2000

# Developing an Electronic Trading System: Experiences from an Inter-organizational Setting

Anders Martensson

*Stockholm School of Economics*, anders.martensson@hhs.se

Follow this and additional works at: http://aisel.aisnet.org/amcis2000

# Developing an Electronic Trading System:
# Experiences from an Inter-organizational Setting

Anders Mårtensson, Department of Information Management, Stockholm School of Economics,
anders.martensson@hhs.se

## Abstract

This study concerns an intra-organizational IT project in an inter-organizational setting. Based on a clinical research approach a major IS development project in the financial industry has been studied during four years. After a brief case description three emerging topics are discussed; inter- contra intra-organizational projects, the importance of setting project goals and scope, and the role of the project initiator. A conclusion for all these topics is the need for widening one's horizon.

## Introduction

In today's network economy most of the traditional economic theories still apply, if yet in a different setting than before the changes brought forward by the Internet (e.g. Shapiro & Varian, 1998). One emerging difference is that the *inter-organizational* information systems (IOISs) are becoming ubiquitous. This leads to new environments for IT projects. Unlike *intra-organizational* projects where the resources are managed and goals are set within a single organization, inter-organizational IT projects involve resources from multiple organizations with potentially varying goals.

The Swedish financial industry has been characterized by its dependence on IOISs ever since the stock exchange moved from floor trading to today's electronic trading in 1990. It is a true electronic market which Bakos (1997, p. 1676) defines as "an IOIS that allows the participating buyers and sellers in some market to exchange information about prices and product offerings". It is also a true marketplace following Choudhury et al's (1998, p. 473) definition that an actor only connects to the exchange rather than bilaterally with all other actors.

This paper describes a research study on a major IT project in this inter-organizational setting, namely the development of a new electronic trading system. The overall purpose of the research is to further the understanding of inter-organizational aspects of IT projects. An underlying hypothesis of the research is that intra-organizational projects are becoming more and more inter-organizational in nature due to the increasing interconnectedness of applications as well as organizations.

## Methodology

The study uses a clinical approach as described by Schein (1987), where the focus of the researcher's activities at the case company is to contribute to its business. The author has been actively involved in the company since 1996 mainly working in the development project described below.

This piece of research is empirically driven as the issues discussed emerge from the case story. Currently, two different approaches are being pursued in the study. One is to investigate what strands of prior research that can contribute to the understanding of the case, and the other is to identify where the case possibly can contribute to theory. Thus, the paper continues with a brief description of the case followed by a short discussion of the case related to different theoretical areas.

### The SAXESS Story

In 1995, the Stockholm Stock Exchange (SSE) decided to initiate a new trading system development project. At this time, SSE was mainly owned by the member firms, i.e. brokerages. The existing system at that time, SAX, had been used since 1989 and was based on the prevalent Swedish market conditions. It was originally designed to cope with 6,000 trades per day (daily averages in 1989 were 1,000). During 1992-1994 the demands on SAX changed fundamentally due to a number of reasons. Financial legislation in Sweden was relaxed as shorting was allowed and the turnover tax, which had caused trading to move to London, was withdrawn. Subsequent changes in technology (e.g. automated trading systems), instruments (e.g. stock loans), and membership (e.g. discount brokers and proprietary traders joined the exchange) led to increased trading and new trading patterns (e.g. price driven trading).

The new demands made some shortcomings of the SAX system apparent. The lead-time for introducing new instruments was too long and implementing new types of functionality was difficult, and thus expensive. The capacity had been increased continuously and by January 1997 the system was coping with 50,000 trades per day, i.e. it had scaled well but price/performance was deteriorating.

However, it was not uncontroversial to start planning for a new trading system since the existing application had sufficient, albeit stretched, capacity. Outside the SSE the general view was that no new system was needed. A strong management team, which had once introduced SAX even though the members/owners did not wholeheartedly agree with giving up floor trading, went forward with the SAXESS project anyway.

Flexibility was an all embracing goal for the new SAXESS system. The ability to trade all types of financial instruments was one cornerstone, as was being able to cope with different market structures (e.g. order and price driven trading) as well as different types of trading (e.g. continuous trading and calls). The requirements also included new and more complex order types. Performance was also an issue as a continued increase in trade volumes was foreseen. SAXESS was required to scale to 2,000 transactions per second per partition at constant cost per transaction. Up-time had to match the track record of the proven SAX system.

A market survey indicated that no existing standard application package fulfilled the requirements, thus the project was kept in-house. The project team turned into a tight team consisting of people from the IT department and some external consultants from IT consultancy companies.

The development project was characterized by iterative development with daily builds. An early decision was to be platform independent to keep future options open. This was achieved by strict adherence to standards and a small abstraction layer separating the operating system from the application. This platform independence actually helped increase quality during the development phase. The continuous porting of daily builds to different platforms helped the testing of the system, which was an ongoing activity during the whole project. To automate testing, specialized tools for simulations and regression tests were developed.

SAXESS communicates with the members via an external protocol. In fact, to ease the switch from SAX to SAXESS for the members SAXESS was designed to allow the members to during a transition phase either use the old SAX protocol or the new one.

To ensure well-functioning interaction with member systems, an externally available test system was provided early on. This test system was available for member firms as well as third party vendors of client applications. The fact that the test system was made available unusually early in the development process unfortunately meant that the system was not completely stable in the beginning. The intensity of the member firms' testing varied quite dramatically as some companies spent quite an effort on ensuring that their systems were compatible with the SAXESS system.

