

# Online-brokerage

## Transforming markets from professional to retail trading

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### Abstract

In this paper, we discuss different concepts for transforming professional trading mechanisms for the increasing market of private investors. Different perspectives of this fundamental change in capital markets are discussed.

The driver of these changes is IT: technological progress provides new ways for private investors to participate actively in the capital markets in order to take advantage – and risk – in the area, where traditionally only professionals could realize their chances.

Starting from these observations, one of the most important success factors for Online-brokers is discussed, namely that of the integration of the various phases within the “market transaction process“. Some already existing concepts in this area – going along with new forms of intermediation – are evaluated on the basis of the requirements of the different groups mentioned above.

Beyond that, the integration level within the market processes serves as a clear framework for further development of IT support of trading activities in Online-brokerage. The concept of an Internet based electronic trading system is presented as a promising way to transform professional trading activities to the needs of private investors in the future.<sup>1</sup>

### I. INTRODUCTION

#### A. Development of securities trading

In the last couple of years the importance of securities trading for private investors (for a delimitation between private and institutional investors see [1]) has increased enormously. There are different factors being responsible for the change in trading attitudes of private investors:

On the one hand, the generation of the young and wealthy investors enters the capital markets with a need for personal old-age pension planing etc.; on the other hand – and that

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should be focussed here – there is a rapid development of IT, namely that of the Internet, not only extending the trading volumes by simplifying the way to reach the markets for private investors, but also *allowing and enforcing* new forms of participating in these markets and of intermediation among these participants.

Due to the increased technical skills and financial expertise of private investors, this class of Online-banking customers is prepared to apply new trading technologies for their own asset management.<sup>2</sup>

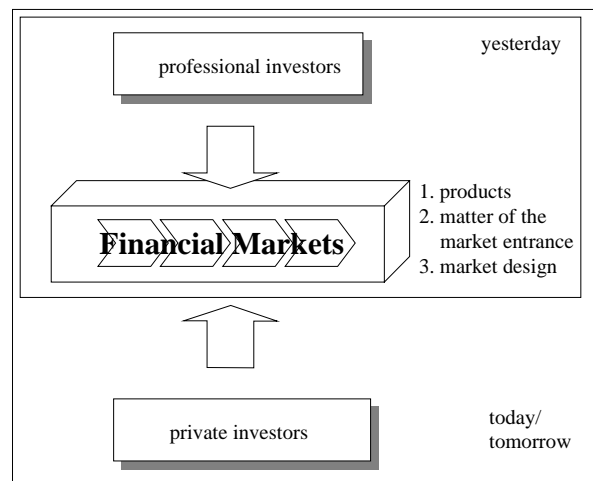


Fig. 1: Development of financial markets.

With the increasing importance of these investors, the necessity to satisfy their needs with respect to the products, the manner of market entrance, and, therefore, the market design itself rises.<sup>3</sup>

<sup>2</sup> It should be marked, that not all of these private investors will want to spend their time and build up skills for investing their money by themselves and, therefore, will continue to need support by intermediaries.

<sup>3</sup> While the product design mostly is attending to pure financial questions, both other mentioned aspects (market entrance, market design) do have a strong relation to information systems.

Figure 1 shows, that beside banks' and other professional investors' perspectives today especially private investors' requirements have to be taken into consideration.<sup>4</sup>

In the further discussion, we focus on the strategic challenges for Online-brokers to meet private investors' needs and to face competitive threats. Therefore, we illustrate various levels of integration in the market transaction process in securities trading as a central success factor. The integration is realized by connecting different transaction phases:

As shown in figure 2, this process consists of four phases, which are supported by different intermediaries (see [2,3]).

The *information phase* is that part of the process, where the investor has to gather information concerning the stock he wants to trade and its corresponding market. In traditional markets, this phase is supported by brokers or by exchanges offering market endogenous information.

In the *orderrouting phase*, orders are forwarded to the point of execution. In traditional scenarios, this is also done by brokers.

