Strategic risk positioning as sensemaking in crisis: the adoption of electronic trading at the London international financial futures and options exchange

Susan V. Scott\textsuperscript{a,}\textsuperscript{*}, Michael I. Barrett\textsuperscript{b}

\textsuperscript{a}Information Systems Department, Houghton Street, The London School of Economics, London, UK
\textsuperscript{b}Judge Institute of Management, Trumpington Street, University of Cambridge, Cambridge, UK

Received 17 June 2002; accepted 13 January 2005

Abstract

In this paper we describe a period of strategic crisis (1997–2000) at the London International Financial Futures and Options Exchange (LIFFE) precipitated by the loss of a key benchmark product from their manual trading environment to an electronic trading platform (DTB/Eurex). Using Bower and Christensen’s (1995a) notion of disruptive technology, our analysis starts by examining the response of major international financial futures exchanges and considers why the industry incumbents ignored the potential threat from electronic trading for so long. Widening our focus to examine responses from the broader financial market community to these events, we then embed LIFFE’s story in the organizational literature on sensemaking. This provides the theory of disruptive technology with an analysis of the meaning-making processes surrounding it and provides evidence for an empirically grounded form of sensemaking, which we call strategic risk positioning. Our findings are of interest both to practitioners in incumbent organizations responsible for managing potential threats from new entrants and academics attempting to develop theoretical tools to provide support during strategic crises associated with new technology adoption.

\textcopyright{} 2005 Elsevier B.V. All rights reserved.

Keywords: Disruptive technologies; Sensemaking; Financial markets; Derivatives; Electronic trading; Interpretive research; Strategy; Crisis; Risk positioning

* Corresponding author. Tel.: +44 207 955 6185; fax: +44 207 955 7385.
E-mail address: s.v.scott@lse.ac.uk (S.V. Scott).

0963-8687/$ - see front matter \textcopyright{} 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.jsis.2005.01.001
“At the beginning of October last year [1997], the City of London Corporation unveiled a new statue. Cast in bronze by the sculptor Stephen Melton, it depicted a futures trader in a striped jacket, his tie casually loosened, talking into his mobile phone. It cost £40,000 and stands on the corner of Cannon Street and Walbrook, just a couple of hundred yards from the main Liffe building. It was intended as a celebration of the City’s most colourful characters, but already it is taking on the air of a memorial: ‘Here lies the Unknown Trader—we will remember him’”. (Hulse, *The Independent* 6th August, 1998)

1. Introduction

In this paper, we analyse a strategic crisis at the London International Financial Futures Exchange (1998–2000) precipitated by the loss of one of its benchmark products (the bund) to a Frankfurt-based electronic trading platform (DTB later known as Eurex). The economic significance of Liffe during the 1990s was remarkable; in 1997 a typical trading day at Liffe would have a nominal value of £170 billion, the equivalent to the UK economy over a three day period (Anon, 1997a). By the mid-1990s, it had become a cliche to cite Liffe as the epitome of the City’s success (Luce and Iskandar, 1998). Yet, by the end of 1999, Liffe had been forced to reinvent itself as an electronic exchange.

The adoption of electronic trading systems has ‘transformed the economic landscape of trading venues and is proving a force for change in market architecture and consequential trading possibilities’ (Allen et al., 2003: 204). There is a growing body of literature on the impact of electronic trading on market structures and the notion of e-finance (see Allen et al., 2002; Banks, 2001; Domowitz and Steil, 2001; Mishkin and Strahan, 1999; Sato and Hawkins, 2001). We consider what can be learned from Liffe’s experience as a dominant incumbent wrong-footed by a competitor using electronic trading as a disruptive technology.

In their seminal paper on disruptive technologies, Bower and Christensen (1995a,b) note that ‘one of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change.’ We analyse the response of an incumbent futures exchange to electronic trading and examine how far our data confirm, refute, or go beyond the disruptive technology thesis. While Bower and Christensen’s (1995a,b) thesis provides us with a theory about the status, nature and trajectory of information technologies used in competitive business situations we maintain that its approach to meaning-making processes during a strategic crisis is under developed. The sensemaking literature, with its focus on how actors in organizations discover that they are facing important decisions, provides a robust conceptual extension to the disruptive technology thesis which allows us to develop a complementary analysis of market reversals in the futures industry.

Since our particular interest is meaning making during a strategic upheaval we have made our conceptual keystone Weick’s (1988, 1993) seminal papers on sensemaking in crisis. Then, in order to encapsulate contemporary phenomena in our electronic trading study, we combine Weick’s work with social theories of reflexive modernization (Beck,
1992; Beck et al., 1994). This enables us to draw attention to characteristics of sensemaking under conditions of globalisation in our analysis, including heightened perception of uncertainty, the chronic revision of knowledge, the influence of ICT and global news media, and local–global dynamics. Finally, we draw these findings together into our concept of ‘strategic risk positioning’, which we present as a form of sensemaking during IT-fuelled strategic crises.

2. Methodology

Our motivation for conducting this study was to inspire practitioners who are facing (or have faced) strategic wake-up calls involving information systems and to develop academic debate about strategic information systems in a globalising age. The research is underpinned by a ‘broadly interpretive’ (Walsham, 1993) epistemology complemented by a longitudinal, qualitative, and social constructivist approach to studying markets. Our position is that:

“[F]inancial markets are socially constructed institutions…stable and orderly market arrangements are produced and reproduced as a result of the purposeful action and interaction of interdependent powerful interests competing for control…The social constructivist perspective suggests that markets are not spontaneously generated by the exchange activity of buyers and sellers. Rather, skilled actors produce institutional arrangements; the rules, roles, and relationships that make market exchange possible. The institutions define the market, rather than the reverse.” (Abolafia, 1996: 8–9)

During our feasibility study, market participants suggested to us that the adoption of electronic trading in the futures industry posed a threat to existing market positions. We subsequently interviewed key actors with a stake in these changes: staff at all levels in major futures exchanges; brokers; bankers; regulators; professional association representatives; and software vendors (see Table A1 in Appendix A1). While questions were tailored for each interviewee, an emphasis on perceived opportunities and risks relating to the shift to electronic trading remained constant. The majority of the 65 interviews were tape-recorded with the permission of the interviewee. Interview notes were immediately written up and cross-checked by the two researchers.

