

Background document v2.0 - 31/5/2013

2 **Executive summary**

3 This section to be further developed.

4 **1 Introduction**

5 This report is a work of the European Multi-stakeholder Forum on Electronic Invoicing
6 about the work carried out in the domain of e-invoice standardisation, which is one of the
7 four areas of work in the Forum. This report summarises the result of the work in the
8 Forum's Activity 4 from the first meeting of the Forum up to the delivery of
9 Recommendation and this companion Background Document as agreed in the meeting of
10 the Forum on 7 March 2013.

11 The report aims at giving explanations and further details as background information for the
12 "Recommendation on Interoperability for e-Invoicing and the use of a Semantic Data
13 Model" that the European Multi-stakeholder Forum on Electronic Invoicing to the European
14 Commission. This document must be considered together with the Recommendation.

15 **1.1 The European Multistakeholder Forum on Electronic Invoicing**

16 A Commission Decision of 2 November 2010 set up the European Multi-Stakeholder Forum
17 on Electronic Invoicing (e-invoicing). This is a larger group of experts (over 60), which is
18 comprised of two members for each Member State, six members of European associations
19 representing consumers, small and medium-sized enterprises and large corporates and
20 one representative from the European Committee for Standardisation (CEN), the European
21 Central Bank (ECB) and the Article 29 Data Protection Working Party each.

22 In carrying out its tasks, the Forum shall take account of the results of previous activities,
23 existing work and solutions, in particular concerning the legal environment, business
24 requirements and technical standards, in the domain of e-invoicing in the public and private
25 sector".

26 The Forum initially was specifically tasked;

- 27 • to assist the Commission in the monitoring of the development of the e-invoicing
28 market and the e-invoicing adoption level in industry and services sectors
29 across the Member States;
- 30 • to bring about an exchange of experience and good practice that facilitates the
31 emergence of interoperable e-invoicing solutions;
- 32 • to point out problems encountered in particular as regards cross-border
33 transactions and propose appropriate solutions;
- 34 • to support and monitor work leading to the adoption of a e-invoice standard data
35 model.

36 **1.2 Overall objectives and business drivers for e-invoicing**

37 The overall objective of the European Commission's initiative on e-invoicing is 'to make e-
38 invoicing the predominant method for e-invoicing by 2020'. This objective targets society as
39 a whole, including businesses, consumers and public administrations.

40 The benefits of e-invoicing are described by the European Commission in its
41 communication on e-invoicing¹ :

42 *"Unlike paper-based invoices, e-invoices provide all data in digital format. Such e invoicing*
43 *offers substantial benefits over paper invoicing. It allows for shorter payment delays, fewer*
44 *errors, reduced printing and postage costs and, most importantly, fully integrated*
45 *processing. One distinctive feature of the e-invoice is therefore its potential for automation,*

¹ after COM (2010) 712 Final

46 *especially if the invoice is sent in a structured format: e-invoices can be generated and*
47 *transferred automatically and directly from the issuer's or service provider's supply chain*
48 *systems to those of the recipient. Most of the economic benefits therefore do not arise from*
49 *savings in printing and postage costs but rather from the full process automation,*
50 *integration from order to payment between trading parties and innovation made possible."*

51 To make it possible to turn the objective into practice, both the need for 'interoperability' as
52 well as the need to 'be able to reach large audiences, including SME's', have been
53 identified as crucial. Where the solutions that will be used for e-invoicing need to consider
54 that the needs and the possibilities for SME's hugely differ from those for large enterprises.

55 Interoperability of e-invoicing solutions may be a problem today and the aim is to overcome
56 the current fragmented situation that follows from the heterogeneity of requirements and
57 invoicing traditions among industries, geographies and jurisdictions, as well as the
58 existence of legacy computer systems. These differing needs and historical circumstances
59 have resulted in a huge variety of often incompatible content standards.

60 **1.3 Obstacles today for making e-invoicing predominant**

61 E-invoicing is already being used by user communities² all over Europe. Today there are
62 barriers both across national borders and across business sectors where different
63 technologies and solutions are being used. To further help contribute to the objective
64 mentioned, solutions must be identified for bridging between different isolated "islands"
65 where that is relevant and justified by business needs³.

66 For obvious reasons, there is no universally agreed single format today that can be simply
67 introduced; communities have invested in current e-invoicing solutions, optimally meeting
68 their business requirements. Any effort aimed at the introduction of a European e-invoice
69 standard must recognise this situation.

70 Note that not only the concepts of e-invoicing described in standards and specifications
71 need attention for the sake of a further uptake. There are more and equally important
72 aspects that must be taken care of, where the organisational aspects of the use of e-
73 invoicing are such an important factor: in order to make e-invoicing reach the mass market
74 and to see it being broadly used simplifications are needed in the on-boarding process, i.e.
75 the activity to start e-invoicing between a supplier and a buyer. The process of setting up
76 the exchange of information electronically may be time consuming when this has to be
77 done on a bilateral basis in every business situation (what technology and what messages
78 to be used). This may become exponentially cumbersome in N:M business relations. This
79 is where the role of service providers may be beneficial, as they may bring a solution to the
80 lack of tools and services for conversions between formats, that may be a limiting factor for
81 the use of e-invoicing across communities.

82 **1.4 Objectives**

83 This document provides the background information that is supposed to accompany the
84 Recommendations issued to the European Commission by Activity 4 Group of the
85 European Multistakeholder Forum on e-Invoicing. These Recommendations follow from the
86 approach that Activity 4 Group has proposed with the aim to contribute to the above
87 mentioned objective. The 'ex-ante verification' working method of Activity 4 showed that
88 this approach could be expected to yield a better contribution than the 'migration to single
89 data model' as envisaged in COM (2010) 712 Final; it was approved by the European

² Where a 'community' can be a Member State, an industry sector, a large corporate and its buyers and suppliers, etc.

³ Ref: 3d meeting of the European Multistakeholder Forum on e-Invoicing

90 Multistakeholder Forum on e-Invoicing and European Commission in their meeting of 26
91 September 2012.

92 This approach shows a focus on 'interoperability' rather than 'convergence' (certainly for
93 the short-to-medium term) in the area of standardisation of the invoice information being
94 exchanged between actors in trade.

95 Where the focus is initially on the invoice, it is of importance to keep in mind the invoice in a
96 larger context. The invoice is connecting different domains such as supply
97 chain/procurement, payment and financing, book-keeping and tax issues. In addition to
98 that, the following starting points for the work were assumed:

- 99 • E-invoices in structured format provide larger benefits than unstructured
100 formats. Therefore the aim has been to promote the use of e-invoices in
101 structured formats.
- 102 • The current fragmentation of e-invoice solutions should be eliminated by a
103 consistent framework based on a common semantic e-invoice data model,
104 where relevant and justifiable by business requirements.
- 105 • A pan-European e-invoicing landscape may not consider invoicing in public
106 procurement (B2G) different from invoicing for businesses (B2B). There is no
107 difference between a public sector entity as party and trade and a private sector
108 entity in the same role.
- 109 • Ways of making the public sector act as a driver for promoting e-invoicing with
110 focus on increased interoperability shall be given special attention.

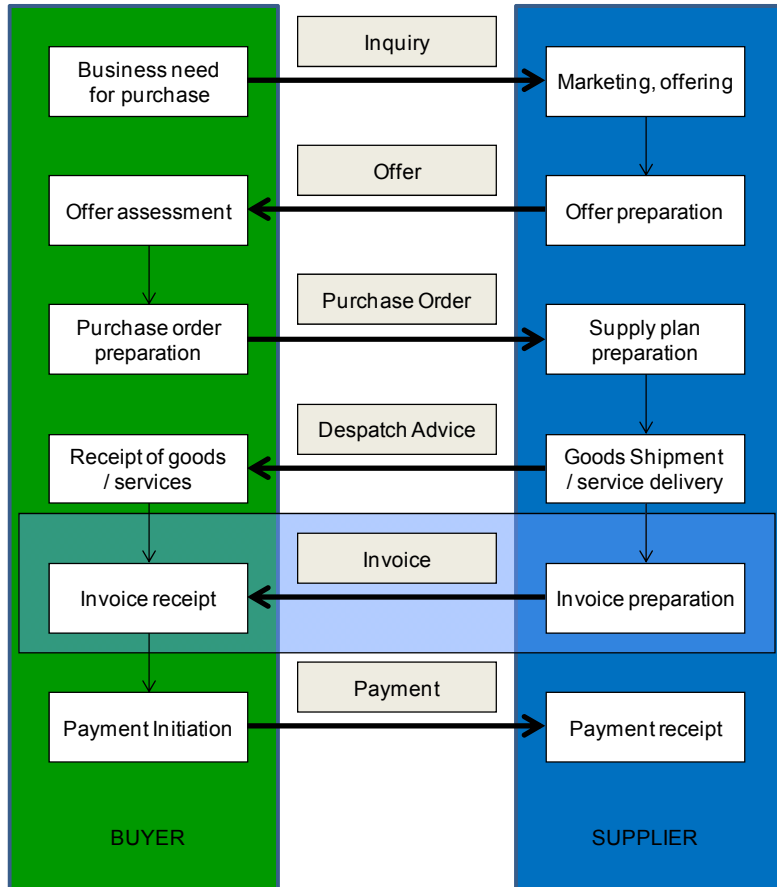
111 The Recommendations assume that - once reviewed and endorsed by the European
112 Commission - the actual work coming from it (e.g. development of standards) shall be done
113 in recognised bodies with the relevant and formal remit.

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115 **2. Invoicing**

116 **2.1 The Invoice as part of the business process**

117 The Invoice plays an important role in the purchase-to-pay business process. Many
 118 variations exist on this process pattern: Buyer and Supplier may conclude a blanket
 119 contract, containing (delivery and payment) conditions, the Despatch Advice may not be
 120 present, the Invoice (and payment) may precede the delivery, etc. In all cases the Invoice
 121 is to prove that the sales transaction has been concluded, specifying the products or the
 122 services that have been sold and the amount due as a result of the transaction. One
 123 example of such a process is depicted in figure 2.1.



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Figure 2.1 Purchase-to-pay process – Example

126 In the public sector many contracts are concluded after a public tendering process. After
 127 awarding, the purchase-to-pay processes in the public sector are however not different
 128 from purchase-to-pay processes in the private sector and also the invoicing process has
 129 exactly the same function.