In the *negotiation and agreement phase* compatible orders are matched. Finally, the clearing and settlement has to take place at a clearing institution.

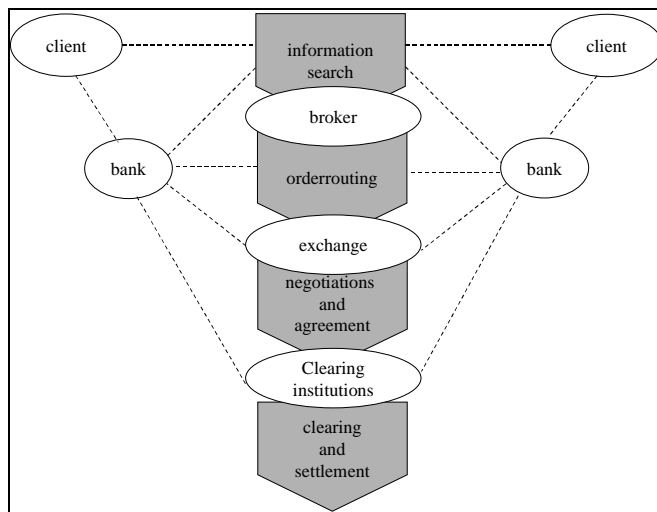


Fig. 2: The market process of securities trading.

## B. Needs and challenges

a.) The first perspective being regarded is that of the private investors:

The group of the private investors is not homogenous, though a customer differentiation is necessary. As a

<sup>4</sup> One can see the need for alternative kinds of trading systems in the enormous volumes traded in the OTC-market. In other words, there are products and trading practices where current exchanges and trading systems are not able to meet the requirements of the existing traders (see [11]).

simplification, the both ends of the continuum between long time investors and day traders are regarded:

	Long time investor	Day trader
Dependence from opening hours	Low	High
Need for real time information	Low	High
Relevance of execution costs and procedure of orders [4]	Low	High
Competition with professional investors	Low	High
Need to access global markets	Medium	High

Table 1: Long time investors versus day traders.

b.) The second perspective is that of banking institutions<sup>5</sup> – by implementing Online-brokerage options into the Online-banking solutions they try to widen their product space and to adhere more financial transactions into their classical Online-banking product portfolio.

c.) Third, there are the exchange institutions: they expand the customer basis, e.g., by reducing the minimum order sizes and expanding their trading hours.

The following table 2 summarizes the main aspects of the transformation, we focus in this paper, with respect to the three groups mentioned above (banks, brokers, traditional exchanges) and to the role of IT in this context:

	Retail traders	Banking institution	Exchange institution	IT- progress
Globalization	Technical Skills	More attention to their web sites	Multiply access points	Global network (Internet)
Huge number of customers	Financial assets	New online product portfolio	Reduce minimum order size	Scalable systems
security, usability,..	Financial expertise	Lower transaction cost	Expand trading hours	Secure multi media communication

Table 2: Aspects for transforming retail markets.

In the following chapter, the integration of the first and the second market process phase is discussed as a possible initial step to enforce customer orientation on *existing markets*. As shown in figure 2, traditionally *brokers* are the intermediaries being touched by this kind of integration.

<sup>5</sup> In the following, the terms „banking institutions“ and „brokers“ are regarded as similar.

Later we show, that the integration of the first three phases will be the next step of transforming the roles of intermediaries (*brokers and exchanges*): the *creation of new* (private investor oriented) *financial markets*.

## II. INTEGRATION ON EXISTING MARKETS

The first step towards enhanced customer orientation in the market process is already realized and should be seen as the state of the art concerning private investors' way of bargaining on security markets: Online-trading or Online-brokerage (We know that actually only 5-15% of the private investors use Online-brokerage, but research institutes forecast this number to triple or even quadruple in the next months (see [5])).

