Analyzing an Ecosystem for Complex Consumer Services

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Abstract. Complex consumer services denote an arbitrary combination of services that fulfil a particular need based on consumer-defined context and requirements. While contemporary service environments are predominately supply-oriented and focused on the provision of single services, complex consumer services require dynamic and co-evolving networked structures (i.e., business ecosystems) to support consumers requesting and transacting such complex services. This paper outlines a consumer-oriented business ecosystem by describing its actors, primary roles, and the value exchanges between them, as well as, illustrates the structural leverage points relevant for the development and growth of such an ecosystem.

Keywords: Business Ecosystem, Complex Consumer Services, Value Networks

1 Introduction

The recent technological developments toward an interconnected world are opening up new opportunities for commercial exchange and give rise to a novel type of products and services that have not been possible before [7]. These can be combined and personalized in a way to satisfy the individual needs and contextual requirements of the consumer emphasizing the primacy of customer experience and the distributed co-creation of value [4].

Consider a tourist who wants to visit a concert and a mountaintop close to the city using the mountain railway; this includes reservation of tickets and searching for parking close to it. Also the mountain railway is only attractive if the weather is good and the queue is short. As a consumer, our tourist is asking for a *complex service* that can be satisfied with service providers offering distinct parts of the complex service. We define a *complex consumer service as any arbitrary combination of single services that fulfil a particular need based on the consumer-defined context.* This context is seen as a richer description of the demand – for our tourist including, e.g., schedule and environmental constraints like weather, location or other state-related data.

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Contemporary service environments are predominately supply-oriented and focused on the provision of single services or a pre-defined combination of them. And thus, limited to support consumers to compose different cross-domain services in one complex service to fulfil a particular consumer-defined context, and to transact it in one single enclosing transaction to avoid switching costs. Our previous work [9], [5] addressed those issues from the technological perspective and proposes Distributed Market Spaces (DMS) – an exchange environment supporting consumers and providers in making transactions of complex products and services in a decentralized, peer-to-peer manner. We argue that the DMS architecture can serve as a technical infrastructure for dynamic structures of interconnected actors, i.e., business ecosystems, required to support complex consumer services. Yet, for a business ecosystem to be created an enabling infrastructure is necessary but not sufficient as it cannot cover the mechanisms by which the different actors interact to create and share value, nor how those interactions impact the business ecosystem during its life cycle.

The main contribution of this paper is to outline such a consumer-oriented ecosystem for complex consumer services from the business perspective and illustrate its structural leverage points. It describes the main actors, roles and the vital value exchanges needed to support the shared purpose, and analyses the main dynamics of the development and growth of such ecosystem.

This paper is structured as follows: Section 2 presents the background of business ecosystems and value networks. Followed by Section 3, that describes the identified actors, roles and the primary value created for each of them and briefly discusses the ecosystem's dynamics. Section 4 concludes this paper with a summary and outlook.

2 Business Ecosystems as Value Networks

A business ecosystem refers to "an economic community supported by a foundation of interacting organizations and individuals" [8], that uses common standards and collectively provides goods and services to their customers [12]. Including customers, providers, competitors, institutions, and other stakeholders, which are integrated into a massive interconnected network, i.e., value network, business ecosystems create value through a process of cooperation and competition [6],[13]. The literature on business ecosystems suggests that the following factors are crucial for a successful ecosystem [6], [10], [13]. First, how value is created to attract and retain ecosystem's participants and provide growth potential, and second, how value is shared in the ecosystem as a whole.

Aiming to answer these questions for our business ecosystem for complex consumer services, we engage the widely-recognized Value Network Analysis (VNA) by [1]. Accordingly, a value network generates value through dynamic and complex exchanges between its actors and can be mapped as a flow diagram showing services, revenue streams, and knowledge flows, as well as dynamics visible through the value network perspective.

In this work, we utilized the VNA method to identify the overall pattern of exchanges and value creation within the ecosystem for complex consumer services. Thereby, we concentrated on the primary actors and their interactions considered essential for the business ecosystem to be established. The next section summarizes our initial findings.

