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An Analysis of CEN/WS BII

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***Abstract*—This position paper discusses the outcome of the standardization initiative CEN/WS BII aiming to support the implementation of a complete end-to-end e-procurement process, that may be used in cross-border business all over Europe and in particular in the public sector. The discussion includes the background of this initiative, its approach, and its outcomes and shall help to understand how the CEN/WS BII worked and if and how these deliverables are appropriate to fulfill the aim of harmonized European-wide e-procurement in the public sector. Furthermore, based on the discussion, implications for future research in Information Systems with respect to standardization of e-procurement and interoperability of information systems are provided.**

I. Introduction

SINCE the rise of e-government, modernizing the public administration in Europe and enhancing its efficiency is one of the major drivers for introducing information technology on every level of public administration. Especially in the field of public e-procurement, the European Commission expects positive effects like seamless and quicker processes and savings of around €100 billion [1].

A crucial prerequisite to reach these goals is a fully end-to-end e-procurement, including the processes of notification, tendering, ordering, fulfillment, and invoicing [2]. This includes that all relevant stakeholders (buyers, sellers, and service providers) participating in public Business have to exchange their business documents automatically based on Europe-wide used and accepted standards for processes, documents, and rules, i.e., the interacting in-formation systems have to be interoperable.

Nowadays, exchanging e-procurement documents in Europe between the various stakeholders is still an unsolved challenge that has been addressed in various research works. For exchanging such documents electronically, all relevant stakeholders have to agree on accepted exchange rules and standards. In the early phase of e-procurement, the main challenge was a lack of appropriate e-procurement- standards to be used. Nowadays and contrary, the problem is the multitude and heterogeneity of available standards stakeholders can choose from or have chosen already. In consequence, in the various member states of the European Union individual e-procurement systems got established which may be interoperable within the corresponding member state, but are not interoperable cross-border, i.e. with the e-procurement systems of the other member states.

For instance, in invoicing the Scandinavian member states base their approach on the UBL Invoice for exchanging invoices, e.g., Svefaktura [3] and EHF Invoice [4], while other member states base their national invoice standard on the UN/CEFACT Cross-Industry Invoice (CII) like it is done in Germany with the ZUGFeRD invoice [5].

One very restrictive solution of this challenge would be that all stakeholders have to agree on only one possibly new developed e-invoice standard to be used mandatory in the public sector of each European member state. But such a solution may have crucial drawbacks on the economic, technical and political level with winners and losers. If, for instance, only the UBL Invoice would be accepted as the one and mandatory standard then all those member states using e-procurement systems based on UN/CEFACT CII will lose their e-procurement investments because they have to implement UBL-based e-procurement systems. In consequence, everyone would try to protect its e-procurement investments by promoting their own standard and will abandon other standards—a scenario what in the context of information systems interoperability literature was described as “empire building” [6]. By this, standards will become an instrument to impose the own preferences on the other stakeholders.

How can such an empire building mentality be avoided? The nature of standardization processes has been addressed in many research works, e.g., [7]-[10]. Besides these research works, this issue has been also addressed in non-scientific projects like the project CEN workshop on Business Interoperability Interfaces (CEN/WS BII) by the European Committee for Standardization (CEN). As a pre-standardization initiative it was concerned to specify and harmonize the manifold requirements on a public e-procurement as well as to give guidance how existing e-procurement standards—including competing e-procurement standards—can be used to implement a European-wide public e-procurement.

In this position paper it is argued that the approach chosen by the CEN/WS BII is a way to deal with the aforementioned empire building mentality. The focus was on requirements and on giving guidance how to use existing e-procurement standards, no existing implementation was preferred. Instead,

The participation of the authors in CEN/WS BII was supported by the German Association Supply Chain Management, Purchasing and Logistics (BME).

it allowed each stakeholder in Europe to preserve its existing e-procurement systems but also to evolve it so that it becomes interoperable with the e-procurement systems of other stakeholders. The approach to achieve this objective as well as the initiative CEN/WS BII itself will be presented and discussed to outline implications for future research with respect of the standardization and interoperability of e-procurement systems.

