The user interface as a platform for interlinked e-services supporting two-sided market customers

Göran Hultgren [a] and Owen Eriksson [b]

[a] Dalarna University, Sweden
[b] Uppsala University, Sweden

Abstract

The purpose of the paper is to present a framework for how interlinked e-services can be analyzed, which could be used to design user interfaces that are transparent for customers. What makes the design of the interface complicated in an e-service context, and different compared to systems used in an intra-organizational context, are the various possibilities to interlink several e-services. In order to design *transparent* IT interfaces, we have to know what the service provider offers and takes responsibility for, and how interrelated e-services provided by other service providers should be presented through the interface without creating confusion, mistakes and misunderstanding for the customers. We claim that the framework presented in this paper shows how important it is to combine the design principle for IT systems interfaces that advise the consistent use of functionalities, colours, frames, messages, etc., with a social interaction and network perspective of e-services, in order to design user interfaces that are transparent for customers.

1 Introduction

Today, much of the world economy is focused on the service sector (Stafford and Saunders 2004). One of the changes driving service economic growth has been the rapid development in computer technology, mobile technology and the Internet (ibid.). There are e.g. mobile positioning services, traffic information services and Self Service Technology (SST) services such as banking services on the Internet. With the help of channels such as the Internet and mobile telecommunications, information and functionalities are delivered by service providers, and are used by customers with the help of information technology (IT) systems.

Service thinking implies a shift of context from the use of the IT system in an intra-organizational context to an extra-organizational use where it is the market, and

the customers' use and benefits that are in focus, not the organizational and the employees' use of the IT system. This can be contrasted to the intra-organizational view that has dominated IS research, and is defined by Frisco (Framework of Information System Concepts), (Falkenberg, 1998):

"Information systems exist exclusively within organisations, to support their work, and to fulfil their information and communication requirements. To understand information systems, we therefore need to understand organisations, what they are, how they work, what their components are, and what their structure and behaviour is. Thus, we will borrow from organisation science. Organisations can be viewed as systems, organisational systems. In this view, information systems are specific subsystems of organisational systems."

In contrast to this, we chose the term *e-service* to talk about the extra-organizational use of IT systems, and regarding IT systems as a utility, not as as a software product (a commodity). The customers only pay, directly or indirectly, for the use of IT system.

The notion of service is defined by the International Standardization Organization (ISO 9004-2:1991:4) as: *"Supplier activities at the interface with a customer and the results of all supplier activities to meet customer needs"*. In contrast to this, Rowley (2006) concludes that an e-service is deeds, efforts or performances whose delivery is mediated by information technology (IT). Thus, in the case of e-services, the service interface is the user interface of an IT system where the service provider and his IT system are used for interacting with the customer. The user interface consists of a series of screen documents providing different functionalities and messages. As a consequence, to deliver e-services it is important to recognize usability aspects of e.g. web interfaces. One fundamental claim in web design research is to design user interfaces informing the users both what to do and how to do it, by being uniform in the use of functionalities, colors, frames, messages, etc. (Nielsen 2000). A fundamental claim in service quality research is to be explicit about the service offered to the customer (Grönroos et al., 2000; Santos 2003). Thus, in the context of e-services, the user interface should make the e-service offered explicit for the customer by a consistent use of functionalities, colors, frames, messages, etc. However, the problem is that in several cases there is not a one-to-one relation between a specific e-service and the user interface presenting it. Instead, several e-services are *interlinked* and presented by the user interface consisting of several screen documents, and this makes the user interface complex and obscure for the customer.

We claim that there is a need to be explicit about the meaning of a single e-service, and how it inter-relates to other e-services (Eriksson, 2013a; 2013b). Applying an e-service design perspective, different and interlinked e-services could be made more explicit. The purpose of this paper is to present a framework for how interlinked e-services can be analyzed, which could be used to design user interfaces that are transparent for the customers. The paper is structured as follows: In the next section, the notion of e-service is described. In the third section, the framework for the analysis of interlinked e-services, and the research approach is presented. Thereafter an e-marketplace is analyzed with the framework in order to show its applicability. Finally, we discuss the findings and conclude the paper.

