# XBRL:  Is it Time?

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## Abstract

XBRL—eXtensible Business Reporting Language—is a manifestation of XML that is gaining acceptance and adoption by governmental regulatory agencies throughout the world for investment and financial reporting.  Current efforts are underway to expand the usefulness of XBRL as a source of business intelligence and a framework for ensuring transparency throughout the information value chain.  This paper presents a brief history of XBRL and an explanation of its current impact on business reporting to make the argument for its inclusion as an emerging technology topic in ICT research and education.

**Keywords:**  XBRL, XML, semantic web, interactive data, information value chain, business intelligence

## Introduction

Information & Communication Technologies (ICT) educators are generally hesitant to embrace unproven technologies as part of an ICT curriculum (Gillard, Bailey, & Nolan, 2008).  This caution has been hard-learnt and reflects the wisdom of experience.  Who can forget the hyperbole surrounding the advent of e-commerce and the rush to develop education programs that later had to be dismantled in the wake of the dot com downturn?  Unfortunately, the recent boom and bust of ICT education has had important repercussions; despite fluctuating economic conditions and the touting of "off-shoring" solutions, the need for ICT workers has remained consistently above that of other business disciplines.  The current shortfall in trained ICT professionals is real and growing.   The pace of technology advances, particularly in the area of mobile computing, have not abated, but there are less trained workers in a position to leverage these new technologies for economic growth.

XML—eXtensible Markup Language—surfaced in the mid-1990s as an emerging technological approach to expand hypertext markup language capability to include metadata tags (Debreceny, Felden, Ochocki, Piechocki, & Piechock, 2009; Hoffman, Pippert, & Walenga, 2005; Siegel, 2009).  HTML and Web styling technologies specifically address the problem of data presentation and hyperlinks in a web browser through a codified tag structure and style sheets.  For example, the HTML snippet:

**<b> 1000 </b>**

displays the alphanumeric characters as bolded text. The same text enclosed in XML tags:

**<salesAmount>1000</salesAmount>**

reveals context and meaning.  Thus the focus of XML is on data representation, creating the capacity to store and transport data via a web browser with its meaning and context intact.

XML has already demonstrated considerable potential across multiple applications and is one of the drivers of the "semantic" web.  The purpose of this paper is to focus on one manifestation of XML—eXtensible Business Reporting Language or XBRL—that has garnered considerable acceptance and influence in accounting and financial domains (Schneider & Hawes, 2009). (Podcast remarks available at: http://macpamedia.org/media/audio/CPASpotlight/Hawes.mp3) Indeed, XBRL is poised to become the *de facto* standard for regulatory financial reporting in many areas of the world.  The benefits of XBRL extend well beyond implications for reducing operating and financial reporting costs.  Because of its potential to increase data transparency, XBRL has the potential to reduce uncertainty and perceived risk in capital-provision decisions for capital providers.  Indeed, there are a number of efforts underway that are designed to expand the use of XBRL into all aspects of the information supply chain and to use it as the supporting structure for business intelligence analysis (Schneider & Wallin, 2009).

To date, academic interest in XBRL has been limited and largely confined to the accounting field (Baldwin, Brown, & Trinkle, 2006). The purpose of this paper is to explicate a case for including XBRL as an important emerging technology for ICT educators that warrants increased research and inclusion in ICT curricula. The next section provides a condensed description and history of XBRL to date.  The third explains the implications of XBRL going forward.  The fourth section argues the advantages and disadvantages of including XBRL as an emerging technology topic in ICT curricula.  The fifth section concludes the paper.

# History and Description of XBRL

XBRL is firmly rooted within the framework of XML and the semantic web as delineated by Sir Tim Berners-Lee in 2001 (Hoffman et al., 2005).  Whereas, the World Wide Web uses hypertext markup language (HTML) as a means of tagging data for human consumption; the semantic web and XML extend open standards for information tag syntax to incorporate semantic meaning. Using similar concepts in object oriented programming, XML has evolved to include a set of related technologies:  XML Schema (for taxonomy definition), XPath (query language), Namespaces, etc. to articulate semantic meaning.  Together, XML and its related technologies facilitate computer to computer interactions and the ability to store and transport information via the Internet.

