

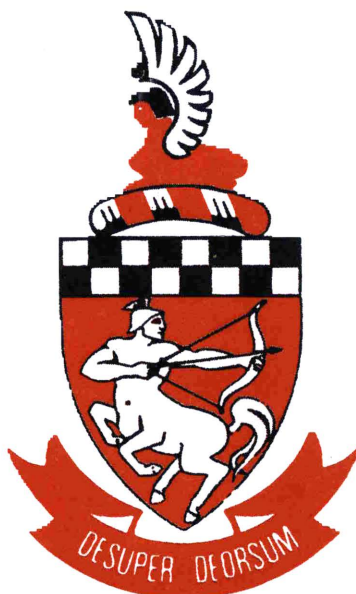
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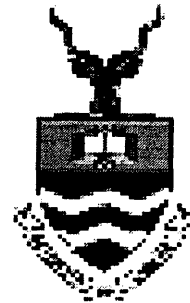
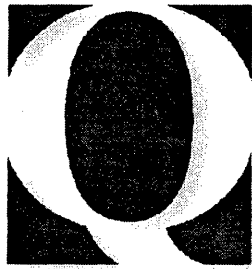
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Preface

Philip Machanick, Overall Chair: SAICSIT'99

Running SAICSIT'99, the annual research conference of the South African Institute for Computer Scientists and Information Technologists, has been quite an experience.

SAICSIT represents Computer Science and Information Systems academics and professionals, mainly those with an interest in research. When I took over as SAICSIT president at the end of 1998, the conference had not previously been run as an international event. I decided that South African academics had enough international contacts to put together an international programme committee, and a South African conference would be of interest to the rest of the world.

I felt that we could make this transition at relatively low cost, given that we could advertise via mailing lists, and encourage electronic submission of papers (to reduce costs of redistributing papers for review).

The first prediction turned out to be correct, and we were able to put together a strong programme committee.

As a result, we had an unprecedented flood of papers: 100 submitted from 21 countries. As papers started to come in, it became apparent that we needed more reviewers. It was then that the value of the combination of old-fashioned networking (people who know people) and new-fashioned networking (the Internet) became apparent. While the Internet made it possible to convert SAICSIT into an international event at relatively low cost, the unexpected number of papers made it essential to find many additional reviewers on short notice. Without the speed of e-mail to track people down and to distribute papers for review, the review process would have taken weeks longer, and it would have been much more difficult to track down as many new reviewers in so little time.

Even so, the number of referees who were willing to help on short notice was a pleasant surprise.

The accepted papers cover an interesting range of subjects, from management-interest Information Systems, to theoretical Computer Science, with subjects including database, Java, temporal logic and implications of e-commerce for tax.

In addition, we were very fortunate in being able to invite the president of the ACM, Barbara Simons as a keynote speaker. Consequently, the programme for SAICSIT'99 should be very interesting to a wide range of participants.

We were only able to find place in the proceedings for 36 papers out of the 100 submitted, of which

only 24 are full research papers. While this number of papers is in line with our expectation of how many papers would be accepted in each category, we did not have a hard cut-off on the number of papers, but accepted all papers which were good enough, based on the reviews. Final selection was made by myself as Programme Chair, and Derrick Kourie, as editor of the *South African Computer Journal*. Additional papers are published via the conference web site.

We believe that we have put together a quality programme, and hope you will agree.

Acknowledgments

I would like to thank the *South African Computer Journal* production team, Andries Engelbrecht and Herna Viktor, respectively from the Department of Computer Science and Informatics, University of Pretoria, for their work on producing the proceedings.

The reviewers listed overleaf did an excellent job: many wrote very detailed reports, sometimes after being called in on very short notice. Inevitably, there were some glitches resulting from the unexpected workload, but the buck stops with the programme chair: I promise to do better next time.

I would also like to thank my own department for putting up with the extra work and expense that running a conference entails. I tried not to burden them with too much extra work, but our secretaries, Zahra Gowar and Leanne Reddy, inevitably had to take on some extra work. John Ostrowick provided valuable assistance with design of our web pages and call for papers poster. Carol Kernick, who handles our finances and membership records, did a fine job of keeping up with the demands of the conference.

