
How e-Invoicing open standards and open specifications will open marketplaces

The European government example of the responsibility to create e-invoicing marketplaces

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Purpose

This essay is written as the material support for the like-named presentation at the Exchange Summit Americas conference <http://www.exchange-summit.com> in Orlando in June 2016.

About the author

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Disclaimers

The opinions expressed in this article are those of Crane Softwrights Ltd. only and not necessarily those of the OASIS consortium or any OASIS technical committee.

Elevator summary

The traditional approach governments have taken to buying solutions from vendors and imposing the solutions on users does not nurture a marketplace where multiple vendors can better service a far larger user base. The European Commission experience demonstrates that governments should consider the responsibility to embrace open standards and support developing open interoperability specifications in order to foster innovation and grow a marketplace of diverse e-Invoicing solutions to service even more diverse users.

Executive summary

Governments worldwide are recognizing the benefits of electronic invoicing. Many are well on their way to implementation. Others -- notably Canada and the United States -- are attempting to gather existing solutions into a single monolithic system. These projects begin with a dictum from on high that proceeds through a Request for Proposal (RFP) for a vendor to implement a central "portal" through which all electronic invoices can be despatched to government departments.

This traditional single-vendor portal "three-corner model" approach for the solution design, absent the specification of an open-access network, could be considered outdated and as unfair to compe-

tion. It also limits the opportunity to grow a marketplace of multiple solutions from many suppliers as a buffer to the problems that can occur when relying on single-source solution supply.

The European Commission (EC) was faced with the challenge of providing for Union-wide government procurement and electronic invoicing from diverse established systems in different countries while meeting legal obligations for fairness for all. Their approach to the complete solution was not to specify and implement a single software program or portal or to have a single vendor design the solution.

An investment has been and continues to be made in analyzing, developing and standardizing the information exchanges and machine interoperability interfaces to satisfy this need. These are agreed upon by participating parties referred to as "access point providers". The access point providers commit to write whatever programs or portals they conceive as "access points". The access point provides a network connectivity service to the provider's individual, and often unique, constituency. It might be government departments or suppliers large and small. Some larger users may, themselves, design and implement their own access points to the network. Market forces to expand onboarding of business participants then create the demand for additional access points by meeting custom needs, changing requirements and competitive innovation.

The metaphor most often used when describing the European "four-corner model" solution is the establishment many years ago of a common suite of standards to interconnect the multiplicity of diverse telephone systems around the world. Making a simple long-distance call bridges two nations' very different and incompatible system designs by globally interfacing national access points with agreed-upon standards and service operating levels. The national access points then interface with the national systems, as only those responsible for those systems can best do. There is no one central connection switchboard for all users from all countries.

Today, European member government departments needing to be invoiced establish their own connectivity through access points to the open network. Suppliers needing to submit invoices establish their own connectivity. This is usually through different access points that provide different services suitable for the suppliers. The access points communicate with each other using the open specifications and open document formats.

An access point may very well be implemented as a supplier portal that is central to only a particular constituency of users. A central government supplier portal could give credentialed front-end access to multiple back-end departmental systems with a custom interface. It would also provide the external path for common network access. Or any given system could be directly connected as an access point providing interoperability to all in the common manner.

But the needs of governments and the needs of suppliers vary so very much, even within each domain. No one "central collection portal into which invoices can be submitted and distributed"¹, in the absence of a supporting network, can accommodate the needs of all suppliers and all buyers. Nor should any one piece of vendor software attempt to do so by being only a "centralized Supplier Portal service for the reception and processing of invoices"². By not attempting to do so, that is, by creating an open access network for buyers and suppliers, the marketplace can fill the need with innovative and disparate solutions that individually meet the one common set of interoperability standards. And governments need to lead the way, by fiat if necessary, in creating this set of interoperability standards. Though it costs money to bring together all of the stakeholders, buyers and suppliers included, the result is open to all and forms the foundation of a marketplace of implementations.

The European government is fulfilling its responsibility in nurturing all, not just a few. And they are benefiting from the resulting wide-range onboarding of suppliers from different constituencies.

¹Direct quote from page 3 of <https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2015/m-15-19.pdf>

²Direct quote from Services Requirements section of <https://buyandsell.gc.ca/procurement-data/tender-notice/PW-XL-106-26508>

Their investment has created in-production commerce-based scenarios enabling cross-border government procurement in a fair marketplace. This is satisfied not by any single vendor or product or service, but simply by the openness of the specifications. The Pan-European Public Procurement Online³ (PEPPOL) suite of conformance standards of interfaces and document formats defines the network on top of the Internet. This is very different from trying to meet the requirement with only a single piece of vendor-specific software.

