

Roger Debreceeny, Carsten Felden, Maciej Piechocki

**New Dimensions of Business Reporting and XBRL**

# WIRTSCHAFTSINFORMATIK

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# **New Dimensions of Business Reporting and XBRL**

With a preface by Roger Debreceeny, Carsten Felden  
and Maciej Piechocki

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## Preface

The concept of highly integrated and IT-supported information supply chains, summarized by the term *Integrated Business Reporting*, has increasingly moved into the foreground of research interest. Current discussions on the improvement of intra-enterprise and extra-enterprise reporting processes cannot be realized without a clear and uniform description of the involved elements. Facing a constantly changing operational and analytical application landscape, individual research projects are not sufficient to build a complete understanding of the research issues within the XBRL community. Based on the idea of supporting the information flows within enterprises and across complex information supply chains the eXtensible Businesses Reporting Language (XBRL) is established as a standard that supports intra- and inter-enterprise reporting as well as to a variety of information consumers. A key objective of the XBRL standard is to increase the efficiency of the usage of information systems at the interface of business management and information technology. Today, the information integration market is fragmented to a considerable degree. Many proprietary solutions are used, from which no solution fulfills the complete requirements of a Web-oriented world. In these circumstances, XBRL works as a multifaceted solution. XBRL can be used to interconnect information systems in order to realize a wide variety of data exchanges.

The aim of this anthology is to analyze the social and technical nature and role of XBRL in information supply chains and capital markets along with analysis of the XBRL standard and taxonomies. The book provides a more critical view of XBRL from a research perspective. Included papers present different projects in the XBRL area as well as indicating future directions for XBRL research. The anthology

- presents the latest research findings from international XBRL researchers;
- familiarizes the reader with the implications of XBRL research;
- presents latest research projects within the XBRL community;
- offers perspectives for researchers, standard setters, computer scientists and market and business participants;
- indicates future directions for the XBRL standard.

Based on this background the current research questions are taken up and discussed from different perspectives in this anthology. Looking from a technical perspective, the research spectrum encompasses the internal perspective on up to the final user layer. Apart from these technical issues there are also key socio-technical aspects,

which are vital to our understanding of XBRL adoption and use. In order to present this multilayered view of XBRL, the anthology has been divided into three main sections.

The first section covers broad questions of the role that XBRL plays in the broad information environment, with a focus on economic, adoption and usage concerns.

The second section addresses domain issues, not only in the traditional area of financial reporting but also in broader compliance and business reporting.

Finally, the papers in the third section discuss some of the technical questions associated with XBRL and with the interaction of XBRL and other IT domains.

We trust that the papers in this anthology will appeal to readers in IT functions within organizations, software houses, participants in a variety of information supply chains and, of course, researchers within several disciplines. These papers represent the state of the art in XBRL research. The papers in the anthology demonstrate that XBRL research is vital and active. Yet, there is clearly a need for more research in all aspects of the XBRL endeavour.

We thank the individual authors, who were able to write their papers despite busy calendars. We thank André Graening and Harald Kienegger for their assistance with editorial revisions. We are particularly pleased with the co-operation with the DUV publisher and particularly thank Ute Wrasmann and Anita Wilke.

Finally, we wish productive reading for the readers of this anthology. Please use our e-mail addresses for any communication on the issues raised in the book: roger@debreceny.com, carsten.felden@bwl.tu-freiberg.de and maciej.piechocki@bwl.tu-freiberg.de.

Roger Debreceny, Carsten Felden, Maciej Piechocki

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## **Introduction**



# Research into XBRL – Old and New Challenges

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## 1 Introduction

The XBRL 1.0 specification, or more accurately XFRML 1.0 specification, was released in 2000. This was only some two years only after the proposals by Charlie Hoffman to the AICPA and the first serious academic discussion of applying XML technologies to business and financial reporting (Debreceeny et al. 1998; Hoffman 1999; Lymer et al. 1999). In the intervening period, we have seen a rapidly increasing level of interest in the policy implications of XBRL. A search of XBRL on Google.com returns an extraordinary 1.4m links. Similarly, a search on bibliographic databases such as ABI/Inform discloses more than five hundred papers from the academic and professional literature. In what is a relatively short period of technology adoption, the XBRL world has also seen significant maturing of specifications, architectures, taxonomies and software tools. In an important third dimension of adoption, the XBRL organization itself has matured significantly over this period. XBRL International and its national jurisdictions are comprised of more than four hundred corporations, agencies and not-for-profit organizations. These foundational elements have clearly been vital for the observed adoption of XBRL in important information supply chains. Whilst not at the rate that early proponents might have suggested (e.g. Coffin 2001a, 2001b; Hannon 2000), the use of XBRL within areas such as credit monitoring of financial institutions and in reporting corporate performance to a variety of securities markets does signal that XBRL has become a core enabling technology in business reporting.