As mentioned above, today private investors intend to compete with professionals. Therefore, they need market endogenous and market exogenous information in the same quality and quantity like the professionals. Through the usage of the Internet, the possibilities to get a vast amount of near – or even real time information have been improved, but the retail investors still have the problem of evaluating the *quality* of information.

Online-brokers can enhance customer orientation and satisfaction by acting as trusted parties in information delivery. Though the delivery of information, typically neither is the core competence of Online-brokers nor is this costly service compatible to their traditional business model, which often is described as “cost leader in the niche” (see [6]).

Therefore, new business models have to be found and implemented. The following example shows one possibility of IT-integration as an innovative type of inter-organizational collaboration<sup>6</sup>. It is the co-operation between “ConSors Online-broker AG” and “Verlagsgruppe Handelsblatt GmbH”:

ConSors is one of the leading brokers in the German Online-brokerage market, who defines his strategy in being a cost leader (see [7]) and, therefore, only provides basic business information, but focuses on facilitating the orderrouting.

The business newspaper “Handelsblatt” has transferred its competence in providing high quality and newsworthy business information for investors and managers on the Internet under the denotation “Handelsblatt-Interaktiv”. Customers can choose between a charged and a gratuitous version of this web based service, which differs in extent and the manner of providing information (see [8]).

The co-operation between both firms enables the customer to link both services together (see Fig. 3):

After a login at the ConSors-site (and a check, whether one is also customer of the Handelsblatt-Interaktiv service) the customer is given access to a vast collection of information (e.g. balance sheets, talks, press releases, stock performance

etc.) concerning the stock of current interest on the Handelsblatt web sites by one mouse click in his security deposit account. Reading news on the screen, another mouse click of the customer transfers the security identification code into the order specification menu of the ConSors security deposit account for fast and easy orderrouting.

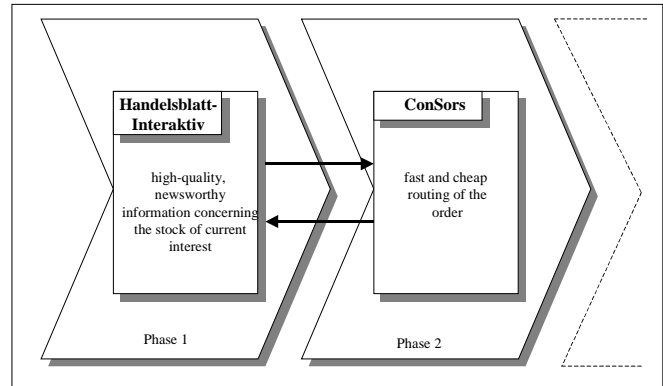


Fig. 3: Integration of the first two phases.

By this co-operation, the integration of the first two phases of the transaction chain is realized between a ‘product champion’ on the one hand and a ‘processing champion’ on the other hand in order to generate added value for retail customers on an existing market.

In the next chapter, it is shown, how the integration of the first three phases is likely to create new financial markets.

## III. CREATION OF NEW MARKETS

### Requirements

The interconnection of the information phase, the order routing phase and the negotiation phase represents the next step of integration. In traditional Online-brokerage the customer merely requires his Online-broker to pass his order to the “place of execution”. This “place of execution” is a stock exchange, either a floor market or an electronic trading system, e.g. XETRA, the system of Deutsche Börse AG.

If an automated matching of the orders and automated pricing is also realized by the Online-broker, the full functionality of a trading system on the Internet can be achieved with this next integration step.

The (theoretical) “opening hours” of the system on 24 hours on 7 days independently of the trading hours of the first markets are referred to as the central advantage of an Internet based trading system. In this context, the Internet provides an inexpensive communication platform and an easy access for investors worldwide and, therefore, represents the ideal prerequisite of a global, integrated market. Securities trading is enlarged from a closed shop of authorized dealers to a high variety of participants – especially to retail investors. This will lower the transaction costs of the participants and increase the liquidity of the market.

