RE-ENGINEERING A FINANCIAL INFORMATION SUPPLY CHAIN WITH XBRL: AN EXPLORATION OF CO-OPERATIVE IOS DESIGN AND DEVELOPMENT

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Abstract

Financial markets worldwide have been experiencing dramatic changes since the mid-1990s. It has been claimed that XBRL, an XML vocabulary for business reporting, is capable of introducing greater integration and transparency into financial information systems, and thus addressing some of the challenges presented by these changes. This paper presents an exploratory case study of the co-operative design, development and implementation of an XBRL-enabled inter-organisational system (IOS) by the Australian Prudential Regulation Authority (APRA), the Reserve Bank of Australia (central bank) and the Australian Bureau of Statistics to revolutionise reporting by financial institutions in Australia. The study describes how the three agencies modernised and harmonised reporting requirements through a gradual review of the reporting returns required by each agency. This harmonisation enabled the reengineering of the reporting process, as each financial institution now has to submit just one set of figures to meet the needs of all three agencies. The findings illustrate that the complexity of data consumption patterns drove increased interdependence within the financial information supply chain requiring the co-operative development of context sensitive data exchanges and commodity-like IT infrastructures. The paper concludes that the co-operative approach to IOS development exhibited in this study is likely to be more suited to the development of XBRL-enabled systems for financial information supply chains than the 'hub and spoke' model characteristic of IOS developments in other industrial sectors.

1 INTRODUCTION

Significant change has occurred in the financial services sector and the global regulatory environment since the mid-1990s (Morrison, 2003). Even before the demise of firms such as Enron, WorldCom and Tyco, and the resulting crisis in public trust, capital markets worldwide were undergoing dramatic changes (Pederson, 2001). For example, the liberalisation of capital markets (e.g., the removal of exchange controls and the opening up of equity and bond markets) had led to a truly global market for capital and investments (Diggle *et al*, 1999). Investor capital has become increasingly mobile, with enormous amounts of capital moving between exchanges and markets daily (Beck and Fraser, 1999; Campbell and Taksler, 2003). These factors, accelerated by high profile market failures, led to the emergence of increasingly globally accepted standards for the regulation of capital markets and financial services.

Within the financial services sector, the diversity of product providers – insurance companies, mutual funds, retail banks, pension funds and other traditional investment vehicles, etc. – highlighted the need for better regulatory processes (Morrison, 2003). Initiatives such as the New Capital Accord (Basel II) and the opening up of markets by the World Trade Organisation (WTO) have given rise to a new set of regulatory prerogatives (Palia and Porter, 2003). Many believe that jurisdictions that fail to implement generally accepted regulatory frameworks such as Basel II will see flights of capital and a risk premium applied by investors.

It is commonly accepted that the new regulatory environment requires the effective implementation of data driven systems to support regulatory and integration activities (Benink and Wihlborg, 2002). The Extensible Business Reporting Language (XBRL), an XML vocabulary for business reporting, has been recognized as a disruptive technology with the potential to address this requirement effectively. XBRL has received much attention within the financial services literature vis-à-vis its ability to transform the financial reporting process and financial information systems (Watson, 2003).

This paper documents the efforts of the Australian Prudential Regulation Authority (APRA) to co-operatively develop and implement an XBRL-based inter-organisational system in order to improve its regulatory activities. APRA was the first such organisation worldwide to incorporate XBRL technologies into its systems. As a result, APRA staff can now spend more time on their regulatory role instead of data entry and aggregation, and are able to create value for financial institutions in new ways. The paper is structured as follows. Section 2 examines some of the claims made regarding the use of XBRL in financial services information systems. Section 3 discusses the research objective and the methods adopted for the study. The remaining sections present the findings and conclusions from the study.

2 XBRL AND FINANCIAL INFORMATION SUPPLY CHAINS

Brown and Willis (2003) argue that the adoption of XBRL systems will revolutionalise the corporate reporting supply chain, with Graziano (2002) noting that XBRL will provide financial executives with the critical ability to provide the transparency required by recent governance regulation. Pricewaterhouse Coopers (2002) predict “as well as transforming the corporate reporting supply chain, widespread adoption of XBRL will bring benefits to all participants. Consumers of information will have faster and richer content to work with; producers will be able to create and disseminate richer information better and faster; and the interoperability that XBRL affords means that regulators are more likely to obtain the degree of transparency that they require, quicker. In short, the speed, efficiency and reliability of business reporting will be exponentially enhanced by the widespread adoption of XBRL. These same benefits will offer investors, creditors and other information consumers better access to the information necessary for more informed decisions.”