There are, however, many challenges facing both XBRL and the XBRL research community. Whilst on the surface, the search evidence provided in the previous paragraph indicates a level of interest and maturity on a par with XML standards such as RDF, XML Query or sectoral XML standards including ebXML and UDDI. When digging a little deeper, however, it becomes clear that the state of XBRL knowledge development is not quite as promising as the citation statistics might suggest. Much, perhaps most, of the literature is professional in nature and in a largely expository mode. There are less than twenty peer-refereed research studies that systematically address XBRL from socio-technological, technical or business or financial reporting perspectives. This is hardly indicative of vital support in the research community for the future development or adoption of XBRL. The papers in this volume provide an indication of the future directions for XBRL research in several important dimensions of XBRL as a technology and XBRL as a socio-technical artifact. I now survey the current state of XBRL research using these studies as a representative sample of the

future direction for XBRL. Unfortunately, there is no current survey of research trends or needs. The closest that exists to such a survey is Debreceeny et al. (2005). As I proceed to survey the research questions that face the XBRL community, I will draw on the relevant elements of that paper.

The remainder of this paper proceeds as follows: In the next section, I discuss the application of XBRL as a generic solution for information exchange. I first address questions of where XBRL fits within broader societal settings which allows us to better understand directions for XBRL adoption. I then address the application of XBRL in a series of disparate knowledge domains. Some of those domains are aligned with the traditional focus of XBRL in financial reporting. Others, however, move well beyond this domain. The penultimate section addresses research questions of technology. A key direction that comes from the papers in this volume is the way in which XBRL is being seen as a technical foundation for broader information exchange than was envisaged by those that sketched out XBRL as a solution strictly for business reporting, and particularly for financial reporting. In the final section, I address some overall challenges for research in XBRL.

## **2 XBRL in a Socio-Technical Setting**

It is easy to see XBRL as a technology or an elegant (or perhaps not so elegant) solution to, without recognizing that as Locke and Lowe point out, XBRL is part of a broader set of organizational and sociological relationships within both national and international settings. The original design of XBRL established the standard as a generic solution to business reporting needs. Particular knowledge domains are represented in taxonomies, rather than in the specification. This deliberate design flexibility coupled with the multi-lingual foundations of XML allows XBRL to be used in a wide variety of reporting environments around the world. Locke and Lowe employ Actor Network Theory (Bruni and Teli 2007; Doolin and Lowe 2002; Latour 2005; Law and Hassard 1999) to analyze the relationships of XBRL players within a complex influencing and adoption environment.

Locke and Lowe identify the key constituencies within the XBRL community and then their interaction with the XML community and the various constituencies of reporting domains. There is little direct interaction between these latter two constituencies. In some fashion, not yet well researched and understood, the XBRL plays an intermediary role between the XML community and the domain-specific information supply chain actors. The former group has strong technical foundations coupled with a broad

understanding of the need for high-semantic web content (Berners-Lee et al. 2001; Berners-Lee 1998). The XML community is unlikely to have a detailed and clear understanding of the needs of particular supply chains. Conversely, the participants within various information supply chains are unlikely to be able to evaluate alternative technical solutions to improve the effectiveness and efficiency of their supply chain. Just how far beyond the historical foundations of financial reporting the XBRL community can push adoption remains to be seen.

The nature of adoption path is also considered by Locke and Lowe. They consider *User, Task, Technology*, and *External environment* in their model. A particular area of research interest that is also under-researched is the application of XBRL within internal organizational information and reporting environments. The interaction between uses the Global Ledger taxonomy ([www.xbrl.org/GLTaxonomy/](http://www.xbrl.org/GLTaxonomy/) Garbellotto 2007; Hasegawa et al. 2004), financial reporting taxonomies and internal reporting environments is ripe for a wide variety of research investigations (see also Debreceeny et al. 2005, 200).

