Agile Development as Service Ecosystems

Full paper

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Abstract

On the background of an emerging shift from a product, goods-dominant to a service-dominant logic (SDL) in business and society, there is a need for further theoretical grounding of information systems development (ISD) in general and for agile development in particular. This paper presents SDL and the concept of service ecosystem as a promising complementary theoretical basis for broadening the understanding of agile development. Based on an analysis of in-depth interviews with experienced agile practitioners and their current involvement in large agile projects related to managing such projects, we investigate the question how agile development can be understood as a service ecosystem, and how such a perspective impacts more general on the scholarly understanding and practice of information systems development.

Keywords: Agile development, agile development projects, project management, service-dominant logic, information systems development

1 INTRODUCTION

Since its inception in the 1990s agile (software and information systems) development has received significant attention and gained wide recognition as an approach that provides values and institutional principles as described in the agile manifesto (Beck et al. 2001) for dealing with turbulent, dynamic environments and change as they are now common for many information systems development (ISD) projects (Dingsøyr et al. 2012). According to Wipler and Vorbach (2015) agile development is based on an emphasis on customer goals and values, collaboration, self-control, and self-organisation to cocreate project outcomes through increased involvement and more frequent deliveries; direct communication to make quick progress and to keep project participants engaged and focused on results, and to foster team building; and on validation through short iterations and development cycles that allow for adjustments and improvements.

However, on the background of an emerging shift from a product, goods-dominant to a service-dominant logic (SDL) in business and society (Kazman and Chen 2009), we see a need for further theoretical grounding of agile development. Concepts such as self-adjustment, value cocreation, and institutional arrangements hold a prominent role in the service ecosystem perspective (Vargo et al. 2015), which is a salient part of SDL theory (Vargo and Lusch 2016; 2019). Therefore, a theoretical foundation in SDL and the concept of service ecosystem presents a promising complementary source for broadening the understanding of agile development. Thus, in the research presented here, we aim at answering the question how agile development can be understood as a service ecosystem, and how such a perspective impacts more general on the scholarly understanding and practice of ISD. Based on our analysis of in-depth interviews with experienced agile practitioners and their current involvement in large agile projects, we focus on the management of agile projects as we are especially interested in how agile projects interact with the business environments in which they are performed. In the remainder of this paper we first provide the theoretical background for our research from the SDL and service ecosystems literature. We will then describe our research method and setting followed by our analysis and presentation of our findings, which we discuss subsequently.

2 THEORETICAL BACKGROUND: SERVICE-DOMINANT LOGIC AND SERVICE ECOSYSTEMS

Babb and Keith (2012) argue that with a larger shift toward a service paradigm, agile methods are naturally well suited to involve customers to support cocreation of value between developers and customers. Alves et al. (2016) distinguish four clusters of value cocreation approaches in the literature, 1) cocreation as business logic, 2) cocreation as a source for innovation, 3) cocreative experiences and loyalty, and 4) cocreation relationships. Within the cluster of business logic, there are three different schools (Grönroos et al. 2015). The service logic school has a focus on the service encounter, the user dominant logic school has a focus on value-in-use, and the service-dominant logic (SDL) school has a focus on the service ecosystem. In this research we use service-dominant logic (SDL) and the concept of service ecosystems as presented by Vargo and Lusch (2004; 2008; 2016; 2019) to understand agile development with a focus on managing these projects.

Vargo and Lusch (2004) first presented SDL as a distinct perspective and alternative to a goods-dominant logic and have developed it further during the last 15 years (see e.g. Vargo and Lusch 2008; 2016). SDL is based on the premise that service, defined as the application of one actor's resources, e.g., knowledge and skills, for the benefit of oneself or another, is the fundamental basis of all economic and other social exchange (Vargo at al. 2015; Vargo and Lusch 2016), focusing on the two-way dynamics of exchange, that a service is exchanged for a service (Vargo and Lusch 2019).

Vargo and Lusch (2016 p. 23) argue that "[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 [...]." Value is cocreated 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." Moreover, value is perceived and

determined by the beneficiary[1], usually a customer or a consumer, on the basis the service's value-in-use (Vargo et al. 2008; Vargo and Lusch, 2016).