3 Outlining an Ecosystem for Complex Consumer Services

Following, we describe and briefly discuss our findings beginning with the formulation of the shared purpose as establishing of *a consumer-oriented business ecosystem that enables complex consumer services in a decentralized, peer-to-peer manner.*

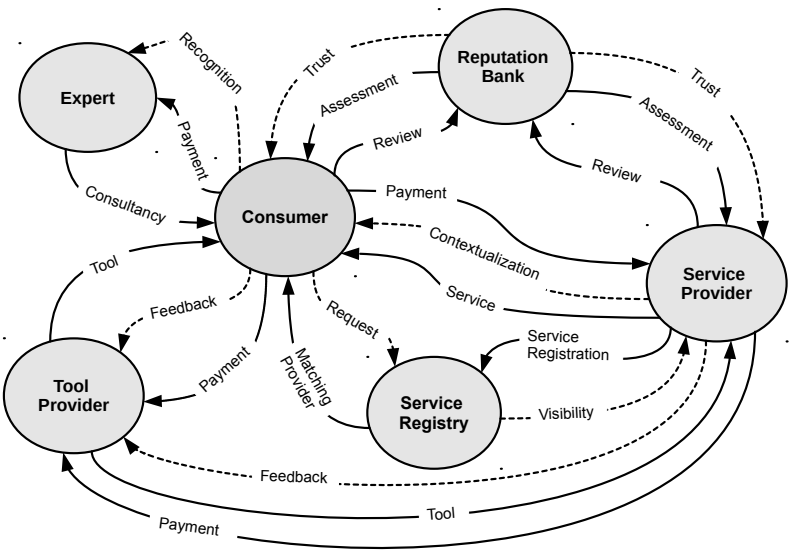

Figure 1: Mapping an ecosystem for complex consumer services.

3.1 Actors and Value Created

There are (at least) six roles for the actors of a consumer-oriented ecosystem for complex consumer services: *Consumer, Service Provider, Tool Provider, Expert, Service Registry and Reputation Bank.* Actors can be individuals, companies,

institutions, associations, networks as well as autonomous agents (e.g., software agents and machines).

Whereas consumer and service provider are considered as the shaper roles, others are seen as enablers. They support the value creation within the ecosystem and contribute to its ability to provide comprehensive services, hence build the foundation for its health and vitality. Given the shared purpose, the ecosystem's value creation needs to be organized around the transaction process of complex consumer services. As to [2], the transaction process divides in information (formulating demand), negotiation (matching and ordering), settlement (realizing the transaction regarding payment and delivery), and after-sales (reviews).

Table 1: Roles and expected values.

Role	Description	Expected Value
Consumer	Requesting a complex consumer service.	To satisfy a particular need defined through a transaction of a complex consumer service in a reliable and trustful manner.
Service Provider	Offering services in one particular domain or many domains.	To earn revenue per service sold (*payment*), increase *visibility*, and the level of customization utilizing contextual information (*contextualization*).
Tool Provider	Providing tools to support the transaction process (information, negotiation, settlement and after-sales activities).	To earn revenue by guaranteeing availability only to paying users (*payment*), and to leverage the user's *feedback* for improvement and development of tools.
Expert	Offering noted knowledge and expertise to support consumers making informed decisions.	To earn revenue through *consultancy* and increase own image through consumer's *recognition* of providing consultancy as the value added service.
Service Registry	Matching requests and registered services and resolving information required for the transaction process.	To acquire knowledge about prevailing offerings (*service registrations*) and current demand for services represented through consumer's *requests*.
Reputation Bank	Assessing ecosystem's actors regarding their reliability, solvency and worthiness.	To capture *reviews* about current transactions needed for qualified *assessments* and establishing an adequate level of *trust* among actors considered essential for peer-to-peer networks [3].

