boundaries, and, ironically, so called art-and-science initiatives can be one of the most convenient devices to help accomplish this" (ibid.:318). Essentially, the 'inter' becomes the illegitimate child of the established disciplines and the results fail to do justice to either disciplines.

Unlike many predefined and funded projects, this research is the result of two independent organizations, one a city symphony orchestra, the other a world leading technology corporation, voluntarily coming together to see how, by drawing upon their individual strengths, experience, aesthetic and technological expertise they could develop a product that would encourage and engage young people in classical music. Critically, they wanted to ensure that the potential users they were aiming to attract were part of the process of

innovation and design. Therefore, we focus our analysis on the process of idea generation by the participants from the moment they start 'composing' their ideas to the day of 'performing' their work of 'art' in front of judges and an audience. In order to mediate and manage this process, the author's university was invited to participate in the process and as such, one of the authors became part of the research team involved in organizing, facilitating and monitoring each step of the journey from idea generation to the development of a prototype. Whilst this is a genuine meeting of science and the arts, it is also an exercise in innovation that has commercial benefits for both sides involved. Moreover, our findings suggest theoretical and methodological implications beyond the immediate context.

The theme of this special issue is how arts can become sources of value creation for business. Drawing on data gathered from ethnographic research involving the innovation process of designing and developing this product, we extend this to ask what lessons can business learn from the arts? These include developing a new approach to product innovation; better tracking of the early and fuzzy stages through formalizing their activities; and aiding consumers to leverage their creativity whilst co-creating values with businesses. We focus our discussion on one particular aspect of organizational activity - the fuzzy front end phase (FFE) in product innovation; and in order to demonstrate our findings we draw heavily on music composition theory as an alternative framework for understanding the process.

2. Theoretical development

2.1. Fuzzy front end in product innovation

Since the 1950s, product innovation has been viewed as one of the most vital competencies of an organization (Moustaghfir and Schiuma, 2013; Crawford and Benedetto, 2011). This has become increasingly important in the light of global competition, technological progress, and product complexity (Schiuma et al., 2012). The real key to product innovation success, however, lies in the very first stage in which idea generation, idea screening, and concept

development take place (Alam, 2006; Barczak, 1995; Iwamura and Jog, 1991). This phase is defined as the 'fuzzy front end' (FFE) since it is characterised by ambiguity and a somewhat chaotic nature (Sanders and Stappers, 2008). It is during this stage that the team has the opportunity to distinguish a truly creative work from a copy-cat and decides to invest in manufacturing the product.

After being popularized by Smith and Reinertsen in 1991, FFE theory has evolved in various direction, ranging from its application in shortening the product development cycle to formalization and development of stage gate processes (Thanasopon et al., 2016; (Verworn and Herstatt, 1999). Low levels of formalization, unstructured procedures and high levels of uncertainty in FFE (Khurana and Rosenthal, 1997) require businesses to generate various types of information from both internal and external alliances (Zahay et al., 2004). Recent FFE literature has seen a trend toward involving consumers in the process in order to reduce uncertainty in FFE, given that consumers are ultimately the final stakeholder and arbiter of products (Schweitzer 2014; Bartl et al., 2010; Füller et al., 2009). The role of consumers in FFE can also be found in early research which supported the idea that consumer involvement significantly improved product concepts (Cooper and Kleinschmidt, 1987) which offered an effective contribution to developmental activities (Lengnick-Hall, 1996; Chase and Tansik, 1983) and enables the project team to gain insights into potential market size and growth (Chandy and Tellis, 1998). They may also play a joint role with companies in "education, shaping expectation, [and] co-creating market acceptance for products and services" (Prahalad and Ramaswamy, 2000:80). Other work focuses on the motivation behind consumer engagement (Füller, 2006); issues in managing and facilitating consumers in generating ideas in FFE (Enkel et al., 2005); factors influencing co-creators to produce the best ideas (Shah et al., 2011); or consumer competences (Tran, 2017; Hoyer et al., 2010; Schoorman et al., 1995).

However, much of this work concentrates on how consumers generate creative ideas in FFE and what influences them to produce the best ideas. Conversely, we contend that FFE is not only about how to get the most creative ideas from consumers. Rather, it can be designed to maximize values as, "innovation is about discovering innovative ways of co-creating value and defining new value propositions" (Mele et al., 2009:14). This inspired us to re-interpret value co-creation in FFE where consumers take the role of co-creators to "participate with their own competencies to realise this potential value through the process of value co-creation" (ibid.:16). As innovation is both an outcome and a process in itself (Vargo and Lusch, 2008), we next re-examine FFE with regard to both value outcome and the value creation process.

2.2. Process and product in Fuzzy front end

Creative product concept generation is the key objective in FFE (Im et al., 2013; Dahan and Hauser, 2001; Amabile, 1983), and as such creativity has, and continues to play, a critical role, and it is considered to be the key component in the process (Boeddrich, 2004). Consequently, the process of generating creative ideas in FFE has become a source of interest for both academics and practitioners. Up to now, Amabile's seminal work is still one of 'the most influential creativity theories' from which 'the most commonly used definition of creativity stems' (Shalley and Gilson, 2016: 3-4). The componential theory of creativity (Amabile 1996, Amabile 1988) highlights three key components and their interaction in enhancing creativity. First, intrinsic motivation to do the task is positioned as the critical component and a mediator in the relationship between contextual and personal creativity (Shalley and Gilson, 2016; Shalley and Perry-Smith. 2001). The second factor relates to domain relevant knowledge and skills, which includes personal educational, technical and functional background to generate and integrate knowledge. These are important in the preparation and idea validation stages. The last component is the skills in creative thinking

which are essential factors in idea generation, particularly as they highlight the ability to examine problems and opportunities, including adopting lenses and combining ways of thinking. Whilst this model has, and continues to have significant influence in creative idea generation (Sokol et al. 2015; Eling et al., 2014), our paper is aimed to offer a refinement of the model which places a greater emphasis, not only on creative idea generation, but also on the importance of experiential values generated from the process.

Recent years have seen a radical shift from values as "tangible goods, with a fixed set of features and attributes" towards emotional bonds and the experience of "intangible services and experiences, with high knowledge content" (Romero and Molina, 2010:452-453). Concurrently, the quality of the overall experience in the consumer journey has become the locus of value co-creation rather than traditional product-centric approaches (Prahalad and Ramaswamy, 2004). In the specific context of FFE, creative ideas can be enhanced by incorporating "as much as possible of the flow experience into the various domains" (Csikszentmihalyi, 1996:10). First introduced by Csikszentmihalyi in 1975, the theoretical construct of flow has since been developed by Massimini and Carli (1988) and has now become a well-recognized area of research within the academic study of creativity. Being defined as the goodness of fit between individual's perception of high skill and high challenge for a given activity, the flow experience invites a person's best effort in tackling difficult task which is also "intrinsically rewarding about the doing itself" (Custodero, 2002 : 3). Consumers participating in FFE can achieve flow experiences under conditions of deep involvement, freedom, self-control, attention, challenge, sense of mastery, competence and task enjoyment (Füller, 2006: 640).

