

Applying a Taxonomy as a Framework to Understand Co-Creation as an Approach to Information Systems Development

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Abstract

Our paper investigates how co-creation as an information systems development (ISD) approach is performed. Our empirical practice study of co-creation for and with youths involved in developing a digital game on a social media platform in a not-for-profit environment contributes to broadening the perspective on ISD and co-creation research. We apply an established taxonomy of co-creation and demonstrate how the taxonomy can be used as a framework to understand what co-creation is, how, when and where it can be performed as an instance of ISD practice. As a result we demonstrate the value and the shortcomings of the taxonomy.

Keywords: Co-creation, information systems development, taxonomic framework

1. Introduction

The objective of our research is to contribute to a better understanding of information systems development (ISD) in practice. ISD is traditionally recognized as a technical process and dominated by normative techno-centric and engineering approaches [11]; however, research has recognized that ISD is not just a rational, methodical and controlled process, but more an adaptive, agile, and emergent process [7]. Recently, the concept and role of co-creation in ISD, in particular in open source software and community-based service systems [13] have also gained some interest as web technologies enable businesses, governments and people alike to collaborate [1]. Increasingly, non-collocated people and organisations are collaborating online to share knowledge and information, to contribute content, and to co-create materials and goods including information and software systems utilising social media as development and usage platforms; much of the literature on co-creation reports on research conducted in commercial, predominantly e-commerce environments [5,22]. In such environments co-creation has been used in a variety of ways to develop new products and services, to evaluate ideas and to propose solutions [5].

This research is part of a larger project that investigated co-creation based on different frameworks. The result of the application of one of the frameworks is reported here. UNICEF (Pacific)¹, a UNICEF chapter, has recognised social media's value particularly for distributing important information on matters such as health, emergencies, education and climate change [18]. Engaging youth is a key focus for UNICEF (P). UNICEF (P) were challenged by Pacific youth to be 'younger and less boring' in using social media. UNICEF (P) thus invited Pacific

¹ For the remainder of the article we will refer to UNICEF (Pacific) as UNICEF (P).

youth to participate in different roles in the co-creation of an information system, a Facebook-based game [4].

To understand co-creation we use a taxonomy of co-creation in the e-commerce marketplace that was developed by Zwass [22] as an analytical framework. The framework comprises elements such as categories of co-creators and their motivations, different modes of creation, characteristics of the development tasks and the forms of governance, as well as types of value, economic beneficiaries and product aggregation. We analyse the project in terms of the taxonomy and specifically discuss the actual occurrence of its elements and their impact on the project and its outcome. In doing so, we demonstrate the value and the shortcomings of the taxonomy as a framework when applied to our case. The remainder of the article is structured as follows: Section 2 introduces the taxonomy for co-creation as the theoretical background for this study. Our research approach is explained in section 3 and the case narrative is provided in section 4. Section 5 includes the analysis of the co-creation project in the case setting. Section 6 discusses our findings and their implications for research and practice. We conclude with our conclusions and a summary of our contributions in Section 7.

2. Theoretical Background

Zwass [22] provides an extensive literature review to develop a taxonomy and integrated research perspective as a foundation for the development of a co-creation theory where co-creation is read to stand both for consumer creation or collective creation.

