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in an era of self-regulated financial services”**

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# Understanding the characteristics of techno-innovation in an era of self-regulated financial services

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## Abstract

Can we identify the key characteristics of techno-innovation in the era of deregulated financial services? This is an important question particularly now when many are laying the blame for the emergence of a “Credit Crunch” in 2008 on ill-managed innovations that fuelled growth in contemporary financial services (see Tett 2009). This working paper draws together findings from a programme of research examining the role of technology in the transformation of work practices in the financial sector and their entanglement with risk and regulation. Examples from multiple longitudinal field studies are used to explore the following questions: What inspires innovation in financial services? How are processes of techno-innovation managed? What are the expected and unexpected consequences of techno-innovation?

## The study of innovation and financial services

Academia has produced a range of theories on innovation reflecting a spectrum of disciplinary engagement. The field of innovation studies has largely discredited the previously dominant deterministic view in which innovation was thought to proceed in a sequential manner with one superior technological design prevailing over all others. The notion of technological superiority itself is frequently equivocal. For example, in the 1970s, JVC won dominant market share with their Video

Home System (VHS) videocassette tape recording format despite competition from a rival product from Sony called Betamax which, while offering technically superior picture quality, did not offer a long play facility (Cowan 1991; Cusumano et al 1992; Liebowitz 1995; Pitt, 1996). Scholars now generally recognize that innovation takes a precarious, uncertain direction and focus their attention on explicating aspects that relate most closely to their particular disciplinary interest.

For example, Schumpeterian economists regard innovation as a major driver of the economy closely linked to productivity. Innovation economists<sup>1</sup> are producing a growing body of literature on innovation, market structure and productivity (see Romer, 1990; David and Olson 1992; Aghion et al 2005; Aghion et al 2006; Aghion & Howitt 2007). In management science, attention has been focused on processes of end-user innovation (see von Hippel 1988); how systems of work are enacted (see Ciborra 1993; Suchman 2007); enabling knowledge creation to support innovation (Von Krogh et al 2000); and, more recently, distributed innovation (Kogut and Metiu 2001; Coombs and Metcalfe 2002; Acha and Cusumano 2007; Lakhani and Panetta 2007).

Moving further afield within the social sciences, scholars in Science and Technology Studies (STS) have developed important insights into processes of innovation by analysing the backstage practices of scientists in laboratories (Latour 1987; Knorr Cetina 1999). The contribution of this academic community is to show how human values affect scientific research and technological innovation, and how these in turn affect society, politics, and culture. As a special issue of the journal *Organization* noted, STS literature is achieving increasingly widespread recognition for its contribution to understanding innovation within business schools (Woolgar et al 2009). This literature has generated three themes that are of significance for thinking about techno-innovation in financial services: firstly, what are referred to as “trials of strength” (Callon 1986) surrounding controversies and

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<sup>1</sup> Academics at The Centre for Economics at LSE have established an important body of work in this area representing what some regard as the most significant research agenda in contemporary economic thinking. <http://ideas.repec.org/e/pva45.html>

the achievement of order; secondly, analyzing what goes forward and what gets left behind in times of change; thirdly, the side effects or unintended consequences that emerge from processes of innovation.

Within the STS community, a group of scholars have specialised in social studies of finance (Callon 1998) and the performance of economic models in markets (MacKenzie 2008). Like mainstream STS, the emphasis of their analyses is on understanding innovations in socio-political context but with a distinctive focus on the cultural world and work habits of professionals in financial markets. Key areas of research have been technical and economic phenomenon such as pricing and trading (see examples in collected volumes such Knorr Cetina and Preda 2006; Callon et al 2007; MacKenzie et al 2008). However it could be argued that the conceptual foundations of the social studies of finance predispose it to frame research questions around relationships within a broadly defined technical field rather than the technology per se thus diffusing interest in understanding particular projects of techno-innovation.

As one of the original and most extensive sites of computer-based innovation, financial services routinely serves as a source of data for scholars studying the use of technology in organizations (see Scarbrough 1992; Howells and Hine 1993; Fincham et al 1994;). Since the pattern of IT development in financial services reflected mainstream technology movements (transaction processing, office automation, expert systems, networks) these studies helped establish important insights that have served as principles of organization studies, for example the realization that IT services must be integrated with the business function to be effective. Nonetheless, despite providing useful illustrations to support such points, financial services are effectively a backdrop for these discussions of IT in organizations. Domain specific analysis is usually confined to reviewing the current state of IT and its major application areas within financial services with some attention paid to the implications of these for IT development practice (see Fincham et al 1994: 150).