2 The e-service concept

Although the e-service concept has been increasingly important for the IS discipline for a long time, researchers have been using different terms and definitions to describe the notion of e-service such as web-services, IT-services, Computational service, Adaptive service, Networking service, and Collaborative service (Mathiassen and Sörensen, 2002; Rowling, 2006). It is not clear what should be considered as an e-service and how they differ from traditional services. There is also a new academic discipline called Service Science emerging (Blomberg, 2013). The aim with this discipline is to bring together computer science, operations research, industrial engineering, management sciences, and social and legal sciences, in order to develop the skills required for a services-led economy. In this line of research, Cardoso et al. (2009, p. 18) define an e-service as "*a collection of network-resident software services accessible through standardized protocols, whose functionality can be automatically discovered and integrated into applications or composed to form more complex services*".

In SMT literature, the notion of e-service (Hultgren 2007) has been foremost described as a Self-Service Technology (SST). A self-service is defined, as "*service in which there is no direct assistance from or interaction with a human service agent*". For example Sousa and Voss (2012:789) define e-services as "services produced by customers by interacting with a web site, excluding any interactions with service employees".

It is correct that in e-services there is usually no face-to-face interaction between the customer and the service provider. Instead, the e-service meeting is mediated through the interface of an IT system. However, this does not mean that there is no social interaction taking place, because the IT system is a machine designed for human communication, and communication is social interaction no matter if it is performed face-to-face, or mediated by an IT system. Based on that assumption, we can define the notion of e-service from a social interaction perspective as "*social interaction between an service provider and an customer, and/or between customers, using the IT-system of the service provider with the purpose of providing a result for the customer.*" This definition is based on the idea that IT systems are used for social interaction, and the principle of non-ownership (see Hultgren and Eriksson, 2014a, for a more detailed discussion on this matter). If the customer owns the IT system, it is not meaningful to talk about an e-service, because then the customer has purchased a commodity product (a piece of software) and is not using the IT-system as a service. The customers (as external users) can be clients in a commercial context or citizens in public context. Based on the definition of the e-service as social interaction mediated by IT systems, the social interaction can be described with the emphasis on three characteristics: the service result, relationships and processes.

The *service specification* describes the e-service produced, and is what the service provider is responsible for. The service specification can be divided into a description of core e-services and additional e-services, where the additional e-services are complementary to the core e-service in order to make the e-service more useful. It is fundamental that e-services are produced in the interaction between an service provider and an customer (or several customers) in order to fulfil customer needs, and that the IT system is used in a social interaction context that consists of actors, social relationships, norms, rules, values and expectations.

The *relationships* are created and maintained by the communication performed between the service provider and the customer(s) mediated and performed by the IT system. It is also important to stress that these relationships are not only technical in character; they are also social, because they are based on the interpretation of communication acts performed in a social context. The communication acts are used to create relationships based on information, commitments and expectations. Based on the actor roles, those of the service provider and the customer, there are two basic relationships in the e-service context: the service-provider to customer relationship; and the customer-to-customer relationship.

The *process* is the chain of activities where the service provider, the IT system and the customer(s) perform communication actions through the interface of the IT system.

3   A framework for the analysis of interlinked e-services

The definition of e-service concept described above outlines three cornerstones when describing one single e-service: the service result, the relationships and the process. But in order to analyze interlinked e-services, we have to look closely at the user interface and introduce a number of additional concepts.

3.1   The user interface

The *user interface* for the customer consists of functionality, information and screen layout. Functionality is what type of communication actions are possible to perform through the user interface; information includes the messages, pictures and logotypes presented at the interface; and the screen layout consists of different frames, colors, buttons, menus and windows.

The user interface is often comprised of a series of screen documents. Within web design research, it is recognized to be important to keep these documents together in a uniform manner in order to develop a usable IT system "telling" the user what to do and how (e.g. Nielsen 2000). You could for example use Cascading Style Sheets (CSS) in order to accomplish this. CSS is used to enable the separation of document content, i.e. functionality and information, from document presentation, including elements such as the layout, colors, and fonts.