2.3. The arts in business and FFE study

In response to the quest for delivering consumers greater experiential values, research supports the value of adopting arts based approaches to assist businesses identify and build

consumer value into new products and services. The arts themselves are experiential and are "consumed primarily for intrinsic rewards - for the experience itself" (Boorsma, 2006: 79). They may be consumed for hedonistic fulfilment, and can be both entertaining and challenging, especially when they involve absorption, engagement, imagination and interpretation (Csikszentmihalyi, 1996). Therefore, when utilizing the arts in the innovation process, there is usually a strong focus on emotional, imaginary, and sensory stimulation experienced by consumers in their use of the product or service. Indeed, the arts can aestheticize the everyday-life of consumers. They can form tastes, transfer these tastes to their everyday objects, and influence future product choices (Venkatesh and Meamber, 2008). Business history reminds us that innovation is often introduced and fostered in the arts (Nissley, 2010). Among the four intersecting levels between the arts and business proposed by Darso (2004), the highest level of deploying arts in the strategic process is encouraged for the creative contribution the arts can make in the innovation process (Styhre and Eriksson, 2008). Many innovation projects have even utilized artists for a period of time for the value they can bring with their fresh eyed approach to organization problems (Taylor and Ladkin, 2009; Darso, 2004). Furthermore, the aesthetic capacity of individuals or groups can be encouraged and developed in order to enhance creativity, expand horizons, and provide alternative views. When looking specifically into innovation activities, the arts may involve "multi-sensorial stimulations that cater to [consumers'] imagination" (Venkatesh and Meamber, 2008: 47). In this respect, through exposure to the arts, consumers may provide sensory information which may be of value to the firm (Alastair and Macdonald, 2001). Essentially, creative individuals can see beyond the horizon of utility and introduce aesthetic skills and qualities (Styhre and Eriksson, 2007). They can also play a central role as co-producers by giving meaning to the artefacts with their imaginative powers. In FFE, the quantity of information and the quality of information flow can be levitated through a linkage

with the arts (Curtis, 2009) and have many qualities which "enhance information transfer and learning" (Opermanis et al., 2015: 67). Co-design activities start to evolve when designers begin to make tools for non-designers to use in expressing themselves creatively (Sanders and Stappers, 2008).

2.4. Music and composition theory in FFE study

In order to understand the application of art-based initiatives in the creativity and innovation process, we focus our attention on music for its highly emotive nature and its important role in the arts repertoire. During the musical sensory encounter, every sound is associated with feelings which may influence emotion in many ways, from melancholy to aggression (Macdonald, 2001). Being known as a higher level of sound with creative patterns, music has been scientifically proven to be "embedded directly in the intellectual dimension of humans' consciousness… [and] generates powerful emotional responses in its listeners" (Radford, 2001:152). From a bio-psycho perspective, creativity, the pivotal component in FFE, has shown to "depend on a wide attentional focus and an expansion of cognitive searching" (Feist, 1998:302) associated with low cortical arousal which can be mediated by music (Martindale et al., 1984; Martindale and Armstrong, 1974). The flow experience, as found in many creative acts nowadays, is initially rooted in the work by Csikszentmihalyi and colleagues (Csikszentmihalyi and Csikszentmihalyi, 1988) who searched for an appropriate paradigm that could explain the compelling nature of music making.

Music composition process also offers a valid opportunity for examining its potential in mapping the FFE pathway. Composition is "an activity simultaneously of arousal and aesthetic imagining" (Impett, 2009: 408) with relative roles of emotional and intellectual elements (Thagard 2006; Damasio, 1999). It is this combination of emotion and cognitive thinking in music composition which both relates and distinguishes it from the creativity process in innovation literature. When analogous with FFE process in the creation of different

forms, music making process sees these outputs as transitory materials that "constitute successive versions of a composition" (Sloboda, 1986: 119). Besides appreciating these evidences of the consciousness of the artists, the music diagram (Figure 1) also highlights the critical role of the unconsciousness, consisted of knowledge, structures, and skills stored in the long term memory of the composer. From the early stage of establishing a theme to the final manuscript, composition requires the input from general tonal and stylistic knowledge (box F) which can inspire the formulation of the thematic kernel, or help the composers to leave their comfort zone. In addition, the diagram emphasises the importance of compositional techniques and devices (Box E) that assist transformation and modification of the original theme, and the iterative judgments and modifications that need to be made before a satisfactory final form (box D) is reached. This model by Sloboda (1986) still acts as the foundation for recent music composition theories, such as the four stage process proposed by Burnard and Younker (2002) or the concept of interspersing stages in the composition process developed by Newman (2008).
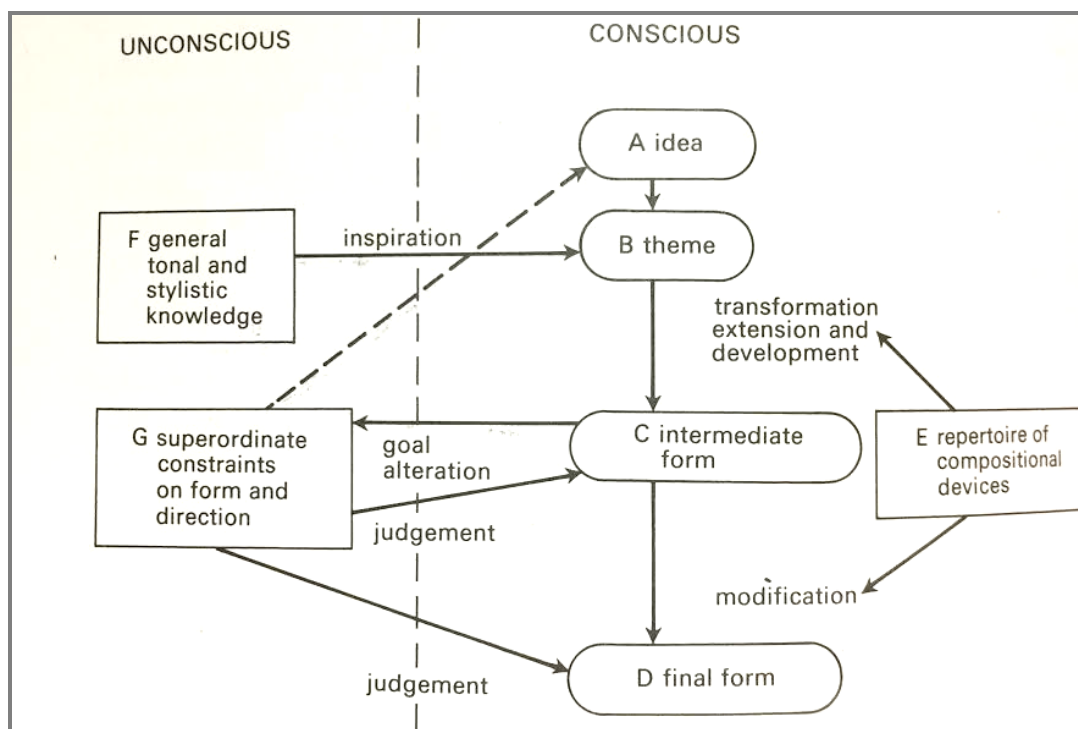

Figure 1: Diagram of typical compositional resources and processes (Sloboda, 1986: 118)

3. Methodological development

3.1. Research questions

Given the intrinsic value of music and the music composition structured pathway, we contend that the interplay between arts and technological innovation can offer alternative insights for FFE theory. The paradoxical juxtaposition of opposites can suggest new notions of innovation and, given the context of consumer co-creation, it can offer both functional and experiential values for consumers. This raises the question: how can music facilitate consumers in co-creating values in FFE? To address this, we posed the following key questions:

1) How can music offer a new approach to the notion of a technology product?