Pinsker addresses a somewhat narrower but more manageable question, which is the issue of XBRL and firm continuous disclosure (Benston et al. 2003; Debreceeny and Rahman 2005; Lymer et al. 1999; Skinner 2003). Pinsker interestingly proposes application of Computer Mediated Communication Apprehension (CMCA) (Scott and Timmerman 2005) to our understanding of how enterprises might apply XBRL to continuous disclosure. Perhaps less interestingly, Pinsker suggests using the well-established Technology Acceptance Model (TAM) as an appropriate research paradigm for understanding perception of XBRL in adoption decisions. I am not convinced of the effectiveness of TAM or its variants to analyze XBRL adoption but Pinsker is making an important point. Perception is reality when it comes to technology adoption and we need to understand this when we come to research XBRL adoption. Equally, Pinsker's concern with absorptive capacity of entities is also an important notion (Cohen and Levinthal 1990; Lane et al. 2006; Phelps et al. 2007). There has been much discussion of the cost-benefit analysis of XBRL adoption (Debreceeny et al. 2005, 197-198). Determining the absorptive capacity of potential adopters will be an interesting research question. Pinsker sets out a number of testable hypotheses and we need research to address these hypotheses.

Clearly economic factors are an important consideration in any understanding of XBRL as a socio-technical artifact. Wagenhofer provides an overview of the economic interplay between organizations and users of performance data and the role that infor-

mation technologies including HTML and XBRL play in the intermediation between these parties. Importantly, Wagenhofer points to the key role played by regulators and by the auditing process in improving information quality. Wagenhofer reminds us that it is all very well to discuss the technical aspects of the socio-technical paradigm, but we ignore the role of those that add value to the information and transmission at our peril.

Locke and Lowe point to the difficulty of conducting research in the interaction of actors within the XBRL ecosphere and the various uses of XBRL. Given the importance of XBRL and the extent of interest in the technology, it is easy for researchers to provide a solid justification for their research endeavors. There are many ways to overcome the barriers to research on XBRL. Even though we are nearly a decade into XBRL development and adoption, it is still a relatively early stage in the history of XBRL. Having survived the initial stages of the adoption lifecycle, XBRL moves into a more mature and in many ways more interesting phase of development. Many different research techniques will be required to address questions of XBRL's socio-technical settings. Case studies (Chang and Jarvenpaa 2005), Delphi studies (Baldwin et al. 2005), surveys and experimental studies are all appropriate research methodologies for this stage of XBRL development.

### **3 XBRL Knowledge Domains**

Applying XBRL to a variety of knowledge domains is, as might be expected, the focus of a number of studies in this book. Moving XBRL taxonomy development and XBRL adoption beyond the realm of business reporting to other areas of reporting assessing XBRL against other metadata standards such as RDF and OWL (see [www.w3.org/2001/sw/](http://www.w3.org/2001/sw/); Kitcharoensakkul and Wuwongse 2001; Lee and Goodwin 2006). The business case for XBRL is not as clear the further one moves from business reporting in general and financial reporting in particular. Piechocki et al. have undertaken a systematic analysis of the application of the *European Union 2002/91/EG guideline on the Energy Performance of Buildings*. Interestingly, Piechocki and his colleagues have systematically applied basic principles for information exchange applied within the European Union. In addition, they employ DIN ISO 9126, which is an international standard that defines software quality criteria. Piechocki et al. find that XBRL meets both the EU and 9126 standards. Piechocki et al. do not, however, apply other metadata standards such as RDF, using the same criteria. This is a new and important area of XBRL research. Other case studies will be necessary and comparisons

with other metadata standards might be applied in such case studies. An outcome of such research may be a methodical approach to determining which metadata standard has comparative advantages in differing information supply chains.