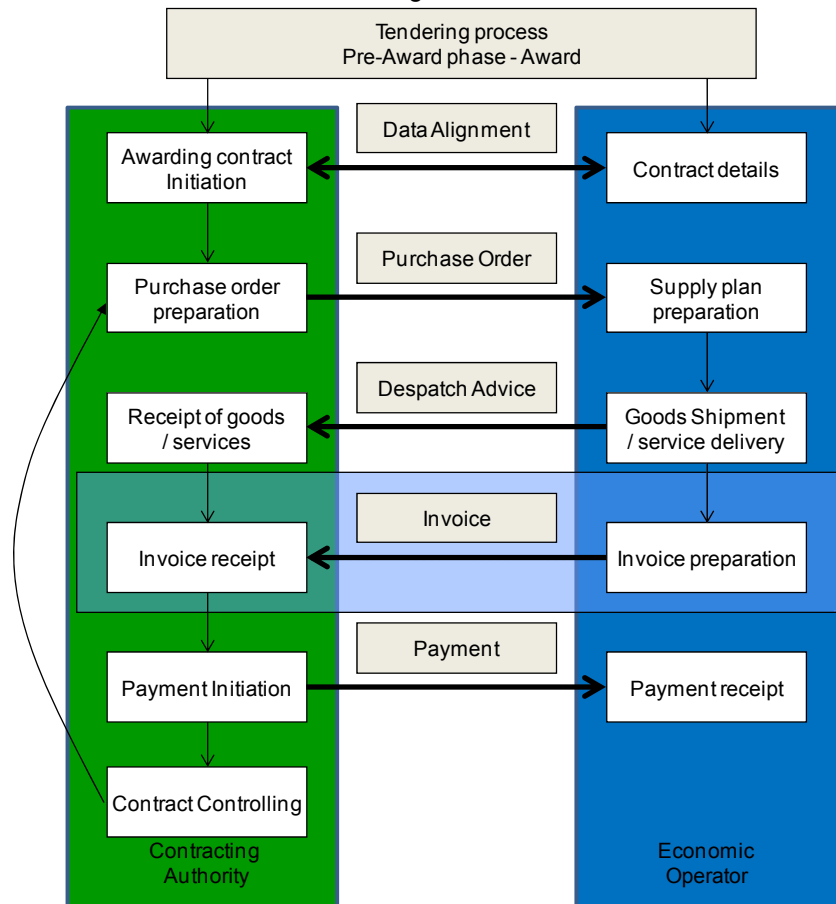


Figure 2.2 Purchase-to-pay process after public tendering

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132 The information content of an invoice is determined by the information requirements of the
 133 purchase-to-pay process. Both process and information content are driven by the type of
 134 business transaction. As a part of the process, an invoice in fact documents the change in
 135 ownership of goods or services within the established relationship between buyer and
 136 supplier.

137 The nature of ownership change during the trade transaction is the same for each business
 138 sector; again there is no need or real reason to distinguish between a public sector entity
 139 as an actor (e.g. buyer) in trade and a private sector entity in the same role. Enterprises
 140 may serve public and private customers simultaneously.

141 But: specific e-invoicing methods, requirements and standards, nevertheless required
 142 today explicitly by or for the public sector - in order to meet local legal or regulatory
 143 requirements form one of the basic hindrances in e-invoicing uptake in the EU.

144 **2.2 Core invoice functions**

145 The information that is contained in an invoice is needed by the receiver to complete
 146 certain activities. These activities are part of one or more business processes, e.g. the
 147 purchase-to-pay process and the accounting process. The invoice supports those activities
 148 with the information it contains. Information is conveyed in information elements (such as
 149 an "Invoice Number" or a "Total Amount").

150 In addition the invoice document may serve as a legal proof. The invoice proves that a
 151 claim is posed by the supplier on the buyer, and that the VAT amount as stated on the
 152 invoice is to be paid by the buyer. The invoice needs to support the auditing activities of tax
 153 authorities. Tax authorities need to audit the correct administration of VAT payments and of
 154 the amounts to reimburse.

155 For tax auditing purposes, the following list mentions some of the activities that have to be
156 carried out by an auditor:

- 157 • Extract the invoice from an archive
- 158 • Verify the invoice authenticity, integrity and readability
- 159 • Identify the buyer and seller
- 160 • Identify the products and services as being subject to the VAT rate claimed
- 161 • Check the VAT calculation

162 The information elements needed for tax auditing purposes are listed in European
163 directives and in legislation of member states. This set of elements may be called the Legal
164 Section (or '*foundation*') of the invoice. Each invoice needs to contain the Legal Section
165 elements. Inclusion of these elements is mandated by law, to enable tax authorities to
166 perform auditing.

167 The foundation elements are however not sufficient to make the invoice complete: they do
168 only support auditing. The organisation of the buyer needs to perform a number of activities
169 itself. These activities depend on the type of goods and services and on the process flow,
170 but activities that usually need to be performed by most organisations that receive invoices
171 are:

172 **Checking the invoice:**

- 173 • Check whether the invoice is authentic and valid
- 174 • Identify the invoicer as role of the seller
- 175 • Check that the delivery has been performed
- 176 • Check that the invoiced goods and/or services have been ordered
- 177 • Check the specification of the goods and services against order and delivery
- 178 • Check quantities of goods and services
- 179 • Check prices, allowances and charges against a contract, price list or order
- 180 • Check invoiced amounts
- 181 • Check VAT amounts
- 182 • Check payment conditions

183 **Financial administration:**

- 184 • Book the payable amount into accounts receivable
- 185 • Book the amounts into the applicable cost accounts
- 186 • Book the VAT amount into applicable VAT accounts

187 **Payment preparation:**

- 188 • Schedule the payment
- 189 • Perform cash management

190 These activities are part of the purchase-to-pay process and/or the accounting process.
191 They can be regarded as the core activities to be performed on reception of an invoice. The
192 information, contained in the invoice is to enable these activities.

193 In court, the invoice may be presented as a proof of the trade transaction. For this purpose,
194 the invoice is to contain information with regard to:

- 195 • Reference to orders and contracts
- 196 • Time and place of the deliveries
- 197 • Quality and quantity of the goods and services
- 198 • (Reference to) delivery terms
- 199 • (Reference to) payment terms

200 **2.3 Invoice variations**

201 Depending on the type of goods and services and on the overall purchase-to-pay trade
202 process, the core activities listed in section 2.2 may need different information elements.
203 Examples of differences in purchase-to-pay processes that impact the invoice information
204 elements are:

205 • Contract or no contract, order or no order
206 In some cases, deliveries may take place without a contract being established
207 previously, or without a (call off) order being placed.

208 • Pre-payment
209 In some cases payment was performed before the invoice was issued. In such
210 case payment instructions are not included, but the payment, e.g. by credit card,
211 may have to be referenced.

212 • Metered products/services
213 Invoices for metered products, such as electricity or telecom, often need meter
214 readings or detailed specifications

215 • Subscriptions
216 Invoices for subscriptions often need to quote the period that is invoiced

217 • Identification schemes
218 In some cases products or services, parties and addresses are identified with
219 identifiers, issued by the supplier, the buyer or some neutral organisation (e.g.
220 GS1)

221 • Transport
222 In transport invoices often complex calculations are included, involving distance,
223 square meters, weight, time, etc.

224 • Complex delivery
225 Products are delivered at multiple locations on multiple dates or to multiple
226 parties/contacts

227 • Temporary labor
228 In invoices for temporary labor the worker needs to be identified, and the type of
229 hours he worked (regular, over time, etc.)

230 • Addresses
231 Different countries have different address schemes. In most countries a country
232 sub-division (e.g. province, Land) must be part of the address, but not in all (e.g.
233 Holland). In most countries a post code is required, but not in all (e.g. Ireland)

234 • Periodic invoicing
235 All deliveries over some period are contained in one invoice

236 This means that invoice templates or specifications always will contain a number of
237 optional elements, the usage of which is dependent on, e.g., the type of product to be
238 invoiced. Moreover, in specific supply chains invoices may need to support additional
239 activities or may have additional requirements due to the type of goods or services
240 invoiced. Examples are:

241 • An invoice may serve as a delivery document and may be used to trigger
242 inventory transactions

- 243 • Invoices may need to refer to advanced logistic planning communication
- 244 • Invoices may be issued by the Customer instead of by the Supplier (self-billing)
- 245 • Invoices may need to state serial numbers, batch numbers or best before dates
- 246 for tracking and tracing purposes
- 247 • Invoices may need to be as short as possible for performance reasons (e.g. for
- 248 invoicing trade in financial securities)
- 249 • Invoices may be needed to support customs clearance and may need to include
- 250 additional information for that purpose, such as specific product classifications
- 251 • Invoices may need to include treatment codes, person id's, birth dates and
- 252 references to insurance coverage (health care)
- 253 • An invoice may cover deliveries by multiple sellers, e.g. when an intermediate
- 254 party such as an auction bundles invoices (agriculture)
- 255 • Invoices may need to support financial services such as factoring, transport
- 256 insurance or trade financing
- 257 • Invoices may be used for marketing purposes, e.g. stating the credits the
- 258 customer earned in a loyalty program or giving him reduction on a future
- 259 purchase

260 When making invoices electronic, each industry sector designed an e-invoice around these
261 variations and additional functions. Little cross-sector interoperability exists, as companies,
262 and specifically SME's, cannot be expected to implement all variations and invoicing
263 options in their invoice processing systems.

264 Total cross-sector interoperability is not really needed, though. It is unlikely, for example,
265 that a British steel plant receives invoices from the Italian silk industry and, when cross
266 sector invoices are needed, they typically do not need to contain sector specific element
267 but they should just support the automation of the basic invoice processing. Many
268 industries are part of one or several supply chains. Their procedures and systems are
269 tailored to the requirements of those chains.

270 So two situations must be distinguished:

- 271 • Purchase-to-pay processes for general (facility) goods and services
- 272 • Purchase-to-pay processes in specific supply chains.

273 Not all products are being sold to all organisations. Especially the purchase of primary raw
274 materials is usually specific to companies that are part of a specific supply chain.