2) How can music be intersected with technology to generate the flow experience?

3) How can music composition theory suggest the formation of FFE pathway?

3.2. Research background

Our research question emerged out of the objectives of two renowned organizations - a city classical orchestra and a global technology corporation – both of which have their own partnership activities with the authors' university. Located in the same city where the university is based, the orchestra was founded in 1920, earnt its reputation as one of the world's finest orchestras in 1980, and affirmed its global pre-eminence in 2013. Since then, it has continued to present internationally-significant classical seasons to more than 200,000 concert goers annually. It also provides around 80,000 opportunities of learning and engagement every year, including partnership with the university from which young talent benefits. The technology corporation, on the other hand, is a multinational technology company with a history of more than 100 years. Not only offering technology solutions to various industries including retail, finance, gas, and oil, the company also has a special

concern and interest in cross disciplinary collaboration and academic engagement in order to harness a diverse range of knowledge. With an aim of approaching students at their early stage of their education, industry experts were sent to work at the university campus during the last 15 years.

In spite of their high performance in the market, the two organizations had their own challenges and expectations. A sharp decline in public funding since 2010 has put an increasing pressure on the orchestra to generate more income from ticket sales as well as attracting new audiences, especially young audience members. The technology corporation, on the other hand, aimed to develop new ideas around using of technology to create a better, smarter life for users. Therefore, this collaborative project represented a genuine meeting of the arts and technology. In 2015, the director of Learning and Engagement from the symphony orchestra met with an expert from the technology corporation who was also the ambassador of co-innovation scheme in the region. Their aim was to work together in order to increase young audience's participation in classical music via technology. One crucial aspect of the project was that young potential users should be integral to the process from start to finish as co-creators of the end product. Therefore, the university was approached and asked to organise, team lead, and mediate the process. This involved a wide range of activities during six months from recruiting the participants, providing space for discussion and meeting activities, offering vital training courses ranging from team work, project management, research, design, to platform development skills. Potential participants were informed by the university about the innovation scheme, which resulted in more than 160 applications submitted for enrolment on the project. These were largely motivated by the prospect of working with renowned companies, learning about innovation and creativity, gaining experience and improving their personal profiles. A further enticement was the possibility of winning a prize from the two companies for the best ideas. There were a

number of teams working on the project simultaneously, which also introduced a competitive element. Team allocation was done on a random basis, with four young participants, one academic lead and one adviser who would be engaged in the process from the early days of generating ideas to the development of a prototype. Taking on this advisory role, the lead author worked closely with members of the two organizations, the university, the academic lead involved in the project, and the young participants themselves. Furthermore, a conductor was invited to join the project to inspire the students with his repertoire of knowledge and skills in music and performance, real stories, and aesthetic experiences.

3.3. Research design and process

To make sense of the creativity process and to recognize both issues and opportunities arising from the marriage of music and technology, we adopted an ethnographic approach to data collection whereby one author was immersed in all aspects of the research over the six-month duration of the project. Ethnography, by its nature enables the researcher to capture the different ways that actors construct and experience their social realities through a deep immersion in their world (Denzin and Lincoln, 2000; Schwandt, 1999) rather than in experimentally contrived or controlled situations (Brewer, 2000: 33). Moreover, we acknowledge that all members are active participants in the construction of multiple realities, and, that the social, cultural and organizational worlds in which they are embedded, shape and give meaning to these constructions (Brewer, 2000; Guba and Lincoln, 1994).

Data collection included participant observation as a prime source of information. Data were also collected in the form of both semi-structured interviews with participants at the various stages of the project and a written report in the form of student's reflective diaries. During the project, participant observation was conducted through attendance at all training session and courses provided for the team as well as facilitating group gatherings, meetings, and discussions. The author was in charge of assisting students' activities, advising and sharing

knowledge with them, and verifying their work, which allowed the compilation of memos (Glaser and Strauss, 1968) of the participants' progress, key events, and milestones in their creativity process. Immersion in the project resulted in two ways of hearing the voice of participants. First, informal conversations revealed participant's feelings of excitement and conversely worry about their ability to tackle the challenge. Second, reflective reports in textual format offered useful insights into thoughts, feelings, and emotions in a more structured and systematic manner. Self-reflection gave both participants and researchers an overview of their journey and the process of developing ideas for a new product. The format was kept relatively loose to maximize space for students to demonstrate their ideas without leading questions. Hence, each of them would focus on a different angle in their learning diary, which opened more opportunities to make sense of individual experiences and gain a more holistic view of the innovation process from distinct viewpoints.

A netnographic approach was also conducted to identify and explore the team's behaviours in their virtual context. As coined by Kozinets (2002), netnography aims to analyze the free behaviour of individuals on the Internet in order to understand "their attitudes, perceptions, imagery, and feelings" (Langer and Beckman, 2005: 192). As such, it generates "thick description of the lived experience of participants" (Elliot and Elliot, 2003: 215). Netnography also suited our research as our participants were 'screenagers' - teenagers born in the age of multi-screens with an affinity for electronic communication such as computers and mobile phones (Radford and Connaway, 2007). With the informed consent of the participants, we capture all the details and the development of ideas as expressed and communicated though various channels (Tapscott, 2008). Pictures and videos were taken and recorded through handheld devices, including mobile phones and tablets. The visual data were initially designed to help storing ideas and junctures both graphically and systematically (O'Sullivan, 2016) relating to the creativity process by capturing tacit knowledge and the

development of skills during the project. In this project, these main online channels were deployed by the young participants. These included Facebook secret group, Pinterest pages, emails, and a CANVAS platform hosted by the university. Participants set their own rules for using these platforms and only shared ideas with selected people. As their adviser, the author was invited to join all the groups to assist participants, take part in their discussions, and share various materials. This afforded the opportunity to examine conversations between members, read their shared materials, and observe their visual content including pictures and videos. This was done overtly with the knowledge and informed consent of group members.

3.4. Data analysis

Data were analyzed through an iterative process of data collection, simultaneous analysis and the search for patterns and themes (Glaser and Strauss, 1968). Initially, we applied a descriptive interpretation of data through open coding, and eventually moved through a series of analytical abstractions by constantly comparing data in order to identify more conceptually significant themes that had a relationship to each other. This resulted in the development of a framework based on four key stages in music composition: germinal idea, theme, intermediate form, and final form (Sloboda, 1986).