Attention has also been given to the (labour intensive) process of translating corporate reports into a format that could be used by investment analysts, and to the content-management capabilities inherent in any XML-based technology. According to Berkeley (2002), "so much energy, time and intellect is consumed at the lowest level of transposing data from the standalone format in which the company reports to the comparative format the investor needs that little time is left for comparative analysis". Berkeley believes that by using XBRL:

- "Companies can distribute a higher value stream of information about themselves to the owners. They can send the same information they send today, but it will be more valuable because it is easier to use.
- Investors will have more time for analysis and insight, as less time is spent on translation and data entry.
- More companies will be used in investors' screening, because the marginal cost of preparing data on additional companies for analysis will drop to zero. Undiscovered jewels will be discovered. The market will become more liquid" (Berkeley, 2002).

Exploratory research supports some of these claims. A study carried out at the University of Washington, for example, found that XBRL-based search-facilitating technologies reduced users' cognitive costs associated with processing recognised vs. disclosed financial information (Hodge *et al.* 2002). The researchers concluded that such technology, by acting as a decision aid, could compensate for users' knowledge limitations and improve the overall transparency of financial statement information.

While the potential of XBRL to revolutionise the financial services sector has been widely discussed (Graziano, 2002; Hodge *et al.* 2002; Brown and Willis, 2003), little is known about the design, development and implementation of XBRL-based systems within specific financial information supply chains. While research, such as that discussed above, has revealed the potential of the technology in relation to specific financial services activities, the complexities that arise when information aggregation and dissemination activities cross organisational boundaries have not been fully investigated. Ashkenas *et al* (1995) reveal the complexities of inter-organisational co-operation as including; changes in business competencies and priorities; changes in ones' sense of identity and sense of common purpose; an increased need for co-operative effort for establishing targets; the synchronisation of differing accounting, measuring and reward systems; and the establishment of trust. Furthermore, Finnegan *et al* (2003) illustrate that systems developed to support supply chain activities will challenge IS developers and methods in ways that the intra-organisational exploitation of the same technologies will not. Therefore, it is important to explore the design, development and implementation of XBRL-enabled systems from the perspective of a financial information supply chain as a first step in understanding the challenges facing potential adopters.

3 RESEARCH METHODOLOGY

This study analyses the design and development of an XBRL-enabled inter-organisational system in a financial information supply chain. Marshall and Rossman (1989) suggest that various research strategies – including a case study, a multi-site case study or a field study – could be used for such exploratory research. Deciding an appropriate strategy is subsequently a question of trade-offs (Stone, 1978). Corbitt (2000) advocates the need for interpretative methods in studying IS issues, especially in electronic business environments. Interpretative studies focus on developing a greater understanding of social aspects of the research environment (Walsham, 1993), and are thus considered useful in the context of this study. Yin (1989) suggests that case studies are appropriate when the object is to study contemporary events, and where it is not necessary to control behavioural events or variables. 'A case study examines a phenomenon in its natural setting, employing multiple data collection methods to gather information from a few entities. The boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used' (Benbasat et al., 1987). The single case study method is considered to be a potentially rich and valuable source of data, while

suited to exploring relationships between variables in their given context (Yin, 1994; Benbasat et al., 1987) and is appropriate where it represents a critical case (Yin, 1994).

3.1 Case Environment

The subject of this case study, The Australian Prudential Regulation Authority (APRA), was chosen as it represented a critical case in the exploitation of XBRL in a financial information supply chain; APRA was the first such organisation worldwide to incorporate XBRL technologies into its systems. Before 1998, the regulation structure for the financial services sector in Australia was complex, with 11 federal and state prudential regulators in existence. This structure was based around what was termed 'three silos', namely:

1. The Reserve Bank of Australia (RBA), which had responsibility for bank prudential supervision in addition to monetary policy and system stability.
2. The Insurance and Superannuation commission (ISC), which had responsibility for general and life insurance as well as pension funds. By 1998, the ISC had responsibility for over 180,000 self-managed superannuation (pension) funds.
3. The Financial Institution (FI) Scheme, which looked after building societies, credit unions and friendly societies. Such institutions are politically important despite having less than 3.5% of the country's savings, as they boasted membership representing about one-third of the population. The FI scheme was a state-based scheme with a regulatory authority in each of the eight States and Territories. A national scheme (AFIC) operated as a policy setting and data collection mechanism for the eight state and territory regulators.