The paper is organized as follows: in the following second section, the design of this research is described and in the third section, the background of CEN/WS BII. In the fourth section the approach developed by CEN/WS BII is reconstructed while the fifth section describes the various workshop outcomes and the sixth section discusses the corresponding insights that were gained from the various phases of CEN/WS BII. The limitations of this case study and possible future work will be discussed in the seventh section and, as usual, a conclusion will finish this paper.

II. The Development of CEN WS/BII

A. The first phase

The first phase of CEN/WS BII started 2007 in Copenhagen as a so-called CEN workshop and lasted until 2010. CEN workshops are no formal standardization initiatives, but rather informal groups of individuals and/or organizations giving recommendations for possible standards. Their outcome is defined as a CEN workshop agreement (CWA) reflecting the consensus of the group on a particular issue [11]. Such an issue might be giving guidance on the structure, content and implementation of a standard or specifying the requirements for proposing a new standard.

The purpose of the workshop CEN/WS BII was to find an agreement on how e-business standards used in European states can be merged into a public e-procurement standard accepted throughout Europe. The main focus of the first phase was to give guidance how to use UBL to implement a European public e-procurement. The deliverables of the first phase were published as CWA 16073:2010. This CWA cannot be retrieved from CEN anymore, because CWAs—without prolongation by the workshop—are valid for three years only. However, the CWA is still available at the workshop's website [12].

B. The second phase

The second phase of CEN/WS BII started in 2010 and lasted until the end of 2012. It had a wider focus than the first phase and in addition, it should give guidance how to use UN/CEFACT XML to implement public e-procurement. Furthermore, it provides an advanced methodological foundation by specifying core business requirements and by modeling the semantics of the public e-procurement business transactions which then could be mapped to the semantics embedded in the messages of UBL and UN/CEFACT XML.

The outcome of this phase became more complex and in consequence five CWAs were published covering the architecture of CEN/WS BII (CWA 16558:2013), notification (CWA 16559:2013), tendering processes (CWA 16560:2013), electronic catalogues (CWA 16561:2013), and post-award processes (CWA 16562:2013). These CWAs are still active and can be retrieved from the CEN website.

C. The third phase

The third and final phase of CEN/WS BII started in 2013 and finished its work end of 2015. The outcome was published in five CWAs as well, which have the same structure as the CWA of second phase. There were no major changes in the underlying architecture of CEN/WS BII, but rather refinements and improvements, for instance, by establishing a business term vocabulary. In line with the structure of the second phase, the CWAs were published recently as CWA 17025:2016, CWA 17026:2016, CWA 17027:2016, CWA 17028:2016, and CWA 17029:2016.

III. Participants and stakeholders

The main goal of CEN/WS BII is to provide a guidance to implement an acceptable, efficient, and standardized public e-procurement process throughout Europe and to ensure that preferably all necessary and most relevant business requirements are gathered. Furthermore, CEN/WS BII coordinated its activities with other relevant European and international activities, such as GS1 in Europe, the German standards Xvergabe and BMEcat, the Multi Stakeholder Group of Experts on Public Procurement (EXEP). CEN/TC 434 on electronic invoicing and with international organization like OASIS UBL and UN/CEFACT XML mainly with respect to syntax solutions.

Experts from public authorities, standardization bodies, universities, as well as, software vendors from more than 20 European states and institutions of the European Union joined the workshop meetings regularly. This broad participation aimed to include the widest expertise possible for structuring and developing this upcoming new standard for e-procurement.

The authors of this paper were active participants of CEN/WS BII on behalf of the German Association Supply Chain Management, Purchasing and Logistics (BME) and the University of Duisburg-Essen main developer and maintainer of the German wide used e-catalogue standard BMEcat. As such, the authors were heavily involved in the architecture and in the development of catalogue-related deliverables.

IV. The CEN WS/BII approach

The approach taken by CEN/WS BII is based on three main propositions:

(1) Since XML is the base language for many standards, all these standards share a common ground. This eases the conversion of data structures and documents between different standards, in particular, if the underlying concepts expressed in these standards are the same or at least very similar.