The value cocreation process takes place in service ecosystems. Vargo and Lusch (2016; 2019) define a service ecosystem as "a relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange." The actors continually integrate two broad categories of resources to create value (Vargo et al. 2015). Operant resources are resources that act upon other resources. Human skills and knowledge as well as technology, as the practical application of knowledge, are operant resources. Operand resources are resources that an act is performed on. SDL claims that operant resources are the key to benefit, and that benefit is often concerned with access (Vargo and Lusch 2019). SDL views technology as an operant resource that can be an outcome of and medium for human action (Akaka and Vargo 2014), whereas Vargo and Lusch (2016) put forward that technology is an institutional phenomenon for the same reason. Vargo et al. (2015) call the development of technology that is used as part of a service proposition for "technological innovation", whereas the process of the emergence and institutionalization of the value proposition is called "market innovation" (Vargo et al. 2015).

The service ecosystems of value cocreation are coordinated through actor-generated institutions and institutional arrangements. Vargo and Lusch (2016) understand these concepts, based on institutional theories in political science, economics, and organisational studies, 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 of service ecosystems that have an impact on and can hinder or support resource integration and the value cocreation process.

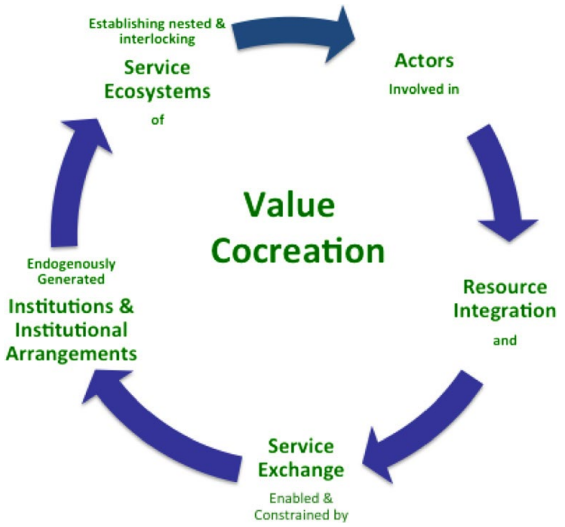

Figure 1. The narrative of SDL according to Vargo and Lusch (2016)

Service ecosystems are multi-level in their structure, where higher level structures emerge from lower level interactions (Vargo and Lusch 2016; 2019). These levels are not independent of each other, rather they present different analytical perspectives. In short, service ecosystems unfold over time as actors reciprocally provide service and cocreate value by creating and recreating institutional arrangements to coordinate the service-to-service exchange (Vargo and Lusch 2019). We will use the key ideas of SDL as depicted in Vargo and Lusch's (2016 p. 7) figure of their narrative of SDL (see figure 1), but with a particular focus on the concept service ecosystem as the point of departure for the analysis of our empirical data. Before doing so we now first introduce our research method and the research setting.

3 RESEARCH METHOD AND SETTING

This research is interpretive and part of a wider project that aims at obtaining a deeper understanding of agile development from a project management perspective. For this purpose, we interviewed 10 experienced practitioners in Norway, where agile development has been an established approach since

[1] Note that the beneficiary can also be (a member of) the firm that ultimately provides the service offering and/or the goods which transmits the service.

its early days. All informants had more than 20 years of work experience and more than 10 years of experience in agile development projects. Two of our informants shared their general knowledge as external consultants in project leadership roles, as coaches in agile development and as contract negotiator in two separate interviews with us. Four further interviews with two interview participants each took place in the context of current large agile development projects at the Norwegian Tax Authorities, the Norwegian Customs Authorities, and a large Norwegian Telco Provider. These projects were very large with up to four years running time, 40-60 sprints, and project budgets with up to US$50 million. Our informants from these projects were either hired as external consultants in project leadership roles, as coaches in agile development, or as product owner or were internal employees in the role of project leader, chief information officer or product owner. Table 1 provides an overview of all informants. The informants were recruited through a snowballing approach. We contacted one consultant in a consulting company in Oslo, Norway, which is well known for its expertise in project management and project management contracts, and she invited others to participate. Some also invited further colleagues from the projects to participate to provide a richer insight. Our questions centred around their actual work tasks, the relation to the projects' environments, and their challenges of managing agile projects.