In sum, despite the many claims that IT and the development of financial services are closely linked there are few studies of innovation in service sectors within the management literature and opportunities still exist for scholars to make further contributions in this important subject area. This working paper addresses two under-researched areas in management: longitudinal field studies of technology in financial services and processes of distributed innovation.

### **What inspires techno-innovation in financial services?**

Most accounts of IT in financial services recognize that historically, techno-innovation has been inspired by a push for efficiency. The main focus of this effort was to remove humans from systems of work. For those that have only experienced contemporary financial services organizations, it is perhaps hard to imagine the level of labour intensity that originally characterized financial centres. Below is an extract taken from a book written by one of the forefathers of computing, Charles Babbage, in 1835. It is included to provide historical perspective and highlight the nature of work processes before the implementation of information technology. The passage describes a manual system of inter-bank clearing that Babbage encountered as part of a research project undertaken to understand the ways in which technology could best be applied in industry:

“In a large room in Lombard Street, about thirty clerks from the several London bankers take their stations, in alphabetical order, at desks placed round the room; each having a small open box by his side, and the name of the firm to which he belongs in large characters on the wall above his head. From time to time other clerks from every house enter the room, and, passing along, drop into the box the checks due by that firm to the house from which this distributor is sent. The clerk at the table enters the amount of the several checks in a book previously prepared, under the name of the bank to which they are respectively due. Four o’clock in the afternoon is the latest hour to which the boxes are open to receive checks; and at a few minutes before that time, some signs of increased activity begin to appear in this previously quiet and business-like scene. Numerous clerks then arrive anxious to distribute, up to the latest possible moment, the checks that have been paid into the houses of their employers. At four o’clock all the boxes are removed, and each clerk adds up the amount of the checks put into his box and payable by his own to other houses. He also receives another book from his own house, containing the amounts of the checks that their distributing clerk has put into the box of every other banker. Having compared these, he writes out the balances due to or from his own house, opposite the name of each of the other banks; and having verified this statement by a comparison with the similar list made by the clerks of those houses, he sends to his own bank the general balance resulting from this sheet, the amount of which, if it is due from that to other houses, is sent back in bank-notes. At five o’clock the Inspector takes his seat; when each clerk, who has upon the result of all the transactions a balance to pay to various other houses, pays it to the inspector, who gives a ticket for the amount. The clerks of those houses to whom money is due, then receive the several sums from the inspector, who takes from them a ticket for the amount. Thus the whole of these payments are made by a double system of balance, a very small amount of bank-notes passing from hand to hand, and scarcely any coin.” (Babbage, 1835: 173)

Some financial services professionals feel that in contrast to the days when banks were seeking out new technology to render transaction-processing more efficient, financial systems are now pitched against each other in pursuit of profit and their work practices are driven by data. A senior representative from a major financial organization noted that this permeated the whole financial system from retail, risk management, payments, trading, and settlement through to communications about daily organizational processes<sup>2</sup>. For example, he remarked that while there was a time in recent memory that email was regarded merely as a supplementary communication medium, now it is an integral part of the business flow: “I experience it as organizational consciousness. It is not an option, it is unavoidable. Like all our information systems. It drives our professional lives”.

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<sup>2</sup> Personal communication

What have been the staging points in the experience of a sector where labour intensity has been replaced by information intensity? It has been suggested that deregulation inspired some forms of techno-innovation; removing the statutory boundaries between different parts of financial services led to a rapid expansion of business and an intense phase of commercial consolidation. Information and communication technologies were part of the process of change as organizations addressed increases in volume, scale and scope of financial services.

Among the programmes characterising techno-innovation in the early part of this era were universal banking, electronic payment systems, cheque truncation and decimalisation. Alongside this a transformation in management reporting took place. Previously, information on accounts was held in branches subject to examination only by representatives from local head office or a (usually annual) visit by a corporate inspection department. Networking branches enabled centralised computer-based data-processing that presented an opportunity to consolidate data around key categories to produce management reports. This meant not only that head offices were not dependent upon local inspection for all their management information but also that local managers could receive branch level reports providing an overview of their 'book' albeit using relatively basic accounting criteria.

Market events and landmark developments have also inspired techno-innovation. For example, the loss of LIFFE's majority share in the liquidity of the German government bund contract was directly related to the widespread adoption of electronic trading in London (Scott & Barrett 2005). The development of new market infrastructure, such as CREST<sup>3</sup> or the Continuous Linked Settlement system (CLS)<sup>4</sup> has prompted major changes in previously manual back-office areas

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<sup>3</sup> CREST was established in 1996 as the central securities depository for the UK market operating an electronic settlement system which is used to settle international securities.