4. Presentation of data and findings

4.1. Stage 1: Germinal idea

In the early stage of the project, participants experienced ambiguity and confusion regarding the process of generating new ideas or even thinking creatively about the ultimate deliverable output. Their first real breakthrough was when the connection with music was made instead of an extensive amount of research.

4.1.1. Constraint to creativity

Young participants in the project had little or no experience of either marketing or new product development. As such, the notion of simply getting them to engage in idea generation, even if it is regarding a technological device with which they were familiar, seemed to be impractical. The first three months were spent on developing participants' knowledge of innovation, creativity, and group work before entering the period of tackling the challenge in earnest. The two representatives from both companies were invited to join the training days to suggest the exploration of interesting topics to inspire ideas. For example, whilst the technology organization provided a session on the role of technology in improving people's lives, the orchestra shared insights of the arts market and their visions of developing learning and engaging schemes with local communities. These preparation activities clearly gave them inspiration, resulting in ideas ranging from a device that could turn all types of music into classical music, to road show exhibitions and a machine selling fluffy dinosaurs for children attending concerts. However, the team failed to come up with a concrete idea for several reasons. Their lack in knowledge of technology in the context of the arts made them hesitant in evaluating other members' proposals and they were stuck with fragmented and premature thoughts. Moreover, they lacked confidence in their knowledge of classical music which was perceived as "posh, middle aged and middle class" (Male participant 1). There was also a fear of 'being in the spotlight' (Female participant 1), hesitation during face-to-face interactions, and avoidance of speaking out in discussion. This sometimes caused a break-down in communication and direction, resulting in blocks in creativity. This also imposed a heavier workload when dealing with deadlines, as one of the participants noted:

> "One of the key criticisms which I could make of our team as whole…is that we could have met earlier in the procedure… It would have given us extra time in the earlier stages and helped us move quicker from simply thinking of the ideas to developing a presentation of that idea…" (Male participant 2)

4.1.2. Music as the trigger and inspiration

Recognising that the participants might not absorb the huge repertoire of knowledge and skills during their training days and that their biggest challenge was to break the silence in their meetings, the lead author tried a different method with the expectation that this could change their mood and inspire their thinking. This involved the introduction of classical music. The team started listening to classical music in different contexts, from concerts to movies, retailing stores, and advertisements. They recognized that they were much more exposed to classical music, even subconsciously, than they had ever imagined. Music also stirred their emotion, from feeling inspired and energetic to calming down and relaxing. From their experiences and new emotional connections to classical music, it became clear that any creative innovation should be rooted in the experience itself:

> "…gaining first-hand experiences is also another way to enhance competences. From our situation, listening to the live music orchestral concert brought different sensations which were helpful for the project and made it progress." (Female participant 2)

When narrowing down the audience for the challenge, the team chose teenagers as the target users of the product since they, as young adults, could add their own insights and experiences into the product development. Furthermore, this target also accounts for a large proportion of the population in the region, as found in consumer market analysis and reports on the country and region. Based on secondary data gathering, participants also had a preference toward females as they made up the majority audience in their chosen geographical area. The team began to think of a few options of digital products, which could contain recorded music to assist users by adjusting their moods and inspiring them in their daily lives. Further research on consumer behaviour corroborated their decision to develop a mobile app as "it was one of the most widely used form[s] of technology by young audiences" (Male participant 2).

Moreover, since the symphony orchestra did not have a mobile app, their idea would not clash with its existing channels.

4.1.3. Summary of the first stage

The idea of co-creation or co-production has generated a wealth of literature within marketing and innovation management (Shah et al., 2011; Vargo and Lusch, 2008; Prahalad and Ramaswamy 2004). Yet, despite calls for greater, mutual consumer/organization participation in the creation, modification or repositioning of goods and services, less attention has been paid to the process of consumer engagement (Brodie et al., 2013). As our research shows, co-creation is a complicated procedure which does not progress in a linear and problem free fashion. Moreover, and drawing on the analogy of the composer, musicians have to learn their trade, which not only involves technical and artistic skills, but also the development of creative skills. No composer simply produces a score without undergoing a journey of discovery, starting with the initial idea (Lapidaki, 2007; Webster, 2003). Similarly, no musician picks up an instrument for the first time and magically plays with dexterity. Consumers, no matter how market savvy, cannot engage fully in the creative process without some form of integration into the company/organization (Vargo, 2008). Moreover, they may need training in specialist areas, or at least the key areas the company wishes to develop (Etgar, 2008). They should also be given time and support to express and nurture the best ideas and to explore different dimensions through the most effective form of communication (Cova and Salle, 2008). Vital to the process of group creativity is the identification of a trigger that bonds the group together and acts as a source of inspiration. In this case it was classical music which was aligned with the project objectives. It did, however, involve a separate process of inculcation into classical music, its forms and its meanings.

4.2. Stage 2: Theme

After the germinal idea, further research was called for in order to assess viability and specify functions and the design of the product. Analogous to the composition process, this stage required both the involvement of knowledge and compositional devices to get the theme emerged. This signalled the quest for transferring, expressing, and exchanging ideas beyond the group as well as introduced the notion of the instrument, and in particular, the importance of fine tuning.

4.2.1. Knowledge as inspiration in theme construction

To further develop the initial idea, the group carried out exploratory research in order to reduce and shortlist theme options. They based their ideas on their daily life experiences and real contexts that were most familiar to them as teenagers to propose three key app themes: a music revision app, an exercise app and a language revision app. Since each theme would lead to different functions, content, and interfaces of the mobile app, participants decided to test out their ideas on a sample of their intended audience.