Interview	Case org.	Informant	Role	Ext. Consultant
1	n/a	1	Project leadership, Coach	yes
2	n/a	2	Contract Consultant	yes
3	Norwegian Customs Authority	3	Project leadership, Coach	yes
		4	Chief Information Officer	no
4	Norwegian	5	Project leadership	yes
	Tax Authority	6	Project leadership	yes
5	Norwegian	7	Project leadership	no
	Tax Authority	8	Product owner	no
6	Norwegian	9	Project leadership	yes
	Telco	10	Product owner	yes

Table 1. Overview of the informants

We use the term 'project leadership' here for the role of some of our informants, because their focus was very much to get others to follow, to share the project visions, to make sure the right people were on board and worked well together, and to negotiate the environments of the projects to ensure the teams could work without unnecessary distraction, all of which exceeds the mere role of a project manager (Highsmith 2009; Floris and Cuganesan 2019).

All interviews were performed by the researchers, who are the co-authors of this paper; the informants were either interviewed in pairs or alone. We used open-ended interviews to broadly explore agile development. Each interview lasted between one and two hours, the interviews were recorded and subsequently transcribed. The interviews were supplemented with the consulting company's documentation of their agile method, "Agile Contracting and Execution" (Strand and Karlsen 2014; Hannay et al. 2017), the documentation of our observation of development practice, in particular a regular stand-up meeting during one of our visits at the Customs Authorities, and of the demonstration of a pilot and early version of a system and service under development to support customs officers and truck drivers during border control. At the Telco Provider the project management approach to estimate value and to prioritise development tasks (called benefit point in the organisation) was also presented to us. In the work undertaken so far and presented here in its current state, we aim to assess the applicability and usefulness of SDL theory and specifically of the idea of service ecosystems as a lens into the agile development process, and as such we used the theoretical concepts introduced in the previous section and thematically coded and analysed the transcriptions of the 6 interviews with the 10 informants and our supplementary documentation.

4 ANALYSIS AND FINDINGS

The following findings are primarily based on the analysis of the agile development service ecosystems which we identified at the Customs Authorities and the Tax Authorities. We will use the case of the Tax Authorities as prototypical example and supplement our analysis where necessary and possible with data from the Customs Authorities, the Telco and our other data sources. In our analysis we focus on the similarities between the cases. The analysis is structured as follows: first we present the actor-to-actor

network in the agile development service eco system at the Tax Authorities, then we show how the actors integrate resources within the service ecosystem for the benefit of the resulting information system. This analysis also includes actors in the environment, but outside the agile development service ecosystem, who are related to the value creation. The last part of our analysis comprises an examination of the different institutional arrangements that support the value cocreation.

4.1 The actor-to-actor network

The actor-to-actor network in the agile development service eco system at the Tax Authorities is depicted in figure 2. It consists of developers, functional specialists and testers in feature development teams which have pilot users and a product owner assigned to them. Furthermore, the feature development teams are headed by project leaders, are coordinated by a cross coordination groups, receive advice from an advisory group and have a steering group as a superordinate unit. The full lines in the figure indicate service-to-service exchange; the dotted lines represent the replicated structure for all feature development teams.