The Australian Prudential Regulation Authority (APRA) was established on July 1, 1998, as part of the Federal Government's drive to establish a stronger regulatory regime. APRA was essentially the merger of 11 predecessor agencies. APRA had responsibility for the prudential regulation of banks, life insurers, general insurers, building societies, credit unions, friendly societies and many superannuation funds. APRA was also interested in the efficiency and competitiveness of the Australian financial system, but was not responsible for product disclosure standards, customer complaints or licensing agents and brokers.

3.2 Research process

The researchers first conducted a thorough archival search to determine the existence of documentary evidence of interest for the period 1998 to 2002. The accuracy of this material was then verified with key staff members at APRA. This verification was conducted using conference calls and document exchange by email. As a result of this preliminary analysis, the researchers prepared a case study protocol as defined by Yin (1994). Interviews were conducted during February and March 2003. In addition to interviews, the researchers were also given access to relevant contemporary documentation. Finally, the analysis of the data collected was validated in discussion with key staff members at APRA.

4 CASE STUDY FINDINGS

This section describes the design and development of the XBRL-enabled inter-organisational systems by APRA in conjunction with the Reserve Bank of Australia (RBA) and the Australian Bureau of statistics (ABS). The findings (see table 1) illustrates that the increasing complexity of data consumption and the complex relationships between participants in the financial information supply chain created the impetus for the development of the system. This complexity created the need for a co-operative approach to IOS development, which facilitated the design of context-driven data exchanges. Such exchanges were deemed necessary in order to meet the demands of data consumers and to effectively participate in inter-organisational activities. This led to a standards-led approach to

implementing the necessary IT infrastructure. As a result the IT infrastructure is seen as a commodity from which participants can leverage value rather than a proprietary asset. It is apparent that this commoditised infrastructure and integrated data architecture may facilitate the resign the activities of some of the participants in the financial information supply chain.

Complexity of Data Consumption amongst inter-related participants in the financial information supply chain	Reasonably homogeneous participants in financial information supply chain. However, participants demand high degrees of data customisation.
Co-operation amongst participants	Achieved by specifically created body to harmonise stakeholder requirements (TDC)
Context of data Exchanges	Data complexity reduced by design of standards-based IOS.
Commoditisation of IT	Used to implement accepted industry practices

Table 1 Overview of findings

4.1 Complexity of data consumption in the financial information supply chain

Senior managers at APRA wanted to move quickly to integrated supervision, i.e., 'treating like risks alike' across all regulated industries. This meant that different industries (e.g. building societies, credit unions, etc.) needed to be assessed in a similar manner. However, APRA discovered that the financial information supply chain within which they operated was characterised by complex data-consumption patterns due to frequent change, data duplication and data definition problems.

4.1.1 Frequent change

One of the most important features of prudential data collection is frequent change; if data does not change, it would stagnate and no longer meet the needs of the regulator (or the market). Operationally, this meant that a development team within APRA needed to update the systems that collected data from financial institutions continuously. Some of these updates were trivial, but often changes would affect the entire risk framework, and require changes, additions and deletions to hundreds or thousands of different data points. In all cases, such updates resulted in a constant need to redesign forms.

The design of data collection forms tended to be similar across the predecessor agencies. Regulators designed the forms and gave them to the IT department to develop the data collection software. However, this was a complex process, as the forms contain hundreds of items and required sophisticated data edit and validation routines. In addition, the reporting subtlety in the forms was not readily apparent to IT personnel.

Managers at various financial institutions also confirmed that the software provided often did not work as intended. They complained that fines were being imposed when inaccurate data were provided, even when the cause of the problem was with the software. For example, if a regulator requested changes – but provided the software and the changes at the same time – banks often failed to provide correct information since they did not have time to ensure that appropriate data collection processes were in place.

4.1.2 Data duplication

It was evident that there was a huge overlap between the data requested by APRA, and the data collected by the central bank (Reserve Bank of Australia - RBA) and the statistics agency (Australian Bureau of Statistics - ABS). One estimate indicated that there was up to a 40 percent overlap between the data collected by the ABS, and the data collected by APRA and the RBA.