In addition to an extensive interview process, three other data-gathering methods were pursued; firstly, we attended industry conferences in Chicago, London, and Frankfurt that had adopted electronic trading as their theme. Secondly, organizational documentation from exchanges, traders, banks and clearing houses were studied, and time was spent observing trading floors. Finally, editorials and media reports were placed alongside the ethnographic observations and interview data. The empirical material describes events (1997–2000) in the futures industry; however, since our fieldwork began in 1998 we used historical material to reconstruct the previous year. The case study in this paper has been crafted from the mass of data gathered and is focused specifically on Liffe’s story.

Preliminary analysis processes included making data summaries highlighting key quotations and ethnographic material, to form the basis of experimental data sifting around
different themes, concepts and issues. Among the codes that we worked with at this time were: IS and the local/global (intensifying awareness of interconnectedness); governance (its entanglement with IS); risk/uncertainty (role of IS in their potential management); multiple forms of strategy at different levels (personal, professional, IS, firm, and industry); and the politics of IS strategy.

In light of further data collection and our reading of the current leading-edge literature, we chose the most provocative and interesting of the patterns revealed for further analysis. The information systems and strategy literatures that we consulted treated the notions of uncertain futures and strategic positioning that characterised our findings too narrowly. By introducing the subjective multifaceted concept of strategic risk positioning we seek to provide an empirically grounded notion that broadens existing research in this area. It represents a distillation of the themes identified during our analysis phase into a line of argument with insights into the role of information technologies in organizational change and communicates key features of sensemaking involved in information systems strategy formation in our globalising age.

The status of findings using this method of analysis are ‘interpretive generalisations’ (Walsham, 1995). Whilst we appreciate that the specifics of our material on the derivatives exchanges may not be relevant for other industries the theoretical issues raised, and the idea of strategic risk positioning as sensemaking in crises, will be helpful to scholars and practitioners attempting an informed understanding of complex ICT-enabled modernisation processes. Section 3 will position our approach in academic debates and outline the theoretical foundations at work in the analysis.

3. Literature

In this section we discuss the literature base for strategic risk positioning beginning with Bower and Christensen’s (1995a,b) thesis of disruptive technologies. We then present Weick’s approach to sensemaking in crises and incorporate within it the notion of socially constructed risk positions, as a useful complement to Bower and Christensen’s analysis of the role and nature of technology in the competitive transformation of industry positioning.

3.1. The disruptive technologies thesis

Managing information systems to achieve or maintain a strategic position preoccupies both practitioners and the academics. Many industries have experienced a rise in new entrants and witnessed the toppling of traditional incumbent organizations. Bower and Christensen (1995a,b) coin the term ‘disruptive technologies’ to describe a particular kind of incursion into a marketplace by a new entrant.

Their findings, from the software and telecommunications industries, identify a pattern surrounding disruptive technologies. Despite their capacity to change the competitive dynamics in an industry, disruptive technologies tend to be ignored by market incumbents because when they first come to attention their functionality is under-developed and current customers are not interested. Typically, these technologies are relegated to
non-core market segments or emerging applications where their capabilities are explored. Such a slow maturation process further convinces market leaders of their initial rejection. However, Bower and Christensen (1995a,b) warn that this lull may merely be a phase in potential performance trajectory, which gradually gains in momentum. When the disruptive technologies are subsequently seized upon by rival companies, incumbents lack the internal resources to respond in a timely way.

Bower and Christensen (1995a,b) maintain that the interests of current customers and markets dominate the logic of most companies, and may actually blind them to important new technologies in emerging markets. There is an understandable tendency to continue with strategies that have made the company successful and are current major revenue streams. Their conclusion is that many of the technologies that proved disruptive would have been rejected by classic management strategies. Traditional economic-based analysis is unlikely to recommend overturning a highly profitable existing market strategy for one on the margins of current customer interest, based upon inferior technical functionality, that is likely to incur initial losses.

They suggest that managers create information about potential disruptive technologies using alternatives means, these include: experimenting with markets; establishing or monitoring smaller companies; examining internal disagreements over the development of new products or technologies; and broadening the scope of organizational conversations beyond existing primary customers. We maintain that sensemaking may be helpful in furthering our understanding of market intelligence and complement the points made by Bower and Christensen (1995a,b) above. Sensemaking is the process through which actors in organizations discover that they are facing important decisions, which is crucial in situations involving disruptive technologies.

3.2. Sensemaking during periods of organizational crisis

Sensemaking (see Weick, 1995, 2001) marks a move away from top-down planned or design models of strategy and is closely associated with contextual rationality (White, 1988) and processes of situational assessment (Klein, 1993).

“The basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs.” (Weick, 1993: 635)

In this paper, we are interested in a specific kind of sensemaking focused on the way that meaning is made and unmade during crises threatening ‘the most fundamental goals of an organization’ (Weick, 1988: 305).

Weick (1988) forwards the thesis of enactment and considers the role of actions associated with sensemaking in the escalation of crises. The underlying premise of enactment is that:

“. . .when people act, they bring events and structures into existence and set them in motion. People who act in organizations often produce structures, constraints, and opportunities that were not there before they took action. Enactment involves both a process, enactment, and a product, an enacted environment.” (Weick, 1988: 307)
He maintains that action precedes cognition in crises. Important new knowledge is created through action (people think through action) and these sensemaking actions contribute to the trajectory of the crisis. This is because actions shape both the outward features or context of the crisis and form assumptions in the minds of the stakeholders involved that inform subsequent actions. Three key attributes influence the nature of action: the degree to which they reflect commitment (to beliefs or actions); available capacity (the repertoire of responses); and expectation (assumptions that might fuel self-fulfilling prophesies). An enactment perspective is, Weick claims, particularly helpful when attempting to understand actions designed to assess or manage the ambiguity of the situation.

Weick (1993) later shifts attention to the collapse of sensemaking and attempts to identify sources of resilience that makes groups less vulnerable to breakdown. The themes of enactment are present in his 1993 thesis, but reframed around an analysis of the Mann Gulch forest fire disaster. For example, the ideas of commitment and expectation are implicit in his proposed notion of everyday cosmology or set of beliefs about the way the world should work. His analysis considers the capacity of the men at Mann Gulch to cope with what he calls a ‘cosmology episode’:

“A cosmology episode occurs when people suddenly and deeply feel that the universe is no longer a rational, orderly system. What makes such an episode so shattering is that both the sense of what is occurring and the means to rebuild that sense collapse together. Stated more informally, a cosmology episode feels like vu jade—the opposite of déjà vu: I’ve never been here before, I have no idea where I am, and I have no idea who can help me.” (Weick, 1993: 633)

In addition to the challenge of sensemaking during a cosmology episode, Weick identifies problems of structure at Mann Gulch. He maintains that a major contributor to the disaster was a disintegration of role structure, which would have kept the men organized. Key leadership roles were left unfilled (leader and No. 2. were displaced), they were asked to act in an ambiguous way that ran contrary to their professional identities (down tools, lie in an escape fire), and the team were unfamiliar with each other. All of this meant that as the fire gained on them they chose to rely upon their own resources rather than trust their lives to the leader’s experience. Weick suggests that if faced with a similar steady erosion of sense and structure organizations might also find themselves vulnerable. He also emphasises the need to remain open to interpretations that challenge our cosmology including the possibility of extreme actions.