275 General (facility) goods and services, such as office supplies, are purchased by all
276 organisations independent of their nature. Invoices for these products therefore need to be
277 processable by generic invoice processing systems. They should not contain elements that
278 are very specific to the products or that support very specific business processes. Products
279 that are sold to most types of organisations include: office supplies, utilities, professional
280 services, maintenance, catering and cleaning, subscriptions, temporary staffing, etc.

281 As illustrated above, many supply chains have specific commercial and logistic
282 characteristics that translate into specific business processes with specific document
283 requirements. These specific requirements may include product identification, periodic
284 invoicing, Vendor Managed Inventory, multi-vendor invoices, self billing, etc.

285 In some supply chains an invoice document is not even needed for the procurement-to-pay
286 business process; its role is taken by another document (e.g. a Despatch Advice) or an
287 invoice is only created for legal and auditing purposes.

288 In a number of industries electronic business documents have been specified to support
289 the specific business process in the industry supply chain. Examples include Fast Moving
290 Consumer Goods, automotive supply, electronics, insurance, agriculture and health care.

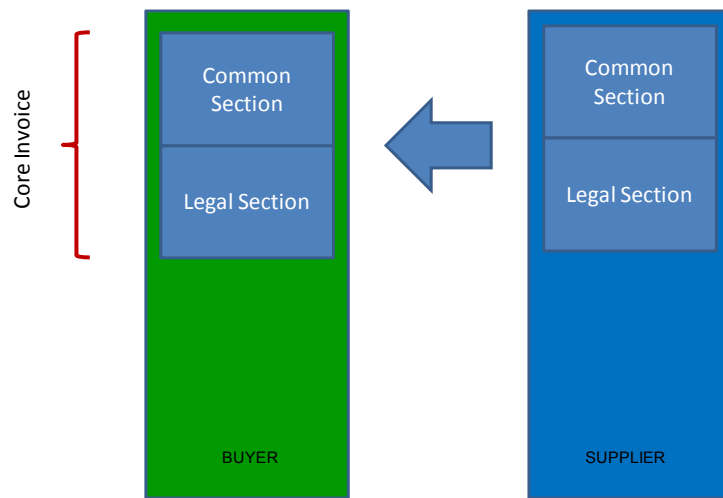
291 In many such supply chains electronic communication has been implemented for years and
292 supports advanced logistic planning and control. These implementations deviate from

293 electronic communication, used for processes for facility goods and services. However,
 294 companies buying these specific products also purchase facility products. So their systems
 295 should also be capable of processing generic invoices.

296 **2.4 Core Invoice concept**

297 The concept of a Core Invoice assumes that a (small) set of information elements can be
 298 defined that supports the core invoice functions as listed in section 2.2 for generic (facility)
 299 products. If, Europe wide, all organisations implement the e-invoice using these elements,
 300 e-invoicing may take place without pre-negotiated bilateral agreements. The concept of a
 301 Core Invoice has been adopted by both the CEN MUG project and by the consecutive CEN
 302 BII Workshops .

303 The core invoice should not assume specific agreements on (supply chain specific)
 304 aspects, such as identification schemes or process variations. It should be used by
 305 organisations in both the public and the private sector.

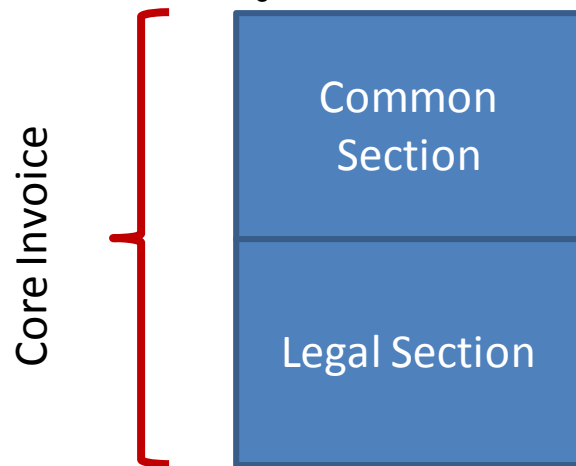


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Figure 2.3 Core Invoice

308 Requirements, stemming from some specific facility goods and services need special
 309 attention: e.g. utilities, temporary staffing and repair services. Invoices for these products
 310 are received by most organisations but may need to support specific facility processes. It
 311 must be decided whether to include extra information elements in the core for these
 312 processes. The 'acid test' is whether a randomly selected customer must be assumed to be
 313 able to process such elements. If the information system of the average customer is not
 314 capable to support the elements in a structured way, the information needs to be
 315 represented using the extension mechanism explained in section 2.4 or as (human
 316 processable) free text in the core invoice or to be exchanged in another way (e.g., a
 317 separate document). Elements, that are common across industry sectors and that support
 318 the core activities listed above, together with elements that are legally required, form the
 319 Core Section of the invoice.

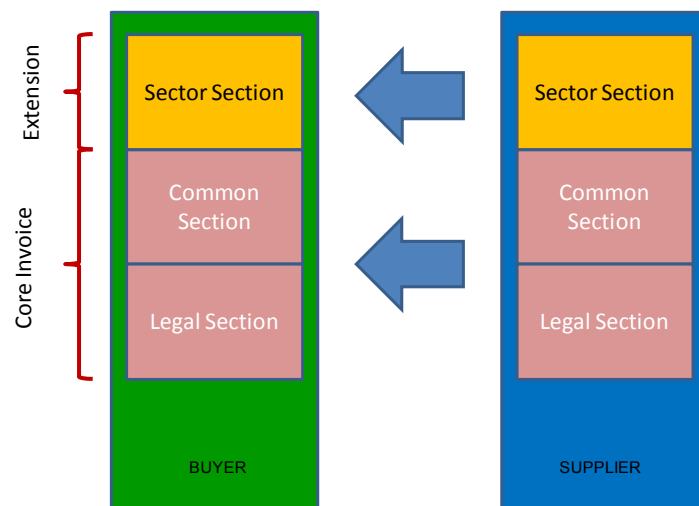


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Figure 2.4 Core Invoice

322 **2.5 Core Invoice extension mechanism**

323 The specific requirements of certain supply chains should be translated into information
324 elements that extend the core set. Only companies that are part of such supply chain are
325 expected to be able to process such extensions.



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Figure 2.5 Supply chain extensions

328 If supply chain specific elements are defined as extensions to the core, cross sector trade
329 could still use the core. Invoice processing systems then at least support the core while
330 ignoring extensions is a decision that should be left to each specific business.

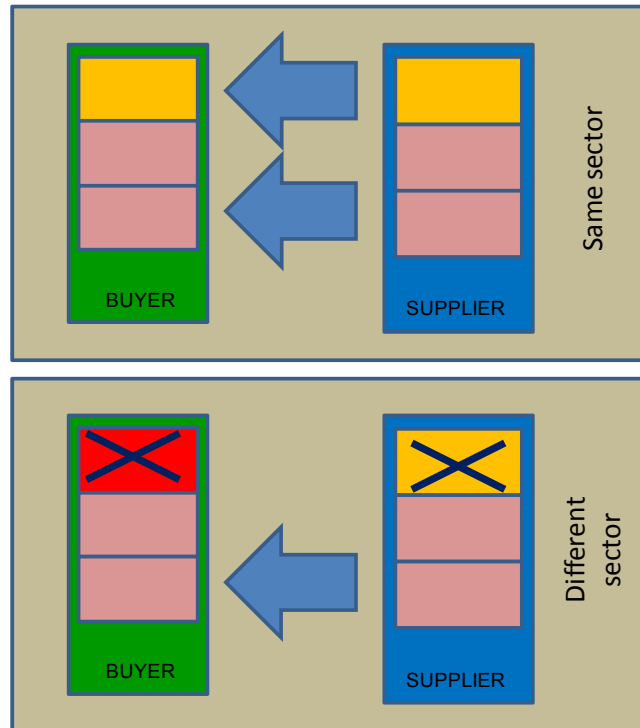


Figure 2.6 Cross sector invoicing

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333 Extensions may in many cases not be sector specific, but specific to functions, needed by
 334 multiple sectors. E.g. Vendor Managed Inventory has been implemented by the automotive
 335 industry, but also by the steel and by the printing industry. Similar functions should be
 336 supported by the same elements. This can be achieved by storing the semantics of these
 337 elements (and the requirements they cover) in a semantic repository or reference registry.

338 2.6 National extensions

339 The EU VAT Directive of 2010 and subsequent adoption by the 27 Member States aimed
 340 to facilitate the increased adoption of e-Invoicing. It implies that each e-Invoice needs to
 341 fulfil a minimal set of requirements to be compliant with these laws. It enumerates up to 18
 342 required information elements. The new laws intend to simplify e-Invoicing by also allowing
 343 business controls.

344 This more liberal legislation has opened the market to a plethora of possible solutions. An
 345 Invoice may now in fact contain any information, provided there are controls to aid auditing.
 346 As a result, Member states individually defined elements they find necessary for (tax)
 347 auditing activities even further enlarging the fragmentation in the European markets.

348 In 2011 CEN hosted several e-Invoice Workshops, which analysed the issues and
 349 developed recommendations (Workshop Agreements) on how Government and Business
 350 can use e-Invoicing to maximise savings for all. A key finding from these CEN Workshops
 351 was that *“there is no universal standard for invoice information content”*.

352 Having regard to the current VAT Directive and its adoption in EU Member States and
 353 significant differences between local invoice information content requirements, up to 27
 354 (different) national e-invoice information contents and e-invoicing business process
 355 specifications could be expected. This results in up to 27 x n different sector e-invoice
 356 specifications (n is the quantity of different sector specifications). This will be a new, huge
 357 barrier for e-invoicing uptake in the EU, particularly for intra Member State border trade.