If we draw back within the more comfortable boundaries of the financial reporting domain, there are many open research questions. Locke and Lowe raise interesting questions on the relationship between XBRL and accounting standard setters (see also Debreceeny et al. 2005, 200). My working hypothesis is that there is only the slightest of links between accounting standard setting and standard setters. For example, the Chair of the IASB addressed the 14th XBRL international conference in Philadelphia. In his address, Sir David Tweedie spent most of his time on developments with IFRS and convergence between US GAAP and IFRS. He made much of the potential of XBRL to aid use of IFRS: “We at the IASB and the IASC Foundation (our oversight organisation) view XBRL as an important tool that will enable these users to take full advantage of the increased comparability and transparency offered by IFRSs” (Tweedie 2006). Not a word, however, on how XBRL might influence the setting of accounting standards. Yet, clearly, there is much that XBRL can do to allow financial reporting to move beyond the iron grip of paper-based publication paradigms (Ijiri and Kelly 1980; Johnson 1970; Sorter 1969). Research on this question is effectively a null set and there is much yet to be done - we do not even have a catalog of how XBRL could be applied to allow interactive reporting of assumptions underlying financial statements. Teixeira also addresses this issue, albeit somewhat more tangentially, and is clearly not hopeful of ready solutions that would allow multi-GAAP reporting. Wagenhofer also speculates on how accounting standards setting would change if events were atomically tagged with XBRL metadata.

If we retreat further into the XBRL *comfort zone* of financial reporting, we come to the important question of inter-taxonomy comparability. Arguably the most important comparison are the similarities and differences in measurement and disclosure principles under US Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS) (Nobes 2006; Tarca 2004). After reviewing state of convergence projects between these two bodies of knowledge, noting the forthcoming developments with the US GAAP taxonomy, Sir David observed in his 2006 speech: “It is my belief that we would be missing an opportunity if we failed to account for convergence considerations when the US GAAP XBRL taxonomy is being developed. To the extent that US GAAP and IFRSs are converging, so should the XBRL taxonomies. We would not want different tags for a particular item, if they are the same under both accounting standards, to provide different results” (Tweedie

2006). These issues are addressed from a policy and research level by Teixeira and at an operational level by Swanson et al. (see also Debreceeny et al. 2005, 193, 199). Teixeira reminds us that not only are there important measurement differences between US GAAP and IFRS but disparities in disclosure. Some of these disparities are tractable, but most are not. The need for research on inter-GAAP taxonomy interoperability is urgent – and long overdue.

Staying within the financial reporting domain, a first attempt at understanding the differences between the US GAAP and IFRS taxonomies, using a major international corporation has been undertaken by Swanson et al.. Swanson and his colleagues analyze both measurement and disclosure issues between US GAAP and IFRS. They then assess the ability of the US GAAP and IFRS taxonomies to represent the reporting for the same corporation – BHP Billiton. Unfortunately, Swanson et al. find many issues, particularly with the income statement. Some of these issues are probably intractable because of fundamental disclosure differences. Some, however, arise because of differences in taxonomy design which is tractable within the broader XBRL community.

#### **4 XBRL and Related Technologies**

Whilst research and writing on XBRL has long discussed adoption and the socio-technical nature of the standard, interrelationships with other relevant technology streams is relatively new. The contributions of Chamoni, Gluchowski and Pastwa and Felden each, in their very different ways, demonstrate how XBRL can potentially be applied in areas far beyond the original design objectives for the standard.

Much of the interest with XBRL within organizations has focused on employing XBRL GL in a primarily transaction-oriented focus. Klement shows exactly how such an integrated system that, additionally, can be linked to external reporting using XBRL financial reporting taxonomies. He shows that well designed XBRL systems can allow drill down from final reports to atomic transactions. Chamoni takes us down a quite different path. Chamoni analyzes the interrelationship between XBRL and business intelligence (BI). XBRL was not designed explicitly as a BI technology. It was designed as a metadata representation language. Yet as Chamoni notes, XBRL may provide a foundation for BI at a much higher level of abstraction than might have first been envisaged. Chamoni describes an interesting maturity model for BI. In this model, Chamoni portrays XBRL playing a native role in areas such as text mining and web reporting. While an important first step, the study by Chamoni provides only a tanta-

lizing preview of future XBRL-based BI implementations. There is a clear need for case studies and research pilots that would test the propositions made by Chamoni.

