

## NRC Publications Archive Archives des publications du CNRC

### Software Support for Multi-Lingual Legislative Drafting McIver Jr., William J.

This publication could be one of several versions: author's original, accepted manuscript or the publisher's version. /  
La version de cette publication peut être l'une des suivantes : la version prépublication de l'auteur, la version  
acceptée du manuscrit ou la version de l'éditeur.

#### **Publisher's version / Version de l'éditeur:**

*Community Informatics Research Network Conference and Colloquium (CIRN  
2004) [Proceedings], 2004*

**NRC Publications Archive Record / Notice des Archives des publications du CNRC :**  
<https://nrc-publications.canada.ca/eng/view/object/?id=4bb1dec3-1d91-43e1-ab19-0c686338f928>  
<https://publications-cnrc.canada.ca/fra/voir/objet/?id=4bb1dec3-1d91-43e1-ab19-0c686338f928>

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at  
<https://nrc-publications.canada.ca/eng/copyright>

READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site  
<https://publications-cnrc.canada.ca/fra/droits>

LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

**Questions?** Contact the NRC Publications Archive team at  
PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the  
first page of the publication for their contact information.

**Vous avez des questions?** Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la  
première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez  
pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.



National Research  
Council Canada

Conseil national  
de recherches Canada

Institute for  
Information Technology

Institut de technologie  
de l'information

# **NRC - CNRC**

---

## ***Software Support for Multi-Lingual Legislative Drafting \****

Mclver, B.  
September 2004

\* published at the 2004 Community Informatics Research Network Conference and Colloquium (CIRN 2004). Monash University. Prato, Tuscany, Italy. September 29 - October 1, 2004. NRC 48068.

Copyright 2004 by  
National Research Council of Canada

Permission is granted to quote short excerpts and to reproduce figures and tables from this report, provided that the source of such material is fully acknowledged.

# Software Support for Multi-Lingual Legislative Drafting

William J. McIver, Jr.

National Research Council Canada  
Institute for Information Technology  
e-Government/e-Citizen Group  
46 Dineen Drive  
Fredericton, NB E3B 9W4 Canada

e-mail: [Bill.McIver@nrc-cnrc.gc.ca](mailto:Bill.McIver@nrc-cnrc.gc.ca)

*CIRN 2004 Conference and Colloquium: Sustainability and Community Technology, Monash University, Prato, Tuscany, Italy, September 29 - October 1, 2004*

## Abstract

Non-governmental organizations (NGOs) face a broad spectrum of barriers to effective transnational cooperation (Ó Siochrú 2003). One critical barrier is the lack of ready access to software tools that facilitate transnational, multi-lingual, collaborative work. As an example, Civil Society's drafting processes for the World Summit on the Information Society (WSIS) have been very complicated, tedious, and prone to error.

Complicating the process further is the fact that NGO communities are now often distributed across multiple languages. There are, for example, six official languages in WSIS. Truly democratic debate over document revisions is severely hampered if translations are not available. This then negatively impacts the sustainability of such processes.

A number of content management systems now exist that might be extended and adapted for this purpose, but no fully functional system as such exists that is accessible to the majority of NGOs. A critical factor here is the use of a free software model.<sup>1</sup> Proprietary solutions are usually prohibitively expensive and, thus, are neither accessible nor sustainable with the NGO community.

This paper will present the context in which advanced collaboration tools for NGOs is needed. It will also discuss general system requirements and provide technical background.

---

<sup>1</sup> The term "free software" is taken in this paper to follow the definition of the Free Software Foundation (<http://www.fsf.org>), which is a more sound intellectual property regime for making software available to NGOs than the ambiguous term "open source."

This paper is in part a reflection on selected technical issues related to the Social Science Research Council Report prepared by Seán Ó Siochrú (2003): *GLOBAL GOVERNANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES: IMPLICATIONS FOR TRANSNATIONAL CIVIL SOCIETY NETWORKING*. We are concerned here with the development of software tools to improve transnational, multi-lingual, collaborative work among non-governmental organizations (NGOs). This paper recognizes the spectrum of barriers identified in the Ó Siochrú report faced by NGOs (3). These include barriers to access and maintenance of solutions based on information and communication technologies (ICTs), as well as barriers between ICT-enabled NGOs and those that are not. We are interested, in particular, in issues that reside in the top two layers described in the Ó Siochrú report:

- Layer 1 -- Physical Access and Enabling Tools and Resources; and
- Layer 2 -- Generating, Retrieving and Using Content.