Integrated and extensible open standards can accommodate customized requirements while still satisfying interoperability at the operational level. The OASIS Business Document Exchange (BDEX) technical committee is progressing the PEPPOL specifications into internationally-recognized standards that a government can employ. This includes the publishing of service metadata and the enveloping of documents into single exchanges. The OASIS Universal Business Language 2.1 (ISO/IEC 19845:2015) is already the most widely-deployed commerce syntax across the PEPPOL network. Yet there remains the urgent need for wider participation by governments and industries in the process of developing open standards and specifications to meet new requirements and changing regulatory mandates.

And the investment continues to be made by the EC to begin describing additional information exchanges over PEPPOL beyond commerce and trade. The Electronic Simple European Networked Services⁴ (e-SENS) project is looking at using the PEPPOL model in construction, transportation, health and insurance. This bodes well for the future.

The requirement in Canada and in the United States is not unlike the European requirement to connect the many differing governmental systems with suppliers across the Union. That Australia is now deploying the PEPPOL approach and components of the architecture in that country puts paid to any argument that Canada and the US might be too unlike Europe to be suited to a successful European solution. The most successful new systems accommodating all government buyers and the many and immensely-varied national and international suppliers to these buyers should be described as a suite of open standards and specifications. This will nurture in Canada and in the US a growing free and open marketplace of many software implementations. And it will enable the successful onboarding of all participants in the most expeditious, fair and robust fashion.

It doesn't have to be PEPPOL, as one can create one's own suite to meet needs that may be different than what is available today in PEPPOL. Or it could, in fact, be PEPPOL if what is there today is considered acceptable after analysis. And adopting PEPPOL would enable suppliers and governments in Canada and the US to interoperate with the suppliers and governments in Europe.

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³http://www.peppol.eu/about_peppol/background-peppol-project

⁴<http://www.esens.eu>

1. Interests in e-Invoicing

Finally, it seems, many governments worldwide have recognized the importance of providing the use of electronic means as a method to be invoiced by suppliers. The incentives vary and the implementations reflect the differences.

In Latin America examples such as the governments of Argentina, Brazil, Chile and Mexico have big initiatives already rolled out to help address tax evasion. Their focus is business-to-business electronic invoicing and their integrated involvement in the work flow is a short leash on companies. Legislated mandatory use is common:

Suppliers and buyers have to send either invoice data or at least reports in electronic format to the tax authorities for real-time validation & auditing. The clearance system for the trading parties is quite complex. As a benefit, suppliers and buyers have electronic invoices, but just because the government is demanding or mandating it.⁵

In Europe, governments originally worked alone and then collaborated together to create a common network across the Union called Pan-European Public Procurement Online (PEPPOL). Their focus is business-to-government electronic invoicing. A company's work flows are at arm's length to governments. There is a mix of voluntary use and legislated mandatory use for government procurement. But the trickle-down effect is real and business-to-business electronic invoicing quickly jumped on the growing European network. As early as 2014 50% of the network was used for business-to-business transactions:

In January 2014, an important milestone was reached when the entity number 10.000 was registered as a recipient ... Most of these organisations have capability to receive eInvoices. ... Among the over 10.000 organisations, approximately 10% are public sector recipients (including all central government entities and a majority of municipalities and counties) while approximately 90% are private. Out of the first million transactions exchanged over the PEPPOL network, nearly 50% were Business-to-Government, and the remaining was Business-to-Business.⁶

Given these examples of benefits to government procurement and growing business adoption, indications from communications from the governments of Canada and the United States imply that the European model of business-to-government procurement and electronic invoicing should be of interest.

These North American countries have recently initiated efforts to either get started with electronic invoicing or to gather and converge existing systems into a monolithic system. The projects start by some dictum on high that proceeds through the Request for Proposal (RFP) process for a vendor to implement a central "portal" through which all electronic invoices can be despatched to government departments.

2. How not to specify the government e-invoicing requirement

The "central portal implemented by a prime vendor" theme is revealed in the solicitations for feedback the North American governments request from industry. Their specifications of a three-corner model approach incorporate a central system connected to both trading partners involved in a given exchange. The trading partners are not connected directly to each other. The one system must address the needs of all trading partners. Conversely, each trading partner must adapt to the one system all trading partners connect through.

⁵http://www.billentis.com/e-invoicing_ebilling_market_report_EN.htm

⁶<http://www.peppol.eu/news/electronic-invoicing-in-norway-a-story-of-success>

Figure 1. Three-corner model approach



Consider the Request for Information (RFI) published by the Canadian government for an Electronic Invoice Presentation and Payment (EIPP)⁷ system from 2013. Among other requirements such as supplier profiling and dynamic discounting, the very first listed in the overview is:

- a. develop and maintain a Supplier Portal where Government of Canada suppliers can upload or input invoices and credit memos

Presuming the responses were considered carefully, the Canadian government then issued an RFI for an ITQ e-Procurement Solution (EPS)⁸ in 2015. Once again the focus of the project is a centralized system:

... seeking an e-Procurement Solution (EPS) whereby the service provider will not only be required to deliver an enterprise-wide, commercially available electronic procurement system but also to provide a fully managed service including system configuration, implementation, maintenance, upgrades and operation to ensure Government of Canada's objectives and service level requirement are fully met.

