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# A Service-Dominant Logic Perspective on Information Systems Development as Service Ecosystems of Value Co-Creation

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**Abstract.** Information Systems Development (ISD) is at the heart of the diffusion of information technologies. It is constantly reshaped by new developments and changing environments. The appearance of extra-organizational platform capabilities and the emerging shift in business and society from a goods-dominant to service-dominant logic (SDL) represent such a development. SDL offers a holistic perspective with an emphasis on value co-creation in service ecosystems that goes beyond the traditional boundaries of organizations. In this capacity, it lends itself to a study of ISD as service ecosystems of value co-creation in such an environment. On this background, we investigate the following research questions: How is value co-creation in ISD projects that transcend traditional organizational settings managed and performed, and how does SDL provide plausible explanations to understand such contemporary ISD? For this purpose, we present a case of ISD in the context of the United Nations Children's Fund (UNICEF) which engaged various groups of actors including Pacific Islander youth in the development of a digital game to raise attention about climate change and use the foundational concepts of SDL to demonstrate how value is co-created by a diverse group of actors in such a setting.

**Keywords:** Information Systems Development, Service-Dominant Logic, Service Ecosystems, Value Co-Creation.

## 1 Introduction

Information Systems Development (ISD) is at the heart of the diffusion of information technologies. It is constantly reshaped by new developments and changing environments. The appearance of extra-organizational platform capabilities and the emerging shift in business and society from a goods-dominant to service-dominant logic (SDL) represent such a development (Kazman and Chen, 2009) where SDL offers a holistic perspective on value co-creation in service ecosystems that goes beyond the traditional organizational boundaries. In this capacity, it lends itself to a study of ISD as service ecosystems of value co-creation in such an environment. We therefore investigate the following research questions: How is value co-creation in ISD projects that transcend traditional organizational settings managed and performed, and how does SDL provide plausible explanations to understand such contemporary ISD? To answer these research questions, we studied a case of ISD in the context of a United Nations Children's Fund (UNICEF) initiated project.

The UNICEF is an intergovernmental, non-for-profit organization and program that provides humanitarian and development assistance to children and mothers in developing countries. UNICEF (P), short for UNICEF (Pacific Islands Countries), has recognized social media's value for distributing important information on matters such as health, emergencies, education and climate change (UNICEF (P), 2013). Engaging youth is a focus for UNICEF (P) but the organization has been challenged by Pacific Islander (PI) youth, who were not significantly engaging with content shared on UNICEF (P)'s Facebook (FB) page, to be 'younger and less boring' in using social media. Thus, to explore the abilities of digital technologies to involve youth to influence decision making affecting their lives, UNICEF (P) invited and engaged PI youth in participating in the development of an information system, a FB-based game here called 'Pacific Climate Change Challenge Game' (PC3G) to raise awareness about climate change in that region (Fisher, 2012).

The paper is structured as follows: the next section includes as theoretical background a brief introduction into SDL and we then position our research with regard to the existing work on SDL in the ISD literature. Subsequently, we present our research method, describe the setting of our study, provide our analysis, discuss our findings and finish with some conclusions.

## 2 Theoretical Background

SDL is grounded in the field of service marketing as part of the service paradigm. It draws on multiple theoretical sources such as economic, institutional, and practice theories, along with complexity and systems sciences (Lusch and Vargo, 2019).

We use SDL and its foundational concepts with its emphasis on service ecosystems as developed by Lusch and Vargo (2019) over 2 decades to understand value co-creation in ISD projects. SDL is based on the premise that service, as the application of one actor's resources, e.g., knowledge and skills, for the benefit of oneself or another, is the

basis of all economic and social exchange, focusing on the two-way dynamics of exchange, that a service is exchanged for a service (Lusch and Vargo, 2019).

“[V]alue creation does not just take place through the activities of a single actor (customer or otherwise) or between a firm and its customers but among a whole host of actors. [...] value is not completely individually, or even dyadically, created but, rather it is created through the integration of resources, provided by many sources, including a full range of market-facing, private and public actors. In short, cocreation of value is the purpose of exchange [...]” (Vargo and Lusch, 2016, p. 23)

Value is co-created by multiple actors in actor-to-actor networks, which always include a beneficiary, or as Vargo et al. (2008, p. 146) put it “[i]n S-D logic, the roles of producers and consumers are not distinct, meaning that value is always cocreated, jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences.” Value is perceived and determined by the beneficiary on the basis the service’s value-in-use (Vargo et al., 2008).