### **The Context**

It is recognized that ICTs have played a role in the significant increase in the number transnational NGOs in the past two decades (Ó Siochrú, 2003:1). In the context of networked computing, this has included electronic mail (e-mail), bulletin board systems, the World Wide Web, interactive communications facilities such as Internet Relay Chat (IRC) and Instant Messenger from yahoo.com. Since the advent of the Web, a new class of systems has also emerged -- content management systems (CMS) -- which make the authoring and publishing Web content more efficient. These technologies have enabled greater collaboration among organizations, but they alone do little to directly support and monitor collaborative processes.

Such processes must still be managed to a large extent by the human "agents" within the transnational networks that are created by and between NGOs. Human agents should, of course, not be subject to management by machines, but arguably many collaborative processes can be improved through intelligent assistance by ICTs, particularly as transnational networking becomes more complex. ICTs already exist and are evolving. They are built upon the technologies in the physical access and content generation layers described in the Ó Siochrú report (7-23).

### **Greater Complexity in Transnational NGO Networking & Intelligent Assistance for Collaboration**

Klein (2003) and Miller (2003) have both recently studied the increasing role of NGOs in summits sponsored by the United Nations and other organizations over the past three decades. There has arisen the so-called "multi-stakeholder" model for participation, which is ostensibly designed to involve civil society and other sectors in the inter-governmental-directed processes involved in summits. The preparatory processes involved in these formal settings have raised the complexity of NGO collaboration to a much higher degree. This is due to the increasing numbers of NGOs, greater geographic and linguistic diversity between NGOs, and the corresponding complexity that these increases bring within these formal frameworks. For example, NGO networks that wish to participate at this level may have to work against ever more difficult linguistic and temporal constraints to which they are accustomed as these networks expand. More critically, if participation is to be democratic, then NGOs must participate in the development of these networks and be a part of their management. Thus, collaborations are developed for processes internal to a network, as well as for compatibility with

processes external to it that are defined by a given summit. It is this particular context that concerns us here. It speaks to a key issue in the sustainability of such processes. ICTs have only begun to emerge since the middle 1990s to help address this complexity.

As an example, Civil Society's drafting processes for the World Summit on the Information Society (WSIS) have been very complicated, tedious, and prone to error. Inputs are received from many NGOs or caucuses composed of NGOs. These inputs may consist of commentary or specific recommendations for language in the consensus document. All of these inputs must be reconciled for inconsistencies, debated, and placed into a structure for the overall document. A tool to assist in this process, making it transparent, democratic, and traceable would make a monumental contribution to the work of NGOs that participate in a transnational context. Complicating the process further is the fact that the NGO community is distributed across multiple languages. There are six official languages in WSIS. Truly democratic debate over document revisions is severely hampered until translations of a draft have been produced.

## **Legislative Drafting**

Legislation in its broadest definition is one of the key products of collaborative agreement processes in transnational civil society work. Legislation here refers broadly to some formal process of group deliberation that yields an output in the form of a written text. Such texts are usually structured and can take various forms, including bills, resolutions or declarations.

This paper presents a preliminary analysis of requirements for improving transnational, multi-lingual, collaborative work among non-governmental organizations (NGOs) and a review of

applicable technologies. The focus of this research is document-based negotiation processes. This is in contrast with both the free form or conferencing communication modalities that are in increasing use in on-line collaboration.

A modest body of literature exists in the area of legislative drafting in multilingual contexts. This derives from processes that have evolved in countries that conduct legislative processes in more than one official language, such as Canada; the Hong Kong Special Administrative Region; and Belgium; as well as International Organizations like the United Nations and the International Labor Organization.

### **Principles of multilingual legislative drafting**

We use the term *legislative system* in a generic sense to refer to a collaborative or deliberative process among multiple entities that has as its goal the production of agreements or statements that are produced in the form of a *text*. This definition is meant to cover the spectrum of legislative processes from parliamentary systems to non-governmental organizations that have agreed to use some type of *rules of procedure* to produce documents. Texts under this definition of “legislative system” might then include, but not be limited to, bills, statutes, declarations or resolutions, or regulations. Such documents, including drafts versions, are said to be *authentic texts* if they are produced according to agreed-upon rules of procedure.