The RBA data collection process had been designed to collect monetary policy and prudential data from banks. Some at APRA believed that, as the prudential regulation section of the RBA had become part of APRA, the duplication between APRA and the RBA would naturally cease. However, the overlap with the ABS data collection was putting a burden on institutions. In addition it was clear that institutions were providing different figures to the RBA and ABS due to (1) problems with definitions, and (2) issues related to how the data was labelled..

4.1.3 Data definition and labelling issues

Institutions often had a poor understanding of the definition of certain data items. Some of the definitions that accompanied the data collection forms were too brief, and led to confusion e.g. 'Does cash include cash in transit?' At the other extreme, some of the definitions ran into 20 or 30 pages. There was often one person in a reporting organisation who (thought they) knew what these definitions meant, but may have been acting on out-of-date descriptions. Smaller institutions often reported that they simply did not have sufficient time to read the long definitions.

The second factor was how the data was labelled/allocated when being reported. For example, to find out what parts of the economy are growing and in decline, the agencies could survey either the 2 million Australian businesses or the intermediaries (financial institutions) that move money on behalf of these businesses. This meant that the banks were asked to provide data based on the regulators' definition of the economy; e.g. to differentiate between government and government owned businesses, commercial and not-for-profit organisations, financial institution activity within the country and outside the country, etc. However, systems in financial institutions were not organised to provide this type of data breakdown, as the differentiation categories did not necessarily correspond to product or operations requirements. Regulators thus had to undertake periodic surveys, and use 'rules of thumb' to provide the data to the collection agencies.

4.2 Towards a co-operative approach

In order to reduce the data provision burden on institutions, managers at APRA, the RBA and the ABS concluded that one agency should collect the data on behalf of the three agencies. They believed that APRA would be the most appropriate agency to do the data collection due to existing arrangements and legislative issues. The RBA bank supervision department became part of APRA in 1998, so APRA continued to collect data for groups in the RBA (e.g. economic group) that previously used the information gathered by the bank supervision department. The ABS could not pass on information that it collected due to legislative restrictions. APRA was not as restricted. In addition, APRA had a critical mass Statistics Unit.

The RBA and ABS were supportive of the proposal. For one thing, it meant they would not have to worry about manual data collection. Furthermore, the harmonization of definitions between the RBA and ABS, and between the two organizations and APRA, meant they would get data that were more consistent. APRA was in the process of moving their definitions closer to the accounting framework; they believed that data collected by banks for management decision-making and financial reporting is generally more accurate than data collected for a regulator, which needs to be collected specifically for the purpose. Finally, APRA, as a regulator, had the power to order data and had the personnel to audit institutions to extract that data or to explain any discrepancies.

4.2.1 The Statistics Project

APRA's response to the issues and decisions discussed above came in the form of 'The Statistics Project,' which started in 1999. As a part of this project, APRA undertook to:

- Re-engineer the data collection and analysis process through the development of new software and systems.

- Modernise and harmonise reporting requirements through a gradual review of reporting returns from different industries. By 'harmonising' APRA was attempting to ensure that for key returns, there would be harmonisation between the requirements of APRA, the RBA and the ABS. By 'modernise' APRA intended that all returns would be reviewed to determine whether the information collected was relevant and prudentially useful.
- Co-operate with key government users of this information (ABS and RBA). APRA sought to collect everything that they required for prudential analysis, together with the depository corporation data that the RBA needed to construct the monetary aggregates, and the ABS needed for the financial accounts and national accounts.

4.3 Redesigning data exchanges

The Tripartite Data Committee (TDC) was established to co-ordinate content redesign for and on behalf of APRA, the RBA and the ABS. The committee consisted of a lead representative, and 2 or 3 business experts from each agency. The TDC was always run in an informal fashion, meeting daily, weekly, quarterly, as needed, over the three-year period of the Statistics Project. On average, the committee met for one day a fortnight during peak periods, falling to one day per month at less busy times. In addition, there were four people working fulltime on the project. These people captured and documented the decisions of the group.

The TDC consisted of people who knew each other professionally for a decade, but had never discussed data definitions previously. The committee took each data item from every form and examined it from the perspective of agreed definition, validation etc. The negotiations relied on face-to-face or telephone conference discussions, and were dependant on personal relationships. The players sometimes relied on brinkmanship, with representatives from an agency vowing that they would continue with their own data collection process if they didn't get what they wanted regarding a data item. The content redesign work of TDC is discussed below.