Weick’s analysis of sensemaking in crisis situations focuses on immediate and dangerous physical hazards (e.g. the Bhopal chemical plant and the Mann Gulch disasters). When Weick analyses ‘thinking by doing’ he is referring to the way that, in novel situations, actors are obliged to go through a rapid learning process about the life threatening phenomena (for example operatives try turning off valves to see whether it has a corrective effect).

In business, threats tend to be economic and competitive rather than physical. Survival is less poignant and the timeframe is often less immediate. During business crises, the cry tends to be ‘today is bad, tomorrow has to be better’ and efforts are focused on building or
colonising a preferred future. Our analysis broadens Weick’s perspective on sensemaking in a crisis to include the commercial cultural context of the financial markets (Table 1).

Markets represent a distinctive organizational form in which to study sensemaking. Trading financial products of necessity involves multiple stakeholder identities; at its most straightforward there must be buyers to match sellers. These counterparties may have little in common other than a coincidence of wants and the need to find a market that will satisfy their requirements. These requirements find expression in the adoption of positions in the market. Actors take positions to manage risk, achieve strategies, and defend their advantage in a market. It is this notion of a risk position that we will identify and develop as a form of sensemaking in market communities.

3.3. The notion of a risk position: from Porter to Beck

In financial markets the term position is used in the economic sense of a contract to manage risk over time, however, there are many other levels of meanings that we can invite. We begin our exploration by noting that both financial communities and the strategy literature use the metaphor of a market position. For example, staff and customers are forced to make sense of their strategic position when a rival new entrant challenges an industry incumbent.

Markets share a practice of economic calculation with particular schools of strategy for example the Positioning School (see Mintzberg et al., 1998: 88ff). The most well-known protagonist of this approach is Michael Porter whose key contributions are the notion of value chains, five-forces industry model, and strategic positioning (see Porter, 1980, 1985, 1996, 2001). This approach to strategy is regarded as top down with a master architect passing plans down to business lines. Key points of criticism include the assumptions of relative stability vis-à-vis rapid or uncertain change. Porter’s work has been accused of taking people out of strategy; and its emphasis on excessive planning is thought to reduce

<table>
<thead>
<tr>
<th>Key concept</th>
<th>Main points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensemaking</td>
<td>The on-going accomplishment of meaning construction in context involving efforts to create order and make retrospective sense of what occurs</td>
</tr>
<tr>
<td></td>
<td>Building meaning from salient cues: scouring for evidence to support a particular sense of events</td>
</tr>
<tr>
<td></td>
<td>A process of organizational narrative (storytelling)</td>
</tr>
<tr>
<td>Sensemaking in a crisis</td>
<td>Cosmology episodes when the universe no longer makes sense (we have never seen this before)</td>
</tr>
<tr>
<td></td>
<td>Erosion of sense and structure in an organization renders it vulnerable</td>
</tr>
<tr>
<td></td>
<td>Action as a means to gain a sense of what is going on (thinking by doing). Includes processes of improvisation</td>
</tr>
<tr>
<td></td>
<td>Closely interwoven with issues of identity: a person’s sense of who he or she is in a setting and their repertoire of responses (capacity)</td>
</tr>
<tr>
<td></td>
<td>Importance of being open to interpretations that challenge our cosmology including the possibility of extreme actions</td>
</tr>
</tbody>
</table>
opportunities for strategic learning. Recent strategy literature has suggested that the Positioning School ‘has not been wrong so much as narrow’ (Mintzberg et al., 1998: 112).

Whilst agreeing with much of the critique of this school, Porter’s notion that companies must be clear in understanding their positioning or identity ‘still rings true’ (Cummings and Wilson, 2003: 29). In this paper we contribute to efforts in the IS literature to broaden the concept of strategic positioning (such as Galliers and Sutherland, 1991) by attempting to develop subjective meaning making processes that can be put alongside the traditional notion of strategic positions. To do this we introduce a concept of socially constructed risk positions (Beck, 1992), which forms the basis for our contemporary form of sensemaking, strategic risk positioning.

Beck defines risk positions as key social and political positions, shaped by opinions that are formed through our interaction with communities (at a distance and close by), media, and definitions decided by scientific-legal entities of various statures (law, scientific reports, regulators like the financial services authorities). This definition relies upon a reorientation of meaning in both the term risk and position relative to finance and economics. However, it provides us with a useful way of understanding situated sense-making, strategizing, and the way actors manage their relationships to uncertainty in contemporary organizations.

Beck uses the term risk metaphorically to examine the (re-)distribution of advantage and disadvantage that accompanies social change under conditions of globalisation. For him:

“Risk is not an object, but a way of perceiving potential positives and negatives in a situation, a choice about what is important and what can be scoped out when making a decision.” (Scott, 2000)

This subjective treatment of risk is supported by cultural anthropologist Mary Douglas with whom he shares a belief that the word risk serves as a ‘forensic vocabulary’ (Douglas, 1990) with which social scientists can hold persons accountable in the new global culture.

Beck maintains that processes of globalisation have made chronic revision of knowledge the norm rendering the process of definition and measurement highly political. Actors have to wade through multifarious opinions and assess the various metrics of uncertainty available in their worlds. As they relate events to their interests and reflect upon where this leaves them actors construct ‘risk positions’ (Beck, 1992). As Beck says, risk positions are dependent upon and sensitive to the diffusion of knowledge about risk, and this creates a perceived obligation among actors to actively manage their relationship to uncertainty. The risk positions adopted to counter uncertainty often contribute a further layer of complexity (e.g. security measures to combat terrorism), which generates side effects or ‘recursive innovation’ (Beck, 1992) that can drain resources and preoccupy management.