Some crucial problems related to Internet based trading systems are often disregarded in this context. The essential

<sup>6</sup> The provider of the currently used services (whether Handelsblatt or ConSors) is always comprehensible for the customer; therefore, we do not use the term „virtual enterprise“ for this kind of a co-operation.

integration problem within the negotiation phase is due to the automation of pricing.

This is the most important challenge from both the technical and the economic point of view, because automated pricing is the most critical and most important subsystem of a computerized trading system [9].

From a technical perspective, trading systems as "mission critical systems" [10] require

- (i) a very high (as close as possible to 100%) *availability* to guarantee the customer being able to trade every time.
- (ii) Beyond this, sufficient *computing capacities* must be accessible, especially in so called "fast markets", i. e. markets with high volatility and frequent order arrival, to be able to execute all orders with answering times as short as possible. Concerning this, a real test, e.g. in a crash scenario like in October 1987, is still imminent. In the dynamic environment of financial markets, these systems must provide also an
- (iii) *openness* and
- (iv) *extendibility* for new functions, new products and
- (v) new customers, i. e., *scalability* of the trading system is needed.

Beyond this, a variety of problems also exist at the economic level:

- (a) Independently of the *institutional arrangement* of the system (see subsection integration alternatives) the question on *liquidity* [11, 12] and
- (b) the *pricing quality* of the transactions in an Internet based trading system arises. Especially in illiquid stocks, wide bid/ask-spreads may lead to
- (c) significant *implicit transaction costs* [13] which may diminish, neutralize or even overcompensate the advantage of the *reduction of the explicit transaction costs* in form of lower charges or commissions.
- (d) Particularly the *fairness of the system* will also play an essential role in Internet trading: all market participants must be treated equally regarding the temporal access to information and the temporal priority of their orders. This is an indispensable necessity for the acceptance of the trading system and represents – due to the various technical entrance prerequisites and system differences – one of the most essential challenges in the Internet.
- (e) To assure the *trust* and the *acceptance* of the participants a market supervision is necessary, which prevents the attempts to manipulate prices.
- (f) Combined with this, questions of *the investor protection* and the *regulation* of such Internet trading systems by the stock exchange supervisory authorities arise.
- (g) Concerning their *supervision guidelines and measures*, on the one hand the stock exchange supervisory authorities should consider the technological progress and should appropriately address the fundamentally changed risk attitude of the private investors on the other hand.

In Germany, the term 'stock exchange' is not defined explicitly. § 1 (1) Börsengesetz (German exchange law) refers merely to the authorization duty, meaning that a stock exchange requires the authorization of the government. A functional definition, which determines the criteria of the admittance of a trading system, is not available yet.

#### *Integration alternatives*

The following institutional integration alternatives are conceivable as possible variants for the installation of an Internet based stock exchange or (stock) trading system, respectively:

- (IA1) the provision of an Internet based trading systems or similar facilities by new players in the "market for markets" or
- (IA2) the ordermatching and pricing within the system of an Online-broker and, therefore, the expansion of the activities of the Online-broker to an Internet based trading system or
- (IA3) the provision of an alternative access via Internet for retail investors to an existing electronic trading system of a stock exchange institution by this institution itself, which then has to integrate administration of security deposit accounts and cash accounts.

In each of these alternatives integration leads to a shortening of the intermediation chain within the market process, namely among the investor, the brokers and the exchange institutions. Nevertheless, the service of an intermediary is needed, which assures the existence of money or stocks, i. e., the credit standing of the buyer or availability of the corresponding stock in the security deposit account of the seller. Beyond this, the intermediary guarantees the identity of the respective customers and the authenticity of the orders [14].

In alternative (IA3) the intermediation role of the bank has to be internalized by the exchange institution. This seems quite unlikely, because this would imply a completely new business field for stock exchanges and would erase the special character of exchange trading, namely the trading among institutional, authorized dealers and put many stock exchange institutions into competition to their owners, the banks. From a current point view, therefore, only integration alternatives 1 and 2 seem to be relevant for the future.