In recent years disparate US government department electronic invoicing initiatives have built independent systems for the Department of Defense, the Department of the Treasury and the Department of Transportation.

On July 17, 2015 the US government, through the White House's Office of Management and Budget (OMB), in a memorandum⁹ invited vendor response for a centralized Federal Shared Service Provider (FSSP) and an associated FSSP electronic invoicing solution that would cease any investments in other new electronic invoicing solutions. The White House:

Requires OMB to work with Treasury, the CFOC [Chief Financial Officers], and the CAOC [Chief Acquisition Officers], within 120 days of issuance of this memorandum, to develop recommendations for a central collection portal into which invoices can be submitted and distributed.

And thus the three-corner model common theme is exposed. But this traditional single-vendor portal approach for the solution design is lately considered outdated and sometimes as unfair to competition.

Absent from these specifications is some kind of open standards-based network access to the portal. This limits the opportunity to grow a marketplace of multiple solutions from many suppliers as a buffer to the problems that can occur when relying on single-source solution supply.

Consider the openness of the process: are all stakeholders able to participate in the design of the system?

⁷<https://buyandsell.gc.ca/procurement-data/tender-notice/PW-XL-106-26508>

⁸<https://buyandsell.gc.ca/procurement-data/tender-notice/PW-XN-111-28381>

⁹<https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2015/m-15-19.pdf>

Consider the openness of the system: are open-source components available if desired by users?

Consider the scalability of the system: can all stakeholders be supported by the system?

Consider the suitability of the interfaces: are all stakeholders ably equipped to participate in the system?

Consider the available onboarding process: are all stakeholders fairly and efficiently treated when trying to join?

This essay contends that asking for a prime vendor to build, supply and support a single central system for all stakeholders, without also building some kind of open access network, is not the way a government should go about specifying a solution enabling an electronic means of submitting and distributing invoices and other electronic documents. There are no concerns if the government chooses to have a prime vendor implement such a portable system only for government departments and internal users. The concerns surface when the government imposes on its suppliers that they must use the government's central system and prime-vendor-supplied software.

What are the benefits and who are the one's benefiting? The RFPs appear to be benefiting the government and not benefiting the suppliers.

How can the one centralized government system meet the diverse and ever evolving requirements of all its suppliers? Or even of its own departments?

How can the government's decisions nurture a growing marketplace offering opportunities for investment and innovation? Where is the network to support this?

3. The European experience

The European Commission (EC) was faced with the challenge of providing for Union-wide government procurement from diverse established systems in different countries while meeting legal obligations for fairness for all. Their approach to the solution was not to specify and implement a single program or portal. Nor did they have a single vendor design the solution.

The stage was set in February 2005 when Denmark legislated the use of XML for electronic invoicing described initially by OIOXML and now by OIOUBL¹⁰. And the country built an entire network called NemHandel¹¹ on which companies and government departments exchanged business documents and invoices. The syntax of electronic invoices, essential to interoperability, that was chosen is the OASIS Universal Business Language (UBL). To ensure at that time that UBL was sufficient to their needs, the Danish government funded active participation of its staff in the OASIS technical committee creating the specification. This required a lot of time and some travel, but the government was assured that the published results would suffice.

Today the system in Denmark has matured after many refinements. The use of UBL syntax has grown in breadth (more documents are now available) and depth (more needed elements are now included). The adoption incentive for businesses was compelling: if you don't use OIOUBL to invoice the government, then you don't get paid. This was backed up by legislation. Software vendors large and small had to respond to the needs of government suppliers now obliged to conform to open standards. And the government had to create alternative means by which suppliers without conforming software could still engage in the process within legal constraints.

The Northern European Subset (NES) project incorporated the Danish experience into a growing regional specification. More countries across Europe took interest in the work. Before the NES project was completed it was replaced with the Pan-European Public Procurement Online (PEPPOL) project¹². But the principles innovated in the creation of NES were carried on Europe-wide with the enthusiastic participation of those who started NES. And so PEPPOL was initiated in 2008 as a pilot project funded by the EC to channel this participation.

¹⁰<http://oioubl.info/classes/en/index.html>

¹¹<http://www.digst.dk/ServiceMenu/English/Digitisation/NemHandel>

¹²http://www.peppol.eu/about_peppol/background-peppol-project

In each stage the governments set out to formally describe the various document exchanges, including the use of the electronic invoice, that would be needed to implement government procurement. This task always involved software vendors and government suppliers in a collaborative environment, knowing everyone was going to win when the project was successful.