4. Building the notion of strategic risk positioning

In this section, we illustrate how the concepts discussed above can combine to provide insights into disruptive technology crises. We suggest that there are common
conceptual linkages between risk positions and sensemaking in a crisis. These literatures are epistemologically sympathetic, assuming multiple interpretation of reality and the social construction of knowledge. There is a shared focus on situations where trust in leaders, experts, and institutions is diminished triggering an obligation to ensure one’s own future prospects. Both Weick and Beck draw attention to issues of identity and the importance of past professional experience in shaping strategic repertoires. Their primary concern is: ‘who survives and why?’ in particular contexts as well as the consequences (or side effects) of actions taken to survive.

However, in contrast to the immediacy of a forest fire or factory explosion where the concern is to have a future *at all*, survival tactics in commercial situations relate to a longer timeframe. Sensemaking provides a theory of meaning making to underpin processes of reflexive modernization, whereas risk positions illuminate the way in which survival tactics in a business context can be assembled into portfolios of hedging, betting and holding tactics designed to achieve a *preferred future*.

In Table 2, we present the four key elements of our concept of strategic risk positioning. This is followed by a brief discussion about how it provides insights into disruptive technologies.

Firstly, reflexive assessment of strategic ties, such as relationships and business agreements, recognizes the need to monitor for disruptive technologies and broadens sensemaking to specifically encompass the local/global reflexivity that characterises our globalising age. Secondly, the formation of risk positions is presented as a contemporary manifestation of sensemaking that is on-going, but becomes intensified during the cosmology episodes (when the universe no longer makes sense) associated with disruptive technologies. Thirdly, we identify actions designed to gain a sense of what is going on and call particular attention to the way that actors use embodied and embedded strategic tools to construct a montage of resources that help them colonize preferred futures across time and space during crisis. In the specific case of market professionals we note a tendency to form portfolios of hedging, betting and holding tactics. Finally, we connect Weick’s notion of an ‘enacted environment’ (Weick, 1988: 307) with side effects characterising reflexive modernization and note that further strategic risk positioning is often necessary to manage the unexpected, which consumes valuable management resources. In Section 5, we present our case study in futures exchanges which documents the strategic crisis triggered by use of electronic trading as a disruptive technology. We draw on this study to illustrate our concept of strategic risk positioning.

Table 2

<table>
<thead>
<tr>
<th>Key elements underlying the concept of strategic risk positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflexive assessment of local and global strategic ties: making sense of salient cues</td>
</tr>
<tr>
<td>Risk positioning as a form of contemporary sensemaking</td>
</tr>
<tr>
<td>Using embodied and embedded strategic actions to colonize preferred futures across time and space</td>
</tr>
<tr>
<td>Managing the unexpected side effects arising from an enacted environment</td>
</tr>
</tbody>
</table>
5. Empirical material

Major futures exchanges are regulated entities whose standing rests upon their ability to offer opportunities for risk management and the establishment of efficient market prices to professional users of the world financial system:

“Those who do not want to take on financial risks transfer them to people who have the appetite for them and the ability to control them.” (www.Liffe.com 19/05/04)

When professionals trade futures they are making promises to buy or sell (financial or commodities contracts) at a set price on a future date. In the early 20th century a system called ‘open outcry’ was developed in order to facilitate the flow of transactions. Traders stand face-to-face on the steps of pits wearing colourful jackets to show their firms and shout trade details backed up by hand signals.

Before the crisis at LIFFE, rivalry between exchanges was regarded as subject to both political and market processes. Exchanges tended not to list each other’s products effectively giving each other a ‘local monopoly’ (Tait, 1998) or as the chairman of Liffe was reported as saying in 1998 ‘a total stranglehold’ (Liffe executive quoted in Luce and Iskandar, 1998). This reinforced a market maxim: that once an exchange had established liquidity (akin to critical mass) in a particular product its reputation for delivering price discovery (fair market price) would hold it there even in the face of highly competitive alternatives.

Liffe’s story is remarkable because it represents a previously unimaginable event: the flight of a product (the German government currency bond or Bund contract) pioneered and dominated by the largest incumbent futures exchange in Europe (Liffe) to a rival exchange (DTB/Eurex based in Frankfurt). The DTB/Eurex overturned Liffe’s market position by changing competitive dynamics through the implementation and use of electronic trading. In the rest of this section, we tell Liffe’s story (1997–2000) documenting the Bund crisis and its aftermath.

5.1. Liffe’s story

Staff and members at the futures exchanges had discussed electronic trading technologies from their inception. During the mid-1980s, the major international players undertook IT projects to explore their business application. The idea of replacing open outcry on the floor of the exchanges was not popular at this time for two main reasons: firstly, open outcry outperformed the functionality of electronic trading technologies; and secondly, it would undermine the interests of many exchange members who made their money from floor trading. It therefore became relegated to non-core market segments and emergent applications (for example Project A at the Chicago Board of Trade and APT at Liffe).

While electronic trading was not regarded as an acceptable replacement for local trading practices at major futures exchanges, its potential to protect international market share was seized upon through initiatives like Globex (an electronic trading alliance begun by Reuters and the Chicago exchanges):
“…the idea was post- and pre-market trade because this would not interfere with open outcry, that was still the sacred cow…As long as we protected the open outcry session in our covenant with [members]…they were willing to go for it.” (Former Chairman of CME, President of brokerage company Chicago 1998)

While the major futures exchanges were content to assimilate electronic trading as an ancillary or complementary service other players explored its potential further. For smaller institutions and entrepreneurial actors electronic trading represented alternative opportunities.

In Europe, the developments in electronic trading coincided with policies to consolidate financial markets. The City of London’s reputation as a progressive financial centre contrasted with other areas of Europe where competitive capacity was hampered by fragmented financial structures. For example, in Germany the historic development of markets meant that multiple exchanges (e.g. Stuttgart, Berlin, Frankfurt, Bonn) with unequivocal or proprietary membership arrangements divided market share. It was in this context that the Deutsche Terminborse (DTB) made moves to develop an electronic trading system to consolidate markets, not only pooling liquidity at German exchanges but also enabling cross-border trading.

The DTB’s decision to become an electronic futures exchange was watched with interest by staff and members at major international futures exchanges in the US and England, however, their early trials and tribulations only served to reconfirm the supremacy of their resident open outcry method:

“The DTB acknowledges that early on the system did not silence the critics of electronic trading. [A senior DTB executive] recalls a rough stretch in January 1991 when the DTB system was overloaded and crashed numerous times. ‘This was a month I’ll never forget…We got a lot of telephone calls’. The DTB expanded the system’s capacity and learned its lesson about staying ahead of the technology curve.” (Kharouf, 1998)

Grassroots actors were also experimenting with electronic trading including forward-thinking local pit traders. Small groups of independent traders used their wealth to fund forays into technology development to explore its functionality. For example Tom Theys and colleagues first became involved in digital assistants for pit traders, then moved on to desktop PC personal trading systems (Interview 1998). By the late 1990s, Tom would spend an hour and a half trading in the pit at Liffe before heading to his office to act as managing director of PAT (Personal Automated Trading) Systems (see Financial News 23/02/98). His speculation into trading technologies was fuelled by entrepreneurial drive, as well as active engagement with both open outcry and electronics. He believed that technical functionality could only advance further, whereas open outcry had reached its optimum capacity.

