

Project Descriptions

The Design of Future Telematic Systems for Private Customers

Our societies are faced with a phenomenon called 'information age'. Among other things, this means important and basic changes in the relationship between the people within an economy. The information and communication technology (ICT) is the driving force of socio-economic progress. After discussing some impacts of future telematic systems, the author develops a conceptual framework for the design of future telematic systems. Also, three prototypes are outlined that show new ways for the realization of modern telematic systems for private customers.

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basic changes in the relationship between the people within an economy. Information and communication technology (ICT) has been the driving force of socio-economic progress and gave this age its name. The impact of the information age has to be compared - concerning their relevance - with the changes from the agricultural to the industrial society. The emerging global telecommunication structures will affect the societies in an elementary way. For example, the boundaries within and between the commercial and the private sector are no longer valid. New forms of virtual organizations will arise [1]. The utilization of these new technologies in our society can be compared with the invention of the steam engine or the electric motor in the past. The new role of private households within these changing relationships has received very little attention yet. So what are the changes that have to be noticed?

We recognize new forms of coordination in changing markets. More and more hierarchical relationships are being replaced by market mechanisms or networked organizations. Thus the market forces are changing and business processes between market partners have to be redesigned. In these changing processes of market coordination, the role of the households has to be reconsidered. They have to be regarded not only as consumers, but also as producers of goods and services, and therefore, as important actors in a market system. The use of ICT enables new forms of production processes to be considered and alters household boundaries [2].

Implications for Telematic Systems

If we take a look at present telematic systems offered in Europe for the private

customer, we find that many of these systems treat the household in the traditional way as a consumer at the end of the value chain. Systems like telebanking- or teleshopping systems are often only the extension of the 'electronic workbench' into the household. The consumer carries out tasks, such as the data entry for electronic payment transactions.

The Electronic Marketplace

A future telematic system should support the new emerging role of the households within the market. In this sense, a modern telematic system corresponds to the Greek term 'agora'. Agora means a marketplace where people come together to sell and buy goods and services (doing business), use entertainment applications, meet people and talk to each other as well. We still find this kind of marketplace in some areas in southern Europe. So we identify two major functions of the marketplace: 1. providing market facilities to do business in an economic sense and 2. serving as an entertainment and communication platform for people. Supported by ICT, the first function we call *electronic markets*, in the second case, we will use the term *telematic mediated communication*.

The development of a concept for the design of a modern telematic system in the sense of the open marketplace was a major objective of the research project 'Competence Center TeleCounter' at the Institute for Information Management of the University of St. Gallen. The concept is outlined in the following. Parts of the ideas were realized in the form of prototypes. They are described at the end of this article [3].

The Home-oriented Interactive Telematic System (HITS)

A Home-oriented Interactive Telematic System (HITS) is considered as an information system to set up an electronic marketplace that enables a private user to

- initiate, transact, and complete a market transaction,
- to communicate with all other participants in the market,
- from his place (home, office, etc.),
- via telematic systems.

The fundamental requirements of a modern and future-oriented telematic system are openness, standardization, interconnection of different telematic systems, integration of E-mail, user-friendly human interface and security (for details see [4]).

Regarding the design of an electronic marketplace, the applications have to be clearly distinguished from the underlying transport media, the *information highways*. The communication services may not be seen as an end in itself, but as an infrastructure to provide the applications and to implement the electronic agora. The concept of a HITS tries to provide a conceptual framework for the design of telematic systems in that sense [4]. The main elements of the HITS concept are the layer model and the organizational model. Both reflect different views of a HITS and will be briefly outlined below.

The Layer Model

The essential characteristic of the layer model is the clear separation between applications and services. The different developing speeds of the two main layers - technology-driven network services and business-driven applications - can be considered accordingly by this clear separation. The HITS-layer model is designed to guarantee the 'balance' between the market needs (which determine the purpose of the system), on the one hand, and the possibilities and restraints of the ICT (the available 'building material'), on the other hand. The model gives a holistic view and permits a discussion and definition of single functions without losing the whole focus. The proposed layer model consists of four layers: Layer 1 and 2 represent the transport services which define a set of communication functions associated with *specific implementations*. They are determined predominantly by network characteristics and are thus technology-driven. The network service platform (layer 2) offers value added network services (VANS), which are set up on available transport media (layer 1). We distinguish three generic types of VANS:

- Message Handling System (MHS)*: Provides a standardized infrastructure for the message exchange between participants on the marketplace.
- Forum service*: A library for information objects allows users to access information objects (such as documents).