Finally, I would like to thank our sponsors, whose contribution made this conference been possible:

- PricewaterhouseCoopers – sponsored generous prizes and the conference banquet
- National Research Foundation (NRF) – provided financial support
- University of the Witwatersrand – provided financial support
- Programme for Highly Dependable Systems, University of the Witwatersrand – provided financial support
- Standard Bank – provided financial support

- Apple Computer – provided equipment for the conference
- Qualica – provided technical support including helping with the conference web site

Web Site

For more information about SAICSIT, including a pointer to the conference site, see <<http://www.saicsit.org.za>>.

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Harmonizing Global Internet Tax: A Collaborative Extranet Model

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Abstract

The advent of Internet Commerce represents a significant threat to taxation revenue collection for governments throughout the world. Governments cannot prevent the creative and innovative commercial use of the Internet in developing new business opportunities. Taxation authorities are, arguably, in a worse plight than Jean Baptiste Colbert, treasurer to Louis XIV, who is reported to have said: 'The art of taxation consists in so plucking the goose to obtain the largest amounts of feathers, with the least possible amount of hissing'. The Internet Commerce problem, of course, is not in obtaining the most feathers but getting hold of the virtual geese. The researchers have developed a theoretical model for the taxation of Internet Commerce using a knowledge management approach to the resolution of the taxation issues in electronic commerce by emphasising evidence based medicine as an appropriate metaphor. The application of Cochrane's principles on collaboration and maintenance are combined with knowledge management principles in an attempt to advance the ecommerce taxation debate. This notion of evidence-based taxation is founded in the requirement for crucial diagnostics regarding taxpayer intent in effecting economic advantage and in the identification of the respective taxation (compliance) models that would apply to a specific set of commercial circumstances. It is the writers' contention that international and national taxation authorities could benefit from adapting some of the ideals of evidence based medicine to an evidence based taxation focus. It takes the novel approach of drawing on the Cochrane principles to support the authors' contention that an Extranet may well become the preferred delivery mechanism for knowledge management in tax administration. This paper defines Extranets, outlines some innovative uses of Extranets and discusses the theoretical framework of Extranets as a potential method for global co-operation as per the Cochrane Convention.

Keywords: Extranet, evidence based medicine, case based reasoning

Computing Review Categories: K.4.1, K.4.4, H.1.1

1 Introduction

The advent of wide scale digital business has created fear and uncertainty among tax collection authorities both in Australia and overseas. The United States Advisory Commission on Electronic Commerce has been appointed by US Congress to investigate how to deal with taxes and the Internet. A study by the University of Texas has stated that the Internet in the US is now the 18th largest economy in the world and that the States in the US are missing out on \$US300 million in sales tax on Internet transactions [11]. As usual, technology is advancing at such a fast rate that legislators and law enforcement agents are struggling to keep up. Put simply, tax systems which are geared for traditional economic relationships are ill equipped to deal with the new type of economy which is emerging from the electronic revolution. Legislation traditionally recognizes tangible goods, transactions and relationships it has no way of coping with the "virtual economy" which is made up of electronic goods and services, such a software, which no-one can really see or touch [12].

The developed countries; principally Australia, the United States and the European Union, believe:

- that international agreements are vital for the encouragement of electronic commerce
- regulation of secure electronic payment systems should be minimal
- there should be a common commercial code for electronic commerce [15].

Some developing countries believe that the United Nations should control the Internet, as they are suspicious of the motives of the United States. Developing countries also see the potential of the Internet for raising foreign currency - they therefore oppose the US's proposal that there should be no new taxes on Internet access or telephony [15]. In this paper we propose a *case based reasoning* approach to the resolution of the taxation issues in electronic commerce by emphasising *evidence based medicine* as an appropriate metaphor. *Evidence based taxation* represents a move towards evidence of a physical transaction that is mapped from electronic connectives to appropriate tax elements. It uses case based reasoning management models employing knowledge (case histories) of electronic message exchanges that logically constitute a trading/business intent, to be stored in an *Extranet* (defined in Section 4).

2 International Studies on Impact of Internet Commerce on Tax

Governments and tax administrations are keen to garner revenues from the burgeoning electronic commerce but they are working in an area fraught with difficulty. If they attempt to overburden the Internet business with red tape and tax impositions, these entrepreneurs will move offshore to tax havens. This research is an attempt to develop a global approach to the problem as ecommerce is a global phenomenon - as such there will be enormous difficulties getting cooperation. However global organizations such as those seen in Table 1 are already working on a number of problems so there are precedents for such cooperation [20].