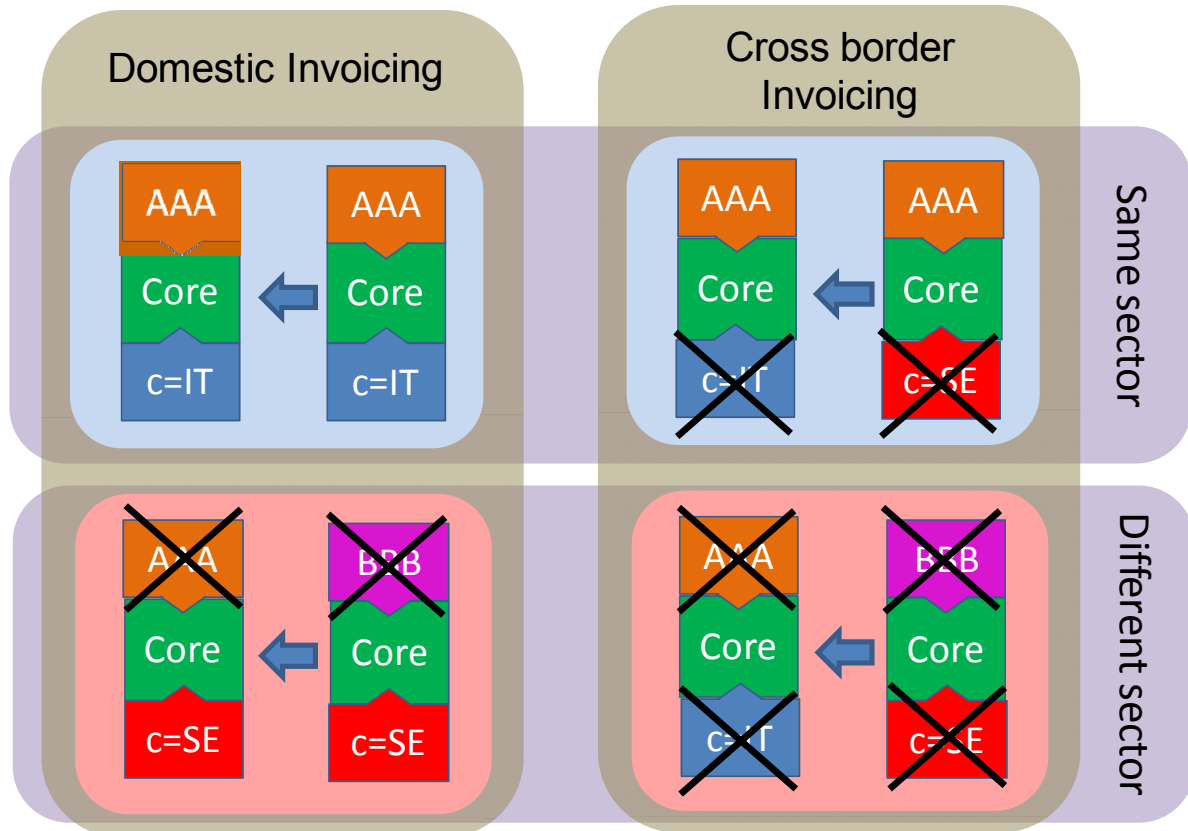


Figure 2.7 Core invoice and extensions

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360 Each VAT compliant invoice should contain the same core: a basic set of legal and
 361 common elements. Each Member State may extend that core, based on their specific legal
 362 requirements, such as additional taxes and auditing practices. Specific sectors may have
 363 additional requirements, so the invoice can be used as part of their business processes.

364 The diagram in figure 2.7 shows how various invoices can interoperate once the core
 365 requirements are separated from national and sector extensions. The sector and national
 366 requirements may be different, depending on the sector involved and which Member State
 367 the transaction occurs in, but the core remains constant. The Country Section is a set of
 368 elements required in a national invoice but not contained in the core set of elements.

369 One of the main obstacles for e-invoicing uptake in the EU, as identified by the European
 370 Commission, is the actual differences in Member States regulations, in spite of the general
 371 EU VAT Directive. Resulting in different requirements for invoice information content and
 372 different e-invoicing rules. These differences need to be clear and therefore each Member
 373 State needs to define their "extensions".

374 These extensions should not be needed for cross-border scenarios within Europe. If an
 375 element is needed for cross-border invoicing, then by definition it cannot be a Country
 376 Section.

377 Ideally there should be no Country Sections - every Member State should have the same
 378 legal requirements. In fact, the existence of the Country Sections does highlight the
 379 differences between Member States and discussions can be initiated to facilitate
 380 convergence by removing them over time by harmonising regulation and legislation.

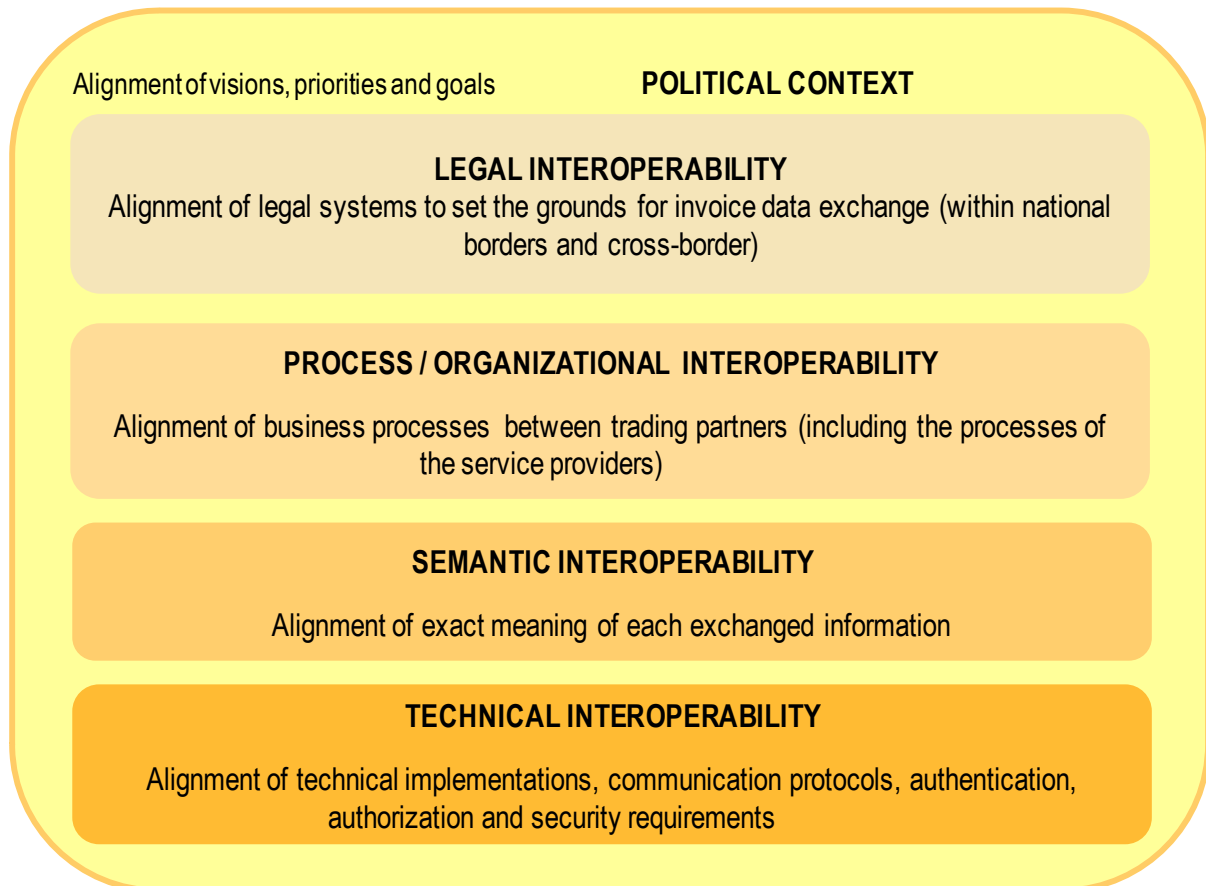
381 Supply chain specific extensions must be based on real business requirements. These can
 382 only be gathered by sector organisations such as GS1, Odette etc, or ultimately by the
 383 implementers themselves who understand these requirements. The resulting information
 384 elements need to be registered, with reference to the requirement. New requirements need
 385 to be checked against that registry.

386 3. Services and technology

387 3.1 Interoperability of electronic invoices

388 For educational purposes, reference is made to the European Interoperability Framework
389 (EIF 2.0) that has been introduced by the European Commission IDABC as a 'tool' to help
390 interoperability between (e-)Governments. It defines four levels of interoperability.

391 The text below figure 3.1 shows how these levels translate when applied to electronic
392 invoicing: trading partners must align all four levels of interoperability (as shown in Figure
393 3.1) to successfully exchange electronic invoices.



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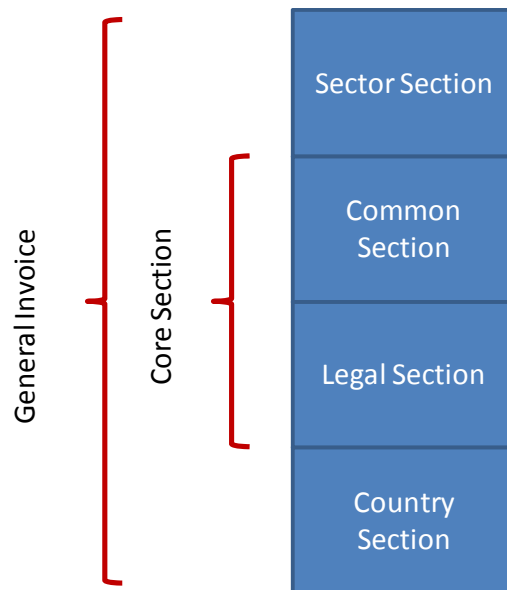
Figure 3.1 Levels of interoperability

396 **Political context** is set by various European Commission documents, especially
397 Communication COM(2010) 712 "Reaping the benefits of electronic invoicing for Europe"
398 which sets the goal that e-Invoicing becomes the predominant form of invoicing in Europe by
399 2020, and Communication COM(2012) 573 "Single market act II" which defines a key action
400 to "make electronic invoicing the standard invoicing mode for public procurement".

401 **Legal interoperability** is established by European VAT directives, Council Directive
402 2010/45/EU of 13 July 2010 amending Directive 2006/112/EC on the common system of
403 value added tax as regards the rules on invoicing being the one that applies at the time of
404 writing this document and their implementations in the national legal systems of the
405 European Union member states.