In *multilingual legislative systems* there is then the designation within the given rules of procedure -- by law in the case of a country or region -- of the *official languages* in which the legislative system may produce authentic texts. The term *language version* will be used here to refer to the instance of an authentic text in a particular language (e.g. Spanish language version).

Two central issues can be identified among societies and organizations referenced in this paper in their implementation of multilingual legislative systems. Decisions about these two issues constrain technological solutions for supporting a legislative system in significant ways. The first and most critical issue is that of defining the status of all of the official languages in the legislative system relative to one another. The second issue is that of defining the principles and

processes for interpreting legislation where any authentic text may be represented by more than one language version. These two issues yield a number of corollary issues. All of these are discussed below.

### **Principle of equality**

All official languages must have equal status if participants and "citizens" within the legislative process are to enjoy equal status. That is, one's officially recognized language must not be viewed as subordinate to any other official language within the process. Transitively, one language version of an authentic text must not be viewed as a translation of another language version. All language versions of an authentic text are thus said to be *equally authentic* under such a system.

The *Vienna Convention on the Law of Treaties* (United Nations, 1969) codified these concepts at an international level. Information about multilingual drafting in this paper has been gathered from legislative drafting guides that have been published by the Hong Kong Special Administrative Region (2001) and Canada (1995); as well as the International Labour Organisation (2001).

### **Natural language translation issues**

The general characteristics of natural languages and the unique characteristics of each language often raise problems in multilingual legislative drafting given the fundamental requirement that equivalence must be obtained between language versions. A complete taxonomy of problems involved in natural language translation is beyond the scope of this paper. Miller (1995) provides an overview. We discuss instead key issues present in the literature on the specific domain of legislative drafting: whether an expression has a direct translation into another language, problems posed by polysemy, and the use of domain-specific terminology.



Any official language likely contains words that have no direct translation into another official language. It may also be the case that a domain-specific term in one language -- such as those found in legal, technical, or scientific literature -- has no direct translation in one of the official languages. These situations have been addressed in some legislative systems through the implementation of multilingual glossaries that attempt to harmonize translations between terms that commonly arise. This has the benefit of not only resolving translation problems, but also of making the overall process more efficient.

It is not uncommon in multilingual drafting to encounter a word in one official language that is polysemous or to find that one official language does not offer an appropriate word that has the same scope of meanings in another official language (Canada, 1995; the Hong Kong Special Administrative Region, 1998). In these cases, one language may require the use of several words to capture the breadth of meaning of its equivalent text in another language. Conversely, what may be required is the choice of a less polysemous word in the former language to constrain the possible meanings in the second.

### **Sequencing in the drafting process**

Because all official languages are to be equivalent, the process of drafting legislation must not privilege one language version over the other. That is, drafting may start in any one of the official languages with translations into equivalent language versions made later. Another possibility that occurs in some legislative drafting systems is that language versions of a text are drafted in parallel in order that drafters can collaborate on finding equivalent meanings. This is known as *co-drafting* (ILO, 2001). The latter approach has the advantage that possible problems in differences across language versions can be dealt with immediately.

In Canada and Belgium both serial drafting and co-drafting are legal options, but it has become customary to use co-drafting. The International Labour Organization's legislation guidelines note that in Belgium drafting often commences in the "mother tongue" of the subject matter expert for the legislation in cooperation with a lawyer producing an equivalent version in the other language (ILO, 2001).

## **The scope of an authentic text**

In multilingual legislative systems, a text is comprised of all of its language versions together. In countries such as Canada or the Hong Kong Special Administrative Region it may not only be the case that language versions are taken to be equivalent. There may be further requirements in legal processes that a text must be considered to include all of its language versions together (Hong Kong, 1998).

## **Document structure and drafting conventions**

Many legislative systems require documents to be produced according to established templates that dictate the types of sections that are allowed in a text, such as chapters, parts, sections, or subsections; how such section types are to be used; and constraints on the way language itself is used. The United States House of Representatives (2004), for example, has established several *styles* by which legislation may be structured. These have subsequently been articulated in the form of XML DTDs or schemas.

Multilingual drafting heuristics and the needs of legislative drafting call for each language version to have the same structure. Structural equivalence refers only to the section level organization of the legislation. It is recognized that sentence level structure between language versions must be allowed to differ due to the diversity of characteristics of each official language. Canadian guidelines, for example, recognize that approaches to reducing ambiguity in legislation differs significantly between French and English (2004, section 2.7).