Charles Hoffman, CPA, is generally credited as the "father" of XBRL as he was an early and active proponent of XML as a mechanism for financial reporting on the web (Debreceny et al., 2009; Siegel, 2009).  He envisioned XML as a key component of identifying financial and accounting concepts, describing their attributes and also delineating relationships between various financial reporting components.  In conjunction with the American Institute of Certified Public Accountants (AICPA) and several major accounting firms, XBRL has evolved beyond traditional XML syntax into a well-defined extensibility framework that can be used across a number of business reporting domains.  More recently, XBRL has been adopted and promulgated as a global open standard for business reporting by the International Accounting Standards Board (IASB). The organizing principles are depicted in the Discoverable Taxonomy Set shown in Figure 1.
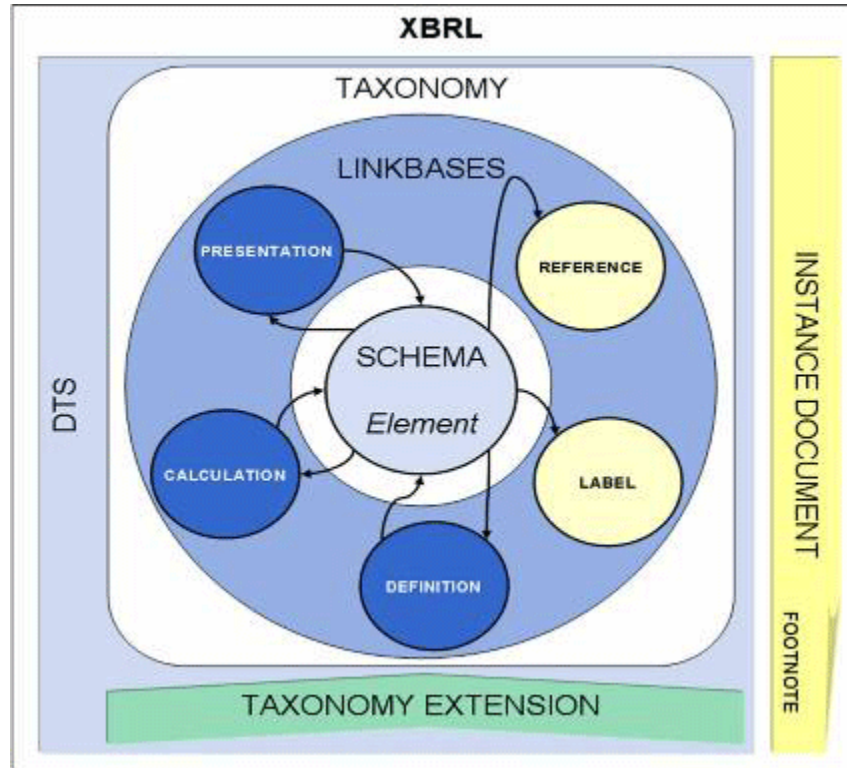
**Figure 1: XBRL Discovery Taxonomy Set**
(Available from: http://www.iasb.org/XBRL/Resources/Fundamentals.htm)

The foundation of XBRL rests on a set of officially recognized element tag schemas known as XBRL taxonomies which are used to create instance documents containing financial information in the form of facts. The schema syntax of the base taxonomies is familiar to XML users. Consider the following instance sequence depicting cash flows from financing, investing and operating activities taken from the December 31, 2008 annual report by Alcoa, Inc. to the U.S. Securities and Exchange Commission (SEC). Note that we have reformatted the original, in particular, bolding the instance facts for visual clarity.

```
<us-gaap:NetCashProvidedByUsedInFinancingActivities contextRef="eol_0001193125-09-
      029469_STD_p12m_20061231_0" decimals="-6" unitRef="USD">
      -20000000
</us-gaap:NetCashProvidedByUsedInFinancingActivities>
<us-gaap:NetCashProvidedByUsedInInvestingActivities contextRef="eol_0001193125-09-
      029469_STD_p12m_20061231_0" decimals="-6" unitRef="USD">
      -2841000000
</us-gaap:NetCashProvidedByUsedInInvestingActivities>
<us-gaap:NetCashProvidedByUsedInOperatingActivities contextRef="eol_0001193125-09-
      029469_STD_p12m_20061231_0" decimals="-6" unitRef="USD">
      2567000000
</us-gaap:NetCashProvidedByUsedInOperatingActivities>
```

Available from the SEC Interactive Prototype Viewer:
http://www.sec.gov/Archives/edgar/data/4281/000119312509076995/0001193125-09-076995-index.htm