Besides the technical questions, from an economic perspective, the design of the market model [15] of an Internet based trading system in general and the order matching and pricing as such, are the central and critical success factors of the respective system.

As fundamental alternatives concerning the design of the pricing module on the Internet, quote-driven or order-driven markets can be realized, by

- (i) trading against the stock of the bank or the issuer. Today, this particularly is carried out in the area of warrants and in bond trading (e.g. the warrant trading systems XEOS or Citibank-OS and the bond trading system 'AUTOBAHN' of the Deutsche Bank AG). In these systems banks or issuers offer tradable buy and

sell prices (quotes) on the basis of enquiry (quote requests) of the customer for a predefined period (e.g. seven seconds in XEOS). The customer can decide the acceptance or rejection of the quote in this period of time.

- (ii) carrying out an automated matching of the customers' orders against each other. The Internet based stock trading system 'Island' [16] represents an example of such a system. Island offers the dealer a direct insight into the limit order book via the Internet (see figure 4). The Investor can observe both price information of executed transactions and all movements in the limit orderbook to estimate his future transaction price.

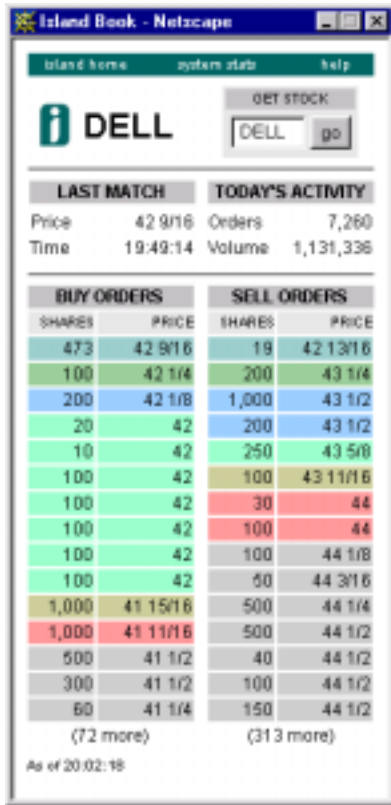


Fig. 4: Limit order book of the Island system.

### Use of new technologies

In order to realize trading systems on the basis of different pricing procedures, i.e., that traders/investors can choose among a variety of market models for their orders, and taking the mentioned requirements (liquidity, fairness, transaction costs etc.) into account, it is helpful to use new IT-paradigms.

In a recent research project the prototype AMTRAS (Agent Mediated Trading System) [17] was developed as an Internet based trading system for the professional fixed income market. With the help of AMTRAS transactions can be performed electronically without any media breakage. In this way, a new trading venue arises as an alternative to telephone calls, fax contract degrees and trading with the use of (traditional) brokers. This prototype was fulfilled for the professional bond trading in Germany. In the following, the

concept of the prototype is discussed in order to provide a basis for further extensions to retail stock markets.

In this project, a trading venue on the basis of electronic representatives of the investors is realized as a proof of concept. These representatives, i. e., autonomous entities according to the paradigm of software agents [18], perform the tasks of information search and evaluation as well as the final placement of the orders for the investor, based on his strategies. One of the central questions in this context is, how market structures and trading processes can be modeled in order to enable traders or private investors to delegate their negotiation processes and, hence, to reduce their transaction costs [19].

The basic elements of this prototype trading system are agents, which represent the preferences and strategies of the market participants and which are able to negotiate – even when the investor is off-line. To enlighten what software agents are able to perform, some characteristics of this technology are introduced.

Software agents are “...computational systems that inhabit some complex dynamic environment, sense and act autonomously in this environment, and by doing so realize a set of goals or tasks for which they are designed“ [20]. This common definition of software agents corresponds very well to the requests of a system approach in securities trading for private investors. Table 3 shows the properties of software agents and outlines the relevance for their usage.