## **Glossaries**

Glossaries have important functions in legislative drafting in general and in multilingual drafting. Drafters in any language may require access to definitions and usage information about domain-specific terminology. Terminology in one language may not be amenable to direct translation into another language (see Canada, 1995 for examples). For this reason, multilingual glossaries have been proposed and implemented. The Hong Kong Special Administrative Region, for

example, has implemented the Bilingual Laws System (BLIS) which has a glossary of legal terms in Chinese and English in addition to full texts of legislation (2001, Annex VII).

### **Drafting rules or heuristics**

A system of drafting rules that specifically addresses multilingualism may be codified within a legislative system. This is the case for the ILO (2001); the Department of Justice in Canada (1995); and the Hong Kong Special Administrative Region (1998). A legislative drafting tool set should support adherence to such rules.

## **Background**

The development of tools to support multilingual legislative drafting must draw on the broad technical areas of markup languages and hypertext, computer supported collaborative work (CSCW), and versioning; as well as the more narrowly focused area of research and development around legislative drafting systems. This research also draws from policies and guidelines that have been established by parliamentary and inter-governmental organizations to manage multilingual drafting processes.

### **Markup languages and hypertext**

Markup languages are now associated almost entirely with the World Wide Web; however, markup languages were originally concerned with typesetting. These languages were used first as written annotations in documents to give layout specifications to human typesetters. Eventually these languages evolved into electronic analogs that could be embedded into electronic documents to direct typesetting machines.

It has been noted that legislative drafting methodologies have been influenced in a significant way by the evolution of markup technologies (United States House of Representatives, 2004).

The particular typesetting machines that were chosen dictated the languages that were used. In turn, the forms that these languages took guided the development of text editing software to be used by drafters to produce texts with embedded markup. Legislative drafters then evolved organizational conventions and procedures that were, in part, adaptations to the capabilities and limitations of these text editing systems made in attempts to achieve greater efficiencies and ease of use. For example, numerous keyboard shortcuts have been introduced into drafting systems used in the U.S. House of Representatives.

Markup languages are used today not only for presentation, which encompasses typesetting, but also to provide structural and semantic information about documents. Correspondingly, the styles used to guide the production of legislative documents are often highly structured and the management and use of legislative documents benefits greatly from having access to meta-data -- data about the content data in the document -- that semantic markup makes possible. The style now commonly used in the U.S. Congress to produce bills provides for a hierarchy of as many as eight types of sections, the basic unit; as well as seven higher level types of groupings (United States House of Representatives, 2004). The formats used by many other countries as well as international organizations, such as the United Nations and the International Labour Organization, can be observed to be highly structured as well.

The current generation of markup technologies for these purposes revolves around the XML standard (W3C 2004). XML (for Extensible Markup Language) is designed to enable structural and semantic markup. It can in conjunction with XSLT, an XML-based technology, be used to automatically produce corresponding presentational markup.

Traditional legislative drafting processes make heavy use of cross-references. These take the form of in-text citations to other documents or to specific sections within the same or other documents (e.g. an act being superceded). An example is the following, which is an act of the U.S. Congress mandating a change to an existing act:

(a) In <<NOTE: 26 USC 3304 note.>> General.--Section 208 of the Temporary Extended Unemployment Compensation Act of 2002 (Public Law 107-147; 116 Stat. 30) is amended to read as follows:

(U.S.C. Pub. L. 108-1)

Thus, a natural part of the application of current markup language technologies to legislative drafting processes has been to make use of hyperlink capabilities to model the various types of cross references in use. For example, applications used for drafting in the U.S. House of Representatives offer functions to automate the use of internal cross-references within a document (e.g. to refer to section numbers) and for retrieving information from other documents (e.g. other legislation) (United States House of Representatives, 2004). Relevant XML-based recommendations and standards here include XML Pointer, XML Base and XML Linking (see W3C 2003).

## **Groupware**

A tool set to support legislative drafting would fall into the broad category of groupware systems, which Ellis, Gibbs, and Rein (1991, p. 40) defined as:

computer-based systems that support groups of people engaged in a common task (or goal) and that provide an interface to a shared environment.

In our problem domain, the common tasks include the drafting and deliberations over drafts of a legislative text. The legislative text itself and the computing environment in which it is created and managed constitute the shared environment.