Exploring a similar theme, Felden explores the use of XBRL in a multi-dimensional knowledge environment. Surprisingly, given the foundations of XBRL in accounting and financial reporting, which at least implicitly deals with multidimensional information (Ijiri 1982, 1987; Ijiri and Kelly 1980; Mattesich 1964), the XBRL specification dealt with multidimensional information in a somewhat naïve fashion. The recent *add on* XBRL Dimensional Taxonomies (XDT) goes some way to overcome the weaknesses of the XBRL specification. Following an analysis of reporting in the energy sector, Felden finds that XBRL and XDT has the potential to perform highly sophisticated multidimensional tasks such as directly facilitating OLAP solutions. Again, however, the future described by Felden gives rise to a desire for more realized case studies and practical work benches.

As an XML standard, XBRL is explicitly designed to meet only specific needs. There is, for example, no concern with security in XBRL given a host of XML security solutions. Similarly, there is effectively no direct support for transport layer in XBRL. Gluchowski and Pastwa provide a process model for the transport of XBRL metadata, within the complex information environment that characterizes the supervision of financial institutions within the realm of Basel II. Gluchowski and Pastwa describe a potential - but not realized - *Referential Architecture* for linking transactional systems in the clients of financial institutions via financial institutions and up to regulatory agencies. To be repetitive, it will be interesting to see these architectures tested first in the research laboratory and then in practical case studies. If we take the adoption of XBRL in financial reporting as an exemplar, we can see that the workbenches created by, for example, Charlie Hoffman in the late 1990s or by PricewaterhouseCoopers for Nasdaq, were highly influential.

Finally, we come to the question of where XBRL fits within the broader XML standards environment. Schmitt takes us on a very important path. Is XML a necessary foundation for XBRL, but only a foundation? Or, alternatively, can the XML technical community draw upon other XML standards to undertake tasks for which there is no readily available XBRL solution. Schmitt undertakes a qualitative assessment of various XML standards including XSLT, XPath and XQuery. Fortunately for the XBRL community, the author finds that a significant number of XML standards have the potential for direct interaction with XBRL. Much yet remains to be done to test directly these conclusions. For example, Schmitt finds that SQL/XML has the potential to op-



erate on XBRL data for purposes of mapping, transformation and reporting ([www.sqlx.org](http://www.sqlx.org); Funderburk et al. 2002). Schmitt notes that the next stage in his research program is to create full-text retrieval techniques that bind together XBRL and other XML standards. This work is important and urgent.

The work by Chamoni; Gluchowski and Pastwa; Klement and Schmitt and Felden would seem to provide many post-graduate students in computer science and information systems with a host of research opportunities.

## 5 Conclusion

The papers in this volume provide tangible evidence of the current and future state of XBRL research. The fact that this study is being published in that oldest of knowledge mediums, the paper-based book produced with moveable type, shows that tested technologies are not easily replaced by new technologies. XBRL does, however, seem to have met a survivorship test. In discussions and presentations on XBRL I have often made the prediction that XBRL data will be transmitted across networks long after I have shuffled off this mortal coil, to quote Shakespeare in Hamlet. Of course, I will not be able to directly test this hypothesis and will leave that to other parties. Yet, despite the clear and important long-term adoption of XBRL, there is much yet to do in the XBRL research field. I trust that the intellectual, societal and technical foundations of XBRL will have largely been resolved before that aforementioned untimely event. The shape of that research agenda is relatively well understood and a number of different research strands are well explicated in this volume. Meeting that research agenda is quite a different challenge, however. In this paper, I have repeatedly called for more case studies, more theoretical contributions, more test beds and more real world implementations. Many of those research tasks will require interdisciplinary approaches. Journal editors will equally need to be innovative in the way that they approach research into XBRL, which is at this stage still highly speculative and tentative. The XBRL research community has, however, the potential to add to the overall objectives of the XBRL endeavor – an endeavor that has the potential to add significantly to societal integration.

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## **General Implications**

# Researching XBRL as a Socio-technical Object

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## 1 Introduction

The Extensible Business Reporting Language (XBRL) is a grammar based on XML that is defined and described in the XBRL 2.1 specification. Instance documents are created by combining XBRL taxonomies and linkbases with data (*facts*) for a particular context. An alternative view is, XBRL is a mechanism for communicating information for decision-making between interested parties based on a generally accepted way of representing and digitally transmitting symbols of actions and events. XBRL may be both of these and many other things depending on how we frame our methodological understanding for the purposes of research. In this section we present an approach that conceives XBRL as a socio-technical object in the tradition of post-social perspectives (Knorr Cetina 1997; Latour 1996, 1999).