(2) There is more stability on the semantic level than on the syntactic level. Names and sequences of syntax elements may change over time, but the key semantic concepts expressed by the syntax elements usually stay a longer time, for

instance, key concepts like invoice number, VAT rate, address, or net price.

(3) There is a significant amount of requirements that have to be fulfilled in all member states. Identifying and harmonizing these “core” requirements enable the member states to comply and provide a sufficient base that makes the European e-procurement systems in the e-procurement chain (cf. Fig. 1) interoperable.

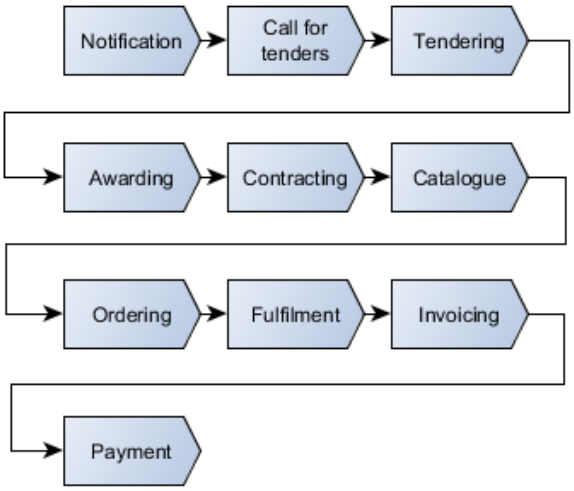

Fig. 1 E-Procurement chain

In line with the proposition (1) and (2), the approach by CEN/WS BII does not include a syntax specification, but rather a guide how to use existing syntax standards like UBL and UN/CEFACT XML and to implement the identified requirements. As there are a lot of different requirements throughout the e-procurement chain, these are bundled by the architecture of CEN/WS BII with the corresponding business processes and information models to so-called a profiles. Fig. 2 shows a simplified extract of the model of the CEN/WS BII architecture describing the concept of a profile and its related concepts.

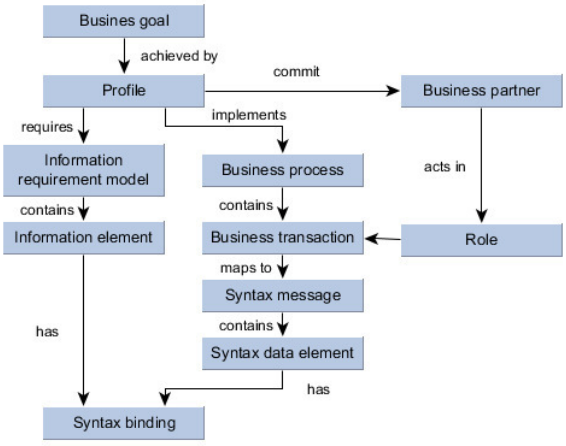

Fig. 2 Simplified model of the architecture of CEN/WS BII

The starting point of a profile is a specific business process aiming at fulfilling a specific business goal. The business process describes a sequence of activities to be performed by partners involved in this business process. The involvement of an actor is described by a so-called role. While acting in their role in the business process, the business partners exchange messages within a transaction, as it is illustrated in Fig. 3.

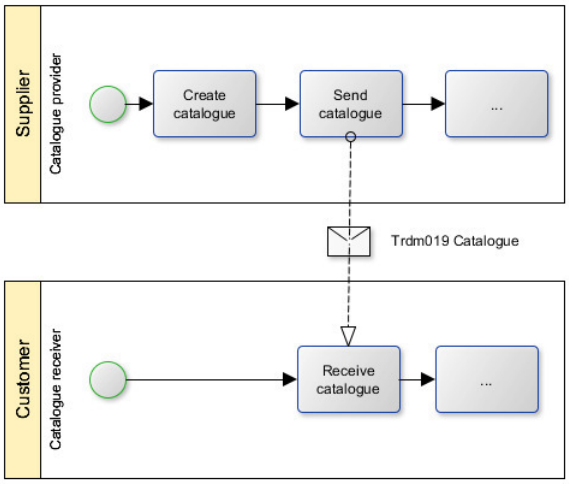

Fig. 3 Extract of the catalogue business process

As an example, an extract of the business process “Catalogue” is shown describing the business process of exchanging catalogues between a supplier and a customer. The business process is modelled using BPMN [13].