<sup>4</sup> Continuous Linked Settlement (CLS) was founded in 1997 to manage settlement risk in the foreign exchange market. <http://www.cls-group.com/About/Pages/default.aspx>

of associated organizations<sup>5</sup>. Finally, compliance regulation has provided an almost constant source of leverage for those attempting to introduce techno-innovation<sup>6</sup>.

At the global level, liberalization of trade restrictions led to a growth of international trade in the post-war period that created increased demand for international banking products and services. Before the 1970s, international banking was the preserve of a small number of banks; work practices were manual, paper-based and often intermediated by correspondent banks. The rapid process of globalization that has taken place is illustrated by the following data: “In 1960, 9 U.S. banks had a physical presence overseas, consisting of 139 branches and subsidiaries. By 1970, 80 U.S. banks operated abroad through 540 branches and subsidiaries. By 1982, almost every large and medium-sized bank in [the USA] engaged in international banking; 162 banks had 900 branches and 758 subsidiaries operating abroad” Roussakis (1997, 405).

As technology made business processes more efficient it opened up the possibility of competition on both price and service. When these have not been achieved within a reasonable timeframe, fair trading organizations have taken up the cause of the consumer and pressured the financial community to embrace techno-innovations, for example the review of UK payment systems by the Office of Fair Trading (see OFT 25th March 2009). When these step changes have occurred it has often left financial service organizations facing the realization that their profit centres were shifting which created pressure to techno-innovate.

While the interdependency of these phenomenon (regulation, events, shifting profit centres) with techno-innovation is apparent there is a scarcity of research that attempts more fine-grained analysis that would help us understand the nature of techno-innovation in financial services, its genesis, practice and consequences. This is the special contribution of Alexandros-Andreas Kyrtis in this volume, who

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<sup>5</sup> Interview with market infrastructure manager, SWIFT London Headquarters, 31<sup>st</sup> March 2009.

<sup>6</sup> See Special issue of *Information Systems Frontiers* on Governance, Risk and Compliance in Information Systems 2009, 11 (5).



presents us with a thesis that traces the characteristics of innovation during the current era of self-regulation in more detail than before.

Kyrtsis' maintains that two main features characterize the financial services landscape: what he refers to as “blended tactical solution technologies” and “architectural concepts”. Solution technologies are short-term and organized around projects that were initiated in response to an immediate problem rather than a long-term strategic vision. Architectural concepts are at the heart of emerging international electronic financial networks and represent a particular kind of development logic moving through specific communities at different times. Kyrtsis maintains that both of these models share a similar constitution: financial services represent an applied area for technology in which innovation is drawn from other fields rather than generated within sector.

This is a proposition that is taken up here: does techno-innovation arise out of immediate need or are there longer processes of innovation at work? In the next section, case study material is presented to help us consider whether techno-innovation is reactive rather than proactive.

### **Techno-innovation in the financial services sector: Examining the evidence from longitudinal field studies**

The empirical material presented in the next section is from two longitudinal field studies. The first focuses on the introduction of risk management software called Lending Advisor into corporate lending practice in a major UK retail bank. The data for this study was gathered by the author between 1993 and 1998<sup>7</sup>. The second is a historical study about the adoption and diffusion of SWIFT, the international payment system. This research was initiated by the author in 2004 and subsequently became the focus of doctoral research undertaken by Marcos Zachariadis<sup>8</sup> at the LSE. Although the core SWIFT research project (including all

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<sup>7</sup> A full account of the methodology employed and the unabridged case study can be found in Scott (1998).

<sup>8</sup> I gratefully acknowledge the support, assistance and feedback of Marcos Zachariadis in the course of writing this working paper. Also see Scott, S.V., Van Reenen, J. and M. Zachariadis (2008).

descriptive statistics produced) is the sole work of Zachariadis, the author participated in the interviews, archive work and site visits upon which this analysis is based<sup>9</sup>.

### **The inspiration for Lending Advisor: Background**

Until the period under study, banking was a deeply traditional sector in the UK and had remained virtually unchanged for nearly two hundred years. Historically, the activities of financial services providers in the UK were bounded and legislation confined retail banks to certain types of business. Cross sector competition was, therefore, limited with retail banks focused on financing industry and providing money transmission facilities, whilst building societies were restricted to savings and mortgages. From the 1960's until the 1990's, retail banking in the UK was dominated by the 'Big Four': Barclays, Lloyds, Midland and National Westminster.