Under the definition given above, a groupware system is typically characterized by its characteristics along three dimensions (Ellis et al. 1991, p. 41):

1. whether or not it allows multiple users to engage in common tasks or to work in the shared environment in real-time;
2. the degree to which it allows or requires users to share common tasks; and
3. the degree to which it allows or requires users to share a common environment.

The combinatorial possibilities, thus, yield the classic class space and time matrix to characterize groupware systems. Examples of how this might apply to legislative drafting systems are given in table 1.

**Table 1. Space-time characteristics of possible legislative drafting systems**

	<b>Working on common tasks at the same time</b>	<b>Working on common tasks at different times</b>
<b>Sharing of space</b>	<ul style="list-style-type: none"> <li>• Collaborative editing of a shared document in real-time.</li> </ul>	<ul style="list-style-type: none"> <li>• Collaborative editing of a shared document at different times.</li> </ul>
<b>No sharing of space</b>	<ul style="list-style-type: none"> <li>• Collaborative editing of different copies of a document in real-time.</li> <li>• Real-time display of editing process for observers.</li> </ul>	<ul style="list-style-type: none"> <li>• Routing of a document to different users for editing.</li> </ul>

Conceptually, a legislative drafting system might need to exhibit characteristics of all four quadrants. Heuristics for multilingual drafting suggest tools that allow group editing in real-time given that drafters in each official language would ideally work in close collaboration. This type of collaboration might be facilitated by editing of a shared document representing an aggregation of language versions or through no sharing of a common document, but rather communication of results between distributed drafting sites. Legislative drafting may at times lend itself to asynchronous interactions, where editing takes place at different times. One scenario is that of editing one instance of a document in a shared repository, but at different times. The other is that of routing the document to different locations for editing by different users at different times.

### **Versioning**

Vitali (1999) defines versioning as "the management of multiple copies of the same evolving resource, captured at different stages of its evolution" (p. 1). Legislative drafting involves another layer of complexity here in that the "evolving resource" is a legislative text that is typically *consolidated* from sections that were authored independently. From a parliamentary perspective these sections often represent proposed amendments to the text. Multiple copies or *versions* of the text then come into existence as each section is added. Further changes to the text may occur in parliamentary processes where text is "marked up" to signify desired edits.

Arnold-Moore (1995) points out that because existing legislation may be subject to amendment, it may be necessary for proper legal interpretation (e.g. in a court case) to be able to see the state of the text at any *point in time* during its evolution. Furthermore, historical scholars may learn more about the intent of a document's authors and the events surrounding its creation by examining its various versions. A legislative drafting tool set should, therefore, be able to represent the content of a legislative text in such a way that it can be reassembled at any stage in its "evolution."

Several research efforts are relevant here. Versioning methods for hypertext have been studied since at least the 1980s. Vitali (1999) provides a survey of many of these. More recent work has focused on lower level database indexing schemes specifically for XML (Chien, Tsotras, & Zaniolo, 2002). The WebDAV protocol includes mechanisms for supporting versioning in a Web environment. All of these approaches solve essential concurrency control, access, and storage problems for version management at the level of the markup language and, in the case of WebDAV, at the network level. These approaches are, however, domain-independent and do not address the specific needs of consolidation and modeling legislative document structures.

The *EnAct* system (Arnold-Moore, 2002) is designed to address version management specifically for legislative drafting. In particular, it supports the consolidation process and allows legislation to be viewed at different points in time. It makes use of an XML-based change description language that is used to articulate proposed changes to a text, including elimination and substitution of text.

## **Content Management Systems (CMS) Software**

Content management systems has evolved as a distinct class of Web-based software. They have eliminated the need for writing custom backend systems for most tasks involved in managing content published on the Web. They help to aggregate content into a consistent framework for presentation, as opposed to the tedious task of file-based management. The basic areas of

functionality provided by CMS include: content aggregation; metadata management; authentication; and tracking or monitoring of the viewers of the content.

Typically content is input into a CMS using a Web client (e.g. through pointing and clicking). However, different modalities of input are provided by CMSs. Not all provide the same modalities. Content might also be input into a given system through: e-mail; Internet chat or Instant Messaging; and news protocols such as NNTP.

These systems can be configured to assist in posting of content, taking feedback on content, managing calendars and scheduling, and annotation and limits forms of voting. Some proprietary systems support workflow management, collaboration, and versioning. These systems usually have modular architectures, which allows new functionality to be added (e.g. calendar, voting, etc).