406 However, in some member states there are still country-specific provisions in the national
407 VAT legislation that create obstacles to establishing Europe-wide e-Invoice interoperability,
408 because they require country-specific extensions to the e-Invoice data model (as shown in
409 Figure 3.2). To ensure coherent implementations and minimize requirements for country-

410 specific extensions, DG TAXUD also issued explanatory notes with clarifications on the
 411 meaning of certain provisions in the directive, so it is to be expected that such extensions will
 412 be minimized (and perhaps even totally avoided) in the future.



413

414

Figure 3.2 Country-specific section in the invoice.

415 **Process or organizational interoperability** requirements are usually defined by vertical
 416 industries, that strive to standardize their business processes to make them more efficient.
 417 To satisfy these requirements, an e-Invoice data model should also provide for extensions
 418 needed to provide the data for these specific business processes.

419 To establish **semantic interoperability**, both parties must have equal understanding of the
 420 meaning of each piece of data contained in the invoice. This means not only the definition of
 421 business information contained in each particular field of the data format, but also definitions
 422 of the values of codes (controlled vocabularies) contained in those fields.

423 **Technical interoperability** deals with questions such as:

- 424 • how to express the Semantic Data Model in particular syntax (file format)
- 425 • how to address the trading partners (parties) and route the data
- 426 • how to exchange information over the network (web services and/or
 427 communication protocol definition)
- 428 • how to protect data from unauthorized modification, ensure their integrity and
 429 achieve non-repudiation
- 430 • mechanisms for authentication and authorization

431 **3.2 A few words on 'Structured' and 'unstructured'**

432 Information such as free formatted text, as used in this document, or an image, is said to be
 433 unstructured. It means that there is no formalized order and rule for the data representing
 434 the information. The opposite is structured data which forces the information to be
 435 represented in a certain way.

436 People use unstructured data every day for creating, storing and retrieving reports, e-mails,
 437 spreadsheets and other types of documents. In the unstructured content, there is no
 438 conceptual definition and no data type definition - in textual documents, a word is simply a
 439 word.

440 The advantage of structured data, is that it allows automatic processing of the information.
 441 Structured data is understood by computers.

442 Furthermore, electronic documents (in general) may have two versions (representations) of
 443 the data: external (preview) and internal (processing). External representation is used for
 444 previewing/displaying the document on computer screen or on paper to a human, whilst
 445 internal representation is used for automatic processing of the document content by a
 446 computer system.

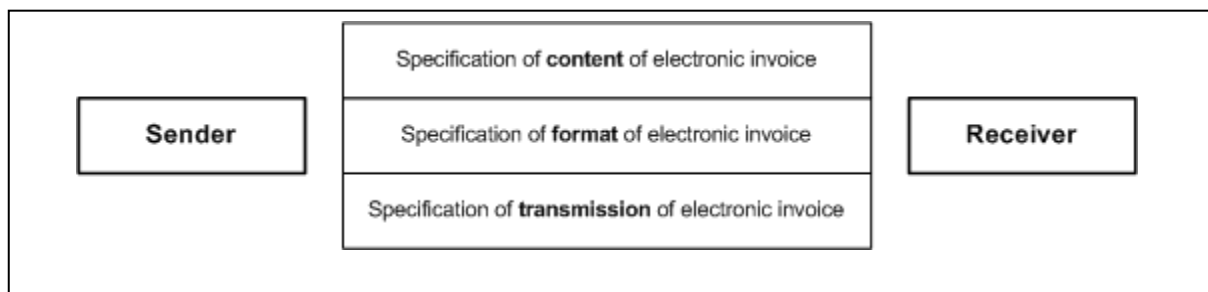
447 Structured data may contain an embedded preview version (image) of the data or generate it
 448 on-the-fly from the internal representation, while unstructured documents in general contain
 449 only the preview version. So an electronic message in some of XML formats (UBL, CII, ISO
 450 20022) conveys structured data, while a (basic) .pdf document does not⁴

451 **3.3 Semantics and Syntax**

452 For full electronic processing of an invoice, the recipient of the invoice (usually 'the buyer')
 453 will try to match information regarding the quantities, price per unit, terms, etc. obtained from
 454 the supplier to the information on the purchase order and to the quantities actually received.
 455 This is called a '*three way match*'. After the suppliers invoice has been validated by the
 456 three-way match, it can be further processed for payment. The three-way match is an
 457 important step in safeguarding an organization's assets.

458 For automated systems to be able to do the processing without manual intervention, the
 459 information needs to be available and the systems need to be able to understand it correctly:
 460 '20120727' and '27072012' mean the same date – depending on the geographical location
 461 in the world – but a simple comparison of the character strings or numerical values would
 462 yield 'unequal'. This chapter introduces the concepts and terminology that are important for
 463 understanding of the relevant topics in this context.

464 In order for the recipient of electronic messages to be able to understand and interpret them
 465 correctly, agreements must be made in some form with the sender of the electronic
 466 messages. This is illustrated in the figure below:



467

468 From top to bottom:

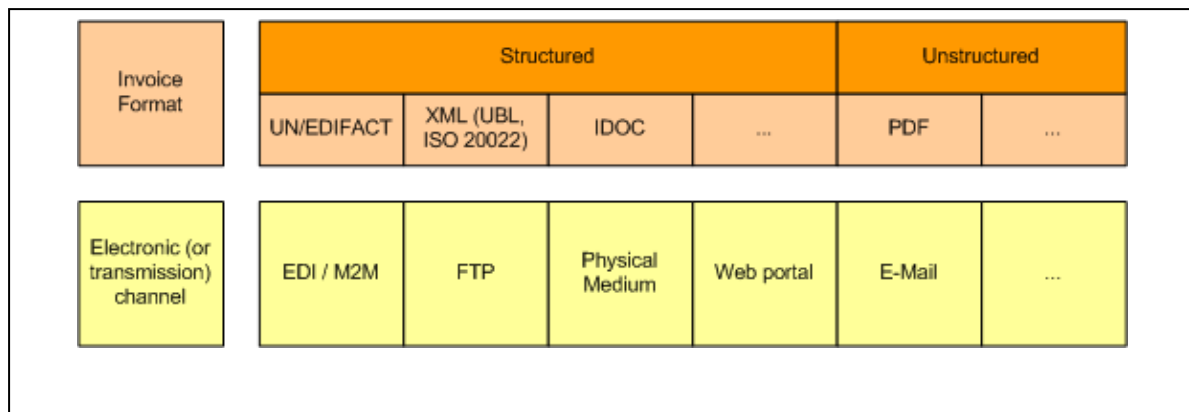
- 469 1. specification of content: what information elements need to be conveyed, e.g.
 470 quantity, price per unit, date, ..
- 471 2. specification of format: how are the information elements represented, e.g. if a
 472 textstring is used to represent a date then does it use yyyyymmdd or ddmmyyyy.
- 473 3. specification of transmission: how is the information in electronic format
 474 transferred from the sender to the receiver. To this purpose (seen from the
 475 receiver side) in fact a number of options is available⁵:

4 Some versions of the PDF format allow to embed structured data (e.g. PDF/A-3, specified in ISO 19005-3:2012). The text here refers to the common practice of sending information in basic PDF format, not carrying automatically processable information

5 They will be mentioned only; elaboration in further detail is beyond the scope of this document.

- 476 • Electronic data interchange (EDI) e-invoicing: Trading partners send and
 477 receive electronic business documents, directly from system to system
 478 without human intervention (no manual retyping).
- 479 • Web e-invoicing: This allows trading partners to manually fill the relevant
 480 information into an electronic form and submit as business document
 481 electronically, typically through web portals.
- 482 • Scan and capture: Paper invoices are sorted, scanned and then data is
 483 captured either through manual keying or optical character recognition
 484 (OCR) technologies⁶.

485 There exist various alternatives for each of the options mentioned. Brought together in a
 486 single diagram for illustration purposes gives the below figure⁷:



487

488 The information transfer may take place directly from sender to receiver of information or
 489 there may be service providers in between, that may provide various types of functionality:
 490 for instance, a service provider may operate a webportal to receive invoice information that
 491 is then transferred electronically directly to the system of the intended recipient⁸.

492 For the receiver of the invoice to be able to process automatically and without human
 493 intervention, a certain set of information elements needs to be present. This set not only
 494 needs to contain the information fields that are needed to make the invoice legally compliant,
 495 but also information fields specifying the transaction that the invoice is about. Simply
 496 speaking, the recipient would need: 'an information field meaning the date of the transaction,
 497 an information field meaning the VAT number, an information field meaning the price per
 498 unit,'. The reader will notice that these requirements specify in fact a (minimum) number
 499 of information fields but do not say anything about the (electronic) representation of the
 500 various fields. It talks about 'meaning' only. Following the fact that 'Semantics' (from Greek:
 501 σημαντικός *sēmantikós*) is the study of 'meaning', focusing on the relation between
 502 signifiers, like words, phrases, signs, and symbols, and what they stand for, their denotation,
 503 such a set of fields is called a 'Semantic Data Model' (or '*reference data model*').

6 These solutions have shown benefits for companies with little automation but are not considered true e-invoicing as they are not e-invoices as per art. 217 of Directive 2006/112/EC as modified by Directive 2010/45/EU, since they are exchanged as paper invoices.

7 Figure is for illustration purposes only. It is not exhaustive; and there is no implied relation between the topics indicated in the layers

8 This touches upon various operating models that are known from literature and practice as 'Buyer Direct', 'Seller Direct', 'Consolidator' and it also gives room to '3-corner model', '4-corner model'. Further elaboration is beyond the scope of this chapter.

504 Syntax is the way in which an information element is expressed in a format that can be
 505 handled by sender and receiver and (in the case of electronic documents or messages) by
 506 their systems. Or: the Semantic Data Model is represented in a syntax that presents the
 507 physical representation of the data model. These parts together are termed a standard
 508 format.

509 To illustrate this, the table below expresses the meaning of an information element, and the
 510 representation in UN/EDIFACT syntax and in ISO 20022 XML syntax.

Information element	UN/EDIFACT	ISO 20022 XML
Issue date 9th of April 2012	DTM+137:20120409:102'	<IsseDtTm>2012-04-09Activity 18:13:51</IsseDtTm>
Order number 550004 and date of issue 15th November 2010	RFF+ON:550004' DTM+171:20101015:102'	-<BuyrOrdrlDdoc> <Id>550004</Id> <DtOfIsse>2010-10-15</DtOfIsse> </BuyrOrdrlDdoc>

511 So a Semantic Data Model may be expressed in a particular syntax, depending on its use. A
 512 semantic model may thus be expressed in more than one syntax. Sender and receiver of
 513 electronic documents can simply exchange information if they would use the same Semantic
 514 Data Model, that each may express in an own syntax. This is also referred to as 'semantic
 515 interoperability': parties agree on context and meaning of message exchanges without
 516 having to agree on the same syntax to be used by both.