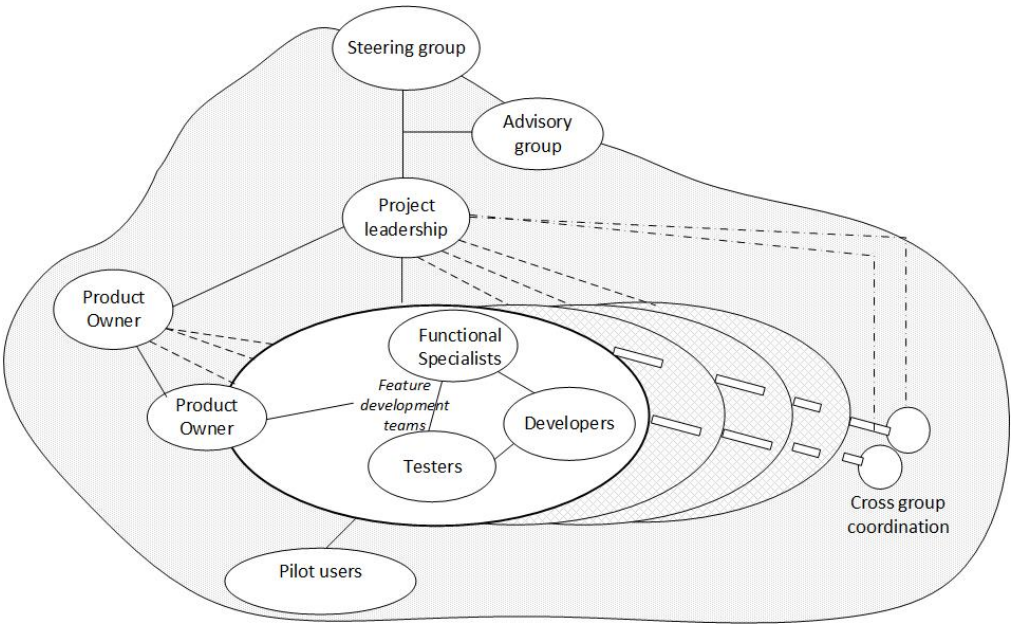

Figure 2. The actor-to-actor network in the agile development service ecosystem at the Tax Authorities.

4.2 The actors' service and resource integration

All projects in the case organisations which we studied had steering groups, as is common in Norway. The role of the steering groups was to set directions in line with the perceived value of each feature, based on input from the project leaders and product owners. The steering group in the project in the Tax Authorities comprises the directors of the organisation. The resources they contribute are their skills to understand and communicate the organisation's strategy and its objective; their service to the agile development project and service ecosystem is to provide and prioritise the development directions based on the perceived, direct value for the organisation and its customers in relation to the estimated costs. To perform their task the steering group members exchange information among themselves and with the project leaders, who also provide reports and advice. They are supported in this task by the advisory groups, which consist of middle managers, who in contrast to strategic knowledge, provide their operational knowledge as a resource to be integrated into the project. The addition of advisory groups is specific for the Tax Authorities.

While all actors in SDL are considered resource integrators, our informants who mainly were project leaders and product owners, emphasized these roles' resource integration duties and explicitly stated this as a particular skill where the project leader both acts as a coach and facilitator with a strong focus on team work, and focus on the quality of the developed software which has to provide a service and value to their ultimate user. The project leaders coordinate between the teams, meet with the Scrum masters of the teams, and with members of other functional teams such as teams of architects or interaction designers which in this study were identified as actors in the agile development service ecosystems at the Customs Authorities. The project leaders also provide the steering groups with the necessary strategic, not operational or technical information, to allow this group to make their respective

decisions. They also negotiate the environments of the projects. The agile development service ecosystem at the Tax Authorities in addition has an overall product owner who operates outside the feature development teams.

In the agile development service ecosystem at the Tax Authorities the product owner as another particular resource integrator builds the bridge between the tax officers, the taxpayers, and the developers in the feature development teams whose task it is to provide a useful and usable service to the ultimate user. The product owner achieves this by breaking the overall business goals for the project down into measurable objectives, then creating so-called epics, large user stories based on high level requirements that are linked to the objectives, and subsequently refining the epics into smaller, manageable user stories. Our informants insisted on that a user story always has to offer value to a user or particular user group, and they emphasized the necessity of building a broader conceptual and architectural basis for their systems and platforms before defining particular user stories to accommodate for continuous change.

The informants at both the Tax and Customs Authorities strongly put forward that the product owner has to be, and in their projects is, a professional with a background and understanding of IT and digital technologies to be credible when discussing with technical development staff. The product owner also needs deep knowledge of the business area, but should not be a business representative, as one of the most important tasks of the product owner is to decide what *not* to develop, a decision many business representatives are unable to make. The role of the product owner is crucial in agile development, as one of our informants put it, "you cannot do agile without a well-functioning product owner".

In line with the agile principles the product owner ensures that only features and services are developed which provide a value offering to some possible beneficiary. In all organisations which we studied, the product owner also develops the user stories, prioritises them for the feature development teams, and makes sure that the developed stories have the right quality and that each story provides value to the business, both the business organisation and its customers. As one product owner put it "Concerning skills, being a product owner is an own knowledge field…You must understand project management…, you have to understand the business, choose a process and be an expert on writing requirements, set requirements to architecture and approve [data] models."