Caldwell [4] believes that US State tax laws that discriminate against interstate commerce will have a negative effect on the ability of electronic commerce business to access nationwide markets in the United States. The growth of electronic commerce, necessitating as it does a more nationwide, indeed more global marketplace, will put enormous pressure on badly behaving states. Many countries including Australia, Ireland, Canada and the USA have conducted independent studies on the potential impact of ecommerce on tax revenues [14, 15, 12, 13]. Appendix A lists significant International Internet Commerce Tax Studies and web sites. The fears are outlined below:

- The Internet allows trade to be conducted in an environment that does not necessarily create independent audit trails.
- Electronic entities on the Internet are not easily linked with their physical equivalents, making identification and recourse difficult.
- The Internet lowers the cost of international trade, potentially increasing the number of participants and, therefore, the number of businesses engaged in profit shifting activities. There are many places that would be happy to give Internet transactions a zero sales tax rate so they could entice businesses to host sites in their countries [11].
- Encryption systems that make electronic cash viable also impede the ability of tax authorities to ensure compliance with the tax law.
- Efficient collection mechanisms are under challenge because the traditional leverage points, the 'middlemen' in the distribution chain from producer to consumer, are under threat due an effect known as 'disintermediation'. This means that producers and consumers are connected directly, cutting out the middlemen such as wholesalers, distributors and retailers.

3 Outline Of Research Methodology

Tax administration requirements are seen to parallel the radical developments since the seventies in health care

practice and in evidence based medicine. Extranets, by focussing on collaboration among tax authorities and policy makers through powerful knowledge management technologies, enable *evidence based taxation* to be implemented by adopting the powerful paradigms of the *evidence based medicine* metaphor! Because of the present state of knowledge, a qualitative and exploratory research approach was used, especially in this area where theoretical propositions are few and field experience is limited [10]. Exploratory research is useful for obtaining ideas for potential new strategies and opportunities. Once the theoretical model was developed, a research in progress paper was published [15] and a seminar given at University of Technology, Vienna in June 1999. Later focus discussions were held with a cross section of researchers, business persons, policy advisers and academics to critique the model. A summary of these discussions is found in section 8 of this paper.

At the 12th Bled International Conference on Electronic Commerce, Professor Doug Vogel from the City University of Hong Kong moderated a networked session on Research Issues in Electronic Commerce. A local computing firm networked 58 computers in one large room and set up group software to enable the brainstorming session. This session was a follow up to similar exercise Professor Vogel carried out in 1998. In the 1998 white paper that was published from this session 28 topics were identified. In this groupware session, participants from academic, government and industry, tried to ascertain classic problems that need further research. Last year's white paper on the 1998 session identified a wide range or areas for research - but tax did not score highly. In the 1999 session after voting, Trust came out as the Number 1 issue (raw score 258) whilst tax came 9th (202 votes). In 1999 the group was concentrating on finding classic problems that need research - not ephemeral ones. In the 1999 session participants tried to narrow down the number of the topics and a white paper will result from this session as well. The participants appreciated the manner in which they could submit their thoughts electronically. This meant that all participants could contribute to the discussion and no one person dominated the discussion [13]. Some key comments from this session have also been included in Section 8 of this paper.

4 Definitions

Extranets

The glossary (whatis.com) defines an Extranet as '*a collaborative network that uses Internet technology to link businesses with their suppliers, customers or other businesses that share common goals.... An Extranet can be viewed as part of a company's Intranet that is made accessible to other companies or that is a collaboration with other companies*'. Riggins & Rhee [17] put forward the idea of the Extranet to bridge the gap between Intranet and Internet applications. In order to allow untrusted sources

Organization	Regulation	WWW address
UNCITRAL	United Nations Convention on Contracts for the International Sale of Goods	http://www.un.or.at/uncitral/english/texts/sales/salescon.htm
WIPO	Trademark Law Treaty	http://wipo.org/eng
WTO	Agreement of Government Procurement	http://www.wto.org/wto/govt
WCO	International Convention on the Simplification and Harmonization of Customs procedures	http://www.unece.org/trade/kyoto/welcome.htm
UNIDROIT	Convention on Agency in the International Sale of Goods	http://www.unidroit.org/english/conventions/c-ag.htm

Table 1: Global entities: (Source An XML Application for presenting and Explaining Regulations and Commercial Terms, Walter Thoen, P533 Bled Conference 1999).

safely into a network, companies need to be able to identify individual users and tie those identities to varying levels of network access. The defined access privileges can be used with e-mail, datawarehouses, custom applications, legacy systems, webified information, product distribution systems, and any other service or application tied to the network. Health institutions have used Virtual Private Networks (VPNs) to provide access to medical records and to offer confidential research information. In our model taxation administrations and policy researchers would have access to taxation policies and rulings, stored in a knowledgebase (electronic libraries) housed in an Extranet.