In 1997, when the DTB began its competitive push for the bund contract it held only 30% of the trade volume (Sales, 1998). DTB launched an introductory package that included a free six-month trial, a rent-free computer terminal, software, and free installation. In response, Liffe reconfirmed their commitment to open outcry believing that
overall growth in the futures market meant electronic trading and floor trading could co-exist (Hamilton, 1998). In July 1997, the Liffe chairman announced that after:

“…a long cool look at the business’, the Liffe board concluded that its open outcry pit system was ‘the fairest and most efficient’. This would remain ‘Liffe’s predominant trading platform for the foreseeable future’.” (Quoted in Searjeant, 1998)

Yet, each month the volume of bund contracts traded on the floor of Liffe dropped. By April 1998, the media were reporting a ‘crisis of confidence’ (Hasell and Kennedy, 1998) among Liffe members.

“The chairman and chief executive have been carrying on as if they were the captain and the chief engineer on the Titanic, congratulating themselves on a smooth launch and journey. They don’t realise the iceberg is just around the corner.” (Liffe Board member quoted by Wolman, 1998)

Eventually, when the bund crisis was well underway, Liffe members held an extraordinary meeting (May 12th 1998) and committed to spending £100 million on the development of a state-of-the-art electronic trading system called LiffeConnect. But it was not enough.

On June 5th 1998 traders on the Liffe floor held a one minute silence to mark the passing of the June bund contract. This represented the end of a year-long plunge in trading in which DTB (now know as Eurex) won 70% of the volume traded (see Callaway, 1998; Sales, 1998):

“It went in a period of about a couple of months… it’s quite phenomenal when it happens, when you see your business disappear.” (Director of IT, Liffe 2000)

The spectacular loss of Liffe’s key German bond contract, the bund, to the electronic Eurex/DTB exchange was widely heralded as a watershed. The events of 1998 not only shocked Liffe, but threw the international exchange communities into a strategic crisis. The volume of trade had shifted to what many still regarded as a functionally inferior alternative:

“…there is growing evidence that electronic trading systems, at least for futures and options contracts, continue to suffer from many technical problems that make them less than completely reliable for the type of international trading and communications links being considered.” (Anon. Securities Week Oct 12 1998)

Although their £100 million investment in the LiffeConnect electronic trading system did not retrieve the bund contract, it marked a strategic turnaround for Liffe, and reduced floor traders to a ‘dying breed’ (Luce, 1999). In 1999, Liffe closed the trading floors and reinvented itself as an à la carte market professional services and software company.

Electronic trading technologies still haven’t proven themselves to the extent that they have quashed all criticism or concern, but regardless of this their use has enabled major change. The loss of the bund contract transformed the European futures markets, which are now all electronic. Eurex not only hijacked Liffe’s market position, it subsequently went on to become the largest exchange by trading volume in the world usurping the Chicago Board
of Trade, formerly regarded as the ‘King of Exchanges’. One certainty, in this period of industry uncertainty, is that the connection between electronic trading and industry change is not over yet and its implications will continue to be felt for decades to come.

6. Analysis

Liffe’s story described above serves as an empirical base camp for our analysis section. In Section 6.1, tenets of Bower and Christensen’s (1995a,b) disruptive technology thesis are illustrated with data from our fieldwork in the financial futures markets. In Section 6.2, we expand their original idea by developing an analysis of meaning-making processes surrounding disruptive technologies in the futures industry. To do this we broaden our focus from Liffe itself to the international financial markets community and analyse evidence of sensemaking activities during the strategic crisis triggered by Liffe’s loss of the bund. Using the four key features of strategic risk positioning discussed in Section 4 we present an empirically grounded analysis of meaning making during a disruptive technology crisis.

6.1. Electronic trading as a disruptive technology in financial futures markets

Liffe’s story illustrates many of the tenets of Bower and Christensen’s (1995a,b) disruptive technology thesis. The potential of electronic trading was recognised by staff at major futures exchanges in Chicago and London, but it was rendered ancillary to the core open outcry business. IT and business development managers with a talent for innovation could find employment at the major futures exchanges; however, the fate of electronic trading projects such as Globex, Project A and APT became subject to broader social, economic, and political forces:

“It is usually not the technology… I have never sat at the table and felt like I was constrained from the standpoint of technology because with the proper amount of resources and the time to do it we can usually solve most problems. It really comes down to the political aspect, and the individual strategies of these exchanges…Politics has always constrained the technological choices.” (MD International Business Development, Chicago Exchange, tele-interview 1999)

An economic-based analysis of market position would support the approach taken by the major futures exchanges: a traditional management tactic in which electronic trading is assimilated to complement the successful and proven core business model currently driving the customers of established market leaders (see Porter, 2001). Yet Liffe’s market position was undone.

“Every company that has tried to manage mainstream and disruptive businesses within a single organization has failed.” (Bower and Christensen, 1995a,b: 51).

Bower and Christensen (1995a,b) maintain that disruptive technologies do not conform to rules of strategy founded on an analysis of past and present data. Following their thesis,
the Liffe managers made ‘the right decisions’ for circumstances that were ‘about to become history’ (1995: 53).

The disruptive technology thesis helps us to understand fatal flaws in the market analysis and intelligence gathering processes undertaken by managers at Liffe. When DTB/Eurex began its bid for competitive supremacy in the bund contract, Liffe executives were confident in their analysis:

“[The] chief executive of Liffe...said there was ‘nothing new in terms of potential’ in DTB’s initiative...He added that there was no evidence of demand for them.” (Quoted in Luce and Guha, 1997)

Even as the volume of trade in the bund contract shifted from the open outcry floor to the DTB/Eurex electronic exchange Liffe’s chairman made the seemingly self-evident comment that:

“The DTB system does not have the superior functionality that we require.” (Liffe chairman quoted in Paterson, 1998)

As the bund crisis unfolded (1997–1998), managers at Liffe found themselves subject to growing criticism. Market participants and analysts voiced this via the financial media:

“Liffe should be worried by its own reaction. It has been defensive and reactive, rather than innovative. The contrast between Frankfurt and London in this respect is startling.” (Bien, 1998)

A sense of ‘expectation’ (Weick, 1988: 307) built, creating assumptions that fuelled a sense of self-fulfilling prophecy. Interviews suggest that contrary to suggestions by some of its harshest commentators there were moves to innovate within Liffe during this period, however they were undermined by a cohort of the Liffe membership who were ‘passionately against change’ (interview former Liffe board member 1999). The pro open outcry argument made by floor lobbyists was not without grounds. During periods of market volatility the performance of electronic trading systems at MATIF in Paris and the DTB/Eurex had been questioned. Floor representatives at Liffe maintained that electronic trading would take the exchange downmarket and reduce profits.