4.2.2. The 'instrument' in idea composition

The team used Pinterest, a visual discovery tool to find, store, present, and exchange ideas. They started generating images of music mobile apps from the Internet as examples which they then inserted into a survey. This platform also allowed them to collect ideas from their respondents since they could search and 'pin' the image they liked on their Pinterest board with just one click (Figure 2). Their findings showed that "students expected to have a music app that could help them when revising – by helping them to relax and concentrate on studying" (Male participant 2). Also, from this feedback, they decided that the app should follow a bright, neat, and clean style of design based on responses and pinned images from respondents.
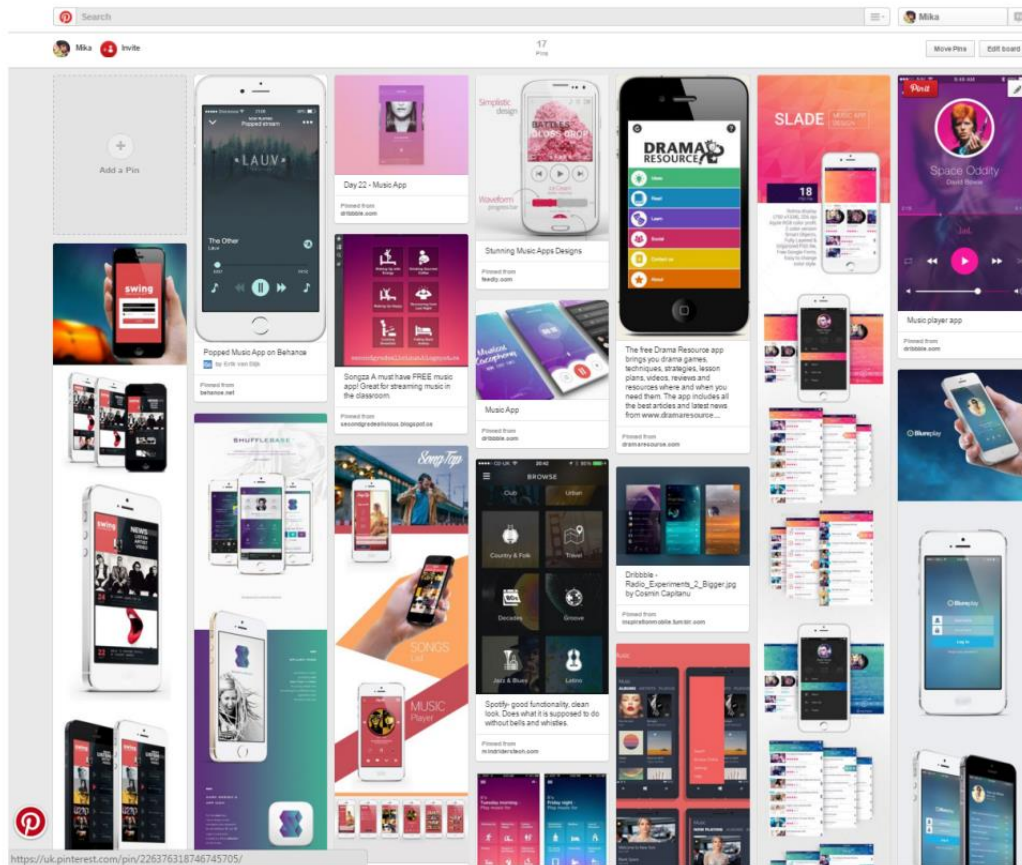
Figure 2: *An example of the Pinterest board from the study*
Source: Pinterest team account

4.2.3.   *Summary of the second stage*

The second stage continued the importance of inspiration in polishing ideas and identifying a clear direction in product development. Inspiration was rooted in personal interests, life experiences, the people they talked to, and incidents that they had been through. This drove the way they generated information and explored possible ideas, which is an important activity found in the innovation literature. However, how to resolve the risk of getting lost in communication, interpretation, and knowledge transfer is less evident in the extant research. Knowledge, as explained by Antonelli (2008) is embedded in the background and experience of each innovator and hence 'highly idiosyncratic' and tacit. The task of transferring and making sense of knowledge in the fuzzy stage is even harder; especially when information needs to be exchanged among people from different domains and with different skills which

have to be coordinated for a creative solution (Hilliges et al., 2007). This issue can also be found in composition theory; and to aid the communication, coordination and interpretation at this stage, a quest for a supporting tool to generate and exchange ideas occurred (Amabile, 1993). A musical instrument is commonly found in exploring the basic question of how the performer conveys his ideas to the listeners (Roger and Edward, 1990). Also, by playing the chords in the composition stage, the composer can listen to their themes and make judgements. Just as composers need to play their first pieces of music composition for reflection, inspiration, and changes, the participants in our case chose Pinterest as their instrument to mediate their interactions, store their ideas, as well as exchange and generate new knowledge for creative solutions. Introducing and utilizing an instrument in the early stages of the idea development process proved to be helpful for the team in tackling the challenge of communication with people from different backgrounds, especially when the idea was still unstructured.

4.3. Stage 3: Intermediate forms

While creating intermediate forms, the participants encountered limitations in their design skills. This block, however, forced them to find further instruments to transform their mind sketch into visible designs, which assisted both their idea composition and their presentation. This stage also saw a transition in their feelings and experiences from anxiety to arousal. Indeed, participants started to enjoy challenging their limits through learning and gaining skills they never knew they had.

4.3.1. The first sketch equipped by instrument

Findings from the survey and evaluation from both technology and music specialists helped the team confirm their idea and specify the product function to illuminate the theme through a design sketch. However, limited skills and competence in graphic design brought them a further challenge – that of transforming the findings of the survey into a real work:

"Heading further into the project ... we hit a bit of a brick wall here as none of us had ever done any graphic design before and consequently had no experience." (Male participant 1)

The team joined a training workshop provided by the innovation project and started creatively experimenting with designs on Photoshop. Being new to this creative instrument took them time when transferring their ideas into a visible format, especially when deciding the colour and early first features of the app. It took over a week for one of the participants to propose a simple sketch, although he had no previous experience of design.

4.3.2. The second sketch improved by stylistic knowledge

They soon recognized that being able to use a software or tool did not mean being able to design if they had no sense of the arts. To gain inspiration and some hints for the design development, the team decided to present their ideas and their first sketch to the orchestra's representative. They confided that each meeting with specialists required them to explain the idea to people from different backgrounds, which was a challenge but also good practice:

"I believe that we learnt from this experience at our meeting…We felt far more mature and comfortable, what's more we felt more confident in asking our questions" (Female participant 1)

With an interest in the idea and high expectations of the feasibility and value of the app, the representative shared further branding guidance, motivating the team and providing suggestions for design style. As a result, they started to explore further mobile apps for young audiences through various case studies, mock-ups, and sample sketches shared by their adviser in order to develop their work in a more professional manner.

4.3.3. The third sketch as a working prototype

Aiming high in introducing their ideas, they decided to use a platform that could turn sketches into working prototypes called "Popapp", an app design devised by Google. This

platform allowed them to "produce a smart, professional looking, interactive storyboard for the app" (Male participant 2). This involved real movements of interfaces after every click on the functional button which made the knowledge transformation much easier with visual aids and virtual interaction.

4.3.4. *Summary of the third stage*

In music composition theory, the intermediate forms play a crucial role in editing and refining the creative process (Robinson et al., 2011) and it is thought to be the outcome of the composition process, together with the final deliverable product (Polfreman, 1999). Similarly, in our case, we found that the team made progressive developments through continuously editing and refining sketches to turn their theme into the final artefact (Figure 3).

The enhancement was based on iterations of verification, which were achieved after the team gained more knowledge from specialists and their own research. This is also a common activity that can be found in composition theory as knowledge plays an important role in all musical processes (Serafine, 1988). Furthermore, the quality of their sketches was improved through the assistance of further instruments. Although it is less common to think of the instruments that composers use, the stipulation of which and how instruments are used is an important part of the skill set of the composer (Alperson, 2008). Just as composers usually use a repertoire of compositional devices for different purposes, some are valid for a group of composers while others are more appropriate for individuals (Sloboda, 1986), participants in our case chose various instruments to accomplish their allocated tasks. What is worth mentioning is that, during this stage, the team's attempts to use unconventional techniques to assist their idea performance proved to be both enjoyable and delivered a sense of personal creative accomplishment. Participants showed that they increasingly took control of the process. They found the challenge more manageable together with continuously finding,