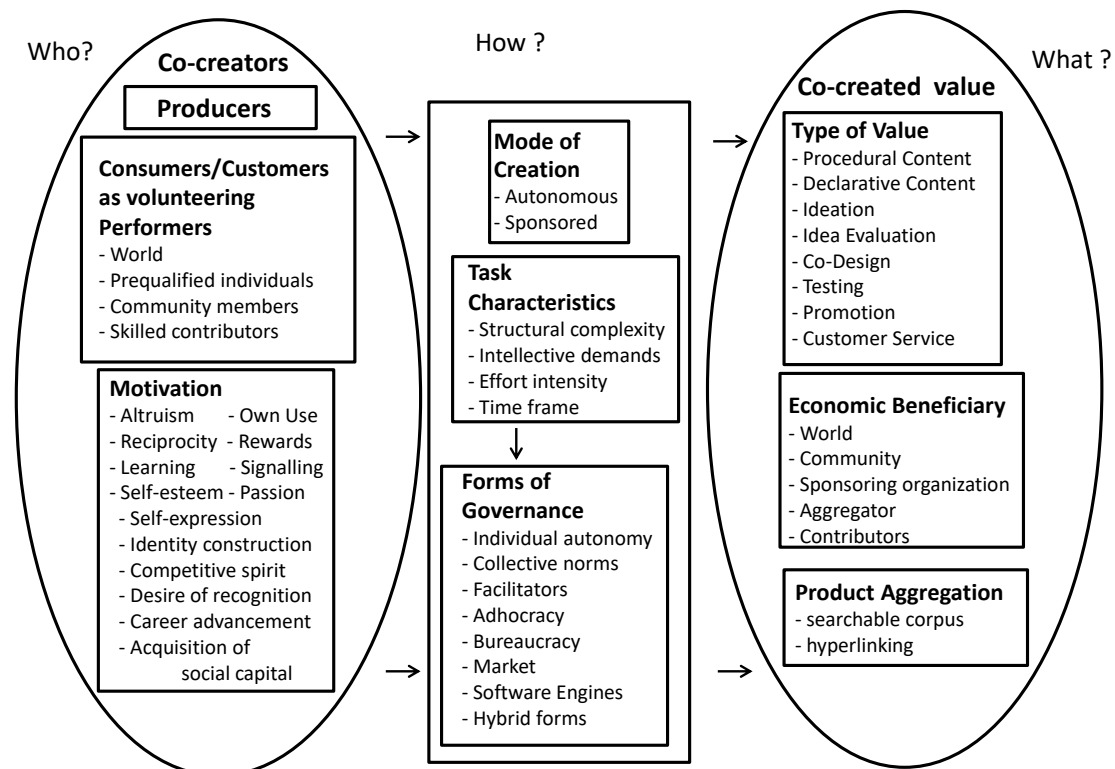


Fig 1: A taxonomy of Co-Creation (adapted from Zwass [22])

He credits the original definition of co-creation to Kambil et al. [9] who in the 1990s defined it as co-creation of value by a firm's customers by engaging customers directly in the production or distribution of value. He suggests that enabled by digital technologies, infrastructures, and ecosystems, in particular Internet and Web technologies, co-creation - defined as the participation of consumers along with producers in the creation of value in the marketplace in the commercial realm, particularly e-commerce - takes place in virtual communities with collective intelligence through open innovation with organisations involving unaffiliated individuals and customers which leads to common co-created outcomes that are largely placed

for open access. Zwass [22] develops an input and outcome oriented taxonomy with focus on the structural features to conceptualize co-creation which is presented in figure 1. He specifies who is involved in co-creation beyond the producers through the concept of co-creators as both consumers and customers in the role of volunteering performers. These co-creators reveal their knowledge based on an array of motivators. The concepts of mode of creation, task characteristics, and forms of governance and the relation of the latter two typify how co-creation is performed, while what is created is labelled co-created value and is determined through the concepts of type of value, economic beneficiary and product aggregation. Beyond the producing organisations, termed producers,

Zwass [22] identifies two modes of co-creation. In autonomous co-creation, individuals or consumer communities' co-creation activities are conducted independently of any established organisation, although they may use platforms provided by such organisations. Sponsored co-creation comprises co-creation activities conducted by individuals or consumer communities at the behest of a producing organisation. Furthermore, co-creation is carried out under varying forms of governance. In practice, hybrid forms of governance generally emerge.

Zwass [22] provides a typology of the value which is co-created as well. Despite focusing on value related to digital products he lists hardware as a co-created value. Beyond this he distinguishes between value produced through task redistribution as such, procedural content such as software and declarative content such as knowledge compendia, consumer reviews, multimedia content, and blogs. He emphasizes the value which lies in the co-created social capital, relationships and trust, collective sense making, ranking for importance, and sentiment expression. Value is also co-produced in the form of ideation and idea evaluation, product co-design, product testing, product promotion and consumer-side customer service. Lastly, there is value in the consumers' self-revelation of personal data.

Although he argues that economic value is not the only type of value created through co-creation as many co-creators receive more intrinsic satisfaction from their co-creation activities, Zwass [22] also distinguishes between the different kinds of principal beneficiary of co-created economic value. Finally, he identifies multiple methods that are used to aggregate the result of co-creation. Digital products are aggregated as textual or multimedia wholes, gathered as a searchable corpus or combined in hyper-linked structures. Content may also be progressively refined. In addition, statistical ratings and rankings are used to summarize product evaluations and competitions, voting and information markets are deployed. Ultimately, folksonomies, user-generated electronic tags or keywords are used to classify and provide access to online content. We use Zwass's [22] taxonomy as a framework for our investigation.