Agents are...	in order to...
situated	create an action in the specific domain
using local knowledge and/or data	consider the individual situation
“social”	communicate with users/other agents
autonomous	search and negotiate independently / for with other agents
reactive	monitor and to act
rational	maximize an individual utility function
adaptive	learn from their own and foreign activities
mobile	minimize the costs of using networks

Table 3: Software Agents as trading actors.

Rationality, adaptivity, and mobility are not necessary to be an agent, but are ‘nice to have’. Their usefulness crucially depends on the application area.

From a **local agent** view, on electronic markets/exchanges information systems are:

- providers and evaluators of information,
- autonomous “negotiation machines“ [21], and
- performers of transactions (for execution and/or control).

From a global point of view, a **multi agent system** turns

- to a decentralized and parallel operating problem solving system and, thus,
- to a global coordination platform in exchange trading.

In various applications, agents are used to assist in search processes, e.g., within Internet applications in order to handle huge search spaces (see [22], [23], [24]). Especially in retail markets, where the broker merely supports the orderrouting, agent technology offers a high potential for disintermediation and reduction of transaction costs.

Using software agents as trading actors they perform a search for suitable partners and inform the dealer about the results of the search. Thus, with these results the principal decides whether to enter personally into further negotiations or to appoint his software agent to carry out the negotiations independently – based on the strategy given before.

The software agents meet and communicate on a central trading platform, consisting of one or several servers. This architecture was developed to assure that the platform is always under supervision of a central authority, e.g., an Online-broker who provides it.

The prototype is implemented in Java [25], the architecture of the multi agent system is based upon the FIPA specification [26]. In order to provide a flexible and a highly available system, the agents which are participating in one *logical* market are *physically* distributed among various platforms: Each agent is capable to identify the location of any other agent on any of the related platforms by queries. This ensures scalability and extensibility of the system, and this is the case also during operation time – simply by adding dynamically one or more new platform(s) [27].



Fig. 5: The AMTRAS front-end.

The front-end of the prototype is realized in form of Java Applets (Figure 5), so the centralized trading system can be accessed via a 'zero installation' user interface.

Actually, AMTRAS will be transferred to meet the needs of an Internet based stock trading system.

#### IV. CONCLUSIONS

In this paper, we discussed various ways of transforming professional electronic trading to retail investors by using innovative concepts of electronic trading/ market platforms. Focussing on the development of securities trading during the last few years, the need of new trading systems for retail investors could be derived. Such systems have to fulfill the requirements of all participating groups in financial trading,

but especially that of the retail traders themselves: they are looking for a fair treatment regarding the professionals as well as the competing retail customers. This means, they want to get information without any time lag compared to the professionals, they want to get high quality information, and they agree to pay some amount for this service.

As we discussed above, beyond an integration of information phase and orderrouting phase – e.g., the integration of the ConSors and the Handelsblatt web sites – an integration of negotiation and agreement provides competitive advantages for Online-brokers.

In Chapter II and III it turned out, that the integration of various services related to different transaction phases within the market process will be one of the key success factors for retail trading systems in financial markets. Technical aspects and economic problems of creating new markets were discussed going along with the integration of services and the retail investors' needs.

With the Island system and AMTRAS two concrete integration approaches are introduced:

Island is the Internet based Electronic Communication Network of Datek Online-brokerage system of Datek Online Holdings Corp. which provides an electronic open limit order book for Datek's customers.

AMTRAS is a prototype trading system based on the software agent paradigm. Software agents are introduced as an enabling technology, to delegate financial trading to software – even and especially when the principal, who generated/started the agent with an order and its corresponding strategy, is off-line.

Within the AMTRAS project, the main goal is to show that it is possible to offer not only a linear sequence of services but to integrate more than one market model for the users, here the retail traders. To be able to choose individually the level of automation, the way of pricing, etc. we consider as the most successful approach in the future (see [15]). Therefore, our further research work focuses on the architecture of a generic trading platform, where innovative market models can be integrated very easily.

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