- *Gateway services*: Offer direct access to systems like reservation or online information systems.

The layers 3 and 4 represent the applications. They are a set of tasks identified by users or a group of users and require transport services. Applications are determined by the user's needs and they are thus market-driven.

The application platform (layer 3) provides basic applications in the sense of an application infrastructure based on the communication infrastructure built by layers 1 and 2. The target group of the basic applications are all potential users in the marketplace. Users have access to the applications through this layer. If value is added to one or a set of basic applications, we use the term value-added applications (layer 4). Added value (from the user's point of view) can be achieved through several processes:

- Creation of a tailored application mix compiled for a specific target group.
- Offer of add-on software with value-adding functions such as a graphical and/or functional integration of different basic applications (for example graphical user interface, multibanking capabilities in the field of telebanking).
- Manipulation of data on the way to and from the user (for example conversion of different data formats, preparing of data in a customized form).
- Offer of market organization and coordination mechanisms.

Organizational Model

The organizational model describes the interaction between the participants in a HIT system. To allow more flexibility, we use the concept of roles played by actors (participants) to underline the fact, that depending on the situation, a participant can change the desired role. The three fundamental roles are those of the supplier, the intermediary, and the user (customer). Although intermediaries are not new in most economy segments, their role in interorganizational information systems is rather new. This concerns especially the integration of private households into IOS.

The *suppliers* 'produce' and offer goods and services. They offer the basic applications in the sense of the layer model. The applications are accessible through the application platform. The *user* (customer) has the possibility to access the goods and services he demands. He has access to the applications through the application platform or (indirectly) through value-added applications (layer 4). The *intermediary* provides market services that add value to either communication networks or basic applications. There-

fore, the possible functions of an intermediary can be distinguished in transport-oriented tasks on the one hand and application-oriented tasks on the other hand. Transport-oriented intermediaries provide value-added network services (layer 2). Intermediaries with application oriented tasks generate and offer value added applications (layer 4).

The roles described above are played by the participants of a telematic system. Each organizational unit participating in a telematic system is referred to as an actor. The main actors are content producer and provider, private households, small offices and small companies, telematic service companies, and network providers.

Model of Interaction

For many reasons a user will not interact directly with a supplier. Therefore, the concept of an intermediary is introduced: Suppliers and users do not interact directly with each other but with the help of an intermediary. The concept of interaction is designed independently from a certain transportation medium. As a second major issue the client-server principle (in an economic sense) is used. A user requests (as a client) from a server the information he needs. This server is - corresponding to the underlying concept - not the supplier but an intermediary. Depending on the architecture of the intermediary, he supplies the customer with the desired information or the intermediary requests (as a client) the information from another server, for example, the supplier itself or another intermediary.

Outline of Prototypes

Besides the development of the HITS concept, parts of it are implemented prototypically. These parts are

- the proposed graphical user interface,
- the handling of EDIFACT-based payment transactions as part of a multibanking-capable telebanking solution supporting the financial settlement of market transactions, and
- an 'electronic information service for banking' supporting the 'information gathering' phase of market transactions.

These examples are intended to demonstrate concrete and different realization possibilities shall be demonstrated. A pilot project involving the electronic handling of payment transactions for private customers on the basis of EDIFACT messages is being run with several banks and with the support of different (transport-oriented) intermediaries. The project demonstrates how a PC client station with a user-friendly graphical user inter-

face generates EDIFACT messages and sends them through different message handling systems to the correct bank. The EDIFACT messages can be received and processed as well. A convenient multibanking and easy-to-use telebanking system is available for the customer. The pilot project 'electronic information service for banking' is set up as a WWW server: The goal is to show how electronic documents could be brought even to the private customers with the help of modern and existing telematic systems [5].

Conclusions

Creating a successful telematic system not only involves designing the communication infrastructure, i.e. the highways, but also the virtual marketplace itself where the highways lead to. Every actor within a marketplace should be able to play each role.

This means a fundamental shift in design strategies compared to existing systems and strategies. New systems will only come to life and will be accepted by users if all participants have the possibility to employ them for their own individual purposes and habits. Telematic systems should not only be built for but by the private household as a major and important group of actors. ■

References

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