To build the PEPPOL project suitable for all users an investment in 2007, also by the EC, was and continues to be made in analyzing, developing and standardizing the information exchanges needed for procurement and electronic invoicing. All stakeholders were invited to participate in the European Committee for Standardization (CEN) Workshop on Business Interoperability Interfaces (CEN WS/BII).

The workshop has operated in three phases so far. It is finally progressing from an informal workshop (without the ability to specify standards) into a formal project committee (with the ability to specify standards). The outputs from the three BII phases are open to the public¹³. The work proceeds apace in two project committees: CEN TC434 on electronic invoicing and CEN TC440 for all other document exchanges in electronic public procurement.

Included are the processes (expressed in prose and swim-lane diagrams) engaged between trading partners and the semantics (expressed as classes and their properties) of the information exchanges. A given set of processes defines a profile. A given information requirement model defines the core set of commonly-used information elements needed for the transaction. This CEN work defines these for the European context, but they are based on generally accepted accounting principles and then refined using local regulatory requirements.

The collection of profiles is called a customization. Thus, a given document in an exchange has the context of being in a particular profile in a particular customization.

Of note, the CEN work in WS/BII, TC434 and TC440 is not creating a syntax. For the convenience of implementers, the project supplies the mapping of semantic items both to the UN/CEFACT Cross Industry Invoice (CII) syntax and to the OASIS UBL syntax. It also identifies which pieces of information, if any, are not available in a given syntax.

Participants in the PEPPOL project, run now by the OpenPEPPOL consortium¹⁴, specified how to use the CEN results with the UBL syntax choice. They developed the machine interoperability interfaces called Business Interoperability Specifications (BIS). The BIS are then agreed upon by participating parties who implement "access points".

4. The four-corner model

These access points communicate with each other, thus forming the PEPPOL network built on top of the Internet. In the four-corner model, a trading partner communicates only with their specific access point, which communicates with the specific access point that services to other trading partner. The web of access points provides the connectivity between trading partners. Metadata describing each of the access points is expressed using the OASIS Service Metadata Publishing (SMP) specification. Locating metadata services is accomplished using OASIS Business Document Metadata Service Location (BDX-Location).

