ABSTRACT
We investigate a set of problems that appear central at this stage of development of e-commerce. In the business to consumer markets the fundamental constraints are the inadequacy of web sites design and implementation, combined with a lack of effective strategies of marketing on line. This suggests that the question of intermediation in electronic markets has been poorly investigated. Recent developments in the field of electronic commercial agents and protocols can address more effectively the issue. We suggest ways to obtain better results, therefore enhancing networks capabilities and effectiveness of electronic markets. In particular, a simplified marketplace architecture, based on a unique intermediary, for a specific application is presented.

KEYWORDS
Electronic commerce, intermediary, marketing, e-agents.

1. INTRODUCTION
The problem of implementation of commercial transactions in electronic markets is the topic of a growing interest. One reason appears to be the somewhat disappointing results with respect to the often anticipated rapid growth of electronic transactions.

The scenario of rapid growth of e-commerce was based on the use of a effective technological infrastructure that would greatly reduce the transaction and information costs. With spreading access to the web it seemed that a second fundamental step were in place. And yet this has not resulted in the impressive transformation that could be expected purely based on the cost considerations recalled above. Much of the misunderstanding may arise from the idea that the intermediary function were simply taken over by the existence of the network.

This appears instead a much more complicated problem. In the paper we first briefly examine the background against which one must consider the development problem of e-commerce. Then we focus on very simple architecture of electronic marketplace as an example of the direction to follow to improve network capabilities and e-commerce prospects. We study the role of an “electronic agent” performing the functions of an intermediary, rather than a pure technological support, in the real estate market.
2. E-COMMERCE DEVELOPMENT: FACTS AND PERSPECTIVE

It is first of all useful to distinguish different problems and prospects according to the specific type of relationships that develop within the electronic market.

There is a certain evidence that Business to Business transactions are rapidly growing and therefore the most dynamic component of the electronic market. Companies increasingly buy from other companies inputs, therefore transforming the suppliers network. Less clear are the prospects in the Consumer to Consumer market and the Consumer to Business transactions. Our focus is however in the Business to Consumer component, in which companies sell to consumers, according to the traditional model of retail trade.

The question one should ask is: are there fundamental limits to the development of electronic transactions in the relationship between producers and consumers? What are the sources of these limits and the possible remedies? First of all we ought to recognize that there are limits to any kind of distribution channel. To discuss the question would take us off track. To make the point it is sufficient to ask the question: have Supermarkets reached the limits of development? This example better then any theoretical argument highlights that the question of limits is one of relative weight of different kinds of distributive arrangements. Alternatively, the problem could be discussed in light of an analysis of the evolution of consumption within advanced market economies [3]. If one were to take this point of view then a sense of the obstacles to a massive development of e-commerce may become clearer. It implies, however, a broader approach that is not immediately relevant to the more narrow focus of the paper.

The fact is that electronic market represents still a small portion of the market as a whole. Its weight changes according to the economic sectors and countries. This is itself a problem that would deserve a closer examination. In particular, one could investigate why in March 2001 the percentage of persons (of age above sixteen) who sought information on prices and products sold online and actually completed some transactions ranges from the 26% of Sweden to the 3% of Italy and Spain, and why the European average, 9%, compares to the 36% in the U.S.[5]

It seems then reasonable to assume that, at least in Europe, we are far from having reached binding limits to the development of this type of electronic transactions.

This conclusion is based on estimates of the volume of transactions. There is however also an issue concerning the greater success of electronic transactions in certain markets. Indeed there is evidence that most of the B2C development appears rather concentrated in a few industries, typically the transactions involving immaterial products (music, books, and information in general - see the third Internet [1]). So also the composition of the electronic market is an important aspect of the phenomenon and of the interwined effects on industrial restructuring.

As a provisional hypothesis we may say that in these sectors the characteristics of the product transacted and the type of relationship between producers and consumers it involves is particularly sensitive to the advantages of electronic market. More specifically it can be argued that in these industries the problem of intermediation is easily solved and electronic transaction do not encounter the difficulties that are associated with other products.

It seems that the question of intermediation is a key issue for a theoretical model of e-commerce and the future of e-transactions. To highlight the problem one could say that electronic networks and Internet imply *more intermediation*, if we focus on the drastic restructuring of market communication and mechanisms they may require. At the same time “as a ‘information gathering enabler’ Internet operates as a instrument for *less intermediation*, to the extent in which critical commercial functions, which are typical of the intermediary, i.e. reducing transaction cost and negative effects of imperfect information” [4] are taken over by the electronic network.

Digging deeper into the issue brings attention to the crucial role played by intermediation and the way it has been so far interpreted and addressed in the electronic market. In particular, the issue revolves around the design and management of the web sites. The systems architecture seems often inadequate, but also of the promotion and management strategies. The problem therefore has a technical aspect, one connected to competence and skills, but it also depends on the lack of an effective marketing strategy.

This has little to do with an abstract notion of limits for electronic markets. It rather suggests that 1) constraints could be lifted with a in deapth analysis of the questions raised by the design of effective, possibly interactive, web sites; and 2) that their management and improvement requires a refinement of skills and a
closer relationship with a well specified marketing strategy. This could eventually permit to refine the question of the limits to the development of e-commerce.

3. AN INTERMEDIARY AGENT FOR THE REAL ESTATE SECTOR

Most part of the existing web-sites, devoted to e-commerce transactions, is organized in a fixed and static way: they are rather similar to electronic versions of the standard commercial catalogues, and the only facilities provided are the hyperlinks for navigation, which are common in all web-sites. The crucial point is that the network offers enormous possibilities that, at the moment, are only partially exploited by the e-commerce applications.