3.2   The focused e-service

As e-services are interlinked; we have to decide from which e-service, i.e. service result, we will start our analysis, because interlinked e-services are nodes in a network of other e-services and you have to choose a node from which the network analysis could start. We use the term *focused e-service* to talk about the starting point of the analysis. A focused e-service consists of several core and additional services, i.e. a service result provided by an service provider. A focused e-service can be presented by several screen documents and it is therefore important to distinguish between documents that are related to each other or not. The reason is twofold: (1) it is important to understand the e-service specification and the relationships that are created and maintained, which is the intended result of the e-service; (2) it is important to recognize the process and what functionality and information constitutes the e-service.

3.3   The service environment

It is common that the interface presented to the customer contains functionalities and messages beyond the scope of the focused e-service. We use the term *service complement* in order to talk about these messages and functionalities, i.e. links to other e-services. The e-service environment consists of the combination of the e-service complement and the focused e-service.

3.4   Three types of e-services

Based on the notions of focused e-service, e-service complement and e-service environment, we can define *three different types* of e-services that co-exist when the user uses an e-service interface:

1.   The *focused e-service* (already discussed);
2.   *Related e-services* to the focused e-service: a related e-service is an e-service that is beyond the scope of the defined e-service for the focused e-service.
3.   *Interrelating e-services,* which provide linking facilities from the focused e-service or its e-service complement to a related e-service.

Figure 1 below illustrates the framework and how the concepts described above relate to each other, and that the interrelating e-services are used in two different ways: a) to link from the focused e-service to related e-services; and b) to link from the e-service complement to related e-services.
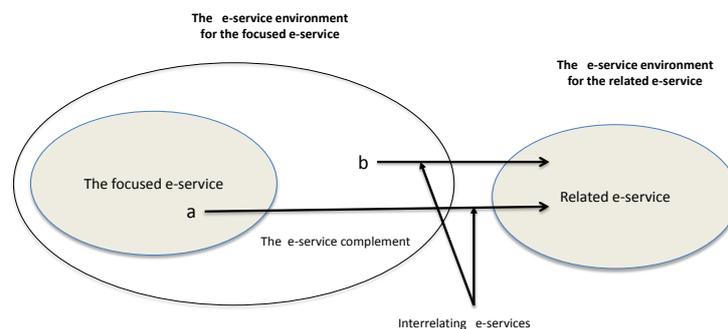

Figure. 1: The two ways of using the interrelating e-services.

4   Research approach

The research approach is characterised as practice research and the framework for analysing interlinked e-services presented in the paper, is a part of the practical theory of e-services, fully presented in Hultgren (2007). The e-service research has also applied the epistemological strategy of multi-grounding. Multi-grounding means a combination of empirical, theoretical and internal grounding. The research approach is elaborated in Hultgren and Goldkuhl (2013).

The proposed framework is based on the analysis of approximately 100 e-services between 2002-2006. The majority of the e-services analyzed were e-services provided on the Internet, but also other e-services were analyzed. During that period, the social interaction perspective of e-services gradually evolved. We started our analysis in 2002 by focusing on the customer to service provider relationship, but realized in 2004 that we also had to include the customer-to-customer relationship in

order to fully understand the notion of e-service. In 2005, we also realized that we had to include the notion of interrelated e-services, since this phenomenon was frequently occurring in the data that was analyzed. A number of web interfaces were selected and analyzed in order to understand the notion of interrelated services. The result of this analysis was the framework described above, and it emerged in an iterative way during the analysis. It would have been impossible to fully analyze and understand the data without the framework. In a recent paper (Baron et al., 2013) where gaps and trends for service research into the future are discussed, the need for taking a broader network perspective in service research is emphasized, rather than taking a supplier–customer dyad focus. We discovered empirically this need and gap in service research already in 2005.

The screen document from which the analysis begins could be seen as a sociometric star (Scott, 2012) in a network of socio-technical nodes and its relationships. The chosen document is the star of the network analysis because it is the recipient of numerous and frequent choices of customers, which therefore holds a central position of the network. The framework presented in this paper could be used for understanding and analyzing interrelated e-services in order to evaluate or design them. In the next section we will show how the framework could be used to analyze an existing e-service and to provide suggestions for its redesign. The purpose is to show how the framework could be used in analyzing a web interface from an e-service perspective in order to understand the interface in a better way.