Evidence Based Medicine

Health care professionals, consumers, researchers, and policy makers, including taxation authorities, are overwhelmed with unmanageable amounts of information. In 1972, Archie Cochrane, a British epidemiologist, drew attention to our great collective ignorance about the effects of health care. He recognized that people who want to make more informed decisions about health care do not have ready access to reliable reviews of the available evidence. Cochrane emphasized reviews of research evidence must be prepared systematically and they must be kept up-to-date to take account of new evidence. If this is not done, important effects of health care (good and bad) will not be identified promptly, and people using the health services will be ill served as a result. In addition, without systematic, up-to-date reviews of previous research, plans for new research will not be well informed. As a result, researchers and funding bodies will miss promising leads, and embark on studies asking questions that have already been answered. It is the writers' contention that international and national taxation authorities, policy advisors and researchers could benefit from adapting some of the ideals of *evidence based medicine* to an *evidence based taxation* focus. These stakeholders would draw on the Cochrane principles to support the authors' contention that an Extranet may well become the preferred delivery mechanism for knowledge management in tax administration.

Case Based Reasoning

The basic idea of CBR is to solve new problems by comparing them to problems already solved [18]. The key assumption is that if two problems are similar then their solutions are probably also similar. Old problems and solutions are stored in a database of cases - the case base - to be stored in the global taxation Extranet. These can be collections of attribute value pairs but for complex tasks it is useful to explicitly represent the hierarchical structure of the cases by describing them as structured objects, using inheritance, object decomposition and possibly other relations between the object parts. When a new problem has to be solved the CBR system looks for the most similar problem already stored in the database. It then adapts the solution to this old problem to meet the requirements of the new problem.

5 Nexus

Axioms for Evidence-Based Taxation

The notion of *evidence-based taxation* is founded in the requirement for crucial diagnostics regarding taxpayer intent in effecting economic advantage and in the identification of the respective taxation (compliance) models that would apply to a specific set of ecommerce circumstances. The current reliance by taxation authorities on intermediaries (e.g. employers) to collect taxes, on taxpayer cooperation (i.e. adequate business records) and on legal precedent to establish tax liabilities are likely to be ineffectual as the basis for compliance with taxation law in electronic commerce, for revenue management or for the selection of taxpayers for audit. The axioms for tax and Internet Commerce that need to be tested are seen to be:

- Ownership of trading entities in cyberspace can be identified through appropriate registration and reporting mechanisms namely the Australian Business Number [2] and International Business Code or digital taxation certificates.
- Trading communities (e.g. home shopping community) can be characterized as to the legal jurisdiction

governing their operations, and the scope of their business charter in Australia may be regulated through the licensing of Australian suppliers and distributors to such communities. Goods and Services Tax (GST) registration could, for example, be extended to include a license to conduct specific forms of business activity!

- Adequate diagnostics exist to determine whether the respective elements of an entity's tax liability, and the associated times at which such liabilities were incurred, are being captured accurately and securely.
- Automation of tax liability assessments, through the establishment of appropriate electronic audit trails results in an efficiency of revenue collection no less than that currently achieved.
- Technical mechanisms to avoid non-repudiation of genuine tax liabilities arising from electronic commerce are robust.

Wilcox et al [22] quoting Chuck [8] outline some proposed solutions for collecting Internet Commerce taxes. Some are in operation, some exist in official proposals while others are under discussion. None of these proposals has been refined to the point where the actual compliance mechanism has been completely defined.