XBRL expands the scope of XML beyond element tag syntax to include standardized metadata attributes related to financial reporting concepts—e.g., financial reporting elements typically incorporate an attribute to signify a debit or credit balance.  XBRL also has a well developed set of linkbases that define element relationships and hierarchies:

*Presentation:*   Describes hierarchies and parent-child relationships for financial reporting

*Calculation:*   Contains business rules; e.g., item summation for "footing" and accounting aggregates

*Definition:*   Describes required attributes, general conceptual descriptions with specific inheritance rules, aliases

*Label:*   Label definitions, including language translations

*Reference:*   Links to specific references, including external rulings and documentation

Thus, individual elements have not only a rich set of metadata attributes that provide nuanced meaning, but they are also presented within standardized references that provide contextual information.  Yet, in accordance with the original intent of XML, XBRL remains extensible, allowing business entities to customize tags for specialized reporting requirements.

Perhaps because the initial emphasis of XBRL—indeed the acronym and name itself—has been focused on financial reporting, early adoption has been largely limited to corporate entities and regulatory bodies.  For example, the Generally Accepted Accounting Principles (GAAP) taxonomy for the United States has been formally approved by the international standards organization (www.xbrl.org) and has been adopted by the Securities and Exchange Commission (SEC) as the future standard for financial reporting compliance.  Currently, there are twenty-three XBRL global jurisdictions, each with its own set of financial reporting taxonomies in various stages of approval and adoption.  The ultimate objective for the majority of these jurisdictions is to converge to a single standard International Financial Reporting Standard (IFRS) and corresponding taxonomy.

As mentioned previously, the SEC in the United States has promulgated XBRL reporting requirements that will expand to all publicly traded firms by 2011 (Gelfand, Van Decker, & Rosenfelder, 2009; Schneider & Hawes, 2009). The U.S. Federal Financial Institutions Examination Council (FFEIC) mandated quarterly XBRL filings from 8,200 member banks as part of their ongoing monitoring of the U.S. banking system in 2005.  Similar initiatives have been proposed in other countries.  Notably, the Tokyo Stock Exchange has promoted full XBRL reporting among its member firms.  In Europe, several XBRL initiatives are underway.  Among these:  the National Bank of Belgium and the Banking, Finance and Insurance Commission have mandated XBRL for Basel II and COREP reporting; the Borsa Italiana requires mandatory XBRL filings and the Netherlands government has been developing XBRL standards for all government financial reporting and filings; in 2007 Australia announced a three-year standardized business reporting (SBR) government initiative using XBRL as the foundation.

Several firms, including Microsoft, have adopted XBRL for their external reporting in advance of regulatory compliance requirements (Pinsker & Li, 2008).  These early adopters cite a variety of reasons for their actions.  Several asserted that the increased transparency afforded by XBRL improved external perceptions of investment risk, measurably decreasing cost of capital.  Other cited benefits include:  (1) decreased costs associated with external financial reporting, (2) increased timeliness and relevance of financial statements,(3) improved comparability across entities and (4) enhanced perceptions in the marketplace.  Given the emphasis on improving transparency in the aftermath of the 2008 financial crisis, it is not surprising that many regulatory agencies are focusing on XBRL as an important component of future financial reporting (Lunn, 2009;

Roth, 2009). Current initiatives span the realm of financial reporting from investment banking to not-for-profits and charitable donations (Schneider & Hawes, 2009).

However, the original conception and purpose of XBRL was not limited solely to external financial reporting. The XBRL tag structure, in conjunction with its reusability and flexibility is particularly suited to interoperable Service-Oriented Architecture (SOA) platforms and web delivered systems (Abraham, Junglas, & Willis, 2008). Standardized tags and validation taxonomies can integrate and leverage XBRL data across information supply chains. Although still at a nascent stage, several ERP providers have developed XBRL adapters to convert proprietary data into tagged data streams that can be transformed into internal management dashboards as well as external compliance documents (Gelfand et al, 2009). Efforts are also underway to expand the XBRL taxonomy structure to increase its utility for internal information management and analysis (van Edmond & Hoffman, 2008). One such initiative is XBRL-GL, a "Global Ledger" taxonomy that addresses the need for a tag syntax and structure within a chart of accounts. Data tags attached at this level are automatically included in subsequent accounting transactions, enabling detailed evaluation of business interactions and processes. A separate initiative is devoted to the development of a multi-dimensional tag syntax that will facilitate the use of XBRL to create OLAP data structures for business intelligence applications.