4.3.1 Removing Redundant Data

The TDC had to assess whether data items being provided by the institutions were actually required by the agencies. For example, banks were previously required to differentiate mortgages granted to investors and to owner-occupiers. The TDC noted that such mortgages were the same product at the retail level, but had not traditionally been so. However, from a monetary policy perspective the difference was important, as investment is an indicator of economic activity. By the late 1990's, banks no longer differentiated between these products, as there was no longer a difference in the credit decision. In addition, almost all mortgages had a revolving credit component so that customers could draw down money already paid. The TDC discovered that Banks had no way of telling how this drawn money was spent. Therefore, banks had to estimate the division between investment and owner mortgages. There was much debate at the TDC as to whether this division would be removed from the reports. Finally, the division of figures remained, but the limitations of the figures were recognised.

4.3.2 Agreeing discrepancies in data definitions

Agreeing on data definitions involved assessing differences in data items requested by the agencies in advance of the combined data collection. For example, both ABS and APRA collected data on cash. However, the definitions were slightly different and the institutions provided different numbers for that data item. The broad money measure (M1) also proved problematic due to changes in banking procedures. In particular, people no longer held passbook accounts, making it difficult to differentiate between transaction and non-transaction accounts. This posed definition problems for the TDC, and policy problems for those that used the figure.

A more complex data-definition issue related to accounting for repurchase agreements (Repos). Repos are a financial instrument used to manage day-to-day liquidity by selling a liquid asset (e.g. government securities and bonds), and at the same time entering an agreement to buy it back. However, accounting for this activity is complex. A comparison of the securities on issues with the repos would reveal that repos accounted for 2 to 3 times the amount of securities on issue as the two counter parties to a repo transaction would often simultaneously record their holdings of the security, without regard to the existence of the contract to repurchase. This caused problems for analysts in the agencies who use repos as an indicator (e.g. for liquidity). The TDC discovered that different institutions used slightly different methods to account for repos. All were technically correct, but the regulators needed to ensure that the figures provided were all based on the same definition. The TDC had to design a rather complex definition and have this agreed upon by the players in the repo market.

4.3.3 Co-operatively Developing Validation Rules

Developing validation rules within the TDC was often straightforward. Most rules were not complex e.g., 'X should equal Y + Z.' As time passed, the TDC became more sophisticated about how they thought about validation rules, and the rule base became more sophisticated. A number of the people who were involved in the process had quantitative degrees, and were able to develop these sophisticated validation rules.

4.3.4 Developing New Items

One of the new items discussed by the TDC was the inclusion of data on banking presence. There is an ongoing debate in Australia regarding physical presence by banking institutions in rural areas. A lot of research has been done on the effects of bank presence on rural communities. A government report indicated that there was a need for better information about physical presence, and it was decided that APRA should gather this. The RBA was interested in the information as it had an active regional economics research agenda. This information was also considered useful to the ABS, but APRA did not consider that this information would be especially useful to them. The TDC met with industry to discuss the issue. It was proposed that the best measure of the physical presence of banks would be entries in the Yellow Pages, as one could count the physical addresses of such entities. However, many banks only advertised 1-800 (free phone) numbers. Finally, the TDC agreed that APRA would collect physical addresses as an indicator of physical presence. This information could then be inputted into a geographical information system (GIS) to view physical changes in bank presence.

4.3.5 Packaging

Finally, decisions made by the TDC had to be packaged for use by both back-end systems and end-users. The packaging of information included the systems level modelling of data items and validation rules, and the production of forms, spreadsheets, etc.

4.4 Developing a standardised IT infrastructure

It was evident to some managers at APRA that adaptive systems were required to accommodate the constant churn of change within the regulatory taxonomies and the large volume of forms and collection tools. Such systems would allow business experts to redesign forms dynamically, based on agreed meta-data rather than relying on IT experts. They believed that the additional cost of building adaptive systems would be outweighed by the costs paid to have programmers 'tweak' systems constantly.

APRA had identified XML as the preferred mechanism for adding descriptive meta-data to their systems. The preliminary representations of the system simply had a big box in the middle marked "XML." APRA therefore needed to replace their "XML box" with something more specific. APRA's

decision to use XBRL was relatively straightforward. XBRL had widespread support from the accounting profession, regulatory organisations, and other financial service industry participants. It addressed the bulk of APRA's needs and showed positive signs of continued growth and worldwide adoption. Furthermore, APRA decided that even if XBRL faltered as a standard, they would be no worse off than if they developed a unilateral, proprietary XML vocabulary from scratch.