The origins of the bank in the field study, UK Bank, go back to 1896 when twenty family-owned banks amalgamated. The administration within UK Bank was traditionally organized along scientific management lines into a functional hierarchy by region with customer contact maintained through a local branch network. The local bank and the local bank manager have been important actors in their community, embedded in a powerful local network that included teachers and clergy. During the 1950-1980s, a career in a major UK retail bank was regarded as respectable traditional occupation with considerable status which tended to be a 'job for life'.

The stability that had characterised this sector saw its first significant challenge during the 1960s, when the Big Four were referred to the Monopolies Commission. A high level of co-operation had developed between the major retail banks and they found themselves accused of being an oligopoly and of cross-subsidisation. Thus began a slow process during which restrictions were loosened in order to

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<sup>9</sup> For details see Scott and Zachariadis

encourage greater competition in the banking sector, culminating in landmark legislation in 1986 which brought about deregulation of the UK banking industry.

After deregulation, continuous commitment to a free-market economy by successive UK Conservative governments helped to generate conditions of 'hypercompetition' (Zuboff 1996). Traditional lines of demarcation within the sector were broken down and competition widened to a broader product range (Thwaites 1991). As discussed above, ICTs were essential to increasing volume, scale and scope of financial services; after back-office information systems were rolled out, operations in the branch network came next. However, lending, described by bankers as 'part art and part science' was not regarded as a suitable site for techno-innovation because of the "sticky" (von Hippel 1994) nature of situated, local knowledge required to assess risk.

The origins of Lending Advisor lie in the last mortgage crises in the UK. In 1992, the bank in the study (referred to as UK Bank) cut its dividend and reported losses of 3.29 billion Euros primarily associated with loan defaults in its mortgage business. Six months before this news was made public, the bank appointed an additional risk management director who subsequently appointed a team to address this problem. They held brain storming sessions, went to industry conferences and sat through many software sales demonstrations. During this exploratory phase, they were approached by a small company in Palo Alto, California, who offered to partner with them to develop a customised decision support system for corporate lending based upon oil prospecting software that the company had developed in partnership with ELF, the French petrochemical firm. The decision support system had already been implemented in Canadian banks, but UK Bank would be their first client in Europe. The development partnership would mitigate costs for the bank and produce a customised system that would reassure UK Bank stakeholders.

So what inspired techno-innovation in this case? Where did they look for ideas? There is a direct relationship between Lending Advisor and the need to address the concerns raised by both regulators and shareholders after the 1992 losses. This

would appear to support Kyrtsis' assertion that financial services develop solution technology in response to immediate problems. Moreover, the use of oil prospecting probability models as the basis for decision support in lending practices also appears to confirm his suggestion that innovation is drawn from other fields rather than generated within the sector.

### **The inspiration for SWIFT: Background**

Next we present material from a study of SWIFT, the Belgium-based international communications platform and messaging service that connects financial institutions worldwide. SWIFT could be regarded as characteristic of an “architectural concept”, the second feature of techno-innovation in financial services according to Kyrtsis' thesis. It forms part of the core infrastructure constituting contemporary financial services. SWIFT is a member-owned cooperative which currently has a membership of over 8300 banking organizations, securities institutions, and corporate customers in more than 208 countries. SWIFT's corporate communications describes its role as follows:

“We provide the proprietary communications platform, products and services that allow our customers to connect and exchange financial information securely and reliably...SWIFT enables its customers to automate and standardise financial transactions, thereby lowering costs, reducing operational risk and eliminating inefficiencies from their operations. SWIFT is solely a carrier of messages. It does not hold funds nor does it manage accounts on behalf of customers, nor does it store financial information on an on-going basis. As a data carrier, SWIFT transports messages between two financial institutions. This activity involves the secure exchange of proprietary data while ensuring its confidentiality and integrity.<sup>10</sup>”

Let us consider the inspiration for SWIFT: de-regulation had opened up the opportunity to develop international products and services but, as discussed above, the means to transact were still relatively crude and labour intensive. One of our research participants was based in the European headquarters of a major US bank in London during the 1960s. When a payment instruction was received by phone or Telex, the details would be written down by hand and then passed to a secretary who would type them out on a form. This was then folded, put in a canister and

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<sup>10</sup> [http://www.swift.com/about\\_swift/company\\_information/index.page?lang=en](http://www.swift.com/about_swift/company_information/index.page?lang=en)

sent via a vacuum tube to the authorization/confirmation section on the floor above.

This description of the manual payments process is typical as is the considerable potential that it held for system breakdown and error. For example, our research participant told us that after a particularly busy morning, staff in the payment section found themselves without the confirmation necessary to complete transactions. A staff member went to the second floor to investigate, to be met by a bemused confirmation section who had been waiting for payment instructions all morning. The vacuum tube between the two floors had become jammed and remained so until staff enlisted the services of a chimney sweep who cleared the blockage and restored payment processing in Europe that day.