# XBRL Going Forward

In 2006, the Gartner Group evaluated XBRL as part of its ongoing assessment of information technology "hype cycles"—which evaluates emerging technologies at various stages of maturity and acceptance. XBRL, as one of several promising XML technologies was rated as "sliding into the trough of disillusionment" (Locke & Lowe, 2007). Typically, this stage is reached after the initial hype of an emerging technology is exhausted. Interest in the technology either wanes completely or the technology reemerges on the "slope of enlightenment" as salient benefits crystallize into a more widely understood and accepted form. In this respect, the impetus towards XBRL as a structured business reporting tool has been aided by the recent global financial crisis. Regardless of the various efforts to ferret out those who created the crisis, there is complete unanimity on the need for greater transparency in financial transactions and asset valuations (Roth, 2009).

Transparency is, in fact, a driving motivation behind the creation and promotion of XBRL. The recent financial crisis has only served to reinforce the urgency to adopt it (Siegel, 2009). Early evidence includes endorsements by potential consumers of XBRL documents, such as the Chartered Financial Analysts Institute. Similarly, the Institute of Management Accountants recently announced two new working groups devoted to promoting XBRL and developing XBRL business analytics. Former IMA president, Kim Wallin is currently serving as the controller of the state of Nevada. She has implemented a number of XBRL projects, including grants monitoring, state debt collection and a "one-stop" business portal for local businesses. Several of these ideas are being assessed by other states for monitoring federal reporting compliance as part of the American Reinvestment and Recovery Act (Schneider & Wallin, 2009).

A corollary indication that a technology is "climbing the slope" on the path to mainstream adoption is the emergence of second and third generation technology products. A review of software tool providers on the XBRL International website (www.xbrl.org/tools) indicates several XBRL specific offerings (Altova Missionkit, DragonTag by Rivet Software, Coyote Reporting). Open source software projects include CodeXBRL available through SourceForge.net and Google OneBox solutions. Microsoft has already invested heavily in XML as the underlying technology in its Office Suite and is reportedly working on product offerings for XBRL compliance. As of this writing, 500 of the largest publicly traded companies are required to tag their SEC filings using XBRL. Based on the current SEC implementation schedule, this number will swell to ap-

proximately 12,000 firms in mid-2011. Ad hoc discussions indicate that software vendors are frantically developing products in anticipation of the reporting market.

Despite recent increased activity related to XBRL in industry and the regulatory environment, academic interest has been relatively modest and limited primarily to the accounting discipline. A cursory search of six academic databases reveals only a limited number of peer-reviewed academic journal articles; again, the majority of these are in accounting related journals. A single teaching case is available from the Accounting Information Systems Educators Association (White, 2006). This begs the question; is it time for ICT researchers to embrace XBRL as an emerging technology worthy of study? Is it time to include XBRL as a topic area in ICT curricula?

# Recommendations for XBRL Adoption in the ICT Academic Community

XBRL is a bit unusual as an emerging information technology in that it appears to have gained traction in the accounting field with very little crossover into the IT disciplines. Perhaps this is based on a perception of XBRL solely as a compliance reporting language for accounting regulators. But as described in this document, the uses of XBRL extend far beyond external financial reporting. Indeed, XBRL working groups are actively promoting XBRL concepts throughout the information value chain (IMA News Release, 2009). How, then, should the ICT community approach XBRL first as a standalone topic within the discipline and as an approach for collaboration with other stakeholders in the information supply chain, such as accountants and financial analysts? The recommendations presented here are simply an attempt to start the conversation. Since XBRL has implications for research as well as teaching, recommendations for each are presented separately (with the implied understanding that teaching and research are mutually reinforcing activities.)

## *Teaching Recommendations*

For ICT educators, XBRL is an ideal candidate as an applied instance of XML in a general business use case. As such, it makes sense to integrate XBRL as a current exemplar of technology principles within an ICT curriculum. Suggestions include:

- Using XBRL as an example of the Semantic Web (Web 3.0) in an emerging technologies course. XBRL taxonomy development and creation of instance documents fits neatly within the object oriented programming paradigm of software engineering; the open source XBRL software tool development provides a venue for students to build next generation applications that could affect diffusion of XBRL globally. This may also require adding a unit and/or culminating project utilizing XBRL skills in a web development course.