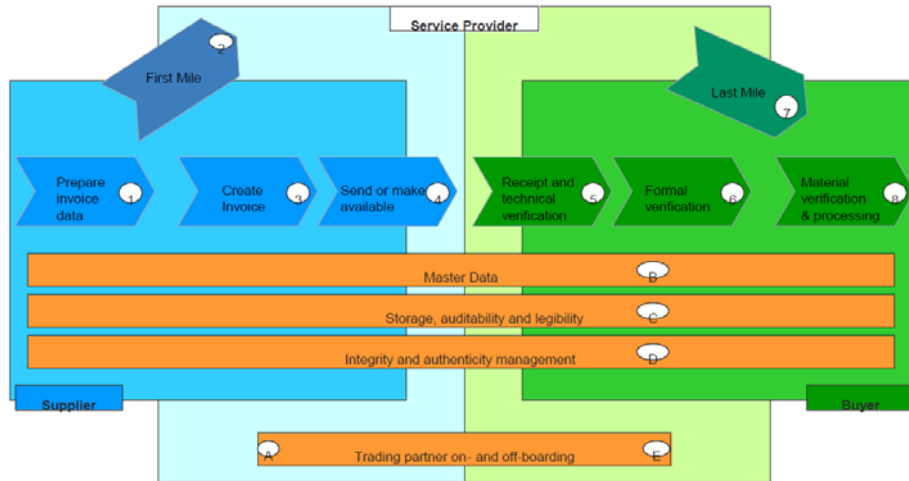
517 Note that semantics reveal the meaning of syntactically valid strings. For instance, the text
 518 string "20130403" in the information element with the meaning 'invoice date' should be
 519 treated totally different from the same text string in the information element with the meaning
 520 'article number'.

521 The e-invoice message and Semantic Data Model can naturally not be portrayed in isolation
 522 and need an integrated linkage to the broader procurement/supply chain processes and
 523 payments. Note that rendering the same Semantic Data Model in multiple methodologies,
 524 where these solutions can map their data model to the reference semantic model, allows
 525 information exchange without restrictions to and from the financial environment and in
 526 support of various e-invoice related services offered to the market.

527 **3.4 e-Invoice exchange models**

528 Consecutive CEN e-Invoice Workshops created a model of core e-Invoice processes and
 529 identified related compliance risks. The process model is presented on the figure⁹ below:

⁹ ftp://ftp.cen.eu/CEN/Sectors/List/ICT/CWAs/CWA16460_.pdf



530

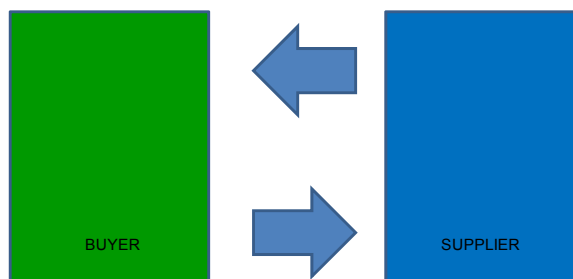
531 Figure 3.4 General invoicing related subprocesses - as e-invoicing background

532 To mitigate or avoid these risks more efficiently and with less expenses, some companies
 533 use service of e-Invoicing service providers to exchange their invoices.

534 **3.4.1 Bilateral exchange (two-corner model)**

535 Initially, some organizations involved develop direct bilateral exchanges with their trading
 536 partners, as shown in the Figure 3.4 below. Issues of interoperability between partners are
 537 resolved in direct bi-lateral agreements and partners implement a direct route to deliver their
 538 invoice messages (for example, an AS2¹⁰ mechanism).

539 Furthermore, this is often an approach for large organizations (e.g. telecoms, utility
 540 companies, credit card issuers), as well as for companies with stable relations with very
 541 large trading partner (buyer or supplier). In such scenarios, large partner sometimes dictates
 542 e-Invoicing solutions to its complete ecosystem (e.g. through access to an e-Invoicing portal)



543

544

545 Figure 3.4 Bilateral exchange / two-corner model

546 Advantage of the model is very close integration with back-office of the large partner, so
 547 such a solution could be a channel for much wider interaction.

548 However, this approach requires individual organizations to manage their e-Invoicing
 549 solutions and faces challenges when it comes to expansion and maintenance. Smaller
 550 partner don't get centralized e-Invoicing solution and limited options of e-Invoicing formats,
 551 so e-Invoice acceptance is limited, because they have to solve integration with their back-
 552 office system themselves.

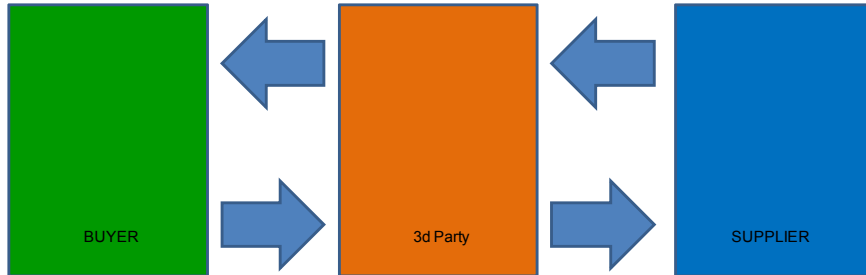
553 **3.4.2 Three-corner model**

554 A more common environment for electronic invoicing is for trading parties to use an
 555 intermediary service provider (or Value Added Network). These provide a community of
 556 trading parties based around a common service for the delivery of messages. Interoperability

10 <http://www.as2basics.co.uk/what-is-as2/> or <http://www.rfc-editor.org/rfc/rfc4130.txt>

557 issues are solved by a service provider, which integrates systems of buyer and seller into its
 558 network, performs format conversion if necessary etc. In some cases the Service Provider
 559 also adds value in terms of invoice creation and processing.

560 Because the intermediary introduces a third party to the bilateral arrangements this
 561 environment is known as a three corner model, as shown below:



562

563

Figure 3.6 Three-corner model

564 There is always the risk in a 3-Corner Model that one of the parties is locked in by a more
 565 powerful trading partner; e.g. the powerful participant can dictate the usage of a specific
 566 service Provider to its partners. For an SME this can lead to a situation where it has to
 567 connect to several Service Providers which leads to a multiplication of efforts.

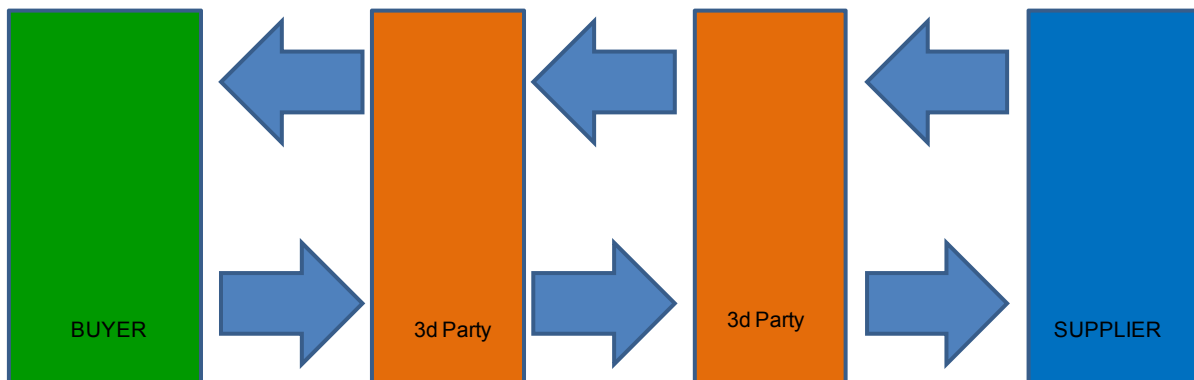
568 **3.4.3 Four-corner model**

569 The initial promise of the 3-corner model and the open market for service providers has
 570 meant that by 2011 there were more than 100 '3-corner models' service providers operating
 571 in the European electronic invoicing market. However, few of these communities are isolated
 572 in their business activities, creating the requirements for Routing messages between
 573 different 3-corner models.

574 While in some circumstances individual organizations choose to subscribe to multiple
 575 service provider communities, the growing trend has been for service provider-to-service
 576 provider 'interconnections' to be established. These enable messages to be routed to the
 577 required service providers who then pass them onto the organizations who are their clients.
 578 Especially SME's are reluctant to be compelled into a 3-corner model and benefit from the 4-
 579 corner model.

580 Because invoice messages may now be routed between two intermediaries this is referred
 581 to as a four corner model (Figure 3.7)

582 The four corner model is increasingly the common situation when exchanging European
 583 electronic invoice messages. However, this requires individual service providers to manage
 584 their own bilateral sets of interconnection agreements, typically involving various Addressing
 585 schemes and protocols. Once again these are challenges when it comes to expansion and
 586 maintenance.



587

588

Figure 3.7 Four-corner model

589 To overcome that, service providers may create networks based on open standards and
 590 common specifications (in fact, network has then its own interoperability framework) One
 591 example of such a network is PEPPOL network.

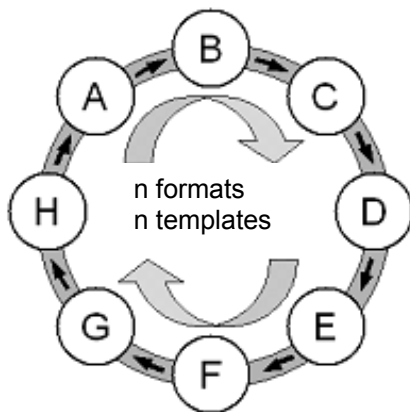
592 Again, an agreement on the scheme to be used between the trading partner and the service
 593 providers is required. If a provider-specific scheme is used, it may lead to a vendor lock-in
 594 for a trading party that wishes to change its service provider. Therefore it is important that all
 595 the providers connected to the network adhere to the same semantic invoice model
 596 (technical level is much easier to change and here lies the room for innovatively solutions
 597 and competition)

598 **3.5 Conversion services**

599 When trading partner use different formats or data model for their electronic invoices, there
 600 is the need to perform a conversion. Since the conversion requires a lot of knowledge of
 601 various invoicing models and implementations, it is usually performed by service providers.