The value co-creation process takes place in service ecosystems that are coordinated through actor-generated institutions and institutional arrangements. Vargo and Lusch (2016) understand these concepts, based on institutional theories in a very broad sense; they consider culture, traditions, customs, norms, formal laws, policies, regulations, informal conventions, and agreements as mechanisms for cooperation and coordination that have an impact on and can hinder or support resource integration and the value cocreation process.

Service ecosystems are complex, emergent, and self-organizing (Vargo and Lusch, 2017). They are multi-level in their structure, where higher level structures emerge from lower-level interactions (Lusch and Vargo, 2019). These levels are not independent of each other, rather they present different analytical perspectives. Service ecosystems unfold over time as actors reciprocally provide service and co-create value by creating and recreating institutional arrangements to coordinate the service-to-service exchange (Lusch and Vargo, 2019).



**Fig.1.** The narrative of SDL according to Vargo and Lusch (2016).

Vargo and Lusch (2017) summarize their narrative and framework of SDL in a circular process model comprised of actors in actor-to-actor networks who are involved in resource integration and service exchanges that are enabled and constrained by endogenously generated institutions and institutional arrangements that in turn establish nested and interlocking, self-governed, self-contained, and self-adjusting service ecosystems of value co-creation (see Fig. 1). Each foundational concept in the model can serve as an entry point for analysis.

We will use these key ideas of SDL for the analysis of our empirical data. Before doing so we first position our research in the existing literature on SDL in ISD and then introduce our research method and setting.

### **3 SDL in the ISD Literature**

The concept of service has received IS research attention for many years (Fielt et al., 2013) in areas such as service design, service innovation, and service management (Böhmman et al., 2014). There has been less focus on SDL in the IS field; and only very few studies have investigated ISD from an SDL perspective.

Keith et al. (2009, 2013) present a method for managing ISD projects by conceptualizing ISD activities as services, but do not relate their work to SDL and its foundational concepts. Their study focuses on the adoption process of the method and its effects on scope, cost, and time more than on the development process itself. Babb and Keith (2012) provide a conceptual argument and reconceptualize ISD methods from an SDL and value co-creation perspective to support the selection of adequate ISD methods in the current dynamic and hardly predictable environment of ISD. They argue that agile and hybrid ISD methods are co-creative by nature and are instances of a general shift towards SDL in business and society. The authors underline the importance of a service's value-in-use beyond traditional quality and value measures related to a product's delivery within time and cost constraints. However, they do not provide empirical support for their argument.

Acknowledging SDL as the wider background of their research, and postulating that SDL has significantly affected the way ISD organizations operate and are structured, Öbrand et al. (2019) provide a longitudinal case study of the development, support, and sales of complex integrated IT services in an ISD organization. The focus of their investigation is on how risks emerge in the development of these services. They produce interesting results on the interstitiality of IT risk in such an environment, but they do not apply the key concepts of SDL. Barqawi et al. (2016) used SDL in an action research project to explore a specific activity in an ISD organization, namely release management in a software-as-a-service environment and performed some interventions to enhance service quality based on selected SDL key concepts and premises.

Also positioning their work in the context of SDL, without explicitly applying the underlying concepts, Kazman and Chen (2009) offer a model for the development of crowdsourced, service-oriented information systems derived from analysis of community-based service systems development, open-source software systems, and ultra

large-scale systems. Their model takes the form of a set of system characteristics and accompanying development principles with implications for practical application. Kautz et al. (2019) applied the principles, understanding the enactment of the model as an organizational innovation, in a previous study of the PC3G development project and empirically confirmed its usefulness for understanding the process of co-creation in ISD. But, like Kazman and Chen (2009) they did not use the full SDL narrative and its comprehensive theoretical concepts for that analysis. Kautz and Bjerknæs (2020) have also investigated ISD as value co-creation based on a perspective that considers value co-creation in service development as a form of innovation (Zwass, 2010; Alves et al., 2016) and supplemented that analysis with selected SDL concepts based on Lusch and Nambisan's (2015) work (see below). Bjerknæs and Kautz (2019) applied the complete SDL framework; however, their study of agile approaches to ISD is based exclusively on the perspective of project managers and product owners. Lusch and Nambisan (2015) used SDL to gain a broader perspective on service innovation. Their focus is on how digital technology in the form of service platforms can contribute to value co-creation.

The present work is based on these predecessors, but rather than focus on particular concepts or organizing principles, on digital technology or on selected ISD activities or a particular ISD method, the starting point for our analysis is the full set of concepts that characterize SDL according to Vargo and Lusch (2016; Lusch & Vargo, 2019).