- Issue software patents for electronic commerce application only to companies that include a method for automatically tracking tax revenues
- Establish local fiscal representatives to whom electronic commerce sales organizations must report and who would be responsible for reporting transactions to the country where the product is sent
- Set up new rules governing Internet domain names that would allow governments to authenticate the identity and location of any Internet addressee
- Require delivery companies to automatically add and collect GST/VAT for goods delivered:
- Increase the tax collection responsibilities of current intermediaries such as financial institutions and sales organizations to include electronic commerce revenue.
- Establish 'Guaranteed Electronic Markets', or central computers that combine the models of public utilities and stock exchanges, where both the buyer and the seller must register, and the transactions have to follow specific rules that guarantee fairness and an efficient market. Demos, a liberal British think tank, has proposed GEMS as a way to level the playing field in electronic commerce and overcome buyer distrust of web based transactions but their applicability to the tax collection problem is evident.

The Nine Principles of the Cochrane Collaboration

The Cochrane Collaboration [9] has evolved rapidly since it was inaugurated at the 1st Colloquium in 1992 but its basic objectives and principles have remained the same as they were at its inception. It is an international organization that aims to help people make well informed decisions about health care by preparing, maintaining and ensuring the accessibility of systematic reviews of the effects of health care interventions. The Collaboration is being built on nine principles:

- collaboration
- building on the enthusiasm of individuals
- avoiding duplication
- minimizing bias
- keeping up to date
- ensuring relevance
- ensuring access
- continually improving the quality of its work
- continuity

Evidence Based Taxation similarly embodies a comparable set of principles and axioms for professional practice in tax administration within an Internet commerce environment. More specifically, we can identify a thematic structure for any preferred taxation model, due to the implicit connectives between future trading entities, which may include scenario-based models of virtual enterprises, and the taxation mechanisms that will need to analyze both intent at the scenario level and actors' roles in the respective functional model (trading processes). These structural elements are already present, for example, in the Open-EDI models accepted by the international community and are expected to emerge in virtual trading communities over the Internet.

The Evidence Based Medicine metaphor also offers a rich harvest of evidentiary mechanisms [3], ranging from Bayesian statistics to knowledge/logic reasoning processes appropriate to *evidence based taxation* requirements. Interest in machine learning techniques for data mining and in hypothesis generation for automated fraud detection [6] exemplify such thematic connectives. In the move to Internet commerce, however, such offline analysis, as is currently practiced, will be inadequate! The dynamics of electronic commerce require not just online recording of trading activity, but automated exception analysis using software of high quality in a secure environment. Concurrent knowledge management is fundamental to successful tax administration in future, with immediate evidence to be found in the overarching role of secure key management in electronic payment systems.

To sum up then, national and international taxation bodies adapt ideals of **evidence based medicine**

to an evidence based taxation focus, drawing on the Cochrane principles to support the contention that an Extranet may well become the preferred delivery mechanism for knowledge management in tax administration.

6 Relating Cochrane Collaboration Principles To An Extranet Approach

We advocate the application of the Cochrane Collaboration principles to the development of an International Taxation Extranet.

Collaboration

There is a history of cooperation on taxation matters in the international arena - in fact there are 1500 international tax treaties already in existence but most of these are bilateral, that is between 2 countries and concern income and capital taxes. The majority of these treaties are based on the Organization for Economic Co-operation and Development (OECD) *Model Tax Convention on Income and Capital* [22]. The rest are based on the 1997 OECD *Model Tax Convention between Developed and Developing Countries*. The OECD Committee on Fiscal Affairs has released a series of studies and the International Fiscal Association has initiated an international research project. Because electronic commerce is transborder it is essential to look for transborder solutions despite the aphorism that '*National borders are not even roadbumps on the information superhighway.*' [7]. The OECD has held two conferences to study taxation and electronic commerce, namely the Turku, Finland Conference in November 1997 and the Ottawa, Canada Conference in October 1998. The Turku conference concluded that the Committee on Fiscal Affairs (CFA) of the OECD should be the international body to coordinate and progress taxation issues of electronic commerce. It has the task of developing the taxation framework conditions that are applicable to electronic commerce. (The Ottawa Conference was the first OECD Ministerial event to have the active participation of a large cross section of the stakeholders, such as international organizations, business, labour, consumer and public interest groups, in electronic commerce). Cooperation with the World Trade Organization and the World Customs Organization is essential to ensure an integrated and comprehensive approach to taxation of electronic commerce.