gaining, and mastering required skills to tackle it. This has set the foundation for them to gradually achieve the flow experience - the optimal experience occurring when both challenges and skills reach its climax (Csikszentmihalyi, 1997).
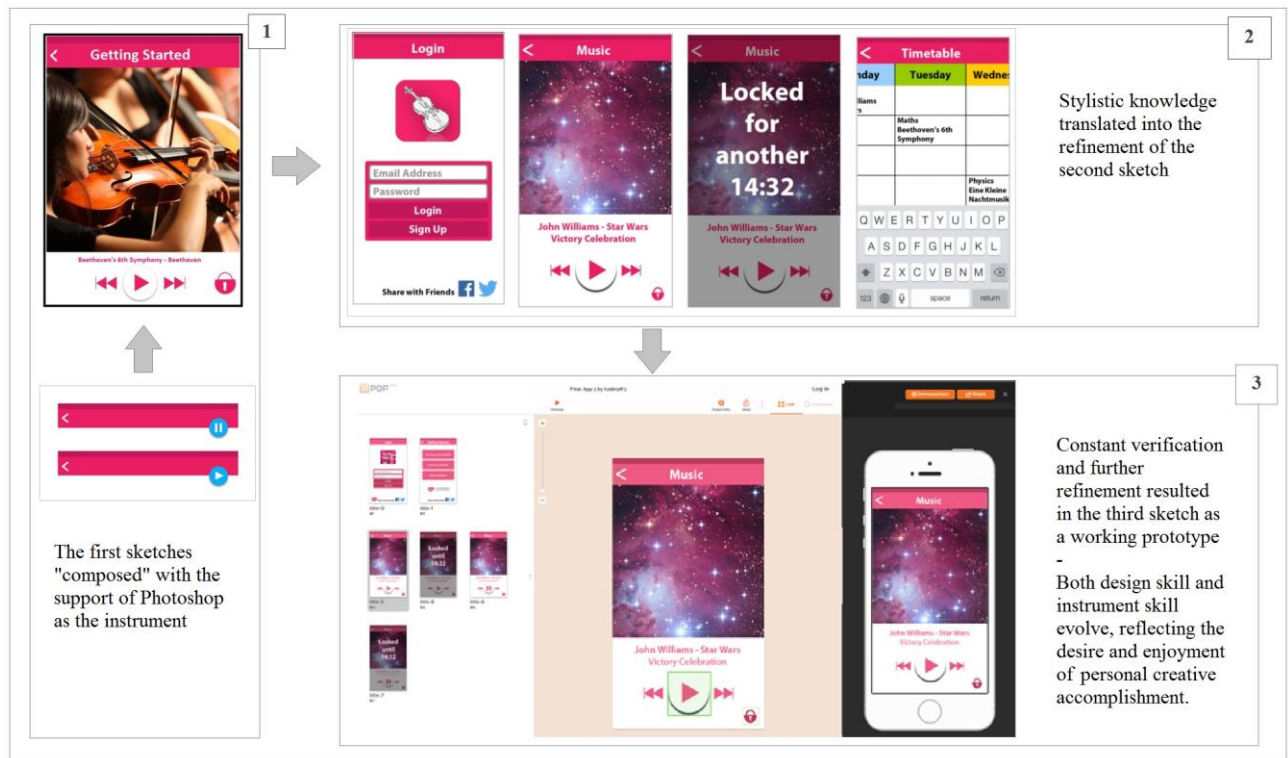

Figure 3: *The development of intermediary forms, extracted from the participants' Facebook Group and Popapp page.*

4.4. Stage 4: Final form

Before arriving at the final output, radical change of the intermediate form can still occur through reflection and further specialist knowledge. In this stage, the mind-set of the composer stimulated the participants to take ownership of the art making process. The team "played through" their idea composition through strict rehearsal and practice. The true reward of their effort and creativity was also revealed on their presentation day.

4.4.1. Radical improvement by adopting a musical mind

As the presentation day approached, participants were given the opportunity to watch a conductor perform on stage. This inspired the team and gave them a sense of performance and presentation. As the conductor described:

"In a physical performance, you will see the conductor coming on the stage, the orchestra standing, the audience applauding … and a special silence before the music begins. All this generates a sort of expectation and excitement among the audience … what we are here for, what we are going to listen to, what is going to happen here…You have a true theophany effect." (The conductor)

His thoughts encouraged the team to prepare an 'idea performance' with the use of sense-evoking techniques to provide 'expectation and excitement', and a 'theophany effect' for members of the audience. With their own experience of how music might trigger interest and create a social bond among people, they conducted intensive research on short pieces of classical music to include in their opening. This was aimed at raising the spirit of both presenters and audience for their presentation day.

In addition to an understanding of the importance of connection and shared experience with the audience, the conversation also helped them widen their repertoire of music and its creators. Motivated by his creativity and the ability to immerse himself in the perfection and arousal of his art, the team ran through all of their outputs, striving to elevate them to an art form, although they had already received positive feedback from their academic lead and two companies. In their final review, they invested more in the design, added new content, and improved some interfaces (Figure 4) besides re-organising the whole presentation. These changes were aimed at "creating a good hook" and "highlight the core value [of their app]" (Male participant 2). The final product, or the 'end of the composition', was the result of gradual improvements, honed through a sequence of sketches as a core part of the production of ideas. They also kept exploring new instruments to assist their performance, including the use of Prezi to replace the conventional PowerPoint as they wished to "encourage better interaction and [offer] a more eye-appealing interface with the audiences" (Male participant 1).
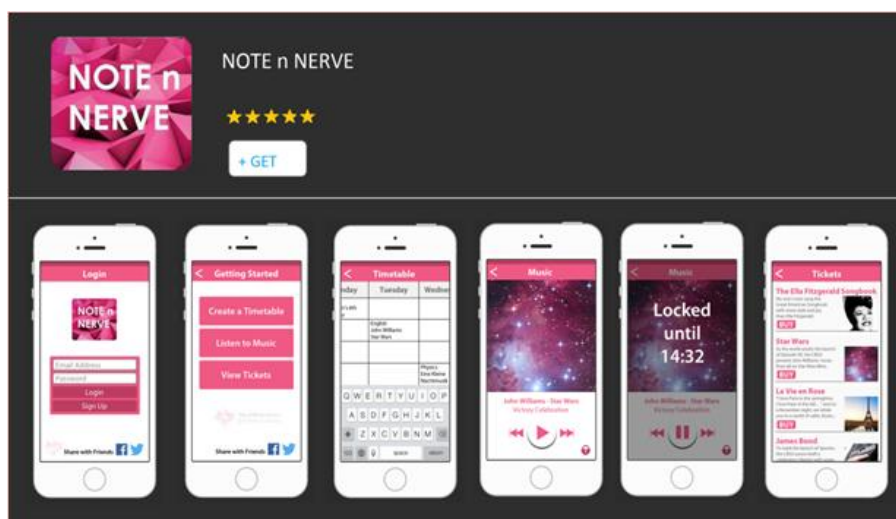
Figure 4: *Final form of the mobile app (from Facebook Group)*

4.4.2. Show time

On presentation day, the team did not win the first prize. However, their use of a short orchestral symphony music in the opening created a positive aesthetic initial impression and engagement in front of 100 audience members and seen as 'extremely engaging…an unexpected and pleasant surprise' (Judging board). Their idea was deemed to be a "brilliant combination between both arts and science" and their efforts did not go unrewarded. They were offered a sponsorship to fully develop the app based on the production of a more detailed plan.