3. Research Approach and Method

The research presented here is interpretive. Interpretive research involves analysing people's actions through a detailed study in their 'natural settings' which leads to a richer understanding [16]. Given the limited literature concerning our research topic, understanding the role of co-creation in ISD and how it unfolds in the particular contexts of Non-Government Organisations' utilising social media platforms and primarily youth as co-creators, our investigation is based on an exploratory, qualitative, single case study [3] of an ISD project which involves a number of different organisational units and stakeholder groups. While it is often stated that it is not possible to generalise and certainly not to theorise from a single case study, Walsham [20] suggests that it is possible to generalise case study findings among others in the form of a contribution of rich insight. Thus to contribute to the establishment of theory we provide our findings in the form of structural, elements which determine a descriptive theory [6]. So inspired, we have used the taxonomy as a framework for our data analysis. The roles and length of stay in the field varied for the four authors of this paper. The fourth author has been involved in the project as a reflective practitioner [17] throughout the whole period. As the UNICEF (P) communications specialist and project sponsor, he was involved as the overall project co-coordinator at all stages of the project. He shared correspondence and provided reflections on the process. As an employee and insider he enhanced the depth and breadth of understanding

the case setting that may not be accessible to a non-native researcher [10]. The third author also participated during the whole project, as an involved, accompanying [20] researcher impacting the design and development of the game. Given the background of these authors the purpose of the research presented here, was to investigate in a less unbiased manner how co-creation takes place in practice. Thus, the first and the second author acted as outside observers [20] and were included in the reflective process. They conducted interviews with the involved researcher and independently analysed all available empirical material. The combination of intervention, interpretation, and collaboration between the three academic researchers and the fourth author was chosen to bring interpretive rigor to our analysis. In line with the research topic and the interpretive approach, our understanding of co-creation in the game development project has come about through an iterative process of interpretation, comparison and connecting of prior research and empirical data.

Given the distributed location of the co-creators the extensive email trail between the different co-creators was the main data source. These emails contained status information, reflections before, during and after the development and implementation of the game, conceptual feedback, reflections and recollections concerning input into the design of the game, the elements of climate change it was addressing, test results as well as technical feedback. The empirical data also comprised social media postings by the four Fiji adolescents who served as facilitators between the technical development team and the juvenile Pacific crowd and their responses to the request for input. Project documentation such as the UNICEF (P) strategic plan for digital engagement, its project description, brief and evaluation as well as a terms of reference document were included as valuable data sources as were the field notes by the sponsor and the accompanying researcher.

Further empirical data for the study was collected through semi-structured, open-ended interviews conducted by the accompanying researcher with the three members of the technical development team and as mentioned above by the outside researchers with the accompanying researcher concerning her role and experience during the co-creation project. The developers were interviewed for about 45 minutes in length with the interviews focusing on the issues around the co-creation process and their reflections as co-creators on the project. The issues included how they undertook the development process, how they managed the interactions with the other co-creators, the mechanisms for communication and how they incorporated new ideas and change requests. The interviews also explored how the developers generated and refined their ideas particularly in relation to the sponsor's brief and explored their motivations for becoming involved apart from the modest amount they were paid.

We wished to achieve an interaction between the existing literature and our observations from the case setting to explain interrelationships and contribute to theory with new insight from practice that might be useful for scholars and practitioners. Our analysis takes its starting point in September 2010 when the project was conceived and ends in August 2011. As a first step in the analysis, we produced a timeline spanning that period and a case narrative which is included here in a condensed form. We then returned to the literature and determined Zwass's [22] taxonomy as one of two suitable research frameworks². The next stage involved revisiting the narrative and the empirical data. Applying the taxonomy as a framework, we identified the co-creators, their motivations and relationships well as the modes of creation, the task characteristics and the forms of governance and types of value and categorised our findings accordingly. Using the taxonomy helped us to increase our understanding of ISD practice and to identify and characterise co-creation as significant in the context of the development process in the case setting. The analysis led to several findings and contributions of the value and shortcomings of Zwass's [22] work towards a theory of co-creation. We next present as a further background the timeline and a narrative account of the investigated project.