Popular free CMSs include: PHPNuke, PostNuke, and Zope. Such systems are already used by many NGOs, but they might provide the basis for a more advanced integrated tool set that supports collaborative processes between NGOs. A wide array of proprietary CMSs are available as well. See <http://www.contentmanager.eu.com>.

### **General Collaboration Technologies**

A number of systems have been developed that support various aspects of versioning and collaborative work described above, but which are not specifically designed to support legislative drafting. Notable examples include BCSW (Appelt, 1999) and Hyperwave (formerly Hyper-G) (Andrews, Kappe, & Maurer, 1995). Both systems are not free and open source and,



thus, do not meet the criteria that we argue are necessary for supporting civil society. Nonetheless, they provide important models for Web-based content management and collaboration that can be adapted to this domain.

Hyperwave's strengths are in the areas of content and link management. Any applicability to collaboration is, thus, a side effect of strengths in these areas. Content and links are stored separately in a database in this system, which allows greater flexibility in the types of objects that can be assigned links, as well as allowing dangling references to be dealt with more effectively. Hyperwave also provides mechanisms for aggregating content, such as multiple language versions, of a single "document" into one object.

BSCW (Basic Support for Collaborative Work) is a system that has explored the use of HTTP servers and HTML to provide an environment for collaboration. BSCW is based on the concept of workspaces, which are locations where multiple users can collect documents and other types of objects for joint tasks. Another major feature the system provides is monitoring and notification of events within workspaces, such as document changes. BSCW implements concurrency control and versioning, which are critical for the collaborative use of shared resources.

An alternate approach that is not dependent on a specific set of systems is a protocol-based focus on collaboration. The key example here is WebDAV (Whitehead & Goland, 1999), an open standard for collaboration on the Web. WebDAV articulates an HTTP-based protocol for supporting distributed authoring and versioning. Its goal is to achieve network-based interoperability of tools. This approach opens the possibility for existing applications, such as word processors, to be used for collaborative authoring through minimal extensions necessary to satisfy the protocol. WebDAV provides for concurrency control; the management of "namespaces," which can represent aggregations such as in BSCW; and an approach to extensibility that does not "break" existing applications.

## **Technologies for Legislative Drafting**

Software systems have been used to support legislative drafting since at least the 1960s through the adaptation electronic typesetting software like the Master Typography Program (MTP) used by the U.S. Congress (n.d.). The lineage discussed here is distinct, though not unrelated to, legal retrieval systems (see Arnold-Moore, 1998). Later with the availability of WYSIWYG authoring tools, applications such as Xywrite and Xmetal were integrated into the drafting process of the U.S. Congress through user-level customizations, such as keyboard shortcut definitions, to support the specific needs of legislative drafting.

Since at least the 1990s, efforts began to develop systems that support both the authoring and version management aspects of legislative drafting. Version management in these systems seem to have focused less on the concurrency control features required facilitate collaborative drafting with emphasis being placed on automating the consolidation of legislation from amendments and facilitating point in time retrievals, as described above. A key example is the EnAct system (Arnold-Moore, 2002) that was developed for the provincial government of Tasmania. In addition, some efforts have been made at addressing multilingualism in the context of legislative drafting. One example is the Bilingual Laws Information System (BLIS) designed for the Hong Kong Special Administrative Region (2001). These systems appear to be closed and proprietary and, thus, not useful for supporting civil society organizations.

For reasons discussed above, legislative drafting technologies have followed the move to XML-based data management. Thus, in addition to XML-based software architectures, such as EnAct, open XML Schemas (and DTDs) have also been developed specifically for legislation. These include open XML-based schemas and style sheets developed for the U.S. congress (n.d.) and the MetaLEX open standard for legal documents developed in the Netherlands (Winkels, Boers & Hoekstra, 2003).

## **Conclusions**

This paper examined a very specific and crucial computing domain for improving collaboration within civil society networks: technological support for collaborative, multilingual, legislative

drafting. The development of legislation, as broadly defined in the first section, is only one mode of production within transnational civil society networking, but one that appears to be gaining in importance as non-governmental organizations continue to participate more fully in international conferences and summits.

The dilemma for civil society organizations is that while a limited number of technologies have been developed to support legislative processes, including drafting, they are proprietary and it appears from our survey that major work remains in addressing the multilingual dimension at a technological level. Free and open source technologies do exist that support various forms of on-line collaboration, but none appear suitable or tailored for supporting the specific needs of legislative drafting, much less the needs of drafting in multiple languages.