Individual features of the information systems are developed in agile feature development teams which can be considered as service ecosystems embedded into the overall agile development service ecosystem. Each team at the Tax and Customs Authorities consists of a product owner for the particular feature, a scrum master who is part of team of developers; this team also includes testers and functional or business specialists, who at the Tax and Customs Authorities are officers and case workers. At the Telco these often were employees with knowledge of the related business process or user experience experts, who represented the organisation's customers.

With the whole information system in mind, the individual features and services are developed to be as independent as possible. The resources that are integrated by the different team members and the services they exchange among each other transform the user stories into useful executable code. The product owner provides overall direction. At the Tax Authorities functional specialists provide knowledge about the business and current practices, including the constraints through laws, regulations and policies. The developers offer technical knowledge and technological skills, and the testers provide test knowledge. These embedded service ecosystems are instances of self-contained, self-adjusting systems.

At the Tax Authorities pilot users use new functionality as soon as it is developed and provide feedback to the development team about how the developed systems work in actual work settings. In one of the projects, the initial group of pilot users was very small, just two people in one tax office that deals with a very simple tax for an imported goods, in that particular case sugar. This however was sufficient to test that the whole business process worked, and after this proof of concept further areas could be added. The service here was that the pilot users got new functionality early, and the developers received feedback and satisfaction from seeing that their code was used and was useful.

At the Customs Authorities all code is read by another developer and cannot be passed on before all identified errors are corrected. When the developers have corrected their part of the code, a technical test is run by another developer in the role of a tester, then specialist testers run the integrated code through further tests, until ultimately functional tests are performed by the functional specialist before a feature is released for what at the Customs Authorities is called production. This is another example of resource integration and service exchange by several actors which contributes to mutual value in the form of correct code for the individual developers, which reduces rework, and for the functional

specialists as representatives of the organisation's customers, in this case their own customs officers and citizens and organisations that import goods into the country, in that they get working code.

At the Tax Authorities the unit that is responsible for rolling out new systems and for ensuring that new business processes and the new digital information system and services are aligned is not following an agile approach. This unit still adheres to a change process that encompasses the implementation of a 'complete' digital system in the whole organisation instead of rolling out new technology, functionality, and services gradually as they are developed and available for particular stakeholders within and outside the organisation. Our informants sensed a mutual tension between the two approaches and the respective units which follow them. In this context several informants stated a concern regarding "how many [people] can you involve in the [agile development] project?" as a background for their lacking attempts to involve the rollout unit in their processes and the rollout unit's lacking efforts to get involved in the actual development projects. On this background we do not consider the rollout unit as part of the agile development service ecosystem. At the Customs Authorities the project leader whom we interviewed stated that their operations employees did not have the competence to operate on the new platform with microservices. Thus as operations competence to a certain extent was represented in their development teams which they called Scrum teams; it was these teams that at least daily rolled out new versions of the information systems. This was not in line with normal operational procedures; therefore also in that organisation a tension between the agile development service ecosystem and parts of its environment existed.

4.3 Institutional arrangements

The institutional arrangements at both the Tax and the Customs Authorities as public sector organisations are grounded on directives from the Norwegian government, which according to our informants requests digital solutions so that the sector can be as efficient as possible, in addition to regulations that set high level requirements for all the processes in these authorities. A second institutional arrangement that impacts on the agile development service ecosystems are the contracts that guide the cooperation in the projects. In addition to their own staff both organisations hired external consultants for project leadership and as product owners to act on their behalf, as well as developers who are paid on a time and material basis as part of framework agreements. Yet the organisations take full responsibility for the projects themselves. The use of the time and material contract type reflects that the organisations have sufficient maturity, knowledge and skill to undertake such projects. The governance structures coordinate the value cocreation through well-defined mandates and reporting lines for the steering boards, advisory groups, project leaders, product owners, and feature development teams and any other teams that are part of the institutional arrangements, which support and constrain the service ecosystems.

In this context all informants underlined the important role of trust between all involved stakeholders and actors to deal with the high level of uncertainty in agile development. They reported that supported by the contractual arrangements, a collegial, error-tolerant culture with functioning teams prevailed, in which the project members as actors in the service ecosystems learn from each other, are trusted by their leaders, and trust and have respect for each other. As they are allowed to make mistakes, which are identified and rectified through intensive testing and through the development of experimental pilot solutions, adversarial behaviours such as mutual blaming, quarrelling, and confrontations are uncommon.