² The other was the Metropolis model for the development of crowdsourced systems by Kazman and Chen [13].

4. A Narrative of the Case

With the help of the timeline, we identified the following five phases of the project which subsequently will also be described in more detail: 1 Initiation of the idea and funding; 2 Establishment of the team; 3 Conceptual design of the game; 4 Development of the consolidated game; 5 Launch of the consolidated game.

Phase 1 – Initiation of the idea and funding

Mid 2010 the communications specialist at UNICEF (P) proposed a project to the organisation. He was concerned that although UNICEF (P) had a strong social media presence and was regularly communicating with their audience via social media, two-way interaction was very limited. His vision was to engage youth through encouraging them to participate in a co-creation project via social media. Given the threats posed to small Pacific Islands from climate change the proposal was to develop a co-created game which would help Pacific youth to learn more about how to respond to climate change. He put this proposal to the Commonwealth of Learning (COL), a Commonwealth of Nations organisation, in November 2010 which provided modest funding early January 2011. The communications specialist who was located on the Pacific Islands immediately approached the third author of the paper in Melbourne, Australia who was known to him from previous collaboration with a request to join the project to help establish and manage if necessary a development team. This led to the second phase.

Phase 2 – Establishment of the team

The third author in January 2011 approached three research students in her network who fulfilled the position requirements; these accepted the invitation and were in the same month appointed as the developers for a period of 30 working days with an original project runtime from February 1 to April 15, 2011. Two of them were Chinese by birth and one was from Bangladesh. One developer was living in Hong Kong, another lived in regional Victoria, Australia and the third member was living in Melbourne; the latter two knew each other, but they did not know the third developer on beforehand, nor did they meet this developer in person during the project. The sponsor's first e-mail to the development team described his vision and what he wanted to achieve, the game was not to be about climate change but how people could respond to its impact. In January 2011, the Sponsor identified and contacted four adolescents from Fiji to be social media facilitators for soliciting and gathering ideas from Pacific Youth about the game. The Social Media Facilitators posted a photo with a message inviting input on the game and launched this as a Facebook album with text encouraging UNICEF (P) Facebook fans to participate and to contribute to the design of the game. Input and comments came from 16 fans, as well as 15 fans hitting the 'like' button. During the same period the accompanying academic facilitated a process among the members of the core development team and the Sponsor who also acted as project co-ordinator where protocols for how the development team would operate were agreed on. The third author played no further significant role in the development process. The Sponsor was happy for the developers to manage the project themselves in terms of ideas for the game and how the work was undertaken. The developers' first meeting was a telephone conversation about how they would manage the process given they were geographically dispersed. They agreed that they would email each other every couple of days to cater for the quite short timeline for finalising the game. They also planned to use Skype to talk regularly and instant messaging and chat to communicate. Although there was no formal team leader, the student from Bangladesh quickly became the person who took charge; she kept minutes of the meetings including the decisions that were taken, the next discussion topics and who would be responsible for determining what the tasks would be. The tasks were reviewed at each meeting confirming what had been done and establishing the next tasks and responsibilities. At the end of each meeting an email summarising progress was sent to the Sponsor by the informal leader. He reviewed the progress and if he thought there was something that needed to be changed or wanted to provide feedback he would email the informal leader or alternatively he called her using Skype. Brief notes were taken from the Skype meetings focusing on any requested changes.

Phase 3 – Conceptual design of the game

The first stage of development was to reach agreement on what the game would be and its look and feel. One developer researched relevant aspects of climate change, another looked at different approaches to and types of Facebook games and the third investigated appropriate technologies, tools and development approaches. As the development of ideas for the game progressed the Sponsor was sharing these ideas with experts from the funding organisation, climate change experts and UNICEF staff. Input from these groups was sought on the direction of the game. Further information on climate change was also provided on a regular basis by relevant experts to the Sponsor. The Sponsor provided the feedback including the ideas of the involved Pacific youth provided through the Facebook page and facilitated by the four adolescents from Fiji to the developers. The requirements of the Sponsor and ideas of the key stakeholders, Pacific youth, and UNICEF (P) staff, guided the developers. The team used the following process to decide on their final game: At the beginning the Sponsor asked the developers to think about some ideas. They gave themselves a week to open their minds to brainstorm and think about every idea without technology, and then collected their ideas to see which of these ideas could be combined together. This led to three major ideas; each with a particular focus from one of the developers which reflected what they individually thought what the youth and UNICEF (P) should concentrate on. This resulted in the game which consisted of three sub-games. Each sub-game was quite different in the way that the players would interact; the CO2 Reducer challenge requires players to identify potential CO2 emitters; the Evacuate Life challenge requires players to understand the climate change threats and initiate action; the Flood Tales challenge highlights the causes of floods and the need for flood mitigation. An important design principle was to ensure that each game was not too complicated. The developers found the fan page postings very helpful; the responses from the Pacific youth had suggested that the game needed to be very interactive, interesting and colourful; it should have graphics, be fun and focused on action, something which promoted to be positive and to make change.