Building on the enthusiasm of individuals

Strategic positioning of Internet businesses can have an impact on where profits are taxed. Tax can be avoided by incorporating and conducting business through a server in an area of low tax jurisdiction. Anguilla, in the Caribbean, has been marketed by Vice Cate as a tax effective jurisdiction in which to locate. His web server (www.offshore.com.ai) supplies

businesses with their place of effective management and hence Anguillian residency. Cate believes that more than 50% of *pure* Internet business will operate from tax havens within 10 years [19]. Cypherpunks or 'crypto-anarchists' are dedicated to building anonymous systems. In the *Cypherpunks Manifesto* Eric Hughes states: '*We are defending our privacy with cryptography, with anonymous mail forwarding systems, with digital signatures and with electronic money.*' By combining encryption technology with digital signatures and remailers people will be able to move funds in the form of anonymous digital cash without a trace. Governments will not be able to tax what they cannot see and even if they try to break the encryption, the resources necessary to decipher potentially millions of transactions would be beyond those available to taxation authorities. Governments will need to fill researchers with enthusiasm to counter such persons. It could be that lateral thinking is required here to encourage 'cypherpunks' to realize the value of using their brains for the community good as is the case with so called 'White Hackers' who have been able to market their valuable skills to show companies where their security holes are. In 1997 the Australian Commissioner of Taxation, Mr Michael Carmody, announced that the subject of tax havens and bank secrecy in administering Australia's tax system would form the topic for the inaugural Commissioner's Award for Research in Taxation with a prize of \$20,000.

Avoiding duplication

The transborder nature of electronic commerce makes it essential for countries to develop timely solutions to the threat of electronic commerce to taxation revenues. Countries that are worried that electronic commerce will erode their tax base may adopt independent, unilateral measures, if substantial action is not apparent at an international level [5]. If many countries develop individual (National) solutions, there will be duplication, and in fact, the spread of electronic commerce will be hindered.

Minimizing bias

The United States is committed to a tariff free Internet with no discriminatory or overly bureaucratic ways of taxing the Internet. Clarke [7] makes the point that the general public has difficulty in perceiving much difference among large corporations, large governments and 'organized crime'. Each is remote from the individual, exacts tribute, makes decisions and acts in its own interests and seeks to bias the process of the societies in which it operates in order to suit its own needs. If law enforcement and tax compliance are to work, education of the public is vital.

Keeping up to date

Just as the Cochrane Collaboration aims to keep health workers up to date so could taxation authorities be kept

up to date with developments in taxation implements. Bentley [1] states: *Once most businesses are operating on the Internet, similar search software to that being developed by AUSTRAC and the United States Treasury Department to track the activities of international crime will be available to the ATO for use in its audit activities. The search capabilities will make it much simpler to find any available information on equivalent products and services.* The use of an Extranet will help to move information quickly to the international authority.

Ensuring relevance

It is not only electronic commerce that has caused significant difficulties in regard to 'trans-jurisdictional' commerce. Where elements of a transaction are quarantined in jurisdictions that do not recognize international conventions, the behaviour can be effectively 'extra-jurisdictional' in that it is incapable of prosecution in any court of law. Clarke [7] states the term 'supra-jurisdictionality' usefully conveys the way in which business conducted in virtual marketplaces may be subject to no existing legal jurisdiction at all [7]. It could be that a totally new legal system needs to be developed.

Ensuring access

Riggins & Rhee [17] developed the Electronic Commerce Domain matrix shown in Table 2 by combining two dimensions of Internet technology applications; namely:

Location of application user relative to system firewall, for example using internal intranets to post information for employees inside the firewall, such as project schedules and updates, employee points of contact and company benefits information;

and

Type of relationship: for example, using the network to promote new decentralized virtual work teams both within and outside the company.

An Extranet can be part of a propriety system where trading partners receive controlled access to certain portions of the firm's intranet or a collaborative network linking trading partners together to engage in cross-application information. Extranets, using the Electronic Commerce Domain Matrix, as shown in Table 2 may be classified as either Cell 3 applications or Cell 2 applications. Using such a setup, an international tax Extranet would allow external trading countries controlled access behind the initiator's firewall and into the initiator's Intranet. These Cell 3 applications are interorganisational decision support systems, where external trading countries use a standard web

<i>External: Location of Application User relative to the System Firewall</i>	Improving coordination with existing trading partners: Cell 3	Market creation to reach new customers: Cell 4
<i>Internal: location of Application User relative to System Firewall</i>	Improving coordination with internal business units: Cell 1	Information exchange to work with new team members: Cell 2
	<i>Technology enhanced Type of Relationship</i>	<i>Technology facilitated Type of Relationship</i>

Table 2: Electronic Commerce Domain Matrix Source: Riggins, FJ & Rhee, H (1998) Towards a Unified view of Electronic Commerce, October 1998, Volume 41, No 10 Communications of the ACM. Page 91.

browser to drill down and pull the desired information into the client application. If the initiator is able to provide up-to-date, valuable information then partners in the international tax Extranet will be more likely to locked into it and become dependent on it.