- Referencing XBRL as a specialized systems development case, requiring highly granular knowledge of accounting requirements and rules. Within this context XBRL-GL can be used to illustrate principles of structured data as part of common business transactions.

More importantly, ICT academics can assist colleagues in other (business) disciplines to understand and integrate XBRL across a business school curriculum. One possible example that resonates with current students is the potential for increased transparency in financial reporting. The SEC XBRL Financial Reporting Viewer, currently available as a prototype with voluntary filings (http://www.viewerprototype1.com/viewer ), can be used in finance classes for financial statement analysis. There is already evidence that XBRL regulatory filing compliance is driving improvements in accounting accuracy (XBRL Business Information Exchange, 2010) and these

"real-time" events can be monitored and discussed within the context of business ethics. From a socioeconomic perspective, the transparency afforded through XBRL has important implications for aligning firm IT initiatives with strategic business objectives (Hoffman et al., 2005). Implementation of XBRL adapters for ERP systems has the potential to increase flexibility in the information value chain that corresponds to and directly affect business supply chains. Thus, one could argue that XBRL should be integrated as a topic area across an array of courses, including: Operations Management, Finance, Business Ethics, Project Management, and Business Strategy.

Finally, XBRL presents an opportunity to break down functional silos between accounting and ICT via collaborative projects. Hoffman, recounting his early efforts to promote XBRL, describes this difficulty in conveying the potential of XBRL to accountants:

> "My strategy…was to take away all the possible reasons for them to say no. If I tried to explain XBRL, it wouldn't work. Many business people can't think abstractly, and most technical people can't think concretely enough."

To implement XBRL successfully—and in particular, to utilize the extensible capabilities appropriately—ICT knowledge workers must develop a deep understanding of accounting rules as they apply to business processes. Accounting controls may seem impractical, redundant and rigid to one unschooled in traditional financial accounting systems, but very often they serve an important purpose by mitigating moral hazard risks and assuring accurate and reliable account valuations. As XBRL pervades the underlying accounting information systems in the form of XBRL-GL, it is likely that ICT professionals will be called upon to work jointly with auditors to implement system controls. Collaboration between academic disciplines will help prepare students for these challenges.

For current and future ICT students, it appears that XBRL will provide global employment opportunities that will only increase as accounting standards converge and additional areas of application are realized. Because XBRL is an open standard, educators need not fear creating a narrow skill set for students. In fact, XBRL can be taught as a business manifestation of XML (albeit a pervasive one), opening up the possibilities of similar adaptations in other areas. For students, however, the important consideration is that learning XBRL significantly increases the probability of being hired upon graduation.

## Research Opportunities

The expansion of XBRL from an external financial reporting tool to a more endemic component of information management also provides opportunities for ICT research. Accounting researchers Baldwin et al. (2006) suggest eight categories (See Table 1) for future accounting related research that apply as readily to information technology academics:

| Table 1: XBRL Research Categories<br>(from Baldwin et al., 2006, pg 108) | |
| --- | --- |
| **Research Category** | **Description** |
| Data/Information | Actual data and information—including items collected, format, quantity and quality |
| Metadata | Data about data—including taxonomies, their explanatory power and evolution over time |
| Adoption | Case studies and patterns of adoption |
| Processes/Task | How work is accomplished—what is done, how it is done and where in the overall process is done |
| Users/Uses | Who uses XBRL—why they use it and what they use it for |
| Reporting Industry Supply Chain | Industry effects—including changes in industry practice and roles within the industry |
| Power/Trust | Changes in power and trust among providers, intermediaries and users of information |
| Education/Training | Best practices with regard to training individuals, including taxonomy creation, application by providers, services of intermediaries and uses of tagged information |

# Summary

Charles Hoffman often recalls his epiphany upon reading his first treatise on XML and speculating on how it might be applied to accounting information.  However, it is unlikely that his initial vision encompassed XBRL in its current incarnation.  Nor did it include the potential extensions of XBRL as a mechanism for creating a global ledger or an OLAP cube.  The current regulatory climate and urgency for transparent reporting mechanisms are driving the adoption of XBRL towards a tipping point.  The question for ICT researchers and educators is:  should we as an academic community involve ourselves in this effort?  Do we want to have a hand in shaping the direction of XBRL in the future?  Do we want to provide our students with the potential opportunities that may become available?   Is it time?

# References

Abraham, C., Junglas, I., & Willis, M. (2008). Enabling an agile information supply chain in service oriented architectures with web services. *Americas Conference on Information Systems (AMCIS) 2008 Proceedings*.