Even if it could be argued that the functionality of electronic trading was in some regards inferior to manual trading practices (during 1997–1998), should this have been the point of reference for Liffe? Bower and Christensen (1995a,b: 50) observe that many of the disruptive technologies they studied never surpassed the capability of the old technology. They go on to suggest that:

“When evaluating whether a disruptive technology is strategically important, people should avoid comparing the disruptive with the established technology: The established technology will nearly always look better. What is critical is to measure the trajectory of performance improvement achievable in the technology against the trajectory of improvement demanded by the market. Our bet is that the technology will move faster than the market.” (1995a: 172)

Disruptive technologies introduce different attributes from the ones customers have historically valued (Bower and Christensen, 1995a,b: 45). In the case of electronic trading
these were primarily: efficient price discovery; reducing the cost of staff and physical exchange infrastructures; less dependency on location; and equality of market access (‘a level playing field’). In their popular book, *Capital Markets Revolution* Young and Theys (1999) turn these into cries for: ‘Accessibility, Transparency, Liquidity’.

For the duration of our period of study (1998–2000) electronic trading had a highly ambivalent status particularly in the main US futures markets, which made it difficult for actors to know how to invest or where to position their business. Researchers at the Bank of England sum up this strategic uncertainty as follows:

“No single arrangement is preferred by all players and what benefits one set of participants can be disadvantageous to others. The microstructure area is replete with trade-offs, gainers, and losers. The multiple objectives at every stage make it unsurprising that there is no unanimity on what constitutes ‘optimal’ trading arrangements, including at the level of public policy.” (Allen, Sato and Hawkins, 2001: 205)

The ambivalence and uncertainty surrounding modernisation of the futures industry became a pervasive feature of our data:

“The threat and promise of electronic trading brought panic early to the futures markets this year, leaving in its wake uncertainty, sharply diminished seat values [membership fees] at exchanges and internal and external battles yet to be fought, let alone won.” (Anon. *Securities Week* October 12th 1998)

Electronic trading was used in the futures industry to overturn the established order of market positions and catapulted incumbent major exchanges out of the established strategies that they were able to follow as de facto monopolies into strategizing under conditions of uncertainty. However, what can Liffe’s story tell us about the meaning making processes surrounding disruptive technology crises?

Bower and Christensen’s (1995a,b) disruptive technology thesis provides us with a theory about the status, nature and trajectory of information technologies used in competitive business situations. However, we maintain that it is also important to investigate the socio-political processes at work and we do this by developing an analysis of sensemaking in the financial markets community during the bund crisis. The loss of the bund from the Liffe trading floor was what Weick calls a ‘cosmology episode’ (1993: 633) for staff and members at the major futures exchanges. It shattered their preconceptions about economic rationality and the constitution of orderly market systems. They assumed that they understood what was occurring, dismissed the need to change and eventually found themselves strategically wrong-footed. In the aftermath of the bund crisis, Liffe and the other major exchanges stood looking out over a competitive landscape that looked deeply unfamiliar to them: ‘vu jade–the opposite of déjá vu: I’ve never been here before’ (Weick, 1993: 633).

Such contexts are immensely challenging in sensemaking terms because it is so difficult to get a stable sense of what is going on. There are no discrete economic models to explain events or off-the-shelf technological solutions to salve the crisis. Practitioners turn to experts and leaders but, as this quote indicates, they too may be searching for meaning:
“CEOs are unclear about direction. This is indicative of the uncertainty facing the industry.” (CEO major brokerage, FIA conference, Feb 2000)

It is at this point that Weick’s notion of sensemaking needs to be infused with the notion of risk positioning in order to get a better understanding of the pressures upon contemporary meaning making. Insights from theories of globalisation, such as reflexive modernization, help us to identify how actors respond to heightened perception of uncertainty during time of crisis.

6.2. Strategic risk positioning: meaning making in disruptive technology crises

By including meaning making in our analysis of Liffe’s story we can show how disruptive technologies are embedded in context and the processes that actors go through as they try to make sense out of difficult situations and bring order to crisis. We use strategic risk positioning (SRP) as our organizing concept to describe key characteristics of contemporary sensemaking during a disruptive technology crisis.

6.2.1. Reflexive assessment of local/global strategic ties: making sense of salient cues

In a contemporary business crisis actors are not dependent upon immediate sensory input in the way they might be at the site of a physical hazard; however, they are dependent upon a different kind of environment scanning in which they must relate their professional stake to events. The strength and weakness of strategic ties (e.g. relationships, business agreements, assumptions) are reflexively assessed with a view to possible revision or reconfiguration. Since the financial markets have become increasingly international this involves bringing the local and global into simultaneous consideration. Indeed, there is evidence that exchange leaders depended upon industry story telling of this kind to stimulate actors into forming a strategic response:

“Liffe’s experience with DTB electronically stealing the [Bund] product helped us greatly to be able to say ‘Look over there, look what is happening over there—look at the electronic markets…and Liffe…and Paris shutting their trading floors…these are pretty big things…there were so many newspaper articles that were saying ‘Will the exchanges close?’, ‘What is their future?’.” (CME Chairman 1998)

One of the primary cross-border information flows in the financial markets is the international financial news media. As Liffe sought to reassure local members during the bund crisis it seemed to sometimes overlook the globality of the market community and did not take into account broader processes of meaning making. For example, in July 1997, the chief executive of Liffe, stated that the exchange was ‘totally committed’ to open outcry (Luce and Guha, 1997). Even as the bund contract ebbed away, Liffe gave ‘seemingly unconditional’ support to their traditional method of trading (Tait, 1998). The depth of their resolution in the face of so many signs of change met with hostile commentary in the financial press:

“Try this waffle for size. According to Liffe chairman…‘There is something very special about human beings being together in an environment where they are
sharpening their wits together. There are a lot of nuances when you look into someone’s face’. Nobody could deny the City would be a duller place without the testosterone-fuelled antics of the barrow boys in stripy jackets. But Liffe’s renewed commitment to the system of open outcry looks nothing more than a victory of vested interests over technological and commercial reality.” (Anon. The Independent 1997b p. 25).