¹³<http://www.cenbii.eu/deliverables/cen-wsbii-3/>

¹⁴http://www.peppol.eu/about_peppol/about-openpeppol-1

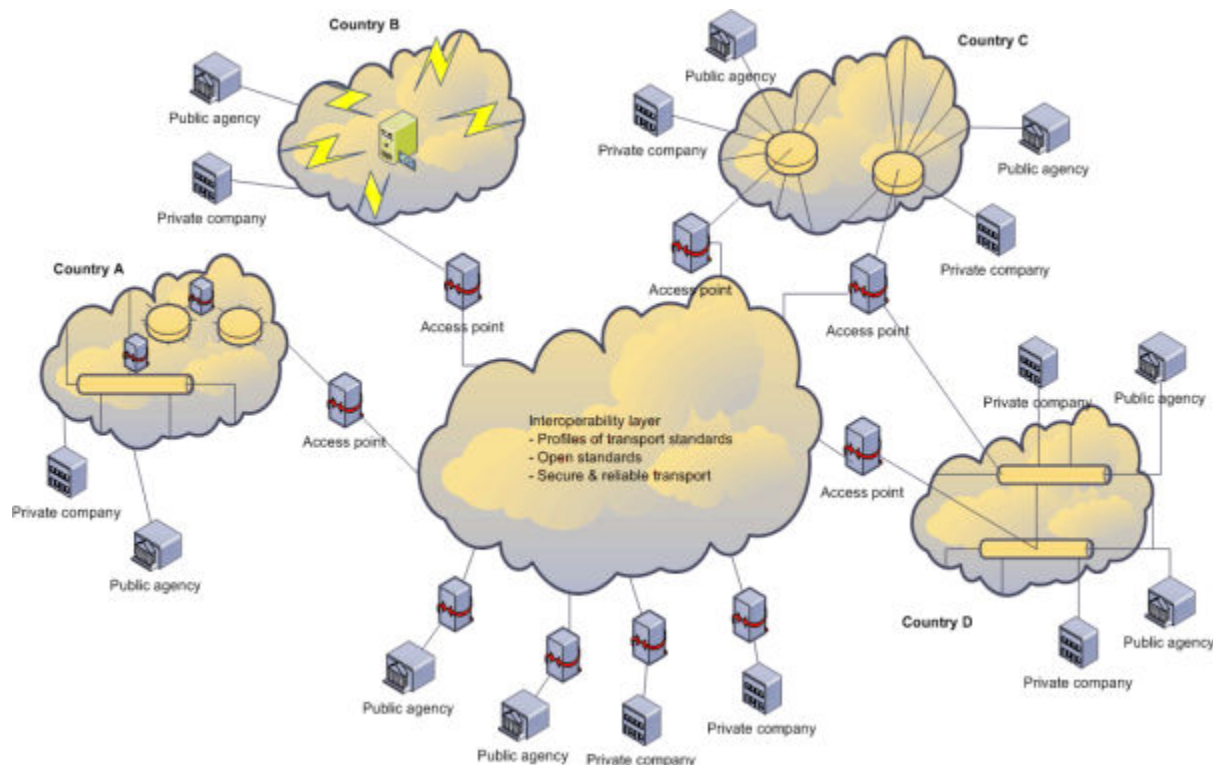
Figure 2. Four-corner model approach



An access point provider commits to write whatever programs or portals they conceive as the access point. The access point provides a network connectivity service to the provider's individual, and often unique, constituency. It might be government departments or suppliers large and small. Some larger users may, themselves, design and implement their own access points to the network. Market forces to expand onboarding of business participants then create the demand for additional access points by meeting custom needs, changing requirements and competitive innovation.

Figure 3, “Four-corner model across multiple networks” depicts these and many other different implementations of access points in the service of different constituencies of users.

Figure 3. Four-corner model across multiple networks¹⁵



The metaphor most often used when describing the European solution is the establishment many years ago of a common suite of International Telecommunication Union (ITU) standards to interconnect the multiplicity of diverse tel-

ephone systems around the world. Each country created and maintained their own telephony networks within their jurisdictions. Designs and implementations varied extensively.

Making a simple long-distance telephone call bridges two nations' very different and incompatible system designs by globally interfacing national access points with agreed-upon ITU-T standards and service operating levels. The national access points then interface with the national systems, as only those responsible for those systems can best do. There is no one central connection switchboard for all users from all countries.

The e-Invoicing parallel works well.

Today, European member government departments needing to be invoiced establish their own connectivity through an access point to the open network. Suppliers needing to submit invoices establish their own connectivity. This is usually through different access points that provide different services suitable to the suppliers. The access points communicate with each other using the open specifications and open document formats.

An access point may very well be implemented as a supplier portal that is central to only a particular constituency of users. A central government supplier portal could give credentialed front-end access to multiple back-end departmental systems with a custom interface. At the same time it would provide the external path for common network access. Or any given system could be directly connected as an access point providing interoperability to all in the common manner.

But the needs of governments and the needs of suppliers vary so very much, even within each domain, that no one "central collection portal into which invoices can be submitted and distributed"¹⁶, in the absence of a supporting network, can accommodate the needs of all suppliers and all buyers. Nor should any one piece of vendor software attempt to do so by being a "a centralized Supplier Portal service for the reception and processing of invoices"¹⁷. By not attempting to do so, that is, by creating an open access network, the marketplace can fill the need with innovative and disparate solutions that individually meet the one common set of interoperability standards.

And governments need to lead the way, by fiat if necessary, in creating this set of interoperability standards. Though it costs money to bring together all of the stakeholders, buyers and suppliers included, the result is open to all and forms the foundation of a marketplace of implementations.

A number of open-source implementations of a PEPPOL access point exist to support this. For example, the e-Prior access point supplier portal is used by the European Commission for all of its invoicing. The Open e-Prior version of it was spun off and made available as open source for any Public Administration to use¹⁸. A number of other open-source projects and free resources are oriented to business use¹⁹. As testament to the growing marketplace, the lengthening list of commercial access point providers²⁰ is maintained by the OpenPEPPOL Consortium (113 at the time of writing).

Note that it is the responsibility of the access point to provide the open specification services of the network to its users. The users may very well use different document formats or different interfaces. The service would then offer translation, interpretation and expression of the user's non-conforming components. A user would then not have to change their systems in order to participate in the network. PEPPOL thus provides a way for everyone to participate.

5. The use of open integrated standards

The European government is fulfilling its responsibility in nurturing all, not just a few. And they are benefiting from the resulting wide-range onboarding of suppliers from different constituencies. Their investment has created in-production commerce-based scenarios enabling cross-border government procurement in a fair marketplace, satisfied

¹⁵<http://wiki.ds.unipi.gr/display/20141201ESENS/SAT+-+eDelivery>

¹⁶Direct quote from page 3 of <https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2015/m-15-19.pdf>

¹⁷Direct quote from Services Requirements section of <https://buyandsell.gc.ca/procurement-data/tender-notice/PW-XL-106-26508>

¹⁸http://ec.europa.eu/isa/news/2015/open-source-e-invoicing-tool-for-public-administrations-explained_en.htm

¹⁹<http://www.peppol.eu/ressource-library/technical-specifications/infrastructure-resources>

²⁰<http://www.peppol.eu/adoption/access-point-providers>

not by any single vendor or product or service, but simply by the openness of the specifications. The Pan-European Public Procurement Online (PEPPOL) suite of conformance standards of interfaces and document formats defines the network on top of the Internet. This is very different from trying to meet the requirement with any single piece of vendor-specific software.