602 There are different conversion scenarios available:

603 **“Ring” conversion process:** In Ring conversion process, conversion is being performed by
 604 cyclic parsing and converting of the document in the predefined direction over the ring, until
 605 the document reaches desired format.



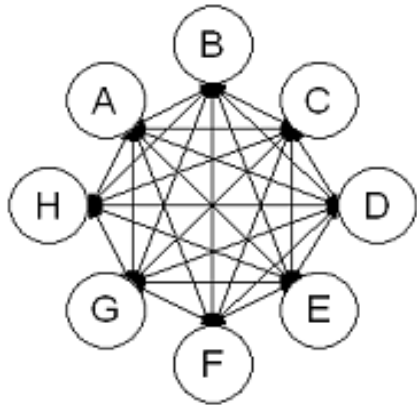
606

607 Figure 3.8 Ring conversion process

608 In this case, n different formats requires n conversion templates. In this approach it is crucial
 609 that conversions do not involve data loss (or change), because each error is propagated
 610 further throughout the whole process.

611 Expenses of the process are high. In the worst case, n-1 conversion would have been
 612 performed to reach desired state, so the process is slow.

613 **Peer-2-peer model:** In Peer-2-peer model each format should be directly convertible to the
 614 desired format.



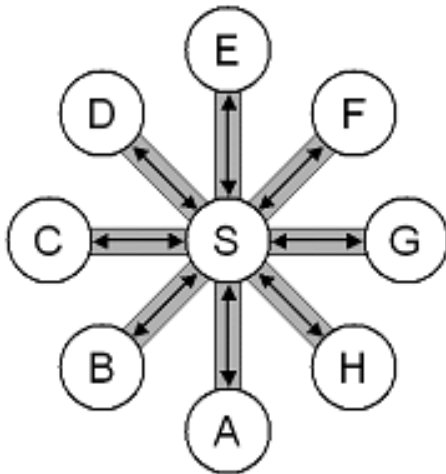
n formats
 $n*(n-1)$ templates

615

616 Figure 3.9 Peer-2-peer model

617 Expenses of development of such a system are extremely high, because for n different
 618 formats one needs to develop $n*(n-1)$ converters. Big problem is scalability, because each
 619 new format requires up to $2*n$ converters. However, conversion process is very fast and
 620 optimal, because each conversion uses only one converter (that could be specially adapted
 621 to reach maximum quality). Therefore, peer-2-peer conversion could be a solution when
 622 there is small and stable number of possible formats

623 **Intermediary model:** In intermediary model one format is chosen as intermediary. Each file
 624 is first converted to the intermediary format, and then from intermediary to the desired
 625 format.



n formats
 $2* n$ templates

626

627 Figure 3.10 Intermediary model

628 In this case for n different formats one needs $2*n$ different converters. If intermediary format
 629 is well chosen (a format that does not introduce data loss in conversion), transformation
 630 system is easily extendable because each new format requires only 2 new converters (“in”
 631 and “out” for the intermediary format). On the other side, transformation is fast, because
 632 each transformation requires maximum 2 conversions.

633 Semantic e-Invoice model as referred in the Recommendation should be suitable as a
 634 intermediary format for this type of converter, which offers advantages over the other two
 635 converter models.

636 **4 Standardisation**

637 **4.1 Introduction**

638 Looking at the average physical mailbox containing paper based invoices, first the variety
639 of different characteristics of invoices can be recognized: the paper-material, the paper
640 size, the logos, the color, the optical breakdown of billing information - there are many
641 variations of a physical invoice.

642 But not only the physical form, but also the type, number and level of detail of the
643 information provided is different, as well as the headers and foottext, the sender
644 identification, etc.

645 Besides the classical invoice variants such as fee assessments (for example in the public
646 sector) there exist special forms of invoices, where some details, subject to certain
647 conditions, are missing compared to a classical invoice.

648 Nevertheless, most of the seemingly fundamental differences only exist at first glance:
649 When categorizing the information supplied in the content, several basic types can be
650 recognised. Thus, the corresponding document contains mostly information about the
651 issuer (seller), the recipient (buyer) and the sold products or services.

652 Often additional information is provided, which should make it easier for the recipient to file
653 the invoice accordingly within its processes. This additional information is transmitted
654 following agreements to help optimize the invoice processing and ultimately the fastest
655 possible execution of the payment process.

656 As an example, a company may be taken that regularly orders the same goods from the
657 same supplier. In order for this company to be able to more easily determine which delivery
658 of goods or which purchase order will be invoiced, it asks the issuer of the invoice to
659 indicate the original order number. Such arrangements may be agreed on between
660 individual invoice sender and receiver (bilateral agreement). In addition, legal provisions
661 can ensure that more information needs to be transmitted. This information may allow, for
662 example, a tax authority to identify the reported tax on an invoice. Individual countries,
663 industries and communities can make additional invoicing requirements that extend the
664 information to be transmitted.

665 Looking at the typical inbox from a traditional paper invoice as described above, it can be
666 considered that both the syntax and the transmission level are indeed relevant to the
667 individual transaction or process. But a crucial layer to transmit information is the semantic
668 level. Only this allows the sender and receiver at the same time to understand what content
669 is transmitted.

670 **4.2 Standardisation in general**

671 As described above, the semantic level defines the information to be transmitted. Based on
672 the example of the specification of reference to the underlying order it is recognized that
673 such requirements are often needed not only in the relationship of two companies. It often
674 applies to a wider range of corporate relations. In such cases, making the agreements all
675 individually would be extremely costly and ineffective in practice.

676 Worst case for each relationship special arrangements need to be made. Here the idea of
677 standardization of information to be transmitted relevant to all invoices begins.

678 **4.3 Business value of using standards**

679 The final aim of standardization would be at first glance a complete abolition of individual
680 agreements between companies. Within sectors, countries or communities such a goal

681 could be achieved potentially in two ways. 1): The definition of the maximum set of all
682 required and desired information for the respective processes or 2): the definition of the
683 minimum set of required information for all processes under the acceptance of restrictions
684 on the full process optimization.

685 This includes that one standard invoice can be sent to and processed by any recipient in
686 the European Union. If the first option is selected for the standardization of an invoice, the
687 result would be a variety of information to be transmitted, which are not relevant for the
688 particular process or cannot be provided by the sender of the invoice. The consequence
689 would be that bilateral (e.g. sectoral) agreements need to be taken again defining subsets
690 in accordance with the specific requirement and thus losing the one-invoice-for-all-concept.

691 As an example for this kind of standard EDIFACT should be mentioned. It is extremely
692 complex in its overall concept and there is no practical application using its pure form.
693 Based on it, however there are numerous subsets (e.g. EANCOM® or ODETTE), which are
694 used as a specific industry or cross-industry application.

695 The advantage of this approach is to allow the target group to reach the highest level of
696 process optimization. However, as mentioned before there are also some disadvantages. A
697 high degree of optimization over time leads to considerations as to maximize the quality of
698 the transmitted data and to minimize the amount of transferred data.

699 One common approach is the introduction of master data management. Infrequently
700 changing information, such as the name and address of the seller or buyer or the exact
701 name and other properties of a product or service in the invoice must not be listed
702 explicitly, but can be marked and identified by a (global) identifier. The information behind
703 this identifier can then be determined from the respective master data management system
704 of the transmitter or receiver.

705 If such a system is once installed, the processing of invoicing can take place almost
706 automatically. However, the requirements to the respective systems are relatively high,
707 since they must be able to operate such master data. EDIFACT is an already several
708 decades old standard, that grew from various sectors and with which in practice often
709 exactly this approach is followed.

710 The goal of Europe-wide e-Invoicing also explicitly includes SMEs. Such companies
711 nowadays work mostly with paper based invoices and are - for example, for financial
712 reasons - not able to adopt a system capable of fully automated processing. As one
713 example, an SME could be taken that is a cross-sector provider of goods or services that
714 are not needed on a regular basis (e.g. painting). Their system would have to meet the
715 needs of each individual industry, which is simply unreasonable.

716 Therefore in recent years, there were intensified efforts to go the second way.

717 The business value of a European solution is obtained by the inclusion of all relevant
718 stakeholders. In Chapter 2, the reduction of information to a core for all processes and the
719 integration of extension points to additional information (and by doing so linking existing
720 standard requirements) was proposed. This creates interoperability between sectors and
721 countries, when accepting (slightly) reduced process optimization. At the same time
722 existing specific, process-optimal, invoice standards should be kept alive. It is precisely this
723 combination of a reduced to the core semantic definition while maintaining optimum
724 standards that leads to an overall gain for the European Community. This way existing
725 solutions would not have to be replaced while for new or cross sector business
726 relationships there could be used one uniform approach.

727 **4.4 The different types of standards**

728 Conceptually, a "standard" is an agreed way of doing something. It is developed to solve a
729 business problem. In its basic form, it may take the form of a bilateral agreement between

730 two entities that share the business problem. If it serves the purpose, then no further action
731 needs to be taken; it need not be publicly available, it needs no formal maintenance, etc.

732 You can often find similar requirements, e.g. within the same industry. This eventually may
733 lead to a quasi-'industry standard' development of a 'proven practice'. This type of
734 agreement suffers from the fact that its scope is in principle limited. To overcome this, a
735 number of mechanisms have been developed over time to develop 'standards':

736 More formal 'standards' are voluntary and are created in response to a demand with the
737 active involvement of a wide range of stakeholders: whether purchasers, vendors,
738 consumers, producers, academics and indeed regulators. They can be developed privately
739 or publicly, at company, consortium, sector, national, European or international level and
740 can be applied to products, services, management systems and technologies.

741 Depending on the development mechanism and the involved parties several types of
742 'standards' can be distinguished.

743 The types differ especially with regard to the target group, and the relevance for the target
744 group. For the target group in particular three dimensions can be distinguished:

- 745 1. the region (local versus global),
746 2. the number of covered business processes (two companies versus cross-
747 industry focus),

748 as well as

- 749 3. the coverage of the standard (small group agreement versus international
750 consensus based standard).