5   Example: The user interface for the e-marketplace

In this section, we describe the user interface for an e-marketplace that existed in 2005 (www.autos.yahoo.com). The selected example is typical for the selected interfaces that were analyzed in order to understand the notion of interrelated services. Although the e-service is from 2005, the interface presents typical e-service networks, which you can find on the Internet today. The start document for the e-marketplace is shown in Figure 2 below.
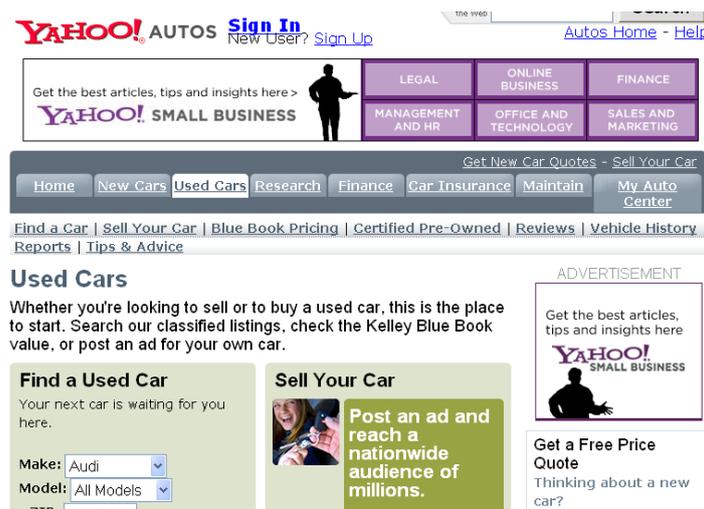

Figure: 2. One screen layout from the interface of an Internet based e-marketplace.

The e-marketplace is open for 'advertisers' and 'readers' of used car advertisements. The 'advertiser' provides a textual message and one or several pictures of cars for sale. The 'service provider' charges a fee for this e-service by using credit card payment facilities. After payment, the advertisement is published on the Internet. The 'reader' can then searches for and read the advertisements. If a 'reader' is interested in buying or selling a specific car, he can contact the 'advertiser' via the website or externally by telephone.

From the document shown in Figure 2, it is possible to advertise and search for used cars. It is also possible to search for information about new cars, to obtain financial services, to receive information about recommended prices for a specific type of used car and to be subject to banner marketing. The 'reader' can use the search facilities in order to obtain a list of cars (as in Figure 3). The 'reader' can click on a specific advertisement on the list in Figure 3 and a more detailed presentation of the car is shown (Figure 4). It is also possible to contact the 'advertiser' using the website.
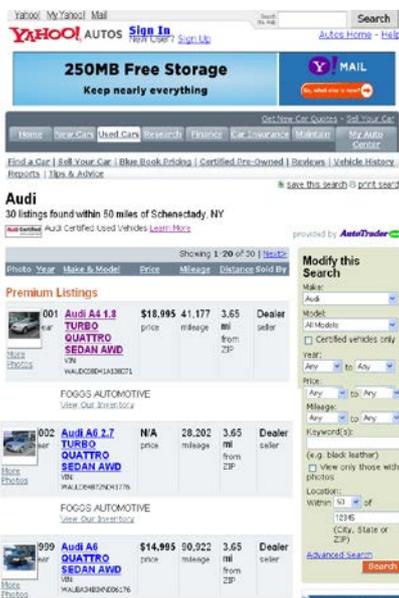

Figure: 3. The list of used cars.　　　　Figure: 4. The description of a specific car.

If the "Finance" button is chosen, a list of financial companies is presented (Figure 5). After choosing one specific financial company, the layout in Figure 6 is presented. If the "Blue Book Pricing" button is used to get a recommended price for a specific type of used car, the information shown in Figure 7 appears after choosing a specific car type and answering some questions. If a banner is chosen, the screen document in Figure 8 is presented.
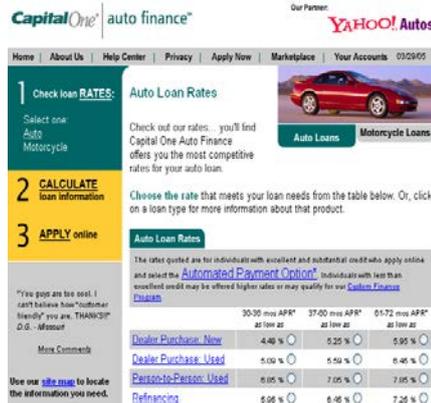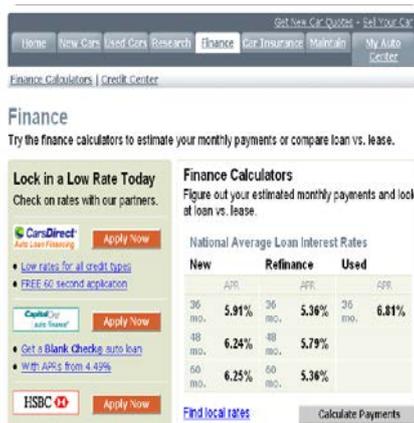
Figure: 5. A list of financial companies.   Figure: 6. A specific financial company.