4.4.1 The systems architecture

Figure 1 shows the high-level architecture of the Direct to APRA (D2A) system. The system consists of

1. Software components deployed within the reporting institutions (left side of the figure),
2. Software components deployed within APRA (centre of the figure), and
3. The exchange of data and metadata with the separately developed XBRL-enabled software components at the ABS and RBA (right side of figure).

The arrows indicate the flow of data and metadata, primarily in the form of XBRL, between the different components in the system. The system components and the flow of information are described in detail below.

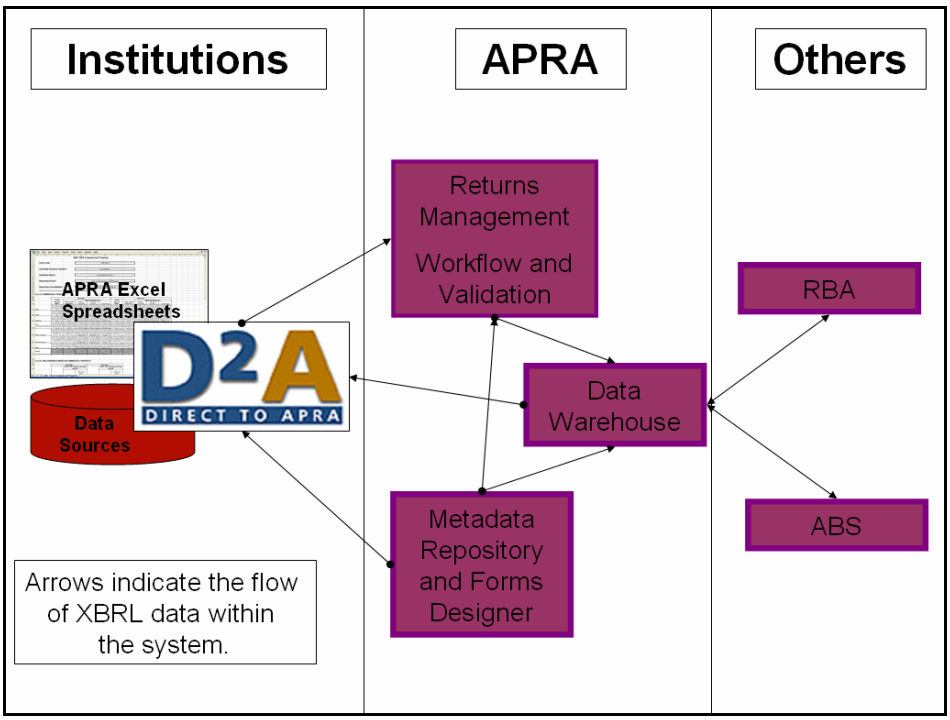

Figure 1. High-level architecture of D2A System

The D2A system is centred on the dynamic production and use of data-entry forms that wrap data items in XBRL metadata and enforce various D&V rules. Within APRA, a commercial-off-the-shelf metadata repository manager is first used to group together related data and metadata items (as defined through the TDC harmonization process previously described). These data groups can then be manipulated (or "painted") into an end-user form, using a "what you see is what you get" application that was custom developed for APRA. The same tool allows APRA to bind these forms with the relevant D&V rules. The output of this tool is a data-entry form that is automatically implemented in the Java programming language, with all of the individual data items described in XBRL.

The data-entry forms, with their related D&V rules, can then be downloaded to the D2A applications deployed in the reporting institutions. The process includes sophisticated filtering functionality – a

given organisation will only download forms/rules relevant to them as an individual company, or as a member of a particular industry category. The D2A application running in the institution is then used to capture data. Data can either be hand entered (using D2A forms or spreadsheets developed by APRA for the task) or imported directly from other enterprise applications using the various tools in the D2A application.

Once data has been entered, D2A uses the appropriate D&V rules to validate the completed form. If a form fails any of the validation tests, changes need to be made. Once a form passes all the relevant validation tests, it is digitally signed and submitted securely over the Internet to APRA; each data item is "wrapped" in the relevant XBRL metadata.