751 However, these three dimensions alone are not enough.

752 Let's look at an example. There could be a small group of people or a student's thesis
753 elaborating and developing the perfect standard with a global and multi sectoral focus
754 theoretically. It doesn't help, if it is implemented and applied by no one.

755 The relevance to the target group is therefore generated by the development of standards
756 by the participating stakeholders (consensus), and by embedding it into a voluntary
757 commitment of an industry or - but that should occur only under very special circumstances
758 - in the legislation. Situations may occur, where the use of a standard is achieved by the
759 party with the stronger market position. It may demand the application of a standard by the
760 weaker party.

761 The following figure summarizes the described.

762

Maturity Region	Consensus, wide agreement	Some aspects are missing	Small or specific group
National / local / industry specific	National / industry standard	National Specification	Bilateral agreement
Europe	EN	CEN Technical Specification	CEN Workshop Agreement
Global	ISO Standard	ISO Technical Specification	IWA Workshop Agreement

763 **Table 1: Different types of standards**

764 As an example for an international standardization Organisation ISO should be mentioned.
765 An ISO Standard is a consensus based document, which is approved by a recognized
766 body aimed to achieve the optimum degree on an international level. Also an ISO standard
767 per se has no legal impact; it is often referred to by laws and thus gets legal relevance.

768 A European Norm is the European pendant to an International Standard. European
769 standards must be adopted by all Member States of the European Committee for
770 Standardization (CEN) and CENELEC in the national standards¹¹. National standards on
771 the same subject must be withdrawn. The goal is the European harmonization of norms
772 and thus the elimination of technical barriers to trade. International standards can be
773 adopted voluntarily as national standards.

774 The European CEN has signed an agreement with the ISO¹², which states that selected
775 international standards are adopted in the European regulations. As stated above, these
776 must therefore be introduced into national rules.

777 Regarding an ISO Technical Specification as well as a CEN Technical Specification there
778 is the future possibility of agreement as an International respectively European Standard.

779 A CEN Workshop Agreement as well as an IWA Workshop Agreement reflects the
780 consensus of identified individuals and organizations responsible for its contents. Although
781 the impact may be very limited initially it can be further developed to reach the status of a
782 Technical Specification or even a norm.

783 In chapter 5 current initiatives are introduced, that use the different levels of standards and
784 for instance develop subsets for given standards to meet the requirements of their target
785 group.

786 **4.5 Governance and Maintenance**

787 Changing (business) economic, technological, environmental or other requirements could
788 lead to a situation where a standard must be amended or updated. The more a standard is
789 implemented in practice, the more far-reaching could be the consequences of such a kind
790 of adaption.

791 For instance the effort and cost of adapting the particular software and the corresponding
792 data maintenance including testing and implementation of the modified system should be
793 mentioned. In order to be able to distinguish the consequences of such changes and to
794 enable practical implementation (investment security versus flexibility) clearly defined rules
795 for the maintenance and development of standards are needed. This is offered by
796 standardization organizations such as CEN or ISO.

797

11 ftp://ftp.cen.eu/BOSS/Reference_Documents/IR/CEN_CLC/IR2_E_AD.pdf 2.5

12 Vienna Agreement

799 **5. Roadmap**

800 **5.1 Current market reality**

801 When research from CEN on e-Invoicing is reviewed over the last 5 years (see Annex A),
802 one common recommendation prevails to this day. Which is epitomised by the 2009 Expert
803 Group Report called EUROPEAN ELECTRONIC INVOICING (EEI), which states;
804 “Experience suggests that a European standard will not readily gain the commercial support
805 and acceptance that an International ISO/UN/CEFACT ratified standard will”. This statement,
806 in one form or another, has been reiterated by the subsequent expert reports outlined above.
807 However another theme that comes through is that there exists a variety of e-Invoice content
808 formats. So this is the dilemma which this report is providing a solution to.

809 **5.2 Convergence using a Semantic Data Model to be used as** 810 **reference for the purpose of interoperability**

811 The purpose of a Semantic Data Model to be used as reference for the purpose of
812 interoperability is to provide a common single reference for existing and future syntax
813 implementations. When syntax is mapped to the reference model, it will demonstrate
814 conformance to legal requirements but also highlight the differences between
815 implementations. It is expected that over time these differences will be significantly reduced
816 or removed and ultimately over time, convergence will take place. In the meantime
817 interoperability will take place using supplied mappings as in the examples given below.

818 The reference model that contains the core and all extensions should be a living registry,
819 that needs a dynamic maintenance agency. In the example below we use the UN/CEFACT
820 Reference Library which uses the ISO 15000-5:2005 Technical Specification.

821 It is a vocabulary, suitable for e-Invoice syntax mapping, extensive enough for all other
822 Supply Chain messages and provides the necessary contextualisation to avoid ambiguity. A
823 spreadsheet is used which contains the common core and also the required extensions for
824 the specific national and sector requirements in any given scenario. This spreadsheet is then
825 used by each organisation to demonstrate conformance of their syntax. These spreadsheets
826 can be used to show how one syntax maps to another and, in time, tools will be developed
827 to automate this. It would be important that reference library maintenance project team
828 consist of members from various syntax implementations, so that changes required can be
829 reflected by all communities in a consistent manner. The reference model will remain
830 agnostic towards past and present syntax and will support XML, EDIFACT and other syntax
831 representations such as JSON. Existing syntax development project teams (from various
832 organisations) will remain unchanged except that at sufficient intervals they will update
833 mappings to the published model.

834 The published model or registry will provide a system to implement the information
835 requirements for each function as required by the different implementations. It stores the
836 semantics of each set of extended elements as the basis of describing all the EU
837 requirements for e-Invoicing. This of course includes the Foundation/Legal Invoice elements
838 and all extensions for business sectors and other specific contexts. It will be a self-
839 conformance system where each e-Invoice syntax will declare its conformance online and
840 publicly to requirements previously stated according to the segments described next.

841 **The process – (re-using existing initiatives);**

842 The Semantic Data Model is in reality the business requirements which have been received
843 from as many different organisations as possible and which have been contextualised and
844 harmonised for reuse. Existing initiatives, such as CEN MUG Core and CEN BII groups have
845 already gathered information on core e-Invoices. Elements, from existing cores, should be

846 split into the models as developed in chapter 2. Elements based on legal requirements (e.g.
847 VAT) should be extracted as “Foundation” or legal requirements, the remaining elements
848 should be considered as either common core, national or sectoral extensions. The
849 development of this reference model is generally only of interest to message content
850 development organisations (not implementers) who need to come together to harmonise
851 their own semantic models. CEN would define and maintain the EU Core and organisations
852 such as GS1, EUROFER, CIDX, EDIFICE, AIAG, ODETTE, GHX etc along with national
853 standards bodies should contribute to the update of the common reference model. So the
854 process is simply organising existing initiatives into ensuring the semantic reference model is
855 maintained.

856 **Syntax conformance – (without disrupting existing implementations);**

857 Once the reference model is available as defined above and the Core elements are defined,
858 syntax publishing or sectoral representative organisation would select from the declared
859 semantics and simply declare its conformance to the Core. These organisations would
860 upload transformation files which would show how their syntax relates to the reference
861 model.

862 An example of a popular workshop which provides guidelines and other artefacts and
863 already contains Core e-Invoice requirements as well as sectoral requirements for Business
864 to Government is CEN BII. The CEN BII artefacts along with PEPPOL specifications are
865 used in over 12 European countries to date. CEN BII contains syntax specifications for both
866 OASIS UBL and UN/CEFACT messages.

867 Similarly organisations such as GS1, EUROFER, CIDX, EDIFICE, AIAG, ODETTE, GHX
868 etc. could align their syntaxes with the Core requirements. This is a mapping exercise for
869 each organisation who wishes to declare conformance. This means that they would not
870 make any changes to their existing implementations, unless they were missing core
871 mappings.

872 **Syntax transformations (the basis of interoperability)**

873 The dilemma as mentioned previously is how to have one common library of harmonised
874 requirements and yet facilitate the mapping of a variety of formats. The answer, for xml, is
875 straightforward and relatively simple as a standard already exists which can do this.

876 This is xslt which has multiple uses and can be used to transform the content of an xml file.

877 This transformation standard is developed within W3C and facilitates transformations from
878 xml to various other formats including non-xml formats but it cannot transform from non-xml
879 formats to xml.

880 Probably the most syntax agnostic way is to use spreadsheets. They are commonly used for
881 mapping other syntax and the example below shows how they could be used to record the
882 mapping in this case. However as well as using spreadsheets, code such as xslt (or java /
883 .net in the case of non-xml syntax) be also supplied which would assist the automation of
884 transformations from the existing syntax to the elements used in the Reference Library (if
885 available in xml schema form).

886 It could also be the basis of visualisation where the e-Invoice could be made legible for
887 Auditors if software was developed to visualise the resultant reference model xml.

888 See examples below, showing ISO 20022 mapping to a reference model;

	A	B	C	E	F	G	H	I	J
1		Semantic Reference	Model						Syntax implementation
2			- Invoice subset mapping						
3	Core Ref		Process Type		Country Code		Sector/Organisation		Message Name
4			Invoice only		All		All		ISO 20022 Invoice
5				Core	National Extension		Sector Specific		mapped element/field name
6				Foundation or Legal					
7				Common					
8			Invoice						
9			SpecifiedExchangedDocumentContext						
10			GuidelineSpecifiedDocumentContextParameter						
11	INV001		ID					=>	not used
12			BusinessProcessSpecifiedDocumentContextParameter						
13	INV002		ID					=>	not used
14			ExchangedDocument						
15	INV003		ID					=>	/Document/FinInvc/InvcHdr/Id
16	INV004		IssueDateTime					=>	/Document/FinInvc/InvcHdr/IssDtTm
17	INV080		TypeCode					=>	/Document/FinInvc/InvcHdr/TpCd
18			LanguageID					=>	/Document/FinInvc/InvcHdr/LangCd
19			IncludedNote						
20	INV005		Content					=>	/Document/FinInvc/InvcHdr/InclNote
21								=>	
22			SupplyChainTradeTransaction						
23			ApplicableSupplyChainTradeAgreement						
24			SellerTradeParty						
25	INV085		ID					=>