## **4 Research Approach and Method**

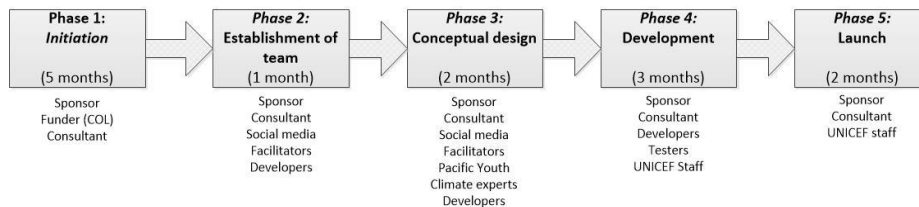
This research is interpretive. Given the limited literature concerning our research topic, our investigation is based on an exploratory, qualitative, single case study (Creswell, 2003) of an ISD project, which involves a number of different organizational units and stakeholder groups.

Access to the case organization was provided directly by two key informants. The first informant had been involved in the project as a representative of UNICEF (P) and communications specialist. He was the project sponsor and project co-coordinator at all project stages, we refer to him as the sponsor. He shared email correspondence and all relevant documents and provided reflections on the process. The second key informant also participated during the whole project as a consultant and facilitator. She brought her distinct IS expertise on the interplay between people, processes, information, and IT to the project. The two authors conducted interviews with the key informants and had access to the record of the project debriefing, which the consultant had held with the three developers concerning their respective roles and experience during the project. Given the distributed location of the participants the extensive email trail between the different participants was the main data source. Lee (1994) argues that email communication can provide a rich understanding of what has occurred. Emails included those between the sponsor, the consultant, the three developers, three testers, four adolescent social media facilitators, as well as email correspondence from UNICEF including headquarter (HQ) staff in New York, climate change experts and learning experts from the Commonwealth of Learning (COL) ([https://thecommonwealth-](https://thecommonwealth.org/commonwealth-)

learning), an organization that provided advice and some funding. These emails contained status information, reflections before, during and after the development and implementation of the game, conceptual feedback, 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. More detail about the different co-creators, their relationship and their location will be provided in the next section.

The empirical data also comprised social media postings by four adolescent social media facilitators including an invitation for input and further feedback on the game. This was launched as a FB album. The data included the initial responses to the request for input and the feedback postings that were received from PI youth. It also encompassed activity data on the page after the game’s implementation. Finally, project documentation including the UNICEF (P)’s strategic plan for digital engagement, the COL Terms of Reference for the project, the project brief and the design document produced by the developers outlining the game, as well as its evaluation report were valuable data sources as were further project notes by the sponsor and the consultant.

Our analysis was guided by the SDL framework. Following Miles et al.’s (2014) ‘data condensation’ strategy we produced a timeline (see Fig. 2) spanning the project period and a case narrative, which is included below in a concentrated form. The narrative builds a conceptual model and provides a sequence of events and serves as a frame of reference for the analysis of the data (Fincham, 2002). Our understanding of value co-creation in the service ecosystems of the PC3G development project has come about through an iterative process of interpretation, collaboration, comparison and connecting of prior research and empirical data. During the analysis we regularly discussed our emerging results with the two informants and through their feedback increased the interpretive rigor of our study.



**Fig. 2.** Timeline, phases, and participants of the PC3G development project.

## 5 A Case Narrative

With the help of the timeline, we identified five phases of the project, which will 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 game; 5 Launch of the game.



### **5.1 Phase 1 – Initiation of the Idea and Funding**

As a starting point, based on PI youth critique of the UNICEF(P)'s web site, the communications specialist at UNICEF (P) proposed a project to the organization. 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 major objective was to ensure that PI youth engaged more with UNICEF. His vision was to engage youth through encouraging them to participate in an ISD project via social media. Given the threats posed to small Pacific Islands from climate change the proposal was to develop a digital game, which would help PI youth to learn about climate change. He put this proposal to COL, which provided modest funding and then approached an IS professor in Melbourne, Australia, known to him from previous collaboration with a request to become a project member as a consultant to help establish, and if necessary, manage a development team. She honorary joined the project in this capacity.