Figure: 7. "Blue Book Pricing".   Figure: 8. "Banner" marketing.

6   Analysing the e-marketplace

In this section we illustrate how the e-service perspective can help us to analyze the user interface presented above.

6.1   The service environment

Figures 2, 3, 4 and 5 describe the user interface, i.e. the series of screen documents for the focused e-service. In all the figures, the layout is similar: similar functionalities, colours, buttons, frames, etc. The layout tells the user that they are using one e-service. However, the user interface also includes content that is not included in the focused e-service, such as the banners, which can contain adverts that do not have anything to do with the buying and selling of cars. This content belongs to the service complement of the focused e-service. The e-service environment also contains *Inter-relating e-services*, the "Blue Book Pricing" button, the clickable banner marketing messages and the logotypes of the financial companies presented in the list of recommended financial institutes. These interrelating e-services are used for directing the user to related e-services that are not a part of the e-service environment for the focused e-service. *Related e-services* are the 'Blue Book Pricing', e-services provided by the banner marketing companies and the financial offering e-service.

6.2 The focused e-service

The core e-service is an e-marketplace for 'advertisers' of used cars to expose "for sale" items searchable by potential 'readers'. The aim of the e-service is to let 'advertisers' and 'readers' meet. This means that the e-service has both 'advertisers' and 'readers' as customers. The core service for the 'advertiser' is to publish advertisements about used cars that he/she wants to buy or sell, and to make contact with 'readers'. The core service for the 'reader' is to search for advertisements of used cars, access them and to make contact with the 'advertisers'. There are also additional services such as information about new cars, presentation of a list of financial institutions (the 'Finance' button) and 'Blue Book Pricing', which can be used to get a recommended price.

The relationships for the core service of the focused e-service are built on three actor roles – the 'advertiser', the 'reader' and the 'service provider', which is Yahoo. The social interaction performed through the IT system between those actors creates three basic social relationships (Figure 9):
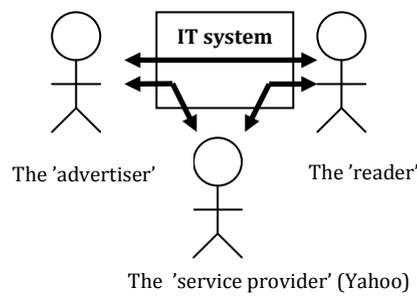

Figure: 9. Relationships within the e-Marketplace's focused e-service.

The relationships between the 'service provider' and the 'advertiser', and between the 'service provider' and the 'reader' are based on information, social commitments and expectations. The relationship between the 'advertisers' and the 'readers' is important because the real value of the e-service is that it acts as a meeting place for customers of the e-service.

6.3 Related e-services

The 'Blue Book Pricing' e-service is an example of a *related* e-service. After choosing "Blue Book Pricing" on the menu bar, which belongs to the focused e-service (see Figures 2, 3, 4 and 5), the 'reader' gets information about the recommended price levels for used cars. Yahoo takes no responsibility for what Kelly, as the 'service provider' of this e-service, offers. This e-service is presented outside the focused e-service environment and a new customer to service provider relationship is created between the Kelly company, and the customer that has been directed to this related e-service. The e-service specification for the related service is different compared to the focused e-service and it regards a recommended price level for a used car. The layout for this e-service also informs the customer that it is another e-service.