Part of each business process is a flow of messages from the supplier—acting in the role of catalogue provider—to the customer—acting in the role of catalogue receiver. In this case, the message sent is the catalogue message containing information on the offered goods and services.

The information in such messages is additionally described in the information requirement model (IRM). This model covers all the information requirements needed to be exchanged within a transaction as part of a business process. The IRMs are specified using the notation of the UML class diagram. Each of the IRMs has a strict hierarchical structure, as it is illustrated in Fig. 4.

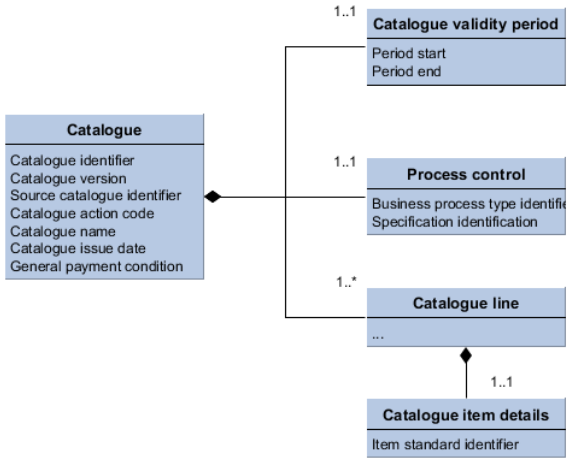

Fig. 4 Extract of the IRM for the transaction “Trdm019 Catalogue”

In IRM shown in Fig. 4 specifies the information exchange in the transaction “Trdm019 Catalogue”. The several classes combine semantically related attributes and represent

semantic parts of the transaction that is why they are related in a composition relationship to each other.

To complete the specification of the information exchange in a transaction, each of the attributes—representing an information requirement—is specified in more detail. Giving an example, in a catalogue process a catalogue has to be exchanged by the business partners. To identify the goods and services listed in the catalogue uniquely, an identifier has to be provided by the so-called information requirement "Item standard identifier".

Table 1 shows an extract of the specification specifying the concept of a unique identifier for good or a service listed as an offer in a catalogue. The definition of an information requirement includes also a specification of the cardinality, the data type, and a mapping to a corresponding business requirement. These were left out for clarity.

TABLE 1.
EXTRACT OF AN INFORMATION REQUIREMENT DEFINITION

InfReqId	Business term	Usage
tir19-092	Item standard identifier	An item identifier based on a registered scheme.

This specification covers only the semantic level. In consequence, the IRM for a transaction only specifies the concepts used in the transaction. In the case of the information requirement "Item standard identifier", this means it is a part of the information requirement “Catalogue” describing the content of a catalogue of goods and services.

To actually exchange a catalogue, a message format is needed that allows "wiring" the catalogue from the supplier to the customer. As CEN/WS BII does not provide such message formats, something else is needed. In this case, existing standards for message formats are used, which are mapped to the information requirements via a so-called syntax binding. In the case of the “Item standard identifier”, the syntax binding to the messages UBL Catalogue and UN/CEFACT XML Cross-industry catalogue by XPath expressions as specified in Table 2.

TABLE 2.
EXAMPLES FOR SYNTAX BINDINGS TO UBL AND UN/CEFACT XML

InfReqId	Syntax binding
tir19-092	Catalogue/cac:CatalogueLine/cac:Item/ cac:StandardItemIdentification/cbc:ID
tir19-092	CrossIndustryCatalogue/ CICHSupplyChainTradeTransaction/ IncludedCICLSupplyChainTradeLineItem/ SpecifiedCatalogueTradeProduct/ID

In this table, using the concepts described in Fig. 2 the information requirement “Item standard identifier” is bound to a specific syntax data element cbc:ID of the syntax message UBL Catalogue as well as to a specific syntax data element ID of the syntax message UN/CEFACT Cross-industry catalogue.