### **5.2 Phase 2 – Establishment of the Team**

The consultant then approached three young research students in her network, who fulfilled the position requirements; these accepted the invitation and were immediately appointed as the developers for a period of 30 working days with an original project runtime of 2 1/2 months. One developer lived in Hong Kong, another in regional Victoria, Australia, and one in Melbourne. The latter two knew each other, but did not know the third developer on beforehand, nor did they meet this developer in person during the project. The sponsor's first email to the development team including the consultant described his vision and what he wanted to achieve, the game was not to be about how people could respond to the impact of climate change. At the same time, he contacted four adolescents from Fiji to be social media facilitators for soliciting and gathering ideas from PI youth about the game. The social media facilitators posted a photo with a message inviting input and set this up as a FB album with text encouraging UNICEF (P) FB fans to contribute to the design of the game. Initial input and comments relating directly to the game came from 16 fans, 15 additional fans hitting the 'like' button of these postings; subsequently many more fans visited the page, provided feedback on the game under development, and eventually subscribed to the page (see descriptions of phases 3 - 5).

During the same period, the consultant facilitated a process among the three developers and the sponsor to agree on communication protocols between them. The sponsor was happy for the developers to manage the project themselves in terms of the 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 they would email each other every couple of days to cater for the 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, one student quickly took charge of managing how things would

work. At the end of each meeting an email summarizing progress was sent to the sponsor by the informal leader. He reviewed the progress. If he thought there was something that needed to be changed or wanted to provide feedback, he emailed the informal leader, or alternatively called her. Brief notes were taken from these Skype meetings focusing on any requested changes.

### **5.3 Phase 3 – Conceptual Design of the Game**

The first development objective 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 FB games and the third investigated appropriate technologies, tools, and development approaches. As idea development progressed the sponsor became an intermediary sharing these ideas with experts from the funding organization, international climate change experts and UNICEF staff. Further information on climate change in particular was provided on a regular basis by the relevant experts to the sponsor. He provided this feedback including ideas of the involved PI youth provided through the FB page and facilitated by the social media facilitators to the developers.

The requirements of the sponsor and ideas of the key stakeholders, PI youth, and UNICEF (P) staff, guided the developers. The team used the following process: At the beginning the sponsor asked the developers to think about some ideas, then they collected their ideas to see which of these ideas could be combined. This led to three major ideas; each with a particular focus from one developer which reflected what they individually thought the youth and UNICEF (P) should concentrate on. This resulted in the PC3G consisting of three games in one. Each game was quite different in the way that the players would interact; one requires players to identify potential CO<sub>2</sub> emitters; one requires them to understand the climate change threats and initiate action, e.g., to evacuate or rebuild before serious consequences; one 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 page postings very helpful. The responses from the PI youth had suggested that the game needed to be very interactive, interesting and colorful; it should have graphics, be fun and focused on action, something, which promoted to be positive and to make change.

### **5.4 Phase 4 – Development of the Game**

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. Managing the process "was very challenging because we would not face each other and sit together", one developer commented. 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, UNICEF staff, and PI youth. As there was no opportunity to discuss, elaborate and clarify ideas and concerns face to face information and communication had to be very concise. As the team mem-

bers were working independently and each component of the game was developed separately, several issues arose during this phase. These issues are highlighted in a statement from one developer: “The game came in three different formats, totally different interfaces. The developing process of the three people was quite different. It came as three totally different styles of game, different user interface, different color, a lot of things were different. There was no standard look to the three different games. Fortunately, finally we got this sorted out - the three games now look quite similar”.

The sponsor and UNICEF staff reviewed the first version of the consolidated game and provided feedback; this included the colors, fonts and graphics, the text and help provided with the game. The sponsor highlighted that further work was needed on standardization and how the three components linked together to be one game. He also reinforced the need for links to further information be embedded in each game.

Technical testing and evaluation were iterative. The developers conducted technical unit and system testing to uncover programming errors and ensure user interface consistency. Each developer tested the work of the others and provided feedback through their phone and Skype meetings and email. While they tested for programming errors, the game was functionally tested by UNICEF (P) staff that played the game and provided feedback to the sponsor. A technical person within UNICEF also tested the game and provided technical feedback once the team had incorporated the earlier feedback. Further user evaluation similar to user acceptance testing was undertaken by three friends of the developers in China, who were young and used FB. 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. Based on further feedback from their peer group and their own evaluations, the social media facilitators also provided feedback along these lines, which they communicated to the sponsor and at times directly to the developers, suggesting the game be more colorful and easier to play. All feedback was considered, further changes made, and the final version of the game was ultimately accepted by the sponsor.