Fortunately, the bodies of research in the constituent areas relevant to multilingual legislative drafting and collaborative computing are sufficiently mature to inform the development of free and open tool sets. Well-defined heuristics for multilingual legislative drafting have been derived from experiences in intergovernmental organizations, countries and regions that have multilingual legislative processes. These heuristics can inform the development of preliminary requirements for a tool set to support this form of collaboration. A number of areas within computer science, including CSCW and database systems, have produced well-understood techniques for supporting document versioning, point in time retrieval, and concurrency control for the safe manipulation of a shared document by several authors simultaneously.

The most promising approach to the development of a free and open tool set for collaborative, multilingual drafting will combine the open WebDAV protocol with use of XML-based document technologies. In the aggregate, these technologies will allow a wide array of existing software applications to be leveraged to produce a solution. They are open and flexible enough to create a solution that can evolve. Solutions based on these technologies can and have been ported to many different types of computing platforms.

## **Acknowledgements**

This research was supported in part by the Social Science Research Council.

## REFERENCES

Abiteboul, S., D., Quass, J. McHugh, J. Widom, and J. Wiener. The Lorel Query Language for Semistructured Data. (1997) *International Journal on Digital Libraries*, 1(1):68-88, April.

Andrews, Keith, Kappe, Frank, and Maurer, Hermann. (1995). Serving Information to the Web with Hyper-G. *WWW'95*.

Arnold-Moore, Timothy, Fuller, Michael & Sacks-Davis, Ron. (2000) "System Architectures for Structured Document Data," *Markup Languages: Theory & Practice*, Winter.

Arnold-Moore, Timothy. (2002). "Markup for automating legislative processes." *SHIP project 5<sup>th</sup> Joint Symposium*. Cyberlaw Study Group and Legal Informatics Study Group. 27th of April 2002. Meiji University in Tokyo, Japan. Retrieved from the WWW in May 2004. <http://ship.mind.meiji.ac.jp/lib/sympo5/english.html>

Association for Progressive Communications. (2000). *APC Annual Report 2000*. Retrieved November 2002 from the World Wide Web: <http://www.apc.org>

Boualem Benatallah, Mehregan Mahdavi, Phuong Nguyen, Lionel Port, Quan Z. Sheng, William J. McIver, Jr. (2003). "Pertinence-Centric Document Version Management Scheme." *The 15th Conference On Advanced Information Systems Engineering (CAiSE'03)*. Klagenfurt/Velden, Austria, 16 - 20 June, 2003.

Chien, S.-Y, Tsotras, V., & Zaniolo, C. (2002). Efficient schemes for managing multiversion XML documents. *The VLDB Journal*. 11:332-353.

Dublin Core. (1997). Dublin Core Metadata Element Set, Version 1.1: Reference Description 1999-07-02. <<http://dublincore.org/documents/1999/07/02/dces/>>.

Hong Kong Special Administrative Region. Law Drafting Division of the Department of Justice. (1998). *A Paper Discussing Cases Where the Two Language Texts of an Enactment are Alleged to Be Different*. Retrieved from the World Wide Web on 11 May 2004. <http://www.justice.gov.hk/eng/inpr.htm>

Hong Kong Special Administrative Region. Law Drafting Division of the Department of Justice. (2001). *Legislative Drafting in Hong Kong: Crystallization in Definitive Form (2<sup>nd</sup> Edition)*. Retrieved from the World Wide Web on 11 May 2004. <http://www.justice.gov.hk/eng/pdf/ldhkv2.pdf>

International Labour Organization (ILO). (10 December 2001). *Labour Legislation Guidelines*. Retrieved via the WWW 7 May 2004. <http://www.ilo.org/public/english/dialogue/ifpdial/lhg/noframes/ch10.htm>

ISO/IEC 13250 (1999) Topic Maps: Information Technology Document Description and Processing Languages, December 3.

Hans Klein. (2003). "The World Summit on the Information Society (WSIS): Distilling Lessons from Prior UN Summits" Paper presented at the Society for the Social Studies of Science (4S) Conference.

Kraemer, Kenneth L. and King, John Leslie. (1988). "Computer-based systems for cooperative work and group decision making". *ACM Computing Surveys (CSUR)*. Volume 20 , Issue 2 (June 1988). Pages: 115 - 146.