Following the CEN/WS BII approach described before, all business process related aspects of public procurement are specified by the profiles. These profiles cannot cover all possible aspects of public procurement in European states, but they are focused to the “core” aspects, i.e. those aspects that are equal or very similar in the various European states. This is in line with the third proposition mentioned before focusing on the core requirements of public procurement.

V. THE OUTCOME OF CEN/WS BII

A. Overview

The various deliverables of the third phase of CEN/WS BII were published as CEN workshop agreements (CWA) covering all phases of the e-procurement chain (cf. Fig. 1) [14]. The profiles are organized in one general CWA specifying the methodology and architecture of CEN/WS BII and four CWAs covering the e-procurement chain. Each CWA specifies profiles, transactions, and syntax bindings or provides guidelines for specific topics related to the implementation of the profiles and transactions. Table 3 gives an overview on these CWAs.

TABLE 3.
CWA OF THE THIRD PHASE OF CEN/WS BII

CWA	Title	Parts
17025	Methodology and architecture	19
17026	Notification profiles and transactions	11
17027	Tendering profiles and transactions	36
17028	Catalogue profiles and transactions	29
17029	Post-award profiles and transactions	38

B. Methodology and architecture

This CWA covers the methodological and architectural aspects for the other CWA by CEN/WS BII. It describes, how the other CWA are structured, how the business requirements are gathered and described, how the processes and data are modelled, and how the bindings to the various syntaxes are specified, etc.

The two parts 109 and 116 of the CWA are dedicated on the methodology and the architecture. Part 109 elaborates on the concept of core and especially on those core business requirements in public e-procurement that are most relevant for any member state. Part 109 outlines the definition of a core business requirement as well as the approach used by CEN/WS BII to identify these core business requirements.

Part 116 provides a business term vocabulary, which was the base for all the profiles and transactions provided by the four other CWAs. By this business term vocabulary all profiles and transactions are aligned with each other sharing the terms used in the profiles and transactions of all CWAs. This business term vocabulary can be seen as a preliminary ontology of public e-procurement.

C. Notification profiles and transactions

The CWA on notification covers the first phase in the e-procurement chain (cf. Fig. 1). The profiles specified in this CWA are rather specific for public e-procurement and do not cover the special needs of the private sector in the field of e-sourcing. Public administrations have to account for the money spent and they are not allowed to prefer certain sup-

pliers as well as they have to make the process of finding and selecting suppliers fully transparent.

This is reflected in the CWAs by providing profiles and transactions for notifying the public on publishing information on current sourcing activities and their outcome as well as profiles and transaction for searching published notification. As the underlying business processes are very specific for public e-procurement, various directives of the European Union, in particular 2014/23/EU [14], 2014/24/EU [16], and 2014/25/EU [17] published in the course of the third phase of CEN/WS BII, are sources for business requirements addressed by the profiles and transactions of this CWA.

D. Tendering profiles and transactions

The parts of the e-procurement chain covered by the second CWA is also specific for public e-procurement. But while the former CWA addresses the issues related to notifying the public on sourcing activities by contracting authorities, this CWA addresses all issues related to sourcing activities themselves. The parts of this CWA are profiles and transaction for calling for tenders, for receiving tenders, as well as conducting the awarding and contracting the most appropriate tender.

In addition, profiles and transactions are provided by this CWA to provide the accompanying documents needed in the context of public procurement, namely the qualification and the virtual company dossier. The related profiles and transaction cover the processes for evaluating the capabilities of suppliers submitting tenders and for self-declaration by a supplier that all necessary regulatory criteria are met.

As Table 3 indicates, this CWA is the one with the most parts, i.e., with the most profiles and transaction. The number of parts is not driven by the amount of processes covered in this CWA, but rather by the complexity of the covered processes. The complexity has its origin in the multitude of goods and services purchased by public administrations as well as the multitude of suppliers and of public administrations themselves. Public administrations buy almost everything from simple goods for maintenance, repair and operations to complex buildings and machines. A public administration can be a small municipality with little IT capabilities or a national ministry having an advanced IT infrastructure at hand.