Establishing the choreography of electronic document interchange was, and continues to be, a collaborative effort amongst government and business stakeholders to create the business interoperability specifications.

Integrated and extensible open standards can accommodate customized requirements while still satisfying interoperability at the operational level. The OASIS Business Document Exchange (BDEX) Technical Committee²¹ is progressing the PEPPOL specifications into internationally-recognized standards that a government can employ. This includes the publishing of service metadata and the enveloping of documents into single exchanges. The CEN work describing profiles is picked up and contextualized in the PEPPOL BIS specifications.

The OASIS Universal Business Language (UBL) 2.1²² (ISO/IEC 19845:2015²³) is the most widely-deployed commerce syntax across the PEPPOL network. It is developed by the OASIS Universal Business Language Technical Committee²⁴. UBL 2.1 business objects are modeled using UN/CEFACT Core Component Technical Specification 2.01²⁵ and realized as validation artefacts using the OASIS Business Document Naming and Design Rules Version 1.0²⁶ applied as described by the OASIS UBL Naming and Design Rules Version 3.0²⁷.

Yet there remains the urgent need for wider participation by governments and industries in the process of developing open standards and specifications to meet new requirements and changing regulatory mandates. These two committees are places to consider.

And the investment continues to be made by the EC to begin describing additional information exchanges over PEPPOL beyond commerce and trade. The Electronic Simple European Networked Services²⁸ (e-SENS) project is looking at using the PEPPOL model in construction, transportation, health and insurance.

It is important to note that the European service providers have recognized that having a multi-lateral solution with common standards for interoperability benefits everybody. The European E-Invoicing Service Providers Association²⁹ (EESPA) acts as a trade association, at the cross-European level, for a large community of commercial e-Invoicing service providers. It is drawn from organisations that provide network, business outsourcing, financial, technology and EDI services. EESPA have adopted BII profiles with the use of UBL syntax. This is an incredibly strong buy-in from a large non-governmental group, representing many private interests and publicly-available end-user products, endorsing the decisions made in the PEPPOL project.

If one were to try and replicate PEPPOL from scratch, there are many aspects of electronic document interchange that would need to be developed.

The Open-edi Reference Model (ISO/IEC 14662:2010) provides a template categorizing the relationships between the components deployed in PEPPOL. Like components fulfilling these relationships would need to be deployed in any other electronic commerce solution. Figure 4, “ISO/IEC 14662, OASIS UBL (ISO/IEC 19845), CEN and PEPPOL” illustrates how PEPPOL fulfills these components. The success of the PEPPOL project is testament to how the costly effort to collaboratively develop and integrate open specifications pays off. It is a model to anyone considering replicating that success in other markets.

²¹<https://www.oasis-open.org/committees/bdxe/>

²²<http://docs.oasis-open.org/ubl/os-UBL-2.1/>

²³http://www.iso.org/iso/catalogue_detail.htm?csnumber=66370

²⁴<https://www.oasis-open.org/committees/ubl/>

²⁵http://www.unece.org/fileadmin/DAM/cefact/codesfortrade/CCTS/CCTS_V2-01_Final.pdf