Weick maintains that commitment plays an important role in enactment during crises because as actions become more public and irrevocable they become harder to undo:

“Tenacious justifications can be forces for good or evil in crises. They are forces for good because they generate meaning in times of ambiguity, surprise, and confusion…The darker side of commitment is that it produces blind spots.” (Weick, 1988: 310)

Executives gave the impression that they had either closed down strategy formation processes prematurely or were moving too slow, sparking allegations that Liffe’s size and success had fostered an ‘arrogant’ organizational culture.

Despite public statements of denial by the major futures exchanges, many stakeholders believed that there were ‘clear signs that the hour of reckoning between open outcry and electronic systems is near’ (Cavaletti, 1998). Sydney Futures Exchange (Sycom) announced their decision to become fully electronic backed up by the statement that this will provide cost savings of 30–40% for ‘brokers, members and the exchange’ (Calvaletti, 1998). The French exchange, Matif, announced it would close its pits and go electronic much earlier than expected and Hong Kong Futures exchange pledged to launch all new contracts on screen (Maguire, 1998). Cantor Fitzgerald, a global investment broker, launched an electronic trading system designed to compete directly with the Chicago Board of Trade on the US treasury futures market. Finally, in 1998, the title chosen for the main Futures Industry Association conference in Chicago was ‘The Brave New World of Electronic Trading’.

6.2.2. Risk positioning as a form of contemporary sensemaking

These events featured prominently in organizational story telling and traversed social networks of market professionals who hotly debated their implications for the future. The ‘opinion forming’ interaction that took place among the financial markets community (at a distance and close by) are the conditions under which ‘risk positions’ (Beck, 1992) are formed during times of uncertainty.

Market actors began to reflect upon what ‘owning a seat’ (being a member) of a futures exchange meant in this changing world. As sensemaking eroded at Liffe questions about organizational structure and confidence in leadership was diminished. This engendered an obligation to act and drove market actors to increasingly rely upon their own resources to survive. The alleged fallibility in organizational structure at the futures exchange and breakdown in sensemaking meant market actors were obliged to take steps to ensure their own survival. They began seeking out alternatives and assessing their choices.

Through a process of risk positioning actors stockpile strategies and opportunities that can be rapidly transformed into action when events turn critical. They filled the void left by
exchange leaders with bricolage, or do-it-yourself, activities. Market participants in our study acted to protect their interests in the futures industry while events unfolded. The difficulty for them, however, was knowing exactly what those interests were in the light of the changes taking place, or as Weick might phrase this: how do actors discover what it is that they are being asked to manage?

6.2.3. Using embodied and embedded strategic actions to colonize preferred futures across time and space

Rather than using a prescribed school of strategy to authoritatively manage change, market players adopted a more organic approach. Market actors used their professional toolbox of entrepreneurial and portfolio-building skills to work out their stake in the changes underway as a way of colonising the future. The basis for this was market culture which provided them with a ‘repertoire of strategies’ (Abolafia, 1996: 169), a tool kit from which they assemble strategies to ‘fit their situation, advance careers, construct a coherent identity’ (Abolafia, 1996: 171). As Abolafia says, it is self interest transformed into tactics and strategies:

“Few occupations offer the continuous opportunity, the tremendous incentives and the repertoire of strategies available to market makers.” (Abolafia, 1996: 169)

Our data provide evidence of a wide variety of market tactics and strategies used for risk positioning. These included holding tactics, hedging and betting and are a reflection of the multiple interpretations coming to bear upon the crisis at hand.

For example, the strategic crisis in the futures industry was characterised by a ‘stampede into new alliances’ (Dixon, 1998). The Chicago Board of Trade formed an alliance with DTB/Eurex under the name ‘a/c/e’ (alliance/CBOT/Eurex). The CME launched ‘GLOBEX 2’ with the French exchange Matif and made alliances with smaller international exchanges (e.g. Montreal, Sao Paolo, Madrid). Liffe entered into discussions with CME to link their respective systems and offer netting arrangements. The permutations explored were many and varied as were the alliance announcements made in the news media prompting one senior executive on an industry conference panel to wish he had ‘a dollar for every letter of intent signed in this industry’ because he ‘would be a rich man’ (Industry conference panel, Frankfurt, 1999). This scepticism notwithstanding the alliance process served as an important holding mechanism for key market stakeholders. As this Vice President (Derivatives), put it:

“I basically think that the alliances are being entered into for very tactical reasons as opposed to truly significant strategic reasons…to maintain the status quo…[alliance activities] ties up a couple more years…which completely serves their interests.”

(Tele-interview, major financial institution, New York, 1999)

Hedging (taking an opposite position to manage risk over time) and speculation or betting (assuming risk for profit) are industry reflexes in the financial futures industry. Market players engaged in a combination of hedging and betting by making seemingly cannibalistic investments in the information and communication technology companies that were invading their pits.
“People are even less sure about the future than they were five years ago. The chinks that have occurred in the last two years are absolutely phenomenal... So in that case, we’d better have a bit of each of them... we better have a bit of TradePoint, we better have a bit of BrokerTec and then maybe some of these are going to be winners and we own 20% so that’s cool.” (VP derivatives, major financial institution 1999)

“No one knows where things are going in the industry. People are investing in everything.” (CBOE, Director International Business Development, FOW conference Frankfurt 2000)

The net result of these activities was a re-ordering of players, rather than a ‘capital market revolution’ (see Young and Theys, 1999). We suggest that this illustrates a professional characteristic of financial market culture that Abolafia (1996) refers to as ‘opportunism and restraint’. The history of financial markets reminds us that, as a whole, their participants are fundamentally conservative; traders are only one part of a broader spectrum of business. Market actors seek to reproduce a balance in opportunism and restraint rather than revolutionary change. Innovations tend to be appropriated in such a way that order is restored because stability is needed for markets to operate efficiently: As Abolafia puts it, “most innovative breaches never become full blown social dramas, but are instead repressed” (1996: 165).

6.2.4. Managing the unexpected side effects arising from an enacted environment

The full consequences of strategic risk positioning activities in the financial futures markets are still emerging; however, we can already highlight some side effects associated with electronic trading. In this sub-section, we focus in particular on governance, cost, and risk management controversies.