To address these multitudes, several profiles and transactions are provided for various maturity levels. For instance, the profile for calling for tenders comes in three shapes. Firstly, a simple call for tenders is provided allowing only the provision of the call for tenders and unstructured documents specifying the goods and services to be tendered, qualification criteria, etc. Secondly, an advanced call for tenders is provided allowing the provision of a structured specification of the goods and services, qualification criteria, etc. Thirdly, the advanced call for tenders can be combined with a so-called pre-award catalogue request allowing the requirements on the requested goods and services in a structured and vendor-neutral way based on classification systems for goods and services.

As the processes covered by this CWA are very specific to the public procurement, regulations are the main source for business requirements, in particular the aforementioned directives by the European Union.

E. Catalogue profiles and transactions

The CWAs discussed two sections before, are located in the pre-award phase of the e-procurement chain. The CWA for catalogue profiles and catalog transactions can be seen as the bridge between the pre-award phase and the post-award phase. Consequently, this CWA provides specifications of core processes and transactions for both e-procurement phases, in particular all core processes and transactions for exchanging catalogues in the tendering phase as well those needed after the awarding of a supplier. Some transactions related to pre-award catalogues and specified in this CWA are even used in the profiles in the CWA on tendering.

In addition, this CWA provides two guidelines as well. One guideline elaborates on the implementation of pre-award catalogues and illustrates by providing examples how the various profiles and transaction can be used.

The other guideline elaborates on the usage of classification systems with the various profiles and transaction. This guideline gives a survey on the four major classification systems CPV, UNSPSC, GS1 GPC and eCl@ss as well as many domain-specific classification systems like ATC, TARIC, ETIM, NCS, or ClaDiMed. Each of the classification systems is described and illustrated as well as examples are given what to do if the classification system is to be used in a transaction. Furthermore, issues of managing and providing classification systems are discussed.

F. Post-award profiles and transactions

The last CWA covers all core profiles and transactions for the post-award phase. These processes and exchanged transactions specify how to place orders (ordering), fulfill orders (fulfilment) as well as send invoices (invoicing) and pay invoices (payment). In the post-award phase, e.g., in ordering, fulfillment, invoicing and payment, the public and private sector are more similar in their goals, business requirements, and activities.

As a consequence, this area is more advanced than the pre-award area, because the standards developed for the private sector can be used in the public sectors as well. In particular, for almost every transaction there are syntax bindings to UBL and UN/CEFACT XML available. Compared to the CWAs from the pre-award area, it is easier to implement syntax messages available. In the case of the pre-award, appropriate syntax messages for a number of transactions have still to be developed by the standardization bodies.

A key profile and transaction in the post-award CWA is the profile for invoicing. In parallel to CEN/WS BII, a technical committee CEN/TC 434 was initiated to establish a semantic data model of the core elements of an electronic invoice [18]. The information requirement model for the corresponding transactions were aligned with the semantic data model developed by CEN/TC 434, which had an impact on the other IRMs, as all other IRMs are aligned to each other via the business term vocabulary.

In addition to the profiles and transactions, this CWA provides four guidelines as well. These guidelines provide fur-

ther details on how to implement specific use cases with the post-award profiles. The first guideline provides guidance on how to implement a master-data approach using the transactions by CEN/WS BII. The other three guidelines provide guidance on implementing the simplified invoice according to directive 2006/112/EC, on payment initiation and reconciliation, and pre-payments.

VI. Discussion

After presenting the approach and the outcome of CEN/WS BII, the workshop and its work shall be put into context as well as research questions derived that might be of interest for the community of Information Systems (IS).

First of all, the questions regarding the effect of empire building mentioned in the introduction shall be addressed, in particular the question, if the approach and the outcome by CEN/WS BII can serve as a means to reduce the effect of Empire Building.