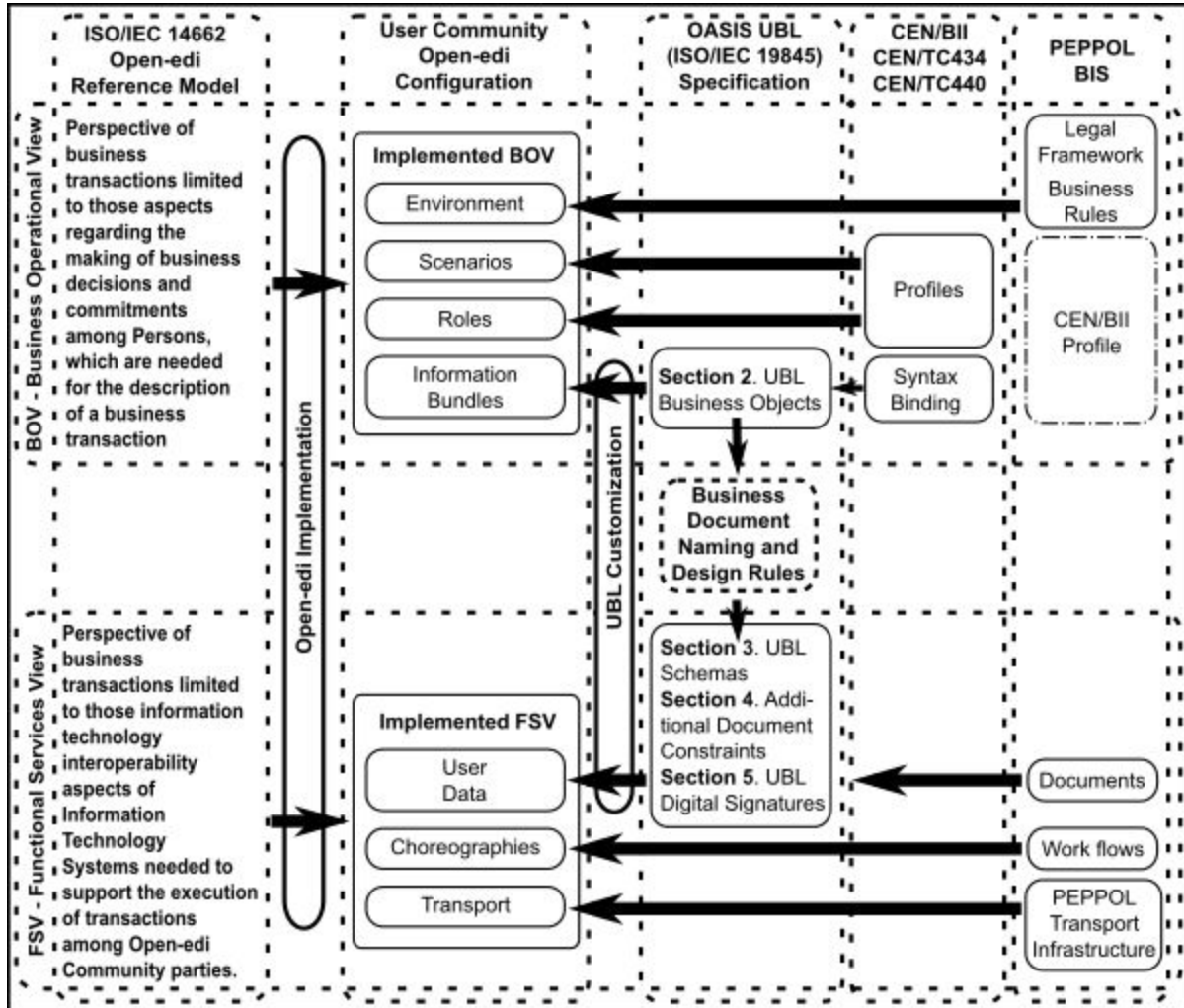
²⁶<http://docs.oasis-open.org/ubl/Business-Document-NDR/v1.0/Business-Document-NDR-v1.0.html>

²⁷<http://docs.oasis-open.org/ubl/UBL-NDR/v3.0/UBL-NDR-v3.0.html>

²⁸<http://www.esens.eu>

²⁹<http://eespa.eu>

Figure 4. ISO/IEC 14662, OASIS UBL (ISO/IEC 19845), CEN and PEPPOL



The Australian example tends to refute any argument that Canada and the US are too dissimilar to the European multi-country scenario and mindset for this solution to be appropriate. Australia is currently planning³⁰ a whole-of-economy approach to eInvoicing (and digital business in general) based on the PEPPOL four-corner model architecture. In Australia's case a multi-stakeholder Digital Business Council³¹ is being sponsored and supported by the Australian government but established as an autonomous body. The council is tasked with defining a national (public and private sector) eInvoice Interoperability Framework. This is based on standards such as OASIS SMP, OASIS BDX-Location and OASIS UBL (ISO/IEC 19845). Also under consideration are the OASIS Business Document Envelope (BDE) and ebMS3/AS4. UBL document guidelines (based on customizing the work of CEN/TC434 and CEN/BII) are being developed for business processes and transactions suited to Australian business. At the same time the Australian government is developing its own policies for how this framework should be implemented by public contracting authorities at federal, state and local levels. With this division of authority, the government isn't telling business what to do, it is responding to the council's framework by putting policies in place for how the framework will be applied in the public sector.

At every aspect of a project incorporating standards, when choosing which standard to use one has to consider three very important issues:

³⁰<http://digitalbusinesscouncil.com.au/>

³¹<http://digitalbusinesscouncil.com.au/about-the-dbc>

- the governance of the standard's evolution
 - what is in scope for changes to a specification?
 - is there an open process to input requests for changes from the general user community (outside of the committee)?
 - how are requests for changes handled?
 - to protect the free use of the resulting artefacts, how are IPR issues handled for input from committee members and from the general user community?
 - is the backwards compatibility of changes to the specification being addressed properly?
 - minor revisions should preserve backwards compatibility (e.g. every schema-valid instance of a schema version 1.3 should also be schema-valid with schema version 1.4)
 - major revisions should indicate non-backwards compatibility (e.g. some schema-valid instances of a schema version 1.x are not schema-valid with schema version 2.x)
- the transparency of the standard's development
 - who is participating in defining the specification?
 - are the committee meeting agendas and minutes open to public scrutiny?
 - are intermediate versions of documents available for inspection in order to track how ideas evolved?
- the availability of the standard's artefacts
 - are all components of the specification's artefacts publicly available and open without encumbrances (including without even the burden of registering and providing personal information in order to get "free" copies)?
 - is there permission to create derivative works (not mandatory but it is a nice-to-have if user communities need to tailor a specification for their own use)?