## **5.5 Phase 5 – Launch of the Game**

An email to various international UNICEF groups announced the launch of the game 13 months after its initiation. The game had a favorable reception as many positive comments on what had been achieved were made by UNICEF worldwide, PI youth and FB fans. A media release issued after the launch showed UNICEF’s positive assessment of the initiative (UNICEF (P), 2011). 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 a request to include it on the Madagascar UNICEF page. The game was further distributed through three other FB sites and put into use. The launch event marked the end of the project.

## 6 Analysis and Findings

### 6.1 Actors and Actor-to-Actor Networks

We identified multiple actors in various roles in the actor-to-actor network<sup>1</sup> of what we identified as the PC3G development service ecosystem (*see* subsection ‘Service Ecosystems’) as project participants. Some took on various roles, others joined the service ecosystem ad hoc on request, while yet others and their roles became less significant or even disappeared throughout the service ecosystem’s existence. The actors, their roles, and their locations are listed in Table 1. The actor-to-actor network, the interactions, and collaborations of various intensity between actors in that service ecosystem are depicted as part of Figure 3. Some actors contributed to co-creation of value with direct, many however without direct relations, interaction, or knowledge of others.

The case analysis shows how the concept of actor transcends the producer-customer (as well as consumer or user) divide in contemporary ISD as some actors, especially those who traditionally would be considered passive customers or future users, become involved in actor-to-actor networks and actively contribute as partners with ideas, requirements, and feedback in the value co-creation process beyond conventional organizational boundaries.

### 6.2 Resource Integration and Service Exchange

The actors provided resources, knowledge, and skills that were continuously integrated and applied in reciprocal, direct, and indirect service-to-service exchanges that contributed to the ongoing recreation of the service ecosystem. Here we provide some examples; Table 1 summarizes all identified resources and services.

The sponsor’s resources consisted of skills to create an initial project vision and plan, social networking talent, access to a network of actors to develop the game, the ability to communicate with diverse actors, and the capability to coordinate diverse actors in project. He applied these resources as services to other actors who reciprocally provided their services to him.

As a service the COL provided the resource of project funding and in exchange, the sponsor’s applied skills in form of a well-coordinated and executed project resulted in an outcome that supported the objective of climate education. The climate experts possessed knowledge about climate challenges, and as a service shared it with the sponsor who as a return service communicated that knowledge to the developers.

The sponsor’s service to the developers comprised his support in coordinating and assessing their work, and to filter, prioritize, and communicate the ideas, requirements, and feedback he received from other actors in the ecosystem. The developers provided ISD knowledge and in a direct service-for-service exchange developed the game’s

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<sup>1</sup> Further service ecosystems can be identified consisting of subsets of the listed actors in the actor-to-actor network.

functional and technical design and programming as an immediate service to the sponsor. These developer activities also represent an indirect service to other actors, notably UNICEF(P) and the PI youth, as potential beneficiaries of the project.

**Table 1.** Actors, Roles, Locations, and their integrated Resources and exchanged Services.

<b>Actor/Role/Location</b>	<b>Resources<sup>2</sup></b>	<b>Service</b>
UNICEF (P) communications specialist/ Sponsor Project co-ordinator Overall decision maker/ Fiji, Pacific Islands	Vision for the game Access to resources Skills/knowledge about coordinating projects, communicating with diverse stakeholders including youth	Coordinated & integrated resources Led & managed project Filtered/prioritised ideas, requirements, feedback Evaluated designs
IS professor/ Consultant/ Melbourne, Australia	Access to students with ISD skills Knowledge about managing ISD projects Knowledge about ISD	Integrated suitable students in the PC3G development service ecosystem & helped develop rules of engagement & cooperation between sponsor & developers Provided guidance
Three research students/ Developers in the core development team/ Hongkong, Melbourne, & Regional Victoria, Australia	Knowledge about ISD Access to testers	Developed the games Integrated testers into the ecosystem
Four Fiji adolescents/ Social media facilitators/ Fiji, Pacific Islands	Access to other PI youth	Engaged other youth, provided a channel for youth opinions, filtered their input, ideas, requirements, feedback
International climate experts/ Providers of climate change expertise/ Globally distributed	Knowledge about climate change challenges & how to meet them	Shared relevant climate change knowledge with sponsor

<sup>2</sup> Digital technologies such as PCs, Internet, and digital means for communication such as email, Skype and FB were a shared resource for all the actors in their various roles.

The social media facilitators' access to the PI youth led to the exchange of a further service that gave the latter a voice on requirements for the design and early versions of the game. These opinions were the resources that the PI youth brought to the situation, and as a service they provided the social media facilitators with input for the game development. This input became a resource for the social media facilitators who applied it with the sponsor and in direct service exchange with the developers.