The idea of a secure, common communications platform that would facilitate payments around the world was initiated by representatives from five different banks during the 1960s. SWIFT was founded with a working group of 20 banks who set about recruiting further members for a commitment to support the project. A former board member described the genesis of SWIFT as follows:

*“This was about 20 banks getting rid of their problems. I was there. In fact, one of my first jobs was in the money transfer department. I actually joined the bank before we had the computers so I’ve seen this whole sort of evolutionary process happen. It was literally in English [free text] and then some guy had to interpret that and put all the account numbers on, the debit account, the credit account, and the typists would come along and type out forms...people realised if we’re using this form as an input device with all the instructions and information coming in... if we got the messaging in the right structure you could cut out all these people. 50% of all transactions...was one community...if you took those 20 banks, 60% of their interaction was with each other anyway. So if you put them together you don’t have to have a big community to get efficiency, and it was really about how do we get these computers to create efficiency, very simple!”*

The acronym, SWIFT, stands for the *Society for Worldwide Interbank Financial Telecommunication* which gives us considerable insight into the concept behind its founding: whereas today SWIFT is referred to as a network, it was founded as a *society*. The notion of a network effect was not part of the consciousness of those involved in the original SWIFT project during the 1970s. Their focus was solely on

creating an entity, a closed society, to bind members together in an organizational form that would enforce standards designed to realise efficiencies on transactions between the member banks. The notion of direct, synchronous connectivity between international banks was alien, for example: there was a brief period of anxiety when SWIFT was first trialled because nothing happened. SWIFT staff gradually realised that they hadn't prepared bank staff for this moment and all the banks were switched to "receive". After a few telephone calls, some banks switched to "send", others remained on "receive" and SWIFT was in motion.

In 1977, Albert, Prince of Belgium (now King) sent the first message and SWIFT launched with 518 commercial banks in 22 countries. Enrolment increased rapidly: by their tenth anniversary, SWIFT had 2,360 customers in 64 countries who sent 222,300,000 messages. In 2008, 1,257,110,454 messages were sent by 8468 live users in 208 countries. Most banks now regard SWIFT as a core infrastructure and it is widely regarded as the most secure, the most "trusted third party" (Van Auseloos 1996) within the financial services sector.

So what inspired techno-innovation in this case? Where did they look for ideas? The data suggests that the originators were highly focused on a well defined problem: how to move from manual processing to bring efficiency, reduce errors and increase capacity. Krytsis describes technologies in financial services as: "very traditional...inspired by analogue systems but with high performance requirements because of transmission and database management issues as well as the need to interface with multiple end-users". The SWIFT network was, indeed, based around existing analogue systems and many characteristics of the former Telex information system were carried forward in its design. For example, SWIFT messages are limited by the need to conform to the four-line thirty-five character format institutionalised during the Telex era<sup>11</sup>. So, it would appear that evidence from the case studies supports the proposal of financial services innovation characterised by solution technologies and architectural concepts.

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<sup>11</sup> Interview, Head of Standards Initiatives, SWIFT Headquarters, Brussels, 7<sup>th</sup> May 2009.

### **Further perspectives on the key characteristics of techno-innovation: Drift and intercalated processes of change**

In this discussion section, it is suggested that longitudinal data may shift our perspective on the nature and status of techno-innovation in financial services. For example, data gathered at the start of the Lending Advisor (LA) field study indicated that budget was made available because the software could be presented as a solution to an immediate problem. However, data gathered on the project in later years showed that once the software was implemented an identifiable process of “drift” (Ciborra 2001) took place. Drift is a concept used in the study of information systems to evoke the notion of “technology both as a drifting system and as an organism to be cultivated” (Ciborra 2001, 32).

This extract from an interview with the Project Manager, three years after the Lending Advisor launch, illustrates this:

*“All Lending Advisor has ever been is a software application. In an ideal world you would develop an information system by identifying a business need – a problem. Then you would gather together your business and technical experts and come up with a solution which you would then design and implement in a series of stages. Lending Advisor was never like that. As soon as the business need had been identified, Lending Advisor raised serious issues. Why was there this gaping hole in their strategy? What was needed to fill it? Lending Advisor brought up issues along the way which made its development very distinctive”*

Let us consider some of the issues that contributed to drift on the Lending Advisor project. At the heart of a decision support system is an inference engine with a model that requires its parameters to be set. As noted earlier, the original software had been developed for oil prospecting and therefore it needed to be customized for the banking sector. Lending Advisor knowledge engineers had to analyze and represent the loans process in order to decide what constituted best practice. Whose work practices would be taken forward and whose would be left behind?