Work practices such as the before mentioned process of testing with its focus on minimum viable, independent features and services based on self-contained user stories support mutual and rapid value creation. The work practices are part of the shared development method, which also includes other practices such as stand-up, reviews, and retrospectives meetings to report on performed and planned work, and to distribute future tasks. The methodological approach used in both organisations as an institutional arrangement is based on the well-known Scrum method. The Scrum method and framework is in both organisations supported by digital and manual tools, which support project communication and coordination, such as project management and bug tracking tools, task boards and backlog boards as well as automated testing and configuration management tools, which are both resources and institutional arrangements, and can said to be enablers of human action whereas the resulting information systems are the outcomes of the process.

Technology furthermore plays a broader institutional role. In one of the projects, tasks were moved from the Customs Authorities to the Tax Authorities. In the Customs Authorities this led to an opportunity to examine the existing digital platform for a possible update, in addition to removing data they were no longer allowed to store according to the EU's General Data Protection Regulation, thus they decided to implement a digital platform with micro services to reduce the development time of new functionality.

At the Telco Provider existing infrastructure, which according to one informant was "like an old oak, with roots everywhere", hindered business objectives such as time to market. The agile development service ecosystem had initially considered to develop a digital platform with micro services. Instead, based on a benefit assessment, the steering group decided to implement automated regression testing to minimize total development time and consequently time to market. These examples illustrate how digital infrastructures and platforms as institutional arrangements hinder and support value cocreation.

Finally, the physical workspace represents an institutional arrangement. In the agile development service ecosystems in both the Tax and the Customs Authorities all feature development teams work in open office landscapes, in huge rooms with many people. This allows for efficient communication and cooperation and replaces the traditional coordination through extensive project documentation. One project manager emphasised the significance of this arrangement as follows: "Landscapes … are important, that you can feel the mood. You see and hear if there is something you need to do. And if there isn't, you do nothing […]". "We have to sit together. There is less documentation because we sit and work together [face-to-face]."

The concept of agile development is based on continuous change, in that it is expected that requirements will change over time. Our informants also noted how the institutional arrangements are changing over time. In the Tax Authorities, in one project they first organised the feature development teams related to the different technological layers of the intended information system. This did not work well, as it took too long for new features to be released, so the teams were reorganised to work according to types of features and coordinating structures were introduced as the individual projects grew bigger. Table 2 summarizes our findings of understanding agile development as service ecosystems in a service-dominant Logic in the three case settings.

Concept	**Instances in our Case Settings** **Tax Authorities, Customs Authorities, Telco Provider**
The cocreated value (the value proposition)	Working information systems
Service ecosystem	The entire development projects, with nested and interlocked service ecosystems such as the feature development teams, cross-functional teams
Actors	Steering groups, project managers, product owners, development teams consisting of developers, testers and functional specialists, pilot users
Resource integration	Coordination and acquisition of qualified actors; application of skill skills such as: negotiation, business knowledge, requirement specifications in the form of epics and user stories, programming, testing; technology such as task boards, development platforms, regression testing, and configuration management tools
Service-to-service exchange	Information, code in various stages of development, feedback
Institutional arrangements	Directions from government, strategy/purpose of organisation, laws and regulations, contracts, norms based on mutual trust, shared method, physical arrangements, technology

Table 2. Agile development as service ecosystems in SDL

5 DISCUSSION AND CONCLUSION

With data collected mainly from and with a focus on project leaders and product owners we demonstrated through our cases how agile systems development can be understood in terms of service ecosystems. According to the definition of SDL and service ecosystems, the beneficiaries of any mutual or value cocreation are actors in the service ecosystem. In our study with its focus on agile development as service ecosystems and in our case organisations, at least some groups of ultimate beneficiaries, such as customers, citizens and businesses, were only represented through employees and officers of the organisations in the development teams and through pilot users from the organisations, who were representative partners in the service encounters, and through substitutes such as user interface experts. In this sense, the resulting information systems can only be understood as a value proposition, which will not turn into a service before there is value-in-use. Nevertheless, Vargo et al. (2015) argue that this is the nature of a technological innovation, and that technological innovation as such can be understood as a service ecosystem.