Table 1 summarizes aforementioned roles briefly describing their core function and motivation, i.e., expected value from the participation in the ecosystem. Identified roles can overlap as a consumer can act as, e.g., a service provider, expert or tool provider, and be taken concurrently, as they do not exclude each other. Figure 1 illustrates the overall pattern of exchanges between these roles.

The nodes represent actors performing a role and the arrows the vital interactions indicating the 'value exchanges' between roles. Solid lines represent the 'tangible' exchanges such as payment or service and the dotted ones 'intangibles' like feedback or trust.

3.2 Ecosystem Dynamics

This section briefly discusses the dynamics considered relevant to ecosystem's development and growth. Following [11], the basic dynamics can be illustrated by a causal loop diagram, as shown in Figure 2.

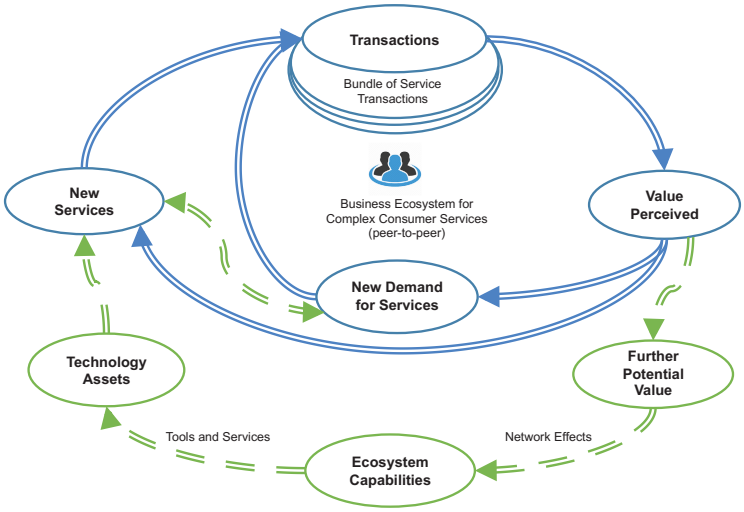

Figure 2: Dynamics of a business ecosystem for complex consumer services.

The transactions (a bundle of single service transactions in one enclosing transaction) constitute the basis for the 'value perceived' as the overall value created through value exchanges (cf. Table 1). Value perceived can generate additional value effects relevant for the ecosystem's operational level represented through solid line loops. Namely, to initiate the new 'demand for services' increasing the ecosystem's traffic and volume, that in turn may attract new consumer and service providers to join the ecosystem and thus, initiate new transactions. That can work in both directions, as either the availability of services can increase the demand, and higher demand may attract more provider and open up opportunities for the creation of entirely 'new services'.

Moreover, value perceived may generate 'further potential value' relevant to the strategic level of the ecosystem as illustrated by dotted lines. Reinforcing the operational loop can cause positive network externalities, i.e., network effects, increasing the value of services depending on the number of other consumers using it. Network effects may also open up the potential for the development

of the ecosystem's foundations, i.e., technology assets like infrastructure and tools, as well as improve the quality of its services in general. Hence, build ecosystem's capabilities to adapt to evolving dynamics and provide for its health and vitality. Effects above may also manifest simultaneously, have a different impact on various stages of the ecosystem's life cycle, or even reinforce each other in a negative way; but due to the brevity of this paper, considered as part of the future work.

4 Conclusion and Future Work

This paper outlined a consumer-oriented business system for complex consumer services. First, we identified the primary roles and the overall value exchange pattern that must be supported by an underlying technical infrastructure while establishing such a business ecosystem. Afterward, we illustrated structural leverage points and discussed value dynamics considered important for development and growth. Thereby we concentrated on roles critical for the value creation organized around the transaction process, as well as, on the positive reinforcement loops neglecting other effects that may manifest over the time and balance the favourable ecosystem's dynamics. In our future work, we will focus on two areas that require additional analysis; the further roles and how they realize value from value exchanges, and the ecosystem's capabilities to create, extend and leverage value and provide comprehensive services to all ecosystem's participants.

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