Levy, Pierre (1997) *Collective Intelligence: Mankind's Emerging World in Cyberspace*, (translated from the French by Robert Bononno), Cambridge, Massachusetts: Helix.

Miller, Clark A.. (2003). "Science and Global Sustainability: Where Do We Go Next?", , U of Wisconsin-Madison." Paper presented at the Society for the Social Studies of Science (4S) Conference.

Miller, G. (1995). WordNet: a lexical database for English. *Communications of the ACM*. Volume 38 , Issue 11 (November 1995). Pages: 39 - 41.

Mueller, M. (1999). ICANN and internet governance sorting through the debris of 'self-regulation'. *Info*. vol.1, no.6, December, 497-520. Retrieved in November 2002 from the World Web: <http://www.icannwatch.org>

Ó Siochrú, Seán (2003, November) GLOBAL GOVERNANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES: IMPLICATIONS FOR TRANSNATIONAL CIVIL SOCIETY NETWORKING. Report to the IT Governance and Civil Society Research Network, Information Technology and International Cooperation (ITIC) Program Social Science Research Council. <http://www.ssrc.org>

Press, L. (1997). Seeding Networks: The Federal Role. January/February 1997. Retrieved in November 2001 from the World Wide Web: <http://www.isoc.org>

Schreibman, Susan, Amit Kumar and Jarom McDonald. (2003). "The Versioning Machine." *Literary and Linguistic Computing*. Volume 18, Issue 1, April 2003: pp. 101-107.

Sperberg-McQueen, C.M.. and Burnard, L. (eds.) (2002). TEI P4: Guidelines for Electronic Text Encoding and Interchange. < <http://www.tei-c.org/P4X/>>.

United Nations. International Law Commission. (1969). *Vienna Convention on the Law of Treaties*. Adopted 22 May 1969. Entry into force on 27 January 1980. Retrieved from the World Wide Web on 2 June 2004. <http://www.un.org/law/ilc/texts/treaties.htm>

U.S.C. Pub. L. 108-1. (Jan 8, 2003). "An Act: To provide for a 5-month extension of the Temporary Extended Unemployment Compensation Act of 2002 and for a transition period for individuals receiving compensation when the program under such Act ends." 108<sup>th</sup> Congress. Jan. 8, 2003 - [S. 23]. Retrieved from the WWW on 25 May 2004. <http://frwebgate.access.gpo.gov>

United States House of Representatives. (2004). Drafting legislation using XML. Retrieved from the WWW on 7 May 2004. <http://xml.house.gov>

Vitali, Fabio. (1999). "Versioning hypermedia." *ACM Computing Surveys*, Vol. 31, Number 4es, December 1999.

W3C (2000a) *XML Schema Part 0: Primer*, W3C Working Draft, 7 April 2000. <http://www.w3.org/XML/Schema>

W3C (2000b) *XML Schema Part 1: Structures*, W3C Working Draft, 7 April 2000. <http://www.w3.org/XML/Schema>

W3C (2000c) *XML Schema Part 2: Data Types*, W3C Working Draft, 7 April 2000. <http://www.w3.org/XML/Schema>

W3C (2003). W3C XML Pointer, XML Base and XML Linking. <http://www.w3.org/XML/Linking>

W3C. (2004.). *Extensible Markup Language (XML) 1.0* (Third Edition) W3C Recommendation 4th February 2004, François Yergeau, Tim Bray, Jean Paoli, C. M. Sperberg-McQueen, Eve Maler. Retrieved for the WWW on 25 May 2004 <http://www.w3.org/TR/2004/REC-xml-20040204>

W3C. (1999). *XSL Transformations (XSLT) Version 1.0*. W3C Recommendation 16 November 1999. Retrieved from the WWW on 25 May 2004. <http://www.w3.org/TR/xslt>

Whitehead, Jr., E. James & Goland, Yaron Y. (1999). WebDAV: A network protocol for remote collaborative authoring on the Web. *European Computer Supported Cooperative Work conference*. Copenhagen, Denmark, 12-16 September 1999.

Winkels, Radboud. Boers, Alexander, and Hoekstra, Rinke. (2003). *XML Europe 2003*. 5-8, May 2003, London, England.

Zakon, R. H. (2001). Hobbes' Internet Timeline v5.4. Retrieved in November 2001 from the World Wide: <http://www.zakon.org>