Continually improving the quality of its work

The Cell 2 applications would be like a consortium sponsored and controlled interorganizational network providing seamless, communication services between member organizations across multiple types of applications. The goal here would be overall consortium efficiency and reduced time to make decisions. The overall objective of such an extranet would be to promote the competitiveness of the entire consortium against other ecosystems (such as cypherpunks). As globalization continues tax across national borders becomes more of an issue. Transnational companies are powerful and adept at shifting their money around to take advantage of the different tax regimes in different countries. The international tax treaty systems seem cumbersome and slow in chasing these transnationals [11].

Continuity

Once the international tax organization Extranet is operative, it is imperative that it be maintained and remains operationally viable. As with any international organization, conflict resolution will be vital, but this is beyond the scope of this paper.

7 Model Structure

By looking at the two dimensions of the Electronic Commerce Domain matrix, we have developed the following model structure for an Integrated International Taxation Extranet (Collaboration) Model for Evidence Based Taxation of Electronic Commerce. This model is seen in Fig-

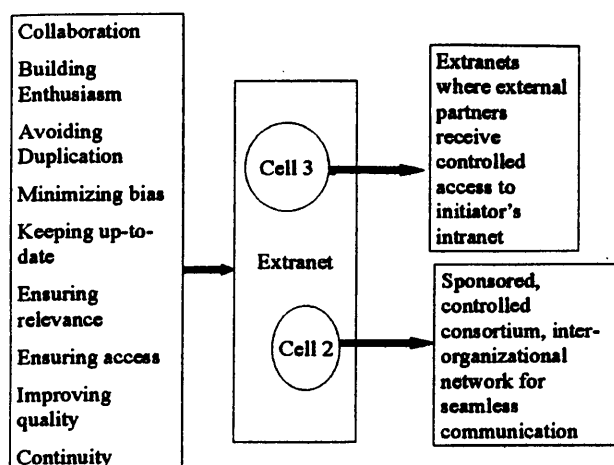


Figure 1: International Taxation Extranet Collaboration Model

ure 1.

As can be seen from the diagram an International Taxation Extranet Collaboration would be set up as per the Cochrane Collaboration and would establish the Extranet Collaboration. Examples of how such Extranets have been used by international companies such as Lucent Technologies, Turner Broadcasting Sales, Countrywide Home Loans, InfoTEST International [17] and national (Australian) John Fairfax Holdings [16].

8 Focus Discussions

Focus discussions are a well-accepted mechanism for crystallizing areas of concern and for definitive requirements. While Internet taxation issues have not been the subjects of intense discussions by electronic commerce practitioners in the past, the growing urgency in addressing these requirements emerged from the researchers' 1999 focus discussions. The core issues were identified as:

- the extreme difficulty in implementing an Internet commerce taxation system
- the ability to escape to tax havens.
- tax could hinder the development of Internet commerce. The participants from the United States pointed out that there were already problems between the State and Federal governments over the collection of taxes. Others pointed out that the answer would depend on the market - that tax would not hinder development if the Internet trade was local but it would if the trade was global.
- Australia is going to implement a GST in the year 2000 but the Australian treasurer, Peter Costello admitted in Parliament that goods arriving from overseas in small quantities will avoid the GST.
- the authors' proposed model was seen to be useful as a starting point and would be beneficial for the academic tax community to exchange views in the same

way that the scientific community does. The participants felt that getting international cooperation would be difficult.

- the use of an Extranet was considered an extremely good and interesting idea however it was pointed out that often international bodies issue sets of guidelines that some countries legislate and abide by but many do not.