The financial service (after a specific company has been chosen from the list of financial institutions, which is a part focused e-service in Figure 5) is a related e-service provided by the chosen 'financial institution'. This e-service is offered outside the focused e-service environment, and another relationship is created between the

'financial company' as service provider, and the user who has been directed to this e-service. The e-service specification of the related service is to provide a financial offer. The layout also informs the user that it is another e-service.

The banner marketing companies that provide e-services after the user has been directed to these e-services are also related e-services. The e-service in Figure 8 is provided by Yahoo, but is viewed in a new layout indicating that the offer is based on another e-service concept compared to the focused e-service concept. The 'reader' is linked to the banner marketing company's e-service outside the focused e-service environment and a new relationship is created between the service provider of the related e-service and the user who has been directed to this e-service.

All the interrelated e-services are based on the intermediation of the customers of the focused e-service to the related e-service creating a new "customer to service provider relationship" between the service provider of the related e-service, and the intermediated customer as shown in figure 10 below.
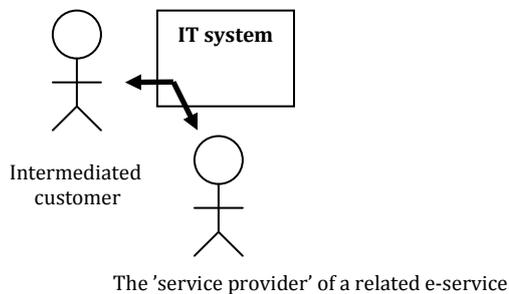

The 'service provider' of a related e-service

Figure: 10. Intermediated relationship between the intermediated customer and the service provider of the related e-service

6.4 Interrelating e-services

Yahoo provides several *interrelating e-services* with the focused e-service and its related e-services. The e-service specification for the interrelating e-services is to intermediate the customers to the service-providers of the related services. The 'Blue Book Pricing' choice on the menu bar, the financial link placed below the menu bar; the logos on the list of financial institutions, and the banners provide interrelating e-services linking from the e-service environment to the related e-services. All of the interrelating e-services are based on relationships where Yahoo on one side is the 'service provider' who is responsible for the e-service environment, and the customers of the e-service environment, and the service providers of the related e-services are the customers of the focused e-service (see figure 11 below.).

The 'service provider of the focused
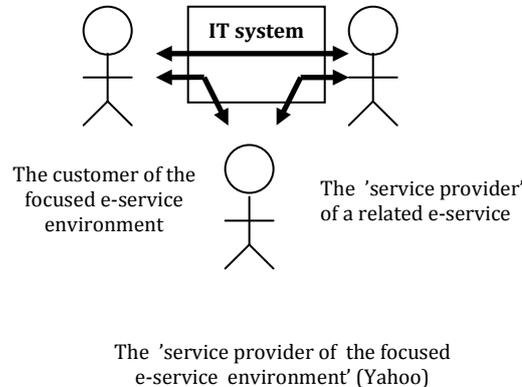e-service environment' (Yahoo)

Figure: 11. Relationships between customer of the e-service environment the service provider of the related e-service and the service provider for the e-service environment.

7   Discussion

The focused e-service and its e-service environment and related e-services provided by the user interface is decisive both for service quality and usability of the IT system. We claim that in order to design the focused e-service, it is important to design the interface considering both the e-service environment and related e-services.

In evaluating the exemplified e-marketplace, we can easily recognize the focused e-service offered. The layout is designed consistently (Figure 2, 3, 4 and 5) and the content of the e-service is in line with the e-service specification and the relationships that are created and maintained.

The interrelating e-services, such as the clickable banner messages and the 'Blue Book Pricing' button, are easily recognised as services that direct the user to related e-services, where Yahoo as the 'service provider' mediates contact between the customers and the service providers of related e-services. The related e-services provided by the banner marketing companies are opened in new windows indicating that they are related e-services. The user interface for the 'Blue Book Pricing' e-service provided by Kelly could, as an example, be improved because it does not open in a new window.

In the case of the related e-service "Blue Book Pricing", the usability of the focused e-service could be enhanced by *internalizing* the "Blue Book Pricing" e-service as an additional e-service, that could take parameters from the already chosen vehicle as input to the search function of the "Blue Book Pricing" e-service making it easier for the user to find a recommended price level for a specific car. However, to do this, Yahoo would have to take responsibility for and provide the e-service, instead of Kelly, which may be a costly decision. They would also have to develop the screen document in Figure 7 in a way similar to the documents shown in Figures 2, 3, 4 and 5.