Referring to Wüster et al. [19], it can be stated that CEN WS/BII moves the break-even point between the costs for standardization and conversion towards conversion. On the one side, the more messages exchange is standardized the more costs will be caused due to missed opportunities by a lack of individuality. For instance, in case of a maximum level of standardization a company may not be able anymore to provide specific services giving the company a competitive advantage.

On the other side, a maximum level of individuality will cause high costs for developing many peer to peer converters between the various formats, costs for the actual conversion of messages, and costs by inappropriate conversions, for instance, loss of information during the process of conversion. As a consequence, there is a trade-off between a maximum level of standardization and a maximum level of individuality. The challenge is to find the “break-even” between these two both extrema, as it is illustrated in Fig. 5.

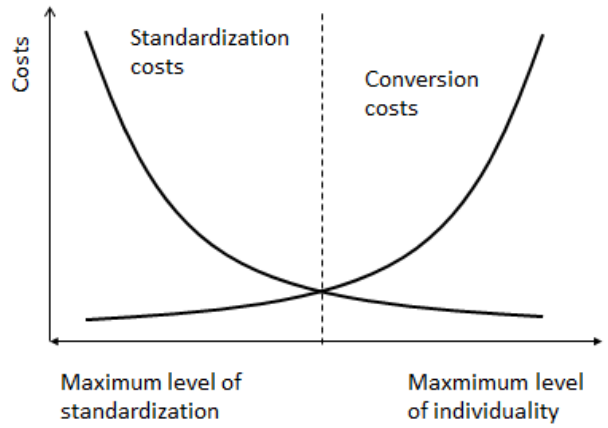

Fig. 5 Trade-off between standardization and conversion [19]

The approach taken by CEN/WS BII moves the point of “break even“ towards the maximum level of individuality, because its reduces the costs for conversion. The IRM with the syntax bindings to UBL messages and UN/CEFACT XML message serve as intermediary language allowing the conversion from one syntax message to another. In the case of the “Item standard identifier”, the syntax binding given in Table 2 states that from the perspective of CEN/WS BII both syntax elements have the same semantic, even if the semantics specified by UBL and UN/CEFACT XML may vary in details. But as long the syntax message is compliant to the corresponding IRM, the syntax elements can be easily converted from one to the other and vice versa.

Furthermore, as there are other standards for syntax messages available, for instance, the German standards BMEcat for exchanging catalogues or ZUGFeRD for exchanging invoices, they can also define a syntax binding for their syntax standard to the corresponding IRM.

This also can be illustrated with the information requirement “Item standard identifier” explained above. There, a syntax binding was defined to a UBL and a UN/CEFACT XML message. By defining a syntax binding to BMEcat as well (cf. Table 4), it now becomes possible to convert the bound syntax elements of UBL, UN/CEFACT XML, and BMEcat into each other.

The semantics of the syntax element INTERNATIONAL_PID defined in the BMEcat specification might be slightly different from the semantics specified for the information requirement “Item standard identifier”. But by using the syntax element with the semantics of “Item standard identifier”, the BMEcat catalogue message becomes compliant with the IRM of CEN/WS BII. This way, the BMEcat community can keep their standard and can address their use cases specific for their community, but allowing a usage of BMEcat compliant with CEN/WS BII. In consequence, the syntax standard BMEcat becomes “interoperable” with the other syntax standards having syntax binding to CEN/WS BII.

Table 4.
Syntax binding for Item standard identifier for UBL, UN/CEFACT XML, and BMEcat

InfReqId	Syntax binding
tir19-092	Catalogue/cac:CatalogueLine/cac:Item/ cac:StandardItemIdentification/cbc:ID
tir19-092	CrossIndustryCatalogue/ CICHSupplyChainTradeTransaction/ IncludedCICLSupplyChainTradeLineItem/ SpecifiedCatalogueTradeProduct/ID
tir19-092	BMECAT/T_NEW_CATALOG/PRODUCT/ PRODUCT_DETAILS/INTERNATIONAL_PID

Consequently, conversions to other relevant syntax standards become easier, as the syntax elements can also be converted to the corresponding syntax elements of UBL and UN/CEFACT XML. This allows communities to define syntax standards for their own special needs as well as being compatible—at least with respect to the core requirements—with other syntax standards in use. The conversions to those standards become less expensive to develop and help to balance heterogeneity and interoperability of information systems in place [20]. In fact, it is argued that communities often just need a core they can adapt to and amend it with their community-specific requirements [21].