Other choices that the design team had to make focused on linking the way that they weighted the model used by the inference engine to UK Bank's strategic lending priorities. What part of the loans market did the bank regard as important within their portfolio? While it was relatively unproblematic to apply Lending Advisor to loans in some parts of the portfolio, others specialist areas raised concerns.

For example, one of UK Bank's, traditional value centres had been small business and they had developed a reputation for being '*The small business bank*'. Local branch managers had been encouraged to develop expertise in small business lending; the logic behind this was that as small businesses grew, they remained loyal to the bank that helped them and committed to more products or services in line with growth. However, small businesses are innovations in themselves who gain market share by filling a gap in a market or developing in an area that hasn't been exploited before. This presented problems for the Lending Advisor system which was designed to draw upon standard business codes and a historic data set which many of these businesses overflowed or didn't feature in.

These design challenges emerged side-by-side with policy issues about how Lending Advisor would be positioned within the overall practice of lending. What would the relationship be between human expertise and the Lending Advisor assessment? Could managers override the assessment? What were the consequences for the managers if they did? Now that each manager's lending portfolio could be assessed centrally using the executive information system capability offered by Lending Advisor, how would this be used in the bank's appraisal and reward structure? Lending Advisor marked the beginning of performance-related pay for loans managers. Indeed, it represented the end of the use of the title "branch manager" and the re-grading of jobs. Rather than being regarded as an expert practice undertaken by a professional person of status within the community, small and medium corporate loans became part of a largely administrative process.



Although presented as a solution to an immediate problem, Lending Advisor became folded into a range of emergent strategies within UK Bank. This is illustrated by the following extract from an interview with the director of the LA design and development team four years after the project launch:

*“Lending Advisor emerged out of a functional line, not a corporate line. We didn’t know that LA would lead to all these changes. The world was changing around us, we knew that, but a lot of the consequences of LA are a ‘chicken and egg’ situation. LA enabled the bank to make changes...but that was not part of the original project. Once the other functional lines began to recognise the potential opportunities presented by LA they began to structure changes around it. I want to emphasise to you that the long term implications and consequences of LA were not really apparent at that point. LA had dropped into my lap by accident. I recognised the profundity of it and the idea that it could lead to strategic changes. However, these were regarded as potential opportunities at that point rather than a deliberate programme of change.”*

Moving our attention to SWIFT, our field study shows that it was intended to serve as part of the inter-bank architecture and designed as the solution to a problem-at-hand. However, its membership grew rapidly creating a wealth of connectivity and a massive economy of scale. Once again, rather than an orderly process of linear development, a wave of innovation followed the launch of SWIFT. Whereas the roll-out of a new computer-based system is now met with anxiety, the introduction of SWIFT in the 1970s was treated as an exciting event as this extract from the Barclays Bank archive shows:

*“The amount of interest shown on the morning of 9<sup>th</sup> May was considerable. We in inward payments, Poole branch, for instance, were visited by a number of management and staff – not forgetting computer services – keen to see the first message arrive. It was realised by all concerned that, although the system was open to receive from France and Belgium, there were no guarantees that any SWIFT members in those countries would transmit to us. Fortunately, the arrival of a number of payment instructions from Societe Generale de Banque in Belgium prevented ‘live’ day for us becoming a non-event. As the weeks have gone by, transmissions have increased slowly as more and more members have linked up with SWIFT and gained confidence in this system. Outward transmission from Barclays will soon become available which will broaden the scope of those departments already involved and enable other areas of work to take advantage of the system. All in all, it is evident that SWIFT will have a very far-*

*reaching effect on banking in the future, particularly for Barclays International whose capacity for extending the system internally is so great.”*

(Barclays archive HOC 138-77 3<sup>rd</sup> May 1977, emphasis added)

As the last part of this document suggests, there is evidence that the adoption of SWIFT was not only seen as key to interconnectivity between banks but also regarded as holding considerable potential for internal change within the member organization. However, the changes that took place were situated, emergent and plans were worked out in practice rather than as part of a sector-wide master plan. For example, in the following quotation a former board member describes retiring their internal standards initiatives in favour of adopting SWIFT on a broader basis to achieve further efficiencies:

*“[Our bank] had its own standard...then we suddenly realised that why do we have to have our own internal standard? If you’re using one standard externally why don’t we use that same standard internally?... We basically took the SWIFT message and put our internal wrap around it and used SWIFT standard internally from that point and on. We suddenly realised it’s not only good for dealing with everyone else.”*