Baldwin, A., Brown, C., & Trinkle, B. (2006). XBRL: An impacts framework and research challenges. *Journal of Emerging Technologies in Accounting*, *3*, 97-116.

Debreceny, R., Felden, C., Ochocki, B., Piechocki, M., & Piechocki, M. (2009). *XBRL for interactive data: Engineering the information value chain*. Berlin: Springer-Verlag.

Gelfand, S., Van Decker, J., & Rosenfelder, S. (2009). Beyond the mandate –Benefiting from the Internal Use of XBRL. XBRL.US. Retrieved from http://xbrl.us/events/pages/natcon2009.aspx#present

Gillard, S., Bailey, D., & Nolan, E. (2008). Ten reasons for IT educators to be early adopters. Journal of Information Technology Education, 7, 21-33. Retrieved from http://www.jite.org/documents/Vol7/JITEv7p021-033Gillard257.pdf

Guilloux, V., Locke, J., & Lowe, A. (2008). Local skirmishes in the contruction of (global) digital business communication technologies. *International Conference on Information Systems 2008*.

Hoffman, C., Pippert, B., & Walenga, P. (2005, August 25). *Business case for XBRL*. UBMatrix, Inc.

IMA-News Release. (2009). IMA forms new XBRL advisory committee to benefit accountants in business and industry. Retrieved December 12, 2009, from http://www.xbrl.org/LatestNews/IMA-Release-20090812.pdf

Locke, J., & Lowe, A. (2007). XBRL: An (open) source of enlightenment or disillusion? *European Accounting Review*, *16*(3), 585-623. Retrieved from http://www.informaworld.com/smpp/content~db=all?content=10.1080/09638180701507163

Lunn, B. (2009, November 28). XBRL: Accounting geeks get radical - ReadWriteEnterprise. *ReadWriteWeb*. Retrieved December 15, 2009, from http://www.readwriteweb.com/enterprise/2009/11/xbrl-accounting-geeks-get-radical.php

Pinsker, R. & Li, S. (2008, March). Costs and benefits of XBRL adoption: Early evidence. *Communications of the ACM, 51*(3), 47-50.

Research Methodologies: Understanding Hype Cycles. (n.d.). Retrieved December 14, 2009, from http://www.gartner.com/it/products/research/methodologies/research_hype.jsp

Roth, D. (2009, February 23). Road map for financial recovery: Radical transparency now! *Wired Magazine* . Retrieved December 15, 2009, from http://www.wired.com/techbiz/it/magazine/17-03/wp_reboot

Schneider, B., & Hawes, T. (2009, December 9). XBRL momentum building? [podcast] *CPA Spotlight*. Retrieved December 13, 2009, from macpamedia.org

Schneider, B., & Wallin, K. (2009, June 25). XBRL: Keep an eye on Nevada. [podcast] *CPA Spotlight*. Retrieved December 14, 2009, from macpamedia.org

Siegel, D. (2009). *Pull: The power of the semantic web to transform your business*. New York: Portfolio Press.

van Egmond, R., & Hoffman, C. (2008, March 11). *XBRL: how a simpler XBRL can make a better XBRL*. Retrieved December 14, 2009, from http://xbrl.squarespace.com/storage/xbrls/XBRLS-How-simpler-can-be-better-2008-03-11.pdf

White, C. (2006). Introducing XBRL using an instance document shell. *AIS Educator Journal*, *1*(1).

XBRL Business Information Exchange. (2010). *More and more SEC XBRL filings get 5 star rating*. Retrieved from http://xbrl.squarespace.com/journal/2010/2/23/more-and-more-sec-xbrl-filings-get-5-star-rating.html

# Biographies

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**George Summers** is an Assistant Professor in the department of Accounting and Legal Studies at the Perdue School of Business.  His primary research focus is on accounting information systems, largely due to his extensive background with SAP enterprise planning resource systems.   A significant component of this is the opportunities that XBRL affords to illuminate business intelligence and the information value chain.

**Jeffrey Kottemann**, is a Professor of Information and Decision Science at the Perdue School of Business.  His extensive research background includes publications in *MIS Quarterly*, *Information Systems Research*, *Decision Science* and more recently *IEEE Transactions in Systems, Man and Cybernetics*.  His interest in XBRL comprehends its potential implications for global information technology development.