> "…[it] raised interest and admiration amongst the audience so I think we were a real success. The audience understood and liked our idea and were curious to see where it could go…" (Male participant 1),

> "I was pleased with my group's project and can't believe we could do so much within a such a short time" (Female participant 1)

> "We all enjoyed everything despite workloads and difficulties – now I couldn't remember all the details. But today we combated stage fright! It was also a great way to boost our confidence and give us courage to speak up more in the future" (Female participant 2)

> "Ultimately I believe that we dealt with the challenge well…and in turn had a product which rivalled that of the others groups…" (Male participant 2).

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4.4.3. Summary of the last stage

The twist in the last stage occurred when participants started to adopt the mind-set of the composer in art making and art consumption, which enhanced their flow experience (Csikszentmihalyi, 2002; Csikszentmihalyi, 1975). In aesthetic activities, including music, this concept is especially appropriate when consumers seek aesthetic fulfilment through absorption, engagement, imagination and interpretation of music and other forms of consumption that elevate the individual beyond the level of everyday experiences (Csikszentmihalyi, 1996). The specific features of flow ensure that participants experience both enjoyable and rewarding activities (MacDonald et al., 2006). Indeed, the study of flow has been employed in a variety of different musical research contexts (O'Neill, 1999) and has extended to a number of other related disciplines (Jackson and Marsh, 1996). In our case, this experience arose when the team, confidently, perceived their product as an art work, which they were proud to present in front of an audience.

5. Contributions and conclusion

In dialogue with this special issue to generate understandings of how arts can become sources of value creation for business, we contribute to the highest intersecting level between the arts and business by revisiting FFE study through an adoption of three aspects in music: the intrinsic benefit of music, the flow experience in music making, and the composition process. This allows us to re-examine the notion of technological product and innovation, the approach to values perceived by consumers who are now the creators of ideas, and the current view of FFE pathway. Our objective of reframing FFE, therefore, goes beyond producing an output, reducing fuzziness or tracking activities as usually seen in innovation theory. These theoretical contributions will be followed by managerial implications and avenue for future research.

5.1. *Music in the shift toward emotion-oriented innovation*

Whilst mobile apps have become commonplace in the arts market, the idea of the team is distinct from existing apps in that it enriches consumers' lives through the benefits of music. Music is important in various kinds of learning episodes, acquisition and processing of language, and binding new memory (Koelsch and Siebel, 2005:582). Consonant music has even been used as therapy due to its "positive effects on up-regulation of neuro-genesis" (Koelsch, 2010:135). Moreover, the emotional effects of music on the autonomic, hormonal, and immune system are also helpful for listeners in the reduction of stress or the amelioration of depression and anxiety (ibid.). With its intrinsic value to human lives, music has power to support the creation of experiential products for consumers. Placing this as its core value, their mobile app proposal is neither positioned as a radical high-technological innovation nor as cost saving channel as embedded in other arts organizations' strategies (Crawford et al., 2012). Instead, it is being developed with a strong focus on experiential value and emotion fulfilment. This is largely the result of the marriage between science/ technology and the arts, which produced an emotion-oriented technological product aimed at enhancing sensory experiences and feelings of wellbeing.

5.2. *Flow experience generated from music-technology intersection*

Various experiences can be achieved in a staged sequence in which people move from apathy, worry, and anxiety at the beginning of a challenge toward arousal and, ultimately, a flow experience that concerns 'conscious effort and the direction of psychic energy to produce a feeling of wellbeing' (Goulding, 2000:270). In our study, flow experience is evident through their evolvement during the process and their satisfaction at the end of the project. However, what intrigues us more is the intersection between technology and the arts during the project that helped the participants gain their flow experience. When the challenge of innovating a technological product was initially the motivation for the participants to join

the project, it was the arts that became the trigger of their creativity instead of data and research on digital devices. After music was introduced to participants to inspire their association with music in their own life events and allow them to reflect and express their needs and problems in the most natural context, further triggers related to music were provided. This included access to the symphony orchestra's brand guidance, discussion with its representative and specialist, and self-seeking and listening to classical music.

The inclusion of arts in the technology-focused creation has led to their transition and redefinition of the challenge. They showed their high control and autonomy when playing with the arts and tech element, placing them as both question and the answer of the others. The moment that challenge and inspiration started to blur became the milestone from which they truly enjoyed the "multiple representations of challenge" as found in music making (Custodero, 2002). Their goal naturally moved from technology production to the expression and communication of music values and meanings. Technological tools, in this new scenarios, became the means that helped them to translate the core value of music into daily life. Their answer to the challenge went beyond a digital solution, as seen when they brought a real piece of music to their presentation day to truly engage audience in classical music. To some extent, their satisfaction was gained from learning and education experiences as much as, or even more than, that obtained from the experts' positive comments. This is analogous to the nature of subjectivity of personal experience and emotion of the composers, to quote Schoenberg "I believe that a real composer writes music for no other than that it pleases him" (1975: 54).

5.3. The fuzzy front end as an idea composition process

Our findings can be summarized by a hybrid model based on the integration of music composition and innovation theory (Figure 5). The intersection and interaction of activities from both the vertical and horizontal sides of the schematic model represent FFE as a

collective and iterative process, in which the final form has to be developed from a hierarchy of creative outputs. Motivation, skills in domain knowledge and skills in creative thinking in creativity theory are found to both contribute and evolve throughout the process.
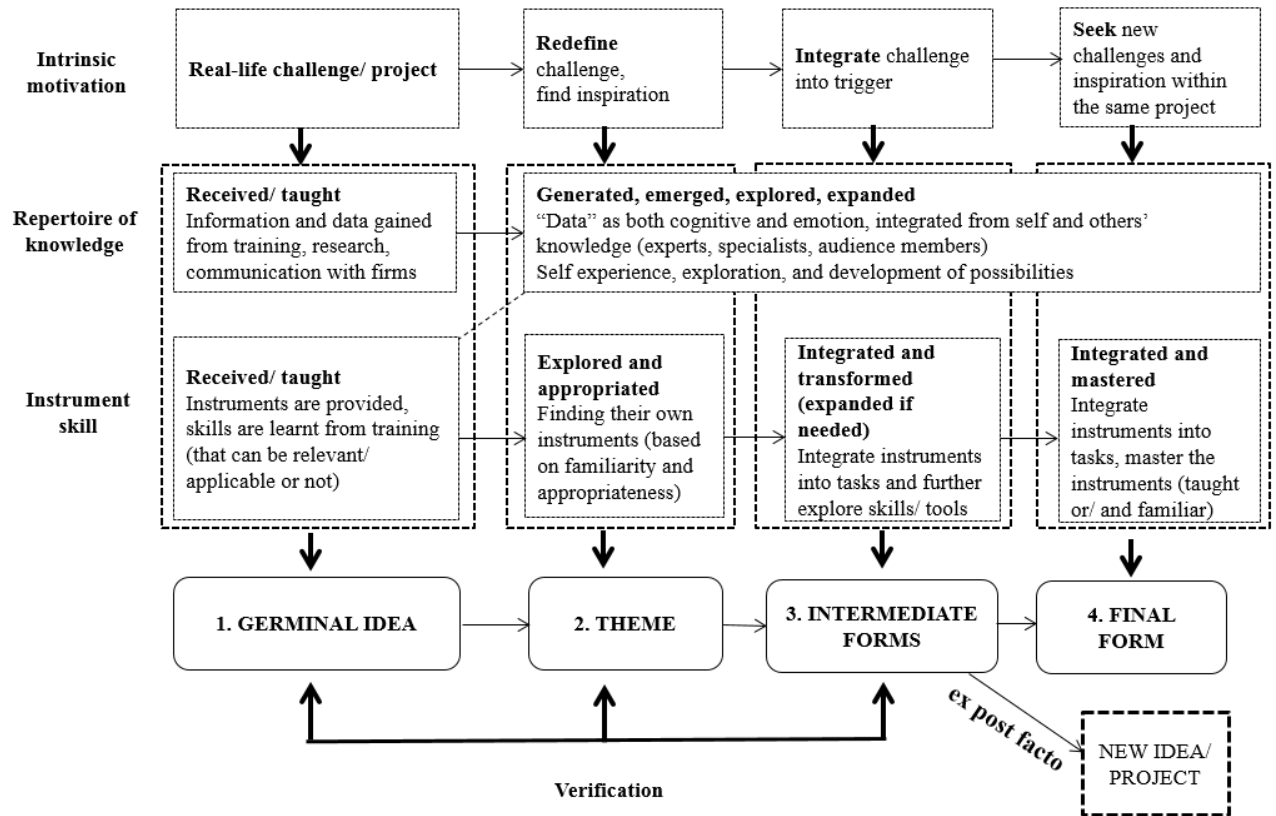