Although SWIFT was a significant innovation at its initiation, there have been concerns that over time it has become an inhibitor to further change in the financial community. In academic terms, it has become what Hanseth (2001, 60) refers to as an “installed base”. SWIFT found itself in the role of monopoly network and standards designer having to prioritise requests for changes. Questions have been raised about whether SWIFT’s “standards development is meeting the requirements of all the constituents in the financial supply chain”<sup>12</sup>. In recent years, major corporations have felt the need to petition SWIFT for more recognition in its membership and governance<sup>13</sup>. SWIFT has attempted to address this issue by developing a special category of membership, the Member Administered – Closed User Group development (MA-CUG), in an attempt to accommodate corporate

<sup>12</sup> “The evolution of global payments”, *Dialogue: The Voice of the SWIFT Community*, Q2, 2005, p.20.

<sup>13</sup> “Triggering transformation **without a crisis**: How can inhibitors to change in the payments business be overcome” *Dialogue: The Voice of the SWIFT Community*, Q4, 2005, pp.8-9.

interests. It has also shown a willingness to consult with other standards organizations and formed working groups such as Innotribe<sup>14</sup> at SIBOS<sup>15</sup>.

Founded as a member-owned utility and given responsibility for managing the world's primary financial messaging network, SWIFT developed a substantial repository of best practice, an extensive system of consultation and hosts an annual conference (SIBOS). As time moved on, what started as a focused project group and subsequently grew into a community of practice, began to be regarded as a cartel with control over the possibility for innovation in networks and standards in the sector. Ironically then, in light of the widespread recognition of its ground-breaking role in the realisation of globalised financial services and its status as one of the sectors most remarkable 'network innovations', SWIFT came to be accused of stifling techno-innovation.

## Discussion

Both of these field studies provide insights into the nature of problem frames and what management scholars have come to recognize as the enactment of "technology in the context use" (Orlikowski et al 1995). Kyrtis appropriately identifies techno-innovation initiatives within his study of financial services organizations as the exemplification of "tactical solution technologies". The context of use in which he found these technologies wrapped them within a problem frame in which they seemed like a 'square peg for a square hole'. This is because just as "problems are not simply presented to management, problems are constructed by them" (Boland and Pondy, 1983, 223), so solutions are designed to form part of a convincing organizational narrative (Boland 2001). However, as we can see in the LA and SWIFT studies, over time further encounters with technology may inspire different problem formulations. Rather than one problem frame dominating over the other, we see the technology become folded into multiple "solution" narratives. In other words, their meaning and use may drift over time in unpredictable ways.

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<sup>14</sup> Innotribe is a SWIFT initiative for community members to brainstorm about new ideas and their implications for the SWIFT infrastructure <https://www.swiftcommunity.net/communities/225/detail>

<sup>15</sup> [http://www.swift.com/sibos2009/About/about\\_index.page?](http://www.swift.com/sibos2009/About/about_index.page?)

The multiplicity of technology in its context of use can perhaps also be seen as expressive of a polycultural phenomenon that characterises the global financial services community. Markets depend upon multiple interpretations and asymmetries of information; financial centres are made up of organizations each of which has a different, distinctive risk appetite. This helps to ensure that, at any one time, a community of willing buyers and sellers can be found. In this regard, there is an interesting parallel with the physics community in Galison's (1997) study, who manages to support the advance of scientific practice in the presence of (despite) multiple threads of discourse, each of which maintains differing ontological and epistemic positions.

Similarly, it could be said that each financial services organization has a different long-term tradition of "image and logic" (Galison 1997) that gives them distinct identities. Regardless of this, financial services manage to find "common cause between and among them" (Galison 1997, 781), moving markets despite tension between distinctiveness and interconnection. The fragmentation of techno-innovation in financial services has been a source of consternation for both financiers and regulators over the years with numerous initiatives designed to achieve consolidated efficiency. These range from the Business Industry Codes embedded in Lending Advisor, to the transaction standards associated with SWIFT, as well as global efforts such as the blueprint for a World Clearing House. Such moves appear highly logical at first glance, however it is possible that a degree of disunification reduces systemic risk and supports creativity.

For example, it is possible that polyculturalism has been an important ingredient of techno-innovation in financial services. Drawing on concepts developed in Mary Douglas' risk studies, Fiol notes that "colliding thought worlds...[can] provide fertile grounds for the seeds of entrepreneurial activities" (1995, 71). Although the financial services professionals engaged in the project studied by Fiol held internally consistent images of their world, there were tensions and contradictions between the organizational groups involved. However, she notes that their "views differed

systematically” and as a result they were able to render the project “operationalizable” (1995, 88) despite these colliding thought worlds.