Phase 4 - Development of the consolidated games

After the developers and the Sponsor had agreed on the consolidated game's design, development proper, including detailed design, coding, testing and evaluation could begin. The development team took an active role in ensuring input in the form of further information and feedback was managed effectively and encouraged further participation by the Sponsor and UNICEF staff. As there was no opportunity to discuss, elaborate and clarify ideas and concerns face to face with anyone except the Sponsor every piece of information and communication had to be very concise. As the team members were working independently and each component of the game was developed separately, several issues concerning the different build and layout of the consolidated game arose during this phase. The Sponsor and UNICEF staff reviewed the first version of the consolidated game and provided feedback; this included the colours, fonts and graphics, the text and help provided with the game. He highlighted that further work was needed on standardisation and how the three components linked together to be one game. The Sponsor also reinforced the need for the links to further information be embedded in each game. Technical testing and evaluation were iterative. The developers each first conducted technical unit and system testing to uncover programming errors. Each developer tested the work of the other two and provided feedback. The game was functionally tested by UNICEF (P) staff who played the game and provided feedback to the Sponsor. A technical person within UNICEF also tested the consolidated game and provided technical feedback once the team had incorporated the earlier feedback. The developers were asked by the Sponsor to find a platform to run the game and they decided on Google which had a free service. Further user evaluation similar to user acceptance testing was undertaken by three friends of the developers in China who were young and used Facebook. They played the game and provided advice suggesting that the graphics and artwork needed to be still more attractive. They thought players would be encouraged to play longer if the game was even more interesting. The social media facilitators also provided feedback along these lines, suggesting the game be more colourful and easier to

play. All feedback was considered, further changes made and the final version of the game was ultimately accepted by the Sponsor.

Phase 5: Launch of the consolidated game

An email to various international UNICEF groups announced the launch of the game in July 2011. The game had a favourable reception as many positive comments on what had been achieved were made by UNICEF worldwide, Pacific youth and Facebook fans. A press release issued after the launch showed UNICEF's positive assessment of the initiative. Postings on the UNICEF (P) fan page highlighted how successful the game was with requests for the game to be translated into Pacific languages and to include it on the Madagascar UNICEF page. Voices of Youth, a UNICEF organisation designed to support young people requested that they embed the game on their website. Lastly, the launch event marked the end of the project for the development team and sparked the developers' pride about their achievement. The consolidated game is now in use and distributed through three other Facebook sites.

5. Analysis

We now revisit the case project appreciating the game development as a co-creation process.

5.1. Co-creators: Motivations, roles and relationships

The framework distinguishes between the producer, usually a profit-making organisation producing a commodity, and the consumers and customers as volunteering performers, as co-creators. We identify 10 different entities who contributed to the creation of the game in the sense of collective creators. In our not-for-profit context however we cannot easily identify among the 10 recognised co-creating entities a producer or producing organisation. UNICEF, specifically UNICEF (P), including the Sponsor and staff as well as UNICEF in general through its New York Headquarter as the owners of the game could be considered as the producer, but they are not in the strict sense. The production of the game in a strict sense was performed by the three developers, although they were not organised in a traditional organisation, but in a transient project organisation, paid by yet another organisation, the COL. The developers were not Pacific Youth; they were not consumers or customers either. This also applies to the Chinese testers, who although youth, were not from the target area. The COL as the monetary sponsor contributed to the co-creation process and could thus be considered part of the producer organisation as could the Australia-based Facilitator who had recruited the developers; she definitively cannot be considered a consumer or customer of the game. The same is true for the international Climate Change Experts who contributed advice on the contents of the game. In contrast, the Fiji-based Pacific Youth Social Media Facilitators as well as the Pacific Youth Facebook Fans who contributed requirements of all sorts for the game were consumers in the strict sense of the taxonomy. Categorising the 10 co-creating entities further poses similar challenges. The Pacific Youth Requirement Contributors as possible consumers of the game can be considered both prequalified individuals based on earlier experience with digital and/or Facebook-based games, in this sense they are also skilled contributors. They are also members of the target community of Pacific Youth and part of the world. In addition, the Social Media Facilitators had a standing in their community as members with skills of good communicators. On that background they were chosen by the Sponsor who participated, in fact had instigated it, in the co-creation process as a prequalified individual as a Communication Expert to reach out to youth in regards to engaging them in serious matters such as climate change. The Facilitator can be categorised similarly; she participated in the co-creation process as a prequalified individual who had access to and knowledge of available, capable, and affordable Developers. The Developers in turn were both prequalified individuals and assumed skilled contributors in the development of digital information systems. The Testers were members of their community and as members of the same age segment as the target consumers they can be considered both prequalified individuals as well as to some extent skilled contributors of feedback as