Figure 5: *Hybrid model of FFE activities*

When being re-developed with a musical mind, FFE process takes into consideration the unconscious aspect of participants' creativity in both senses: recalling their prior knowledge and experiences and gaining new ones which later become their life experiences. This supports us in proposing a list of activities to suggest how firms can 'stage experiences' (Pine and Gilmore, 1999) for their consumers through relevant stimuli during the co-creation project. Also, this opens up opportunities for firms to actively interact with their consumers which entail experiences, values, and favourable connections. Our paper thus can introduce fresh insights for the incubation stage in creativity, which is linked to well-known cognitive effects such as reminiscence and priming (Helie and Sun, 2010; Yaniv and Meyer, 1987). More than just the 'time away from the problem' during which creators use their previous

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knowledge to develop ideas (Collins, 2005), incubation is found to be ongoing and allow participants to accumulatively build up experiences that are helpful for later stages.

Besides stressing the constant provision and inter-relatedness of motivation, inspiration, and repertoires of knowledge, the hybrid model also highlights the importance of instrument and, more importantly, the process of instrumentalization (Gall and Breee, 2005). This process occurs when "the instrument does not exist in itself but become an instrument when the person using it has been able to appropriate it for themselves and has integrated it with their activity" (Verillon and Rabardell, 1995: 80). With this view, we propose that co-design would not necessarily be restricted to the practice of firms' provision of tools to facilitate their consumers. Once claiming that the consumers are empowered as the designer/ co-designer, firms need to appreciate the choice of instrument of the composers of ideas. They should recognize and consider which types of instruments and tools that are convenient and familiar for consumers in designing process, how consumers transform them in unplanned directions (Trouche, 2003), and how the instrument skills emerge, extend, and develop as part of the creation (Sloboda, 1986).

Our model also adds a further element entitled 'ex-post facto' to highlight the alternative views of a creative work in different contexts, time, and space. Art history reveals that many cultural works such as those by Bach, the first of the Great German composers in the tonality tradition, were not fully recognized during their lifetime (McClary, 1987). Therefore, storing an art work and tracing back an art-making process have well received attention of analysts. In music composition, postulating basic compositional techniques from sketches or the reproduction of sketches from the melodic fragments has been examined to understand the composition process, as each sketch was considered as "signs of competence, necessary and enabling resources for the compositional process" (Sloboda, 1986: 104). This directs our attention to developing a way of systematically recording and storing ideas that can be used

as materials and inspiration of creative thinking. Full notes in time sequence should be kept and recorded to reflect and facilitate the development of further sketches to allow later modification, completion, or a more mature idea. In our case study, sketches consisted of content posted on Facebook group, pinned images on Pinterest accounts, the diary of the author, and the participants' reflective reports.

5.4. *Managerial implications*

In our study, the technology aspect that engaged audience in classical music was responded by the creation of a mobile application. However, the full answer to the challenge was the act of empowering consumers to co-create values with the firms, which then brought them closer to classical music and let them immerse into various types of experiences. To elaborate we would borrow from immersion theory in arts consumption: "the consumer lives these intense moments of immersion through a complex combination of nesting, investigating and stamping operations in which one conjures up all of one's competencies and knowledge" (Caru` and Cova, 2006: 11). This type of co-creation project can, therefore, be adopted outside the arts industry by businesses that aim to actively communicate with [young] audiences. Innovation projects should, therefore, be seen as the starting point for a conversation, the maintenance of relationship, and a communication channel established naturally and developed actively by both sides so that their consumers can reflect on experience and 'make sense of the experience in new ways to determine the value outcomes' (Gummerus, 2013:16). We also recommend that choosing relevant institutions or organizations to create and mediate an innovation environment is crucial for the success of value co-creation. From our case study, it is worthwhile to look at the role of the university in such collaborative projects for its relevance and capability in recruiting, supporting, and assisting young participants in the construction of value outcomes.

5.5.   Avenues for future research

Whilst our ethnographic research may have limitations linked to the context and empirical case of the study, it opens avenues for future research. Music has been often overlooked (Belfiore & Bennett, 2007) despite scientific findings showing that we are a 'musical species', 'to be human is to be musical' (Mithen, 2009: 3-4), and 'we are born with musical wisdom and appetite' (Trevarthen, 2000: 173). The long tradition of music in the humanities can extend the potential of music application in business study, such as how music supports creating social bonds in group creativity (Huron, 2001), provides a sense of group identity, and develops a personal understanding of self (Mithen, 2009). The functional niche that music is chosen to be part of (Sloboda et al., 2009) can, therefore, be further explored, allowing many opportunities for creating music-based products to engage with consumers. From our research, the interplay between the arts and technology can be moved forward. Other types of arts can be examined in product innovation activities to confirm whether they can make similar contributions. Further forms of technology, apart from mobile apps, may also be investigated in future research that could benefit from the intersection of arts and science. With the emergence of theories from our study, we would suggest more empirical research on art-based initiatives in developing theories of experience innovation, including space and environment (Prahalad and Ramaswamy, 2003) and multiplicity of perspectives and value creation logics (Gummerus, 2013). We are also keen on empirical research on the role of arts and culture in extending models of collaborative innovation such as the Triple Helix model (Etzcowitz and Leydesdorf, 2000) and innovation ecosystems (Carayannis and Campbell, 2009).

Vitae

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