The agile development service ecosystems which we studied were all well-established. Barriers in agile development that have been reported from other studies, such as adversarial contracts, requests for detailed requirements specifications before project approval, or governance structures related strictly to time, cost and scope (van Waardenburg and van Vliet 2013; Dikert et al. 2016) had been replaced by

time and material contracts, practices where users participate in the development and requirements emerge through cooperation, and governance focusing on value, quality and constraints (Highsmith 2009). At the Tax Authorities pilot users are allowed to use the new systems early in operation, however, when it comes to rollout, a concerted enterprise-wide approach still prevails as we identified a gap between agile development and organisational implementation. In terms of SDL there is a disconnect between technological and market innovation. While the development division of the organisation is agile, the remainder of the organisation is not. This may lessen the value proposition in that new functionality that leads to more efficient processes or new services may take longer to implement.

The notion of institutional arrangements for coordination within the service ecosystem coupled with the layered approach to service ecosystems gives a new perspective on the traditional roles in ISD. In our case settings, the teams to a large extent managed and coordinated the development themselves through a disciplined approach and by being held accountable for the results, much in line with what Dingsøyr et al. (2018) report from their research of large-scale agile development. Thus, some of the actors' roles rather are or have become facilitating functions between the agile development service ecosystems and other service ecosystems in contrast to their traditional control and governance function in conventional information systems development. For instance, in all the case we studied the steering groups represent the most important stakeholders of the agile development projects and become a coordination mechanism between the projects and the business organisation that commissioned the projects. Our informants had put forward that the product owner role is neither a technical nor a business role. This role is another coordination mechanism: product owners are the custodians of the social-technical aspects of a project as they consider both the business goals and the existing technical infrastructure when prioritising requirements. In line with Highsmith's (2009) assertion that agile projects need leadership as well as management, our findings confirm that project leaders in service ecosystems coordinate the people within the project by setting up the project organisation and acquiring the right participants and attune the needs of the project with the activities in surrounding organisation. By doing so, they create the context for cocreation of value.

A critical assessment of SDL has to take into account the role of digital technology. It seems straightforward to regard digital technology such as development tools, automated testing tools, configuration management tools and communications tools as operant resources. Digital technology in the form of digital platforms have the capacity to support and hinder cocreation of value, the latter by contributing to what Rolland et al. (2018) call digital debt, namely "the build-up of technical and informational obligations that affect a platform's maintenance and evolvability as part of a user organization's digital infrastructure" (Rolland et al. 2018). On this background we argue that digital platforms should or could be seen as institutional arrangements as they emerge over time and are indeed the result of previous resource integration. Still, sometimes digital platforms may be seen as an actors that deploy control strategies and mechanisms to realise labour efforts as e.g. in the cases of UberEats and Deliveroo (Veen et al. 2019). Digital technology can be either an operant resource, an institution, or an actor, therefore the attempts to categorise technology in just one of the concepts provided by SDL has been challenging and is not very effective. Thus, we argue that an extended understanding of digital technology through e.g. the lens of sociomateriality in line with Orlikowski (2007) and Orlikowski and Scott (2008) might strengthen SDL's usefulness for understanding and undertaking ISD in the digital age.

To summarize, regarding agile development (projects) as service ecosystems grounded in SDL focuses on the cocreation of value creation and the coordination which is needed within a project and between the project and the surrounding and/or commissioning organisation, at the same time as it includes a view on how digital technology may support or hinder both coordination and the cocreation of value. The emphasis on value for a beneficiary resonates well with projects that focus on customer value, which is the goal of many contemporary digital transformation projects (Urbach and Röglinger 2019).

In conclusion, a final note of caution concerning our research presented here is however appropriate. Our informants emphasised that Norway is a homogenic and relatively egalitarian society, where agile development and working in autonomous teams, in which developers, users, and other stakeholders cocreate information systems and services is considered a natural evolution of the way ISD has developed over time. This is influenced by the Norwegian legislation that has required consultation with employees and the union representatives in IT projects since 1977 (NEW Act 1977). Further research in environments where ISD is traditionally organised more hierarchically (see e.g. van Waardenburg and van Vliet 2013) is therefore necessary; we are currently in the process of designing such a study.

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Acknowledgements

We would like to thank our informants from Promis AS, The Norwegian Customs Authority, the Norwegian Tax Authority, and Scienta AS. A special thank goes to Siri Sundby, Promis AS, who organised the interviews. We would also like to thank the anonymous reviewers for their insightful and constructive comments to an earlier version of this paper.