We noted that digital technologies and resources embodied in the applied ISD approach when used for cooperation and coordination take the form of institutional arrangements.

### **6.3 Institutions and Institutional Arrangements**

Institutions and institutional arrangements are a special kind of resource. Some arrangements existed before the project start and became part of the service ecosystem; others were negotiated by some actors in the beginning while still others emerged over the course of the project during the resource integration and service exchange processes. Here we present some examples.

The sponsor's initial vision and requirements were the foundation for cooperation and coordination in the project. It originated as a cognitive arrangement. Shared with other actors, it became a normative arrangement. The Terms of Reference document, along with the formal contracts between UNICEF (P) and the three developers that included the budget, plan, and expected deliverables were regulative arrangements for the service ecosystem.

The developed communication protocol provided a communication structure that compensated for minimal documentation and helped manage the high flux rate as a normative arrangement. The regular planning meetings and feedback sessions, along with early game versions based on short iterations, were further normative arrangements. The role of social media facilitators, the additional role of facilitator in the development team, and the norms for collaboration determining the division of labor as the team went along were all actor-developed arrangements.

The cooperation and coordination mechanisms and the structural arrangements in the service ecosystem were aligned and consistent with the ISD method which itself was an institutional arrangement, as were the egalitarian management practices, the flat organizational and governance structure where the sponsor and the social media facilitators represented coordination mechanisms between the three developers and PI youth.

Above we identified digital technologies as resources; when used for coordination they are also institutional arrangements that helped overcome project challenges like the distribution of actors over geographical and time zones, limited timelines, the high change rate, and the evolving competencies of the developers.

None of the institutional arrangements hindered service exchange. This indicates that they were well aligned with the actors' roles and different knowledge and skills resulting in value propositions and the co-creation of value for all actors.

#### 6.4 Value and Value Co-Creation

Co-created value propositions emerged when some actors were considered by others, or themselves, as potential beneficiaries, and became values when accepted as such by a beneficiary. The co-created value propositions and values were perceived differently by each set of actors. The values comprised different components and came into being through different actor relationships, but all actors experienced an increase in wellbeing through the co-created value.

For the PI youth as one, if not the main, beneficiary of the service ecosystem, the value proposition that they accepted was a game that offered important information about climate change in an attractive, entertaining way. The service exchange interactions were also of value for them, they produced the satisfaction of being listened to and having their feedback taken seriously. The resulting strengthened relationship between PI youth and UNICEF (P) became an accepted value proposition that was co-created.

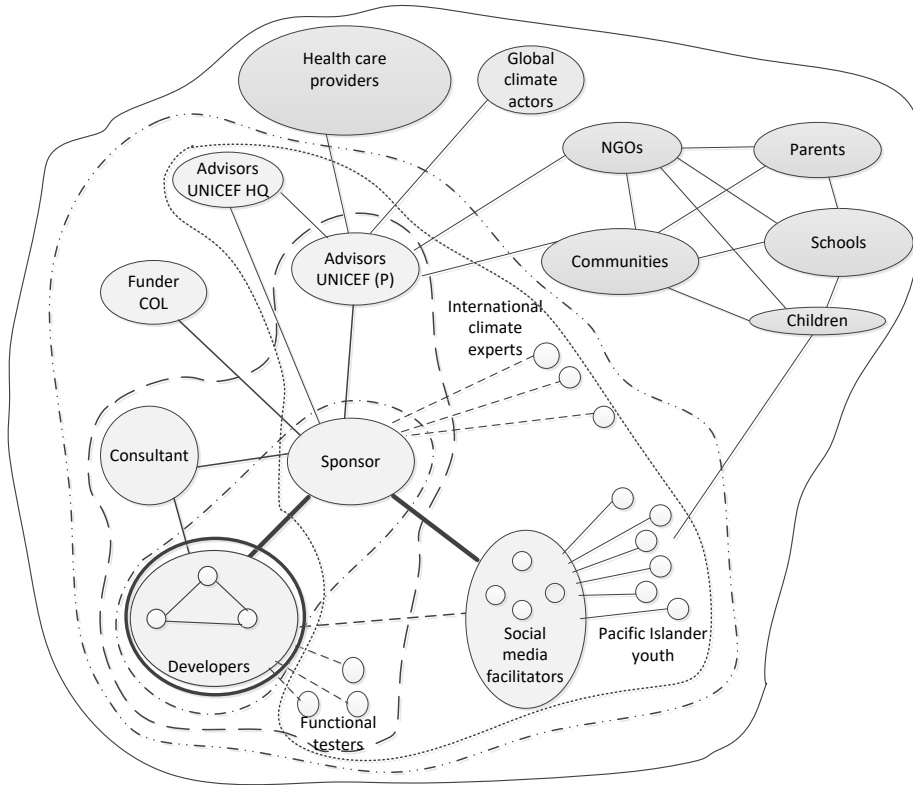
The gratification of helping others as a value proposition was an accepted value by the consultant, the three developers, UNICEF (P) staff, and the functional testers. The two former also emphasized the value of the relationships they had developed with each other and the sponsor. The developers also accepted the value of the newly gained knowledge, skills, and recognition they received for the services in the ISD activities.