experienced digital game players and Facebook users. The input and feedback provided by the New York UNICEF Headquarter, the Fiji-based UNICEF (P) staff, and the International Climate Change Experts also all fall into the categories of prequalified individuals and skilled contributors in their fields of competence. They were also community members within the different communities of which and from which they were contributing, though not members of the community of the target audience. In this regard the COL is even harder to categorise. It could be considered as a prequalified contributor, though not individual which based on prior experience of good results provided some monetary resources; considering this a particular skill might however be too farfetched.

The framework also supports the identification and analysis of the co-creators' motivations. In the context of the project altruism constituted a major motivator. Both the requirements contributing Pacific Youth and the adolescent Social Media Facilitators expressed an altruistic desire to contribute to the game development with another motivation being their own intention to use the game. The Australian Facilitator also stated altruism and a passion for the task to support an important cause involving youth, young researchers and climate change as her main motivators. Enjoyment of working with UNICEF (P) and learning during and about the co-creation process were other motivators for her. With no direct data available from all co-creators we made some informed assumptions concerning some of the co-creators' motivations. Working for a not-for-profit organisation presupposes a certain level of altruism; thus the Sponsor, as well as the UNICEF (P) staff and involved employees at the UNICEF Headquarter were certainly motivated by that and their passion to work for and with young people. The same can be presumed for the COL staff that supported the project financially. Passion for their cause can be assumed as a certain motivator for the International Climate Experts who contributed their knowledge. Altruism, enjoyment, and reciprocity as well as interest in learning can be supposed as the motivators for the Chinese Testers who helped out their friends who developed the game. The Developers themselves had joined the project for a small monetary reward, but expressed a passion for the task and the opportunity to learn both about co-creation, game development and climate change as important motivators. They were all motivated by non-monetary rewards such as personal satisfaction with the intended, and ultimately achieved outcome and the opportunity to signal competence to possible employers. We can speculate whether the desire for recognition, at least for the project member who took on a management role was an additional motivator.

5.2. Co-Creation Process: Modes, Tasks, Governance

The framework distinguishes autonomous and sponsored modes of co-creation. Although not a producing organisation in the traditional sense of a for-profit company, UNICEF can be considered as the sponsoring organisation with the Communication Expert as the personified Sponsor. The situation was more intricate as the COL through its funding also appears as a sponsor. It is unclear whether the Australian-based Facilitator's activities were independent and autonomous of the sponsoring organisation. She sovereignly chose and appointed the three developers however whether she selected them for that UNICEF sponsored process or did so at the behest of the organisation cannot be clearly answered.

The co-creation process can be classified as an endeavour of varying intellectual demands regarding the various types of performers. Specific content about climate change issues was provided by Climate Change Experts and UNICEF staff. The latter, together with the Communication Expert and the Pacific Youth, held the needed knowledge of how to communicate these complex issues in a simple, playful form to potentially affected adolescents. Beyond the specific provision of adequate content and content presentation, project management and coordination skills and experience were demanded and provided by the UNICEF (P) Sponsor, the Australian-based Facilitator and to some extent by the Developers. The latter were challenged to develop some of these skills during the process using their study-based experience. ISD, in particular game development skills were also required. While the Developers had the former, they had to acquire the latter during the process. This was possible based on their education which enabled them to gather and analyse ideas and requirements,

provide functional and technical designs, program, test and react appropriately to test results, feedback, and evaluation provided by other co-creators. For the Pacific Youth and the UNICEF staff, the intellectual demands were not that high as they could base their contributions on their mundane experiences.