The user interface provides several e-services where the e-marketplace for 'advertisers' meeting 'readers' is *one* e-service. The 'service provider' can use the presence of the 'advertisers' and the 'readers' to provide *interlinked* e-services. This is

important because it can add customer value to the interface. For example, the interface of the e-Marketplace could not only be used for the creation of and search for advertisements for used cars; it can also be used to search for new cars, to obtain financial and car insurance services, to receive information about recommended prices for a specific type of used car, and (to be a subject for) banner marketing.

The service provider that owns the platform can collect revenue from each customer, although one side is often subsidized. Services that bring together groups of customers in this way are two-sided networks or markets (Eisenman, et al., 2006). Two-sided networks induce a phenomenon called the network effect. With two-sided network effects, the platform's value to any given customer largely depends on the number of customers of the network. Because of the network effect, the platform becomes the star of a socio-technical network.

The downside of this is that the interface could be complex and hard to understand for the customer.

8 Conclusion

Designing e-services means designing IT systems and their user interfaces. What makes the design of the interface complicated in an e-service context, and different compared to systems used in an intra-organizational context, are the various possibilities to interlink several e-services to each other and obtain advantages in different settings; both for the service providers and the customers. However, it is important to make this interlinking transparent for the user. To design *transparent* IT interfaces, we have to know the service specification of the focused e-service and the social relationships created and maintained by the e-service. This means that we have to know what the service provider offers and takes responsibility for, and how interrelated e-services provided by other service providers should be presented through the interface without creating confusion, mistakes and misunderstanding for the customers. Thus the design of e-service interfaces is a highly commercial and social task, and not only technical to its character.

We claim that the framework presented in this paper shows how important it is to combine the design principle for IT systems interfaces that advise the consistent use of functionalities, colors, frames, messages, etc., with a social interaction and network perspective of e-services, in order to design user interfaces that are transparent for the customers.

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About the Authors

Göran Hultgren (1960 – 2009) was a Senior Lecturer of Information Systems in information systems at Dalarna University Sweden. In 2007 he presented his PhD dissertation in Swedish where he presented his practical theory of e-service, but he did not write so many papers in English on this subject. His research interest was in theories and methods for organizational development in network settings supported by inter-organizational information systems and e-services. He also contributed a lot to the research in informatics in the tourism- and travel- industry, a business that has changed considerably due to the emergence of the Internet and e-services. One of the unique contributions of his research was the way he worked together with the students, and how skillful he was to use his research in education. The practical theory on e-services is a role model for this. The theory was developed in close interaction with the students, and the thesis is used in a number of university courses. Due to his talent for teaching, and his ability to combine research and education he was an excellent scholar. His emphatic and warm personality, a sharp analytical mind, combined with a practical efficiency of getting things done made him a person with a unique set of talents, and he always used them to help other people. He was a friend you always could depend upon. He is no longer here among us, but his memory, ideas and work will remain and always inspire us.

Owen Eriksson is a Senior Lecturer of Information Systems in the Department of Informatics and Media at Uppsala University and an Associate Professor of Informatics in the Department of Management and Engineering at Linköping University. He received his Ph.D. from Linköping University and has held positions at Dalarna University, University of Borås and the Viktoria Institute. His main research fields are conceptual modeling, information infrastructures, Intelligent Transport Systems, e-government and e-services. Together with Göran Hultgren he has worked with the development of the social interaction perspective on the e-service concept. He is currently developing ontologies for conceptual modelling and theories and methods for information infrastructure design. All these theories and methods are based on speech-act theory, communicative action theory and the so called pragmatic turn in philosophy. This work has been published in journals such as *European Journal of Information Systems, Journal of Information Technology*, *Journal of the Association of Information Systems, Information and Organization and Information Software Technology, in the conference proceedings of ALOIS, CAISE, ECIS, HICSS, ICIS, ISD and LAP*. His research is action-oriented and design-oriented and he has been the research leader of a number of externally funded research projects in close cooperation with authorities and industry. He also works as a professional consultant and systems developer.