Meeting the requirements SAXESS was launched, on time and on budget, on March 12, 1999. Launching and operating the system was nontrivial from an organizational perspective as there are several different departments involved. The system was developed by a development department, operated by an operations services department, and used by a third (the exchange). Finally, the member firms connect to the system from their offices.

During the first week there were some incidents in the operations of the system. One experience from the incidents was that while the technical problems might be fixed quite rapidly the time until the trading could commence was in some cases significant.

Currently, SAXESS has a very good availability record and the current levels of some 100,000 daily trades not only leave the system basically idling, but provide daily examples of how procrastinating about the decision back in 1995 would have led to performance problems.

## Discussion

Three different issues emerging from the case will be discussed: the difference between *inter* and *intra-organizational* projects, the issue of defining goals and scope of projects, and the role of the initiator in inter-organizational projects.

First, research on IT governance in general and IT projects specifically is usually intra-organizational in nature. External partners are considered mainly as vendors or consultants (e.g. Sambamurthy & Zmud, 1999). In such intra-organizational settings the company has both responsibility for, and authority over, the project. In inter-organizational settings however, a company's success does not only depend on its own actions but on other organizations' actions over which it has limited control (Konsynski, 1993). This can lead to situations where the importance of an organization's course of action actually is far more important to another company (e.g. the company responsible for an inter-organizational IT project) than to the organization itself (Stinchcombe & Heimer, 1985).

The success of SAXESS was dependent on the member firms being ready to make the transition from the old system. The complete inter-organizational system consisting of the trading system (SAXESS), the network, and the member firms' trading applications was crucial to SSE. Accordingly, the members' transitions were eased by e.g. backward protocol compatibility, which allowed each member to switch protocol at their discretion. This backward compatibility of course increased the complexity of the implementation effort.

Second, the project management literature tends to focus on the implementation phase and downplay the goal setting phase (Hellgren and Stjernberg, 1995). Goal set-

ting is however important since once the project commences the goal, or scope, in many cases is not questioned. Instead the focus is on meeting this goal (Kreiner, 1995).

The technical and functional scope of the SAXESS project was actually an ongoing issue within the implementation team. The organizational perspective was however of less concern to the development project. This led to the organizational aspects of the implementation not being as rigorously planned and tested as the more technical ones. This in turn resulted in a high degree of dependence on key developers before the operations department came up to speed.

Third, discussions on the initiator are often confined to considerations *within* an electronic market; the purpose is to compete with other actors on the same electronic market (e.g. Choudhury 1997). SSE faced a different situation as it developed the trading system partly to compete with other electronic markets, i.e. other exchanges.

To further increase the level of complexity, some members of the exchange were members at other exchanges and thus participants in a number of different electronic markets. The member firms were also the major owners of SSE at the time of the go-ahead decision. This was, and still is, the ownership structure of many exchanges around the world and have in some instances inhibited proactive technology projects (Lee, 1998). Existing customers are not always positive to e.g. new technology (Christensen, 1997). As trading volumes increased heavily during the development phase, SAX was having some problems to keep up and thus prompted the members' demand for a new system. Luckily, by having overcome the initial resistance the exchange at this time was close to delivery instead of just starting the project.

To summarize, a general conclusion from this research is the importance of widening one's horizons.

- The resources needed in inter-organizational projects are not controlled by the focal organization but extend beyond the boundary of the organization. A project plan only considering the efforts of the focal organization can prove to be too narrow; a wider plan is needed.

- A company has to define goals that make the project's result useful even though this might mean involving other companies. A too narrow scope can render the project less useful even if it does succeed to achieve its goals.

- To listen too intensely to one's customers can lead the company wrong. Instead, a successful initiator has to look beyond the day-to-day business to fulfil not only the customers' current needs but also their future ones.

## References

Bakos, Y. "Reducing Buyer Search Costs: Implications for Electronic Marketplaces," *Management Science* (43:12), December 1997, pp. 1676-1692.

Choudhury, V. "Strategic Choices in the Development of Inter-organizational Information Systems," *Information Systems Research* (8:1), March 1997, pp. 1-24.

Choudhury; V., Hartzel, K., and Konsynski, B. "Uses and Consequences of Electronic Markets: An Empirical Investigation in the Aircraft Parts Industry," *MIS Quarterly* (22:4), December 1998, pp. 471-507.

Christensen, C. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Harvard Business School Press, Boston, MA, 1997.

Hellgren, B., and Stjernberg, T. "Design and implementation in major investments – a project network approach," *Scandinavian Journal of Management* (11:4), 1995, pp. 377-394.

Konsynski, B. "Strategic control in the extended enterprise," *IBM Systems Journal* (32:1), 1993, pp. 111-142.

Kreiner, K. "In search of relevance: project management in drifting environments," *Scandinavian Journal of Management* (11:4), 1995, pp. 335-346.

Lee, R. *What Is An Exchange? The Automation, Management and Regulation of Financial Markets*, Oxford University Press, Oxford, England, 1998.

Sambamurthy, V., and Zmud, R. "Arrangements for Information Technology Governance: A Theory of Multiple Contingencies," *MIS Quarterly* (23:2), June 1999, pp. 261-290.

Shapiro, C., and Varian, H. *Information Rules: A Strategic Guide to the Network Economy*, Harvard Business School Press, Boston, MA, 1998.

Schein, E. *The Clinical Perspective in Fieldwork*, SAGE Publication, Beverly Hills, CA, 1987.

Stinchcomb, A., and Heimer, C. *Organization Theory and Project Management*, Norwegian University Press, Oslo, Norway, 1985.