The data submitted to APRA was used by APRA to support various prudential regulation activities. The data was also passed on, in XBRL format, to the ABS and RBA. The ABS and RBA built there own systems to make use of the data, and have both been active in exploring new applications for the data – e.g. the dynamic creation of charts and graphs and the dynamic creation of print publications, all based on the live XBRL data.

Finally, the APRA aggregated the XBRL data, and anonymous, industry specific aggregations of the data were provided back to individual companies as a tool for them to use in benchmarking their own performance against a group of peers.

4.4.2 Systems Rollout

The first rollout of the system occurred in September 2001, with the first collection from building societies and credit unions part of a staggered introduction until March 2002. After the system was implemented, the amount of data collected changed from 2,500 data points per month per bank to 1,600 per quarter. The validation rules also changed; becoming more numerous and sophisticated. APRA introduced 10 times more validation rules than there used to be. This meant that there were almost as many validation rules as data points. Between March 2002 and March 2003, the system was rolled out to banks, superannuation entities, and general insurers. By March 2003, APRA had also taken over responsibility for registered financial corporations from the RBA, and had rolled the system out to these as well. At that stage just life insurers and friendly societies remained.

The new system and wholesale review of reporting requirements introduced a lot of change for regulated institutions. For example, there used to be a simple annual return with 180 items for superannuation entities. The new system permits much larger returns, with a few thousand items in aggregate, that are required if APRA is to regulate the superannuation industry as effectively as other industries. The Head of the statistics Unit at APRA expects this to have a big impact on the industry, particularly in terms of the ability of individual entities to make informed decisions regarding self-regulation.

4.5 Towards a redesign of the financial services supply chain

A key objective of the Statistics Project was to return unit level data to the institutions that provided it. By March 2003, feedback to building societies and credit unions had been introduced. Building societies and credit unions received their own information as well as benchmark data from defined peer groups on a quarterly basis. The benchmark information consisted of the financial ratios generated for internal prudential analysis. Using these ratios, institutions could compare their performance against that of their peers. APRA believed that providing this information to the company made life easier for the company by letting them know how the regulator saw them. Benchmarking reports are usually given to senior managers in the institutions. These managers are often prompted to revise the information that was originally sent to APRA because of the feedback of the benchmarking information. This action is very positive according to the Head of the Statistics Unit as it improves the

quality of the data received by APRA, and means that APRA supervisors and the company are 'talking the same language' when APRA personnel visit the company.

APRA managers noted that benchmarking was of most interest to those institutions with less than a billion Australian dollars in capital, and believed that such institutions were better able to regulate themselves when they received the benchmark information. Due to the success of the benchmarking service with building societies and credit unions, APRA are planning to introduce the service for other industries. APRA is also planning mechanisms for more widespread dissemination of financial information, and is considering the provision of detailed information to the rest of the industry, government and policy makers.

The Basel Committee's recommendations for market discipline due for implementation in 2006 propose that a large amount of information previously considered confidential would be made publicly available. For example, some of the KPI included; how the bank measures risk, which risks impact the business, how the bank defines, monitors, and measures risk. When viewed in the context of Basel II, the provision of benchmarking information back to the institutions and for peer analysis could be interpreted as the first step of a two-step process to act as a substitute for market behaviour. The first step is to get the company to analyse and thus regulate itself. According to a Senior Project Manager, the more ambitious step is to have all companies disclose their information publicly. He notes that in the USA, for reasons of moral hazard (the tendency for the behaviour of organisations to alter detrimentally when they know that they are being monitored i.e. companies do not worry as much about the management of their organisations), all information provided to prudential regulators is republished within 90 days. The manager believes the next logical step for APRA is to require all monitored companies to disclose prudential information. He believes that banking peers will monitor this information and begin 'shouting at the regulators when they believe that one of their competitors is going down'.

5 CONCLUSION

This study has advanced the understanding of the design, development and implementation of XBRL-enabled inter-organisational systems in a financial information supply chain. The findings of the study demonstrate that:

- The development and implementation of such systems necessitate a substantive co-operative development effort to meet strong organizational as well as technological challenges.
- The business re-engineering that appears possible after the implementation of such systems could have profound effects on many players in the financial services sector.
- XBRL-enabled systems can significantly reduce the overhead of data discovery and processing.
- XBRL-enabled systems can enable new forms of value creating activity (e.g. returning benchmarking data to the market).
- XBRL-enabled systems can support higher levels of 'transparency and trust' (cf. DiPiazza and Eccles (2002), thus shaping the environment for new regulatory policies and processes.