Here lies a first field of action, where the IS community can contribute to the standardization work. Although, the ex-

ample might give a good indicator for the benefits of the approach by CEN/WS BII, the question remains, if the approach will keep what it promises, i.e., that small and specialized communities can keep their practice-proved and tested syntax standards on the one side and at the same time are interoperable with other e-procurement systems with acceptable costs. Because, it might be also the case that the approach of CEN/WS BII is just another, but very subtle, means for empire building. It will not squeeze out particular syntax standard out of the market, but rather making all the syntax standards the same by imposing mandatory requirements on them.

Related to this first field of action, there is another field of action related to the second proposition of CEN/WS BII. To make syntax binding to IRMs feasible, these IRMs must cover an accepted and stable set of requirements. As mentioned before, the CWA on methodology and architecture elaborate on the concept of core and core requirements. This part of the CWA gives a definition and requirements on the core as well as hints how to find these core requirements. But this part lacks a precise definition, what a core requirement in practice is, and lacks a sound methodology how to find the core requirements in the various uses cases in the e-procurement chain.

In a wider vision, this requires that the architecture of all types of e-procurement standards used in Europe should be compatible with each other. There are initiatives to promote and ensure this kind of compatibility, such as ISA, the European Commission's program for interoperability solutions for European Public administrations. This initiative developed the so-called European Interoperability Reference Architecture (EIRA). EIRA offers a service-orientated method, models and building blocks to develop, extend, and adapt any kind of e-government solution in Europe in a harmonized manner aiming at achieving interoperability over the whole lifecycle of these systems. In respect to specification by CEN/WS BII the challenge is to harmonize the profile- and process-orientated approach CEN/WS BII with the service-orientated reference architecture of EIRA in a way that the practical needs of users both on the buying and the selling side are taken in account. They have to understand, accept, efficiently use, and incorporate these standards and specifications in their everyday work.

In spite of the benefits of the outcome of CEN/WS BII, there are other limitations. One of them is that possible variants of a product, service, or process are not explicitly modeled. In the terms of CEN/WS BII they are interpreted as extensions or changes of the "Core". But modelling and implementing these extensions or changes may be not easy because of the complexity and major diversities related to the various types of product, service types, and supply chain as well as the worldwide differences procurement regulations on the political, organizational, and technical level. In addition, in some industries and trading areas there exist special order and delivery concepts.

Possible variants may cover product specific differences (liquids, hazards, food), sectors specific differences (health, chemistry, logistics), special supply chain types (projects, automotive supply chains and special order and delivery concepts like vendor managed inventory (VMI) or just-in -time delivery (JIT).

To incorporate these variants in goods, services, processes, and supply chains and to identify the common core requirements as well as provide the means to identify and to specify the core requirements is a third field of action where the IS community can contribute to the field of e-procurement standardization.

VII. Conclusion

In this paper, the work of the third phase of CEN/WS BII was presented and discussed. The outcomes provide a basis for implementing European-wide public e-procurement from notification and tendering to fulfilment and payment. The outcome was discussed arguing that the outcome might reduce the effect of empire building and allows an increased level of individuality by increasing the interoperability of e-procurement systems. Based on this, research questions and themes were outlined that might be addressed by the IS community in the future.

Addressing these research questions, may help to improve the approach of CEN/WS BII. This is important, as CEN has decided to establish the technical committee CEN/TC 440 [22], which picks up the outcome of CEN/WS BII and has the mandate to transform the CWAs into an efficient and acceptable formal European standard for public procurement. In fact, the work done by CEN/WS BII and continued in CEN/TC 440 contributes to one of the "grand challenges of Information Systems research" identified by Becker et al. [23] to "[integrate] information systems in one single virtual space" of e-procurement systems.

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