The project occurred within a limited time period with no a priori defined deadline other than the original contract deadline for the Developers. This was subsequently renegotiated as the whole process lasted 12 months. The first six months involved idea initiation, funding application and approval, followed by six months identifying the development team and establishing a governance structure and process to the game's launch. Four of these months were intensive development work with the Developers paid for 30 working days each to develop the game. The process consequently had varying levels of intensity of effort ranging from moderate, though important, idea initiation and securing funding, to more intensive during team and coordination establishment. The effort was very intensive during requirements provision, gathering and analysis, functional design and its evaluation, technical design and programming, technical and functional testing and validation ultimately leading to acceptance, approval and launch by the Sponsor.

There was some structural complexity in developing the game with a confined number of involved performers who were prequalified individuals or skilled contributors to the project. To apply the concept without taking the individual skill demands and actual skills into account is not easy, but we argue that structural complexity was medium high, when re-interpreting the concept of structural complexity and taking the organisational structure of the project into account. The co-creators were distributed over at least three continents and several regions and time zones with numerous collaborative relationships between them. The co-creation process was considered a success by all stakeholder groups. Beyond the described task characteristics including the creativity and diversity of the different stakeholders but this also is related to the governance of the co-creation process.

The project's governance can be characterised as a hybrid form comprising elements of all methods of governance defined in the framework. The co-creation process had bureaucratic traits with formal rules established for design approval of the intermediate and the final version of the game by the Sponsor. It also had traits of an adhocracy given the Sponsor's relationship with UNICEF Headquarters and the collaboration of the Developers and their cooperation both with the Testers, the Pacific Youth Social Media Facilitators and the Australian Facilitator. The latter two stakeholder groups as their roles indicate operated as facilitating links and moderators between different roles. The Pacific Youth Social Media Facilitators linked Pacific Youth UNICEF Fans to the co-creation process, both to the Developers and to the Sponsor. The fans' activities and the Facilitators' actions in this regard enacted a market mechanism. Such a mechanism was also in play when the international Climate Change Experts were contacted and contributed knowledge about the game's topic and when the Fiji-based UNICEF staff provided feedback.

The Developers' collaboration with its developing coordination mechanism strongly resembled collective norms as they were not defined by the collaborators as strong formal rules. In this context the analysis of the co-creation process shows strong signs of individual autonomy by those who provided knowledge and feedback as representatives of the 'world', community members, skilled contributors or prequalified individuals such as the Australia-based Facilitator, but even more so the Developers and the Social Media Facilitators when performing their individual tasks. Software code and engines did not in any strong way implement a governance regime. Email enabled general communication and coordination of the process including the organisation of the incoming feedback. The design and development of the game was supported by standard software tools.

5.3. Co-created Value

The game came into being through the execution of the various development tasks which were redistributed among the different co-creators in a way uncommon in traditional

development projects. Without the execution of the redistributed tasks, the game as an asset would not exist. Thus, the task distribution as such created value. Although the game was not the outcome of a pronounced autonomous co-creation process, it delivered both procedural content in the form of software that constituted the game as well as declarative content in the form of information about climate change and possible future counter actions. It strengthened the relationship between various stakeholder groups, e.g. UNICEF and Pacific Youth, between the Facilitator and the Developers, between the Developers themselves and in that way co-created social capital, relationships and trust as intangible values. From the perspective of sponsored co-creation, although not a purely sponsored co-creation process the project created value through the different co-creators' input into ideation and idea evaluation, their co-design activities as well as testing of the game. Beyond these activities the Developers performed the technical design and programming activities for a modest remuneration; this type of value is not recognised in the taxonomy. The involvement of Pacific Youth throughout the uptake and their appreciation of and recommendations expressed through Facebook likes contributed to the promotion of the game. In a not-for-profit environment, the concept of economic beneficiary does not apply, still using the framework for co-created, non-economic, intangible values, we identify the larger community of the game players and through wider diffusion the 'world' as beneficiaries. Information and knowledge about the issue is spread, awareness is created, and future action might be triggered; this type of social value was not part of the taxonomy. The contributors and the sponsoring organisation benefit from the co-creation process, either as game players, conscious young citizens or representatives of UNICEF or climate change aware organisations. In the widest sense although not directly involved, Facebook as the platform provider and 'aggregator' for the provided game might benefit from an image as a supporter of this important societal issue. Product aggregation of the game was simple, consisting of three sub-games which were integrated into a product with a partially searchable corpus and hyperlinks to further relevant material. The software and the contents were frequently refined throughout the project, however once approved and launched, the game remained unchanged.