XBRL may be seen as a technological artefact looking to act as a solution to a problem. It is afforded equal status as an actor in a network of relations that come together in the construction of a complex socio-technical object. From this perspective XBRL is much more than a metadata standard designed to enable advances in business reporting. XBRL becomes the outcome and at the same time the facilitator of complex linkages creating a network of connections among institutions, individuals and other technologies associated with compiling and delivering business reports and submissions to government agencies and regulators. It is the effects of these socio-technical arrangements that our research seeks to explain. XBRL and its impact within accounting and business reporting and more broadly its impact on business and social arrangements are rich topics for research from the postsocial perspective. In this section we explore the potential for research by examining some applications of this research programme to XBRL.

Much of the literature to date on XBRL has followed the course of business fads (Abrahamson 1996; Scarbrough, Swan 2001). It has been building a significant volume of articles, but much of the material published has followed a predictable pattern of professional publications that focus on the promotional while tending to pay much less attention to the problems associated with the technology<sup>1</sup>. There are very few academic research articles published on XBRL so far<sup>2</sup>. This reflects the lack of knowledge about XBRL amongst accounting and Information Technology (IT) academics and the difficulty of examining aspects of a technology that is unsettled.

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<sup>1</sup> A representative sample from over the period of XBRL's development include: Boyd, Teixeira (2004a); Coleman (2002); Cover (2000); Hucklesby, Macdonald (2000, 2004); Strand et al. (2001); Teixeira (2005); Zarowin, Harding (2000).

<sup>2</sup> See for example: Debreceny and Gray (2001); Bovee et al. (2002); Hodge et al. (2004).

XBRL may be seen to occupy a somewhat tenuous position at present. From a research perspective the relative lack of implementations precludes the application of a number of research approaches such as surveying users or undertaking case studies. This situation is expected by XBRL proponents to change over the next few years. We believe that a postsocial and socio-technical perspective will open up a programme of research that will be of benefit to understanding XBRL as a technical object embedded in relationships with other objects and social settings (Bloomfield, Vurdubakis 1997; Law 1996, 2002; Lowe 2004; Knorr Cetina 1997; Knorr Cetina, Bruegger 2002; see also Giddens 1990, 1994).

The interaction or potential interaction of the technology with users and the features and characteristics of the social settings which surround the development of the technology become critical to understanding why it develops as it does. Taken together these approaches seek to enable research that tries to examine shortfalls in the manner in which the technology is developed or deployed and how we might better predict its trajectory as a successful innovation (Appadurai 1986; Kopytoff 1986; Mueller and Carter 2005).

This approach offers the potential for valuable research into where and why XBRL is as it appears to be and insights into how and why it may mature into an accepted international business reporting digital communication standard or potentially “miss the mark”. It directs our attention to the complex relationships and forms that objects in society may take and allows scope for our studies to focus in on specific times and places or to encompass XBRL’s global nature.

The scope for research is extensive. Our aim in this section is to focus attention on the socio-technical aspects of XBRL in a way that we hope highlights XBRL’s development and diffusion into the business community. We see this as being affected by aspects of how the technology is presented to its potential users who are many and varied. This is not just a matter of superficial notions of how best the technology might be sold to interested parties – it is a more fundamental examination of such things as: the breadth of expertise involved in development; aspects of governance; tracing the biography of the technology and concerns about the ability of the technology to enrol allies and supporters.

The section seeks to provide a broad introduction to the postsocial and socio-technical approaches to researching XBRL. In the next section the theoretical perspective is outlined and a summary of influences from the literature provided. Section 3 relates this material more specifically to XBRL and uses a diagram as a construct for a general



illustration of how we see the postsocial perspective may be applied. The following section describes three specific XBRL research projects as exemplars. Some concluding comments that include a description of the challenges faced in undertaking research of this type complete the chapter.