Building on this, we can suggest that processes of innovation in this sector are intercalated. This is a term coined by Galison to describe situations where:

“Two groups can agree on rules of exchange even if they ascribe utterly different significance to the objects being exchanged; they may even disagree on the meaning of the exchange process itself. Nonetheless, the trading partners can hammer out a local *coordination* despite vast *global* differences. In an even more sophisticated way, cultures in interaction frequently establish contact languages, systems of discourse that can vary from the most function-specific jargons, through semispecific pidgins, to full-fledged creoles rich enough to support activities...” (Galison 1997, 783).

Intercalated processes of change in financial services mean that techno-innovation is loosely coordinated without having a homogenizing effect. Regulators play an important role in this but most financial services professionals will point to other ways in which this occurs. New products and services transform financial services but without specific organizations losing their separate identities and practices.

From this perspective, each project of techno-innovation acts as engine of change; in other words, communities within financial services innovate at different rates and generate their own path dependent innovations trajectory. The innovation shifts within and between these communities are not simultaneous: multiple innovations occur at different rates and times around the community and are inserted into the global mix. While many of the basic ingredients may have been imported from other fields, people in the financial services have shown themselves to be adept at incremental, situated practices of innovation: they involve themselves in tinkering and folding; they mash ideas and technologies together; then, drawing on the relationships around them: configure a path to profit.

## Conclusion

Inevitably our ways of conceptualising the key characteristics of techno-innovation in financial services are in a state of on-going development and evolve side-by-side with processes of change in the sector. For example, the dominant management

literature published at the time that the projects of techno-innovations discussed in this working paper were initiated was “rational, regard[ing] organizations as a unity with everyone working towards one aim [with] strategy formation [portrayed] as a logical, linear process” (Walsham 1993). The focus was on mission statements reflecting a grand plan or what is commonly referred to as top-down strategy.

Organizations were seen to be no more than the planned outcome of rational decisions made by senior management (Knights et al. 1997). For the most part, the role ascribed to computer-based information and communication technologies was technologically deterministic. However, this is not supported by the field studies presented in this working paper. The studies presented in this working paper focus on strategy in practice and view the whole concept of organization as problematic with strategy formation as a dynamic socio-political process that unfolds over time within multi-level contexts (Ciborra 1991; Orlikowski et al 1996).

So what do these two case studies tell us about innovation in financial services? The discussion of Lending Advisor and SWIFT complements the proposition that financial services are a “blend of tactical solution technologies and architectural concepts”. While they confirm the standing of these categories, they extend and develop them by allowing techno-innovation a biography in the course of which their status as ‘solutions’ shifts over time. So we see that phenomena that began as the solution to a specific problem become an engine of innovation, folded into multiple strategies. We also find that community initiatives can begin as great innovations but over time sediment into an installed base and have to be re-invented yet again.

It is important to remember that techno-innovation is not always positive, it can be negative and therefore we need to have a capacity to identify toxic innovation. For example, the implementation of Lending Advisor marked a watershed in UK retail banking and other banks soon embarked on similar projects of techno-innovation in lending. However, many regarded the lengthy customization processes involved in implementing decision support systems too costly and therefore opted for

computer-based credit scoring systems such as those used in the credit card industry (Poon 2007, 2009). This helped to accelerate an increasingly concerning pattern of bank lending that contributed to the so-called Credit Crunch in 2008.

What does it mean to attempt techno-innovation in financial services? Those involved in the projects discussed in this working paper are working in a living laboratory. To survive they had to learn how to construct a convincing narrative to win budgets and cope with events. Part of this included developing a critical understanding of their role in making a market for software solutions (Pollock and William 2007, 2009). Many of them spent considerable periods in their career moving from one project to another (often leaving just as the initiative went on-line).

While the practitioners that I have encountered have assembled cumulative project knowledge, they may benefit from deepening their awareness of the systemic amplification created by on-going techno-innovation within the sector. While techno-innovation accumulates in firm-specific financial services products and practices, it also manifests in interconnected processes and path-dependent infrastructure. Those involved may have the impression that they are taking discrete building blocks and stacking them in an orderly way, like the children's toy Lego™. However, techno-innovation in financial services is not like Lego™, it is closer in nature to working with a chemistry set. Compounds that have been sourced elsewhere are gathered and added together. As a consequence, there may be discovery but there will also be side-effects and occasionally meltdown.

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