One of the strategic risk positioning activities that we described involved major financial institutions making experimental investments in electronic trading development during the bund crisis. This gave them experience in the construction of market micro-structures; in other words, to develop the requirements for their IT trading system they were asked to translate their interests and in so doing gained an appreciation of the way in which opportunities could be seized and used for inscribing their stake into market design. We suggest that this has helped the governance debates and cries for change in organizational structure that have accompanied the rise of electronic trading.

Secondly, as the benefits of electronic trading became better understood, customers expected the cost savings associated with automation to be passed on to them. As a consequence, it has become harder for market institutions to justify many of the fees that they previously enjoyed, effectively eliminating trade execution as a profit centre. As a consequence, there has been increasing pressure to reduce end-to-end costs throughout the trading lifecycle.

Finally, the redesign and automation of front-end trading processes brought to light inefficiencies in back office practices prompting financial institutions to vigorously challenge clearing and settlement costs. This has fuelled widespread moves to modernise traditionally fragmented back-office processes and consolidate clearing and settlement organizations triggering concerns about the implications of this global risk management and concentration risk (see Giovannini Report 2001).
7. Conclusion

Over the last decade, the strategic information systems (SIS) literature has advocated a move from IT planning, to IS-enabled strategizing (Galliers, 2004). However, the opportunity to put more responsive, incremental processes of strategizing into effect depends in part upon our capacity to proactively deal with potential e-shocks from disruptive technologies. To do so, we suggest that IS managers draw on subjective meaning-making processes to complement traditional notions of strategic positions as part of their early warning mechanisms.

We challenge a deterministic emphasis on IT in the management studies thesis of disruptive technologies (Bower and Christensen, 1995a,b) using a case study-based analysis from the interpretive IS tradition of longitudinal research. Building upon Weick’s work on sensemaking in a crisis, and insights from social theory, we introduce the term strategic risk positioning to communicate features of contemporary meaning making surrounding strategic information systems. By incorporating concepts from reflexive modernization, a theory of globalisation, strategic risk positioning expands the sensemaking literature and locates our study in the context of broader social, economic, and political change.

Our findings overturn previous SIS literature on markets, in particular Malone et al.’s (1989) assumption that advances in technology drive change. In contrast, we show that ICT developments are one of a combination of social and technical forces necessary to bring about organizational change. Following Kuljis et al. (1998 in this journal) we argue that the rapid intensification of competition and fundamental change in financial services mean that new products and services are ‘both agents and consequences of change’. From this perspective, it is difficult to separate technology from the socio-political ‘moment of interest’ (Hosein, 2003) in which they emerge. Whereas Bower and Christensen (1995a,b) focus on the moment of IT-driven market disruption the scope of our analysis is broader. We not only describe a specific event (the toppling of an incumbent market leader), but also the socio-political processes surrounding the build-up of IT use at financial exchanges and the post-disruptive technology phase of industry change.

Liffe’s story of disruptive technologies challenges Carr’s (2003) assertion that ‘IT doesn’t matter’ and suggests instead that not only are strategic information systems still potent competitive weapons, but that more than ever we must strive to understand strategizing in context. Our study of the futures markets contributes to research seeking to understand how actors in financial markets exploit and explore strategic information systems (Galliers and Newell, 2003). We make two contributions to scholarship in this area.

Firstly, we provide evidence to support Abolafia’s (1996) assertion that market actors recognise that balancing ‘opportunism and restraint’ is key to ensuring the standing of financial institutions. Our findings suggest that while ICT-enabled disruption signals competitive opportunities for innovation, financial markets actors avoid actions that might precipitate wholesale revolution as this would undermine mutual self-interest in the long-term goal of maintaining orderly markets that are attractive to customers. Secondly, whereas Weick (1993) examines how actors fall back on their own resources to survive immediate danger in Mann Gulch, our study shows how practitioners draw on their skills
to overcome business crises. The Liffe case study provides evidence that strategizing by risk positioning in context is a crucial and pervasive feature of contemporary life and work-life.

In closing, we emphasise that the notion of strategic risk positioning is built from the ground up inspired by original empirical data rather than an abstract top down model of strategy imposed upon practice. The market practitioners involved in these events were, for the most part, operating in survival mode and their opportunities for critical reflection were limited. We suggest that, rather than relying on the external weltanschauung of consultants and strategy gurus, market practitioners consider how their own expertise might serve them in strategic situations.

Acknowledgements

We would like to thank the three anonymous reviewers and the editor for their support and constructive advice throughout the review process. We are grateful to our colleagues in the Information Systems Department at LSE and Judge Institute of Management Studies at The University of Cambridge for their excellent feedback on earlier versions of this paper. Also to David Stark, Daniel Buenza and participants at the Social Studies of Finance workshop in New York (2002) who provided very helpful comments. Susan Scott was sponsored by the Moving Markets corporate/academic funding consortium during 2002–2004.

Appendix A1

Table A1
Summary fieldwork table 1998–2001

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>London</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>2</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>2</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td>2</td>
<td>Mgr</td>
</tr>
<tr>
<td>Exchange staff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>4</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>3</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td>2</td>
<td>Mgr</td>
</tr>
<tr>
<td>Clearing House</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>2</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td>1</td>
<td>Mgr</td>
</tr>
<tr>
<td>Brokerages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>2</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>2</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td>Mgr</td>
</tr>
<tr>
<td>Traders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>2</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>1</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td>1</td>
<td>Mgr</td>
</tr>
</tbody>
</table>

(continued on next page)
Table A1 (continued)

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>London</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>1</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td>Mgr</td>
</tr>
<tr>
<td>Independent advisors/consultants</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Software companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>1</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td>Mgr</td>
</tr>
<tr>
<td>Market services companies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td>1</td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td>Mgr</td>
</tr>
<tr>
<td>Financial news media</td>
<td>Markets</td>
<td>Markets</td>
</tr>
<tr>
<td>Editor</td>
<td></td>
<td>editor</td>
</tr>
<tr>
<td>Government treasury</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional associations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic communications network (ECN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exec</td>
<td>1</td>
<td>Exec</td>
</tr>
<tr>
<td>Sr</td>
<td></td>
<td>Sr</td>
</tr>
<tr>
<td>Mgr</td>
<td></td>
<td>Mgr</td>
</tr>
</tbody>
</table>

Exec, Executive management; Sr, Senior management; Mgr, Manager.

References


Bien, M., 1998. German and Swiss take aim at Liffe The European, p. 50.