## 2 Socio-technical Objects and their Impact on Social Relations

This section of the paper presents a brief outline of the broad theoretic framework that we employ. *Postsocial* refers to hypothesised changes in the composition of society and social arrangements (Knorr Cetina 1999; Latour 1996, 1999). Authors argue from this perspective that social relations can no longer be seen as structured solely as a consequence of human interactions but that it is increasingly the case that our lives and culture are influenced by our reliance on technology and our relationships with technological objects (Latour 1987; Law 1999, 2002). Socio-technical perspectives, in part, draw from the ideas contributed by postsocial theorists on the increasingly important place of technology in structuring society (Knorr Cetina 1997, 1999; Lash 2001; see also Giddens 1990, 1994). Socio-technical objects are understood to include both the *hardware* of technology, such as mobile phones and laptop computers, and *virtual* objects such as computer software, accounting packages and ERP systems, email and other types of ICT technologies. These objects are socio-technical in at least two respects: they only work in settings that are constituted by humans; and they are of course also the product of human creativity. XBRL is such a technology, a socio-technical object which is intended to enable improved business communication. At the same time it will produce many side-effects by affecting how individuals and institutions who come in contact with the technology work. Some of these side-effects will be unanticipated but may nevertheless be of significance (Ciborra et al. 2001).

We conceive XBRL to be a socio-technical object which will both impact and be impacted by social arrangements as it develops. Our view from a socio-technical perspective is that the development of XBRL the technology and of organizational networks of which it is a part will evolve in an unpredictable and organic way. It follows that the development of such technologies is a complex process which engages aspects of the technical, social and political in a heterogeneous collection of objects and actors (Knorr Cetina 1999, 2001; Latour 1993, 1999; Law 1986, 1999, 2002).

Table 1 provides a summary of the main conceptual underpinnings of our research perspective. We draw from a range of literature that has in common its emphasis on the role of the object in constituting society as we experience it, an acceptance of the

heterogeneous nature of social arrangements and a constructionist understanding of society, facts and technology. The consequence of this combination of perspectives is that it makes little sense to study the technology in isolation from its social context. In order to understand how XBRL has and will develop and the effects it may have on business reporting and accounting practices we need to examine the broader social and objectual relations within which it is set. This means that our research should consider aspects of the nature of the technology and in relation to any competing technologies that might be available or perhaps become available. But that in addition to this we need also to examine the broader social and organizational arrangements that are involved in fabricating XBRL.

Table 1: Theoretical Framework for Research Using a Postsocial Perspective, (adapt. Lowe 2004)

Level of theorization	Theoretic Research Framework
Social theory/ concepts	Postsocial relations/technological forms of life A move toward post-social relations, reflecting an ontology based upon a depth of understanding of social relations (Knorr Cetina 1999; Lash 2001). Some of the aspects identified in this literature include: an increased reliance on relations with objects (both of a solid technological character and an ephemeral knowledge based nature; the increased incidence and experiencing of generic spaces; a faster pace of life (at least in the developed world) and the pervasive influence of ICT (information and communications technologies).
Implications and effects at the social and cultural level	A knowledge based society One interpretation of a knowledge society is that it is composed of social arrangements which are based on knowledge. Social culture and work relations are increasingly affected by technologies and the growth of expert knowledges (Beck 1992; Giddens 1990; Knorr Cetina 1999).
Research styles/ pro- grammes  Broadly constructionist – relying on empirical enquiry. Theoretical framework provided by the concepts described above.	Actor Network Theory (ANT) Research in the Sociology of Science and Science Studies has provided perspectives on the diverse ontology and epistemology of different disciplines (Callon 1986; Barnes, Shapin 1979; Knorr Cetina 1997; Latour 1987). Such studies examine the way in which expert work is performed at the micro level through anthropological and ethnographic methods. A broad theoretical school can be identified as ANT (actor network theory); see Callon 1980; Law 1992, 2002; Latour 1987, 1999). These studies commenced in the hard sciences but have made a considerable impact in sociology and organisation studies (Blackler 1993; Bloomfield 1995; Knorr Cetina, Bruegger 2002; Law 1996). This research is characterised by its <i>empirically realist</i> style (Lee, Hassard 1999; see also Calas, Smircich 1999; Law 2002; de Laet, Mol 2000). The importance placed on network relations and the need to trace the networks by following the actors (Latour 1987), the role of knowledge objects and object relations in enriching social and work cultures (Knorr Cetina 1997, 1999).

It is necessary to say a little more about the literature which we believe helps to define the philosophical position that we adopt for our research. There are some influential writers who have argued that our society is increasingly affected by the impact of spe-