Some of the comments that came out of the Group On-line discussion session on Tax and Internet Commerce (to be published as a white paper in 1999) are reproduced below:

- Taxation will be the next trade war
- Urgent need for certainty re taxation and Internet Commerce as businesses need plenty of empirical as well as theoretical analysis.
- There is no quick solution for tax and Internet commerce.
- Tax is part of a broader question of jurisdiction.
- Must be equity in ecommerce versus tradition commerce - a level playing pitch.
- The broader issue would seem to be government policy of which one method is to introduce policy as even today we have different tax arrangements between states
- This is an issue for international bodies such as OECD WTO and the like.
- The Irish government is about to release a paper on tax and custom issues in ecommerce on June 20, 1999 - at www.revenue.ie

Based on the authors' research a number of weaknesses in proposed taxation regimes were identified namely:

- recovery of GST payments
- equity issues arising from the dominance by western countries of Internet trade
- impact on privacy legislation if automated tax collection is imposed
- division of tax income within regional boundaries eg among states.

9 Further Research

The nature of international electronic commerce is truly complex and warrants sustained methodological, multidisciplinary longitudinal research as well as high levels of interaction between academics, business and government [21]. Progress to date with our methodology and model solution will be further underpinned by current research activities in the following three areas:

- Classification and characterization of electronic business structures in terms of the taxation mechanisms, relevance and cost effectiveness
- Mapping of scenarios proposed for business-to-business trading (e.g. Open-EDI) to knowledge management requirements, having regard to multiple jurisdictional regimes
- Design concepts appropriate to an Extranet model for evidence-based taxation, focussing on the knowledge structures and processing mechanisms (e.g. electronic libraries, case models) required for automated tax collection and forensic auditing.

10 Conclusion

The personal and corporate tax regimes have become so complex that even the courts have difficulty interpreting them, and some taxation lawyers argue that while a "black letter" approach to tax law is adopted by the courts, the tax-avoidance industry will always be ahead of the taxation authorities. There is a need for international bodies to take a more active role in tax matters [11]. As a result of our exploratory research the authors believe the Collaboration Model taken from Evidence Based Medicine could be adapted by the International Tax Community, represented by a body like the OECD or the World Trade Organization to develop forecasting models for taxing Electronic Commerce and serve as a repository for trading mechanisms as and when they occur. Data mining and data rules could then be applied generically to classes of transactions. In fact, it would be an international body that aims to help taxation authorities of member nations make well informed decisions about taxation of Internet commerce by preparing, maintaining and ensuring the accessibility of systematic reviews of Internet Commerce transaction classes. Reviews of taxation research need to be prepared, kept up-to-date, new research planned and information disseminated effectively to the collaborative, international body using Extranet technology. The international organization would aim to ensure well informed taxation decisions by preparing, maintaining and ensuring accessibility to systemic reviews and information of the types of electronic transactions and data rules kept in the Extranet repository.

The current reliance by taxation authorities on intermediaries (e.g. employers) to collect taxes, on taxpayer cooperation (i.e. adequate business records) and on legal precedent to establish tax liabilities are likely to be ineffectual as the basis for compliance with taxation law in electronic commerce, for revenue management or for the selection of taxpayers for audit. The authors justify the knowledge management approach by citing the compatibility of Extranet facilities with Cochrane's principles, citing their earlier research on Knowledge Domains. They state that any tax model selected for internet commerce must satisfy not just the technical requirements of message integrity, authentication and non-repudiation requirements, but must

address the constraints of knowledge formalisation, knowledge sharing and organisational repositories for effective tax administration. Taxation authorities from around the world could benefit by working cooperatively within an Integrated International Collaborative Extranet, based on a Knowledge Management framework.

In summary, our research has identified the critical taxation issues for a cost effective taxation regime in Internet commerce and has foreshadowed the critical success factors that compliance mechanisms will need to satisfy. The complexity of electronic commerce mandates an overarching requirement for new taxation strategies, namely knowledge management, but new technologies, such as Extranets, may paradoxically ensure greater compliance by individuals and business communities.

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A A Some Useful Web Sites

Australian Taxation Office (ATO) Tax and the Internet, Discussion Report of the ATO Electronic Commerce Project, <http://www.ato.gov.au>

National Office for the Information Economy, Establishment of a National Authentication Authority, A Discussion paper, 19/08/1998 <http://www.noie.gov.au/reports/naa/index.html>

Electronic Commerce and the Irish Tax System, <http://www.revenue.ie> (file ecommerce.pdf)

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CommerceNet <http://www.commerce.net>

Singapore Ecommerce site <http://www.ec.gov.sg>

New Zealand <http://www.nzec.org.nz>

World Trade Organization <http://www.wto.org/wto/new/whatsnew.htm>

United Nations <http://www.un.or.at/uncitral>

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