A recent research effort has been done to develop architectures where the commercial transaction is handled by on line agents, that is, intelligent software agents, (called e-agents) playing the role of intermediaries between buyers and sellers (see [6] for a review of the existing research). The e-agents can automatically or semi-automatically perform several functions that are outlined in [6], namely: mediating among heterogeneous web sites, monitoring contents and notify customers, performing information filtering and comparison, providing tailored services according to specialized need of customers, assisting customer in making decisions, and acting on behalf of customers in matchmaking, server monitoring, negotiation, bidding, auction, transaction, transfer of goods, follow-up support. The e-agents should also be able to take advantage of other standard facilities of Internet, such as: search engines, data mining systems, multimedia applications.

Some of the function listed above are implemented by electronic agents in several solutions for electronic marketplace, which are presented and discussed in the first part of [6]. The mainfold roles of the intermediaries, involved in the phases of a business transaction, are also outlined. The behaviour of the agents is defined from the buyer, the seller and intermediary perspectives. The specific functions performed by the intermediaries are then precisely defined with respect to the particular applications [7, 8]. Sometimes the marketplace is enriched with methods for valuating potential transactions and algorithms matching buyers requests and sellers offers in the optimal possible way. These matching algorithms can be based on multiple predefined criteria.

The intermediary functions and the Internet facilities listed above can enhance the quality of e-commerce systems and the services to users. This can make electronic transactions more appealing: and in turn fully exploit the potential of Internet.

In the paper we discuss a particular application in the real estate sector, focusing on the preliminary phase of a commercial transaction. We start from the buyer point of view and organize the system following his perspective. This approach seems to be important in applications where the preliminary phase is particularly hard and time-consuming for the potential buyer, who has to choose in the labirinth of the non-homogeneous offers and acquire relevant information before initiating actual transactions. The apartment or the house must satisfy many requirements and involves a costly investment, hence an extensive and accurate search and evaluation is fundamental in this application.

Even if the study is carried out taking the buyer point of view, also real estate agencies would probably have interest in being part of the proposed electronic marketplace. In particular they could profit from a serious filtering of potential buyers that would certainly increase the number of successfully completed transactions and reduce the cost of dealing with the customers.

Our study focuses on a city, Pisa, where the real estate agencies are already on line. The sites where their offers are listed (see for instance http://www.episa.it/Immobiliare) is an example of a static, only very partially interactive, approach to the market. We propose instead a simplified architecture of marketplace organized with a unique intermediary agent as an interface between the buyer’s needs and the seller’s offers. The intermediary agent interacts with buyers on one side, and with sellers, that is, the real estate agencies and individual sellers, on the other. The functions of the intermediary agent are: visit the web-sites of the real estate agencies, mediate among heterogeneous web-sites, build the data-base of offers in a standard format and attributes, update the data base periodically, assign a global value to the quality of the offer, list the best offers of the period for several of prices, matching buyers requirements and actual offers by coordinating all the information available in the marketplace.
To implement the first three functions it is necessary to collect detailed information on the attributes of each item on sale. Some of it could not be present in the web site of the agency. The agent should initiate an interactive process with the agency trying to complete the records, since all items on sale should have the same format including a standard set of predefined attributes. The problem is that the real estate agencies should release information at times confidential and could be motivated to do that and remain an active part of the market only if their business is enhanced by the participation to the marketplace. The intermediary should offer to the user the possibility of enquiring the database with complex questions, which should have the form of those of a standard relational database.

In order to keep the real estate agencies involved, the intermediary has to provide them with additional services. Among those services the most important are the release of a quality certification and the arrangement of a virtual visit to the real estate unit. The intermediary should on the one hand guarantee the reliability of the agencies involved to the perspective customers; on the other it grants the agencies with a recognition that gives them an advantage with respect to those which have not any certification. A standard procedure could be to invite the real estate agency to sign a protocol of ethical behaviour and inserted in a list of certified agencies. This of course cannot rule out the possibility of breaking the rules of ethical behavior. Worse, there are no sanctions for this kind of violation. Therefore certification is only a partial guarantee for the buyer. Nevertheless it should put some pressure on the agencies that have joined the electronic marketplace.

The second service that would become available to the real estate agencies joining the electronic marketplace is the access to the multimedia facilities of the network, therefore the access to a virtual visit to the unit on sale, a sensitive point for the agencies that spend much time and effort organizing physical visits.

For the intermediary to offer a virtual visit is enough to have a video of the unit and of its immediate surrounding available from the agency or the individual seller. The virtual visit requires a sophisticated software and should allow to enter each room and possibly open doors and windows. Programs of this kind are already used in many museums.

When the preliminary phase is completed and the potential buyer has found one or more suitable real estate units, he can then proceed to the virtual visit. only after this point he needs to contact the real estate agency to initiate the commercial transaction.

4. CONCLUSIVE REMARKS

Crucial issues for the development of the electronic commerce appear to be the role of the intermediary and the re-thinking of web sites design and marketing strategy. Intelligent e-agents coordinating electronic marketplace and designed for specific applications are a promising technology for the development of the commercial transactions on Internet.

We suggested an intermediary based marketplace solution for the real estate market. for this purpose we devised the basic functions of a unique intermediary, assuming the perspective of the buyer in the preliminary, but very relevant in this application, phase of the commercial transaction. In the real estate market products are characterized by a great number of parameters and high price. a highly specialized intermediary can enhance the quality of the service by giving the user an exhaustive view of the market, the widest range of available offers and the possibility of virtual visits. after the preliminary phase the commercial transaction can follow the usual procedure, but with a higher probability of a rapid successful conclusion.

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