Another value proposition for UNICEF (P/HQ) was the achievement of their objective: proof of concept of their social media strategy to mobilize youth in two-way communication. They and the climate experts possibly also gained value from the furtherance of their mission to spread awareness about climate change. This assumption is unverified, as is the value proposition for the COL.

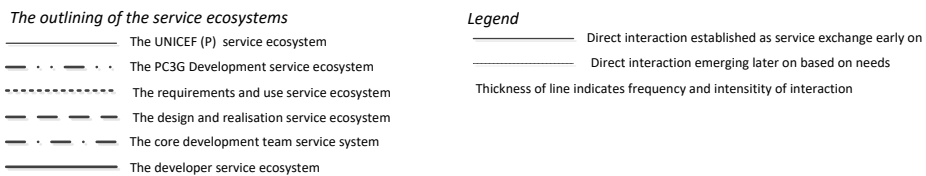
#### 6.5 Service Ecosystems

The focal point of our analysis was what we call the PC3G development service ecosystem. It was surrounded by the larger UNICEF (P) service ecosystem consisting of numerous actors in various roles such as other non-governmental organisations (NGOs), health care providers, global climate actors, parents, schools, children, communities to just name a few.

This service ecosystem consisted of two further interlocked, partly overlapping, and nested service ecosystems. The first we called ‘the requirements and use service ecosystem’. It is associated with requirements gathering and analysis, functional design evaluation, prototype and usability testing, and related feedback. The second we called ‘the design and realisation service ecosystem’. It concerns the functional and technical design, technical realisation, technical testing, and related feedback. This service ecosystem had another one embedded which we denoted ‘the core development team service ecosystem’. Within the latter another was nested, ‘the developer service ecosystem’. These service ecosystems and the actors involved are represented in Figure 3. Our analysis reveals that the project exhibited the fundamental characteristics of service ecosystems which we illustrate with some examples.



**Fig.3.** The Service Ecosystems of the PC3G Development Project.



In terms of complexity, despite its manageable number of actors compared to other service ecosystems, the project was simultaneously stable and unstable. The sponsor's initial project vision and plan, his specification of the overall requirements, the developers' formal contract, and the communication protocol, created a relatively stable space within which service exchanges unfolded. However, the project had to deal with instability brought about by the continuous flow of ideas, requirements, change requests, and feedback occasioned by the involvement of diverse actors spread across continents and time zones. The focal ecosystem balanced this complexity with emergent institutional arrangements that divided actors into the identified interlocked service ecosystems.



This emerging organizational form that allowed for a steady yet flexible response to the input coming in short iterations of controllable task size, as well as the regular planning and feedback sessions led to the emergence of a regular rhythm and work pace that afforded stability and flexibility. The organizational structure of the dispersed actors was not planned, nor was the inclusion of certain actors. The PI youth, the UNICEF staff, and the climate experts joined the project voluntarily when called upon and left of their own accord without notice. These are instances of emerging behaviors.

Self-organization unfolded as the project was not led and controlled top-down but managed in an egalitarian manner. The sponsor acted as a facilitating co-ordinator. He set up an environment with short communication paths that fostered task self-assignment, largely autonomous decision-making, and joint responsibility. Self-organization and self-governance were evidenced in the way the social media facilitators solicited and filtered requirements provided by other youth, and how the latter offered ideas. The self-directed entry and exit by PI youth, UNICEF (P/HQ) staff, and the three juvenile testers are other instances of emergent self-organization.

## **7 Discussion and Conclusion**

We have applied SDL because it puts a strong emphasis on the concepts of value and value co-creation that transcend the producer-customer/consumer/user divide (Lusch and Nambisan, 2015). The purpose of value is to increase the collective wellbeing of all actors in an ecosystem so that value co-creation becomes a contribution to the wellbeing of others (Vargo and Lusch, 2016) as was the case in the PC3G development project.