A fourth important issue is very technical in nature. Extensibility in a user-oriented open standard is a strength, not a sign of weakness or insufficiency. Extensibility in a network-oriented standard is less critical, as the network protocols have a closed definition for interoperability and interaction. User communities, on the other hand, may have the need to express more information than found in the standardized components and so they must have a means of conveying the additional information without interfering with the interoperability contracts. In OASIS UBL an extension point is found at the beginning of every document type, including the invoice. A user can put any information under the extension point without triggering a schema-validity error with the standardized XSD schemas. For example, industry sectors can augment a UBL electronic invoice with line-item detail information regarding goods, while still using the standardized structures for the accounting aspects of the invoice payment demand. That augmented invoice will continue to work with the accounting aspects of any UBL-aware system, within the sector or not, because the augmentations are ignored. The augmentations might, however, be important in the fulfillment of the purchase, and so if expected from a sector partner, they can be retrieved from under the extension point.

Participation in standardization is important all around. The committee benefits by sharing the workload amongst more members, while getting input from the widest possible range of ideas and experiences. Committee members incur real costs when participating, but they benefit by influencing the decisions made by the committee and shaping the results of the work. Many hands make light work. The US Government has long recognized the value of participating in consensus standards, and promotes participation in areas important to its work:

³²All federal agencies must use voluntary consensus standards in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law or other-

wise impractical. In these circumstances, your agency must submit a report describing the reason(s) for its use of government-unique standards in lieu of voluntary consensus standards to the Office of Management and Budget (OMB) through the National Institute of Standards and Technology (NIST).

³³If a voluntary consensus standards body is in the process of developing or adopting a voluntary consensus standard that would likely be lawful and practical for an agency to use, and would likely be developed or adopted on a timely basis, an agency should not be developing its own government-unique standard and instead should be participating in the activities of the voluntary consensus standards body.

6. Conclusion

The requirements in Canada, in the United States and in Australia are not unlike the European requirement to connect the many differing governmental systems with suppliers across the Union. Australia has recognized this.

The most successful new systems accommodating all government buyers and the many and immensely-varied national and international suppliers to these buyers should be described as a suite of open standards and specifications. They should not be described as a pieces of software.

Participation by buyers, suppliers and vendors is needed in committee work of all of the open specifications that are available today. Governments need to participate to ensure their procurement needs are met. Suppliers need to participate to ensure decisions are reasonable. Vendors need to participate to ensure specifications can be implemented.

For any e-Invoicing deployment the specification work needs to be done. It may already be available off-the-shelf. It may need to be developed from scratch. Projects need to plan to adopt and participate in existing specifications, or to build new specifications. But projects must avoid being myopic by trying to specify software implementations to be sourced by single vendors.

The task is big. The benefits are huge.

The approach of developing and mandating open interoperability specifications and open data formats will nurture in Canada and in the US a growing free and open marketplace of many software implementations. This will enable the successful onboarding of all participants in the most expeditious, fair and robust fashion.

And any new requirement doesn't have to be fulfilled using PEPPOL, as one can create one's own suite of open standards and specifications to meet needs that may be different than what is supported today in PEPPOL. Or it could, in fact, be satisfied with PEPPOL if what is there today is considered acceptable after analysis. And adopting PEPPOL would enable suppliers and governments in Canada and the US to interoperate with the suppliers and governments in Europe.

Just like making a long-distance call.

³²https://www.whitehouse.gov/omb/circulars_a119/#6

³³https://www.whitehouse.gov/omb/circulars_a119/#7

A. Revision history

Table A.1.

Date	Revision
2016-01-13	First release to public for feedback and comment
2016-04-11	Addition of news of Australia using PEPPOL architecture and UBL
2016-05-13	Final text before preparing presentation; incorporate facets of standards development and participation; add a couple diagrams
2017-05-11	The OMB link in this paper is edited to point to the White House archive where the cited document has been moved. No other changes have been made to the content.

Colophon: this document is authored in DocBook XML using the oXygenXML editing tool, published using Saxon for XSLT with the public DocBook stylesheets and Antenna House for XSL-FO to PDF composition. The choice of US-letter page size is based on the anticipated audience.