6. Discussion

Our analysis provided an in-depth understanding of the game development as a co-creation process. The original taxonomy had to be reinterpreted, adjusted, and extended; its application and empirical confirmation as a framework was not entirely unproblematic and not without challenges. The analysis of the co-creators reveals a complex network of geographically dispersed actors in a transient project organisation. In our context, we could not easily identify a distinct producer or producing organisation and one sole sponsoring organisation, and the process was neither a pronounced autonomous nor a purely sponsored one. Categorising the co-creating entities was equally demanding as some co-creators could not simply be classified in one category; they could be placed in several categories and held ambiguous roles. With regard to structural complexity we re-interpreted the concept and took the organisational structure of the project into account where contract arrangements otherwise not named in the taxonomy became part of the structure. Our analysis also recognised further types of values, in particular social value in a not-for-profit context and extended the concept of beneficiaries beyond mere economic receivers.

Our focus here however is on co-creation as an approach ISD. In this context, co-creation has been regarded as an extension of or as growing out of participatory design [15] where people are directly involved in the collaborative design of IS and IT they are supposed to use [2,14], and it has been argued that research on the design and co-design process is part of design science research in the information systems discipline [12,21]. Holmquist [8] highlights how some methods used for co-creating information systems are related to participatory design, but argues that they are somehow different, because they have to deal with contributors and co-creators that may largely be unknown to those who manage the process with the challenges of managing volunteer co-creators in mainly virtual teams with different roles and varying time and effort contributions. These issues are largely covered by the framework. Compared to a more enterprise-centric approach to ISD, we find the focus on motivation and value is especially

useful, as there is no way to force the youth as the intended beneficiaries to either contribute to or to use the game. According to Vargo et al. [19] the value-in-use, which is not only an entertaining game, but also increased knowledge on how to cope with climate changes, is the reason why the project has been considered as successful by all stakeholders.

Wastell et al. [21] argue that a part of design science and design theory concerns the effectiveness and suitability of development and design approaches and methods. In this respect, our work adds to the studies and theory of the co-creation and design process in ISD. Wastell et al. [21] furthermore contend that design science generates knowledge of direct practical relevance. Our work shows how actual co-creation in ISD can be organized in a project to result in a process and outcome that all stakeholder groups appreciate. In practice, the high level categories in the taxonomy thus can be used as a framework for: (1) preparing for the organisation of co-creation processes in Non-Government Organisation and other contexts (2) coping with co-creation during the development process by providing an understanding of co-creation as an approach to ISD; and (3) for after-the-fact reflection and collection of lessons learnt.

7. Conclusion

In this paper, we investigated the question how co-creation as an ISD approach is performed in a not-for-profit environment with limited resources and with a number of youths on a social media platform as a step towards a theory of co-creation in ISD in this particular context. Our analysis shows that the taxonomy applied as a framework for co-creation can be fruitfully used to understand what co-creation is and how, when and where it can be performed as an instance of ISD practice. As such we contribute to a descriptive theory of co-creation in ISD.

We also contribute with a practice study of co-creation to broaden the perspective on co-creation research and we provide a sound, empirical study of co-creation. The presented framework can be used to prepare for co-creation, while recognizing that the actual course of an ISD project will evolve with the situation. Our research adds to the body of knowledge in ISD with rich insight about co-creation as a possible and vital approach to ISD and provides a link between the otherwise often disconnected research areas and research communities of co-creation and ISD. We recognize that our study is exploratory and that the game development project belongs to a special class of development project, which may limit the generality of our findings but, like Walsham [20], we contend that this does not mean that it does not contribute to the collective body of knowledge, both academic and practical, of a discipline. Still, more studies which apply the framework are necessary to allow for more theorising about the relation of the two fields and for a viable theory of co-creation in ISD. To accomplish a more exhaustive explanatory theory, to answer why co-creation in ISD played out the way it did in the presented case and to draw more general lessons learnt, further research is necessary.

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