The concept of value co-creation in service ecosystems therefore warrants further reflections on the relationship between SDL, its foundational concepts and ISD methods. SDL does not prescribe operational principles or methods; it provides foundational concepts and premises. Our analysis shows and reinforces the importance of, and the increased focus on, value and value co-creation in contemporary ISD that has been advocated by agile ISD and project management methods since the early 2000s (Highsmith, 2002; Highsmith, 2009) - regardless of the application of a particular ISD method and without any relation to SDL.

Kazman and Chen (2009) argue that despite incorporating customer feedback in the development process, the application of agile ISD does not reflect an SDL perspective when customers are treated as self-contained and passive recipients of value, or as part of institutional arrangements where they are replaced by proxies. Babb and Keith (2012) in contrast reason that agile methods are well suited for the co-creation process as put forward in the SDL framework. Bjerknes and Kautz (2019) support this position through their empirical study of agile ISD as service ecosystems in three projects with institutional arrangements that followed the agile principles with a focus on value co-creation with and for customers. We therefore argue that agile ISD methods per se are not incompatible with SDL and affirm that it is not the agile methods as such that support or hinder value co-creation, but rather other institutional arrangements in which they are embedded. In the PC3G development project all characteristics of a supportive

service ecosystem were in place, including a methodological approach similar to an agile method that led to accepted value propositions and co-created value for all actors.

Based on SDL's view that all actors in a service ecosystem are partners, Babb and Keith (2012) further argue that co-creation establishes a mode of equality and empowerment under which ISD operates. In this context, co-creation has been related to participatory design (Iversen, 2014), here distributed participatory design (DPD) where the actors are geographically dispersed (Lukyanenko et al., 2016).

Our analysis demonstrates how SDL and DPD converge in contemporary ISD despite the different worldviews underlying the two approaches, because the actors were guided by communal, humanistic goals while keeping instrumental considerations in sight. Our research shows that under these circumstances the two approaches are compatible, demonstrating how humanistic and instrumental outcomes can be synergistically connected. In this way, the work contributes to a sociotechnical perspective as foundational to the IS discipline (Sarker et al., 2019). In our case, value was not predominantly co-created for and by employees and workers, but for and by diverse, voluntary actors in the service ecosystems, including research student developers, regional youth, intergovernmental organisations' staff, and subject matter experts.

Further reflecting on the theoretical and practical implications of SDL on ISD leads us to one of SDL's foundational sources: complexity science that has long been recognized as a valuable approach to understanding ISD. Several researchers have applied complexity science and provided organizing principles and suggestions for best practice of the ISD process. For instance, Benbya and McKelvey (2006) do so, but without empirical grounding, while Meso and Jain (2006) and Vidgen and Wang (2009) put forward empirical-based principles for agile ISD. Placed in the larger context of SDL and based on an analysis of large ISD projects Kazman and Chen (2009) offer principles and implications with an emphasis on egalitarian management of open, networked teams for practical application in ISD with distributed actors in crowd-sourced settings.

Our work is based on these predecessors, but rather than using SDL as a backdrop and limiting our work to any particular ISD approach, we use the full set of SDL concepts for our analysis. Our investigation empirically displays how these concepts are interrelated and allow a broad, yet holistic examination of the researched case from the different perspectives embedded in the framework. As such, we show how SDL-based principles and derived implications are advantageous for comprehending and organizing contemporary ISD.

This discussion also warrants a brief remark on SDL's demanding terminology. We found that some concepts, notably those of 'resource' and 'institutional arrangement' expose ambiguity. We also experienced that the current ISD vocabulary is still firmly rooted in a goods-dominant, firm-centric logic. It will take joint efforts to integrate SDL and its language with the constructs of projects, developers, customers, methods, and profits. This is not a straightforward task.

In conclusion, we applied Vargo and Lusch's multi-theoretical SDL framework and conceptualized ISD as service ecosystems of value co-creation. Our study confirms empirically that the framework and its conceptual devices offer a holistic perspective to capture the nature of contemporary ISD. It shows the strength of the service ecosystems metaphor as it grasps how current ISD goes beyond organizational

boundaries. Instead of bureaucratic, hierarchical structures, our analysis uncovered an emergent, dynamic network of actors involved and collaborating in ISD.

Despite its particular context, the project shares its dynamic, complex, and emergent nature with other contemporary ISD endeavors (Duggal, 2018). While we believe that our contributions based on analytical generalization (Walsham, 1995) of a single case study will hold beyond this case, we acknowledge that future research is needed to verify and refine our results.

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