The study has revealed a much more co-operative approach to IOS implementation than was evident with earlier IOS such as those studied by Webster (1995). Such co-operation is in line with the thinking of Finnegan et al. (1998) and Axelsson (2003) regarding the need for IOS implementations to become more co-operative in order for systems that are more complex to be adopted. Nevertheless, it is not evident that these changes can be attributed to changes in strategic thinking amongst IOS proponents, but rather a realisation that IOS built on emerging technology such as XML requires a much more co-operative approach to its development. Overall, it must be acknowledged that the results of the study are tentative due to the exploratory nature of the study.

References

Askenas, R., Ulrich, D., Jick, T. and Kerr, S (1995). The Boundaryless Organisation: Breaking the Chains of Organisational Structure. Jossey-Bass San Francisco, CA.

Axelsson, K. (2003). Analysing Business Interaction in a Virtual Organisation--Using Business Action Theory to Study Complex inter-organisational contexts. Journal of Electronic Commerce in Organizations, 1 1-27.

Beck, D.A. and Fraser, J.N. (1999). Personal financial services goes global. McKinsey Quarterly (2) 38-48.

Benbasat, I., Goldstein, D.K. and Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. MIS Quarterly, 11 (3) 369-386.

Benink, H. and Wihlborg, C. (2002). The New Basel Capital Accord: Making it Effective with Stronger Market Discipline. European Financial Management. 8 (1) 103-115.

Berkeley, A. (2002). The Road To Better Business Information: Making A Case For XBRL

Brown, F. and Willis, M. (2003). XBRL: Revolutionizing the corporate reporting supply chain. Financial Executive. 19 (3) 70-71.

Campbell, J.Y. and Taksler, G.B. (2003). Equity Volatility and Corporate Bond Yields. Journal of Finance. 58 (6) 2321-2351.

Corbitt, B. J. (2000). Developing intraorganizational electronic commerce strategy: An ethnographic study. Journal of Information Technology. 15 (2) 119-130.

Diggle, J., Brooks, R. and Shannon, J. (1999). International diversification of the funds management industry. Applied Economics Letters. 6 (10) 663-668.

DiPiazza, Jr., S.A. and Eccles, R. G. (2002). Building Public Trust. New York: Wiley.

Finnegan, P., Galliers, R. and Powell, P. (1998). Inter-organisational Systems, Strategy and Structure: The Case for Planning Environments. Australian Journal of Information Systems. 6 (2) 45-55.

Finnegan, P., Galliers, R.D. and Powell, P. (2003). Applying Triple Loop Learning to Planning Electronic Trading Systems. Information Technology and People. 16 (4) 461-483.

Graziano, C. (2002). XBRL. Financial Executive. 18 (8) 52-54.

Hodge, F., Kennedy, J, and Maines, L. (2002). Recognition versus Diclosure in Financial statements: Does Search-Faciliating Technology Improve Transparency. University of Washington Working Paper.

Marshall, C. and Rossman, G. (1989). Designing Qualitative Research, Sage Publications, Inc., CA.

Morrison, A.D. (2003). The Economics of Capital Regulation in Financial Conglomerates. The Geneva Papers on Risk and Insurance - Issues and Practice. 28 (3) 521-533

Palia, D. and Porter, R. (2003). Contemporary Issues in Regulatory Risk Management of Commercial Banks. Financial Markets, Institutions and Instruments. 12 (4) 223-256.

Pederson, R.A. (2001). Capital Markets Update. Journal of Corporate Real Estate. 3 (4) 394-398.

Pricewaterhouse Coopers (2002). Corporate communications for the 21st Century. PWC White Paper

Stone, E., (1978). Research Methods in Organisational Behaviour, Goodyear Publishing Co., California.

Walsham, G. (1993). Interpreting Information Systems in Organisations. Wiley, Chichester.

Watson, L.A. (2000). Looking At Business Reports Through XBRL-Tinted Glasses. Strategic Finance, 82 (3) 40-45.

Webster, J., (1995). Networks of collaboration or conflict? Electronic data interchange and power in the supply chain. Journal of Strategic Information Systems. 4 (1) 31-42.

Yin R. (1989). Case Study Research: Design and Methods. Sage Publications Inc., CA.

Yin, R.K. (1994). Case Study Research, Design and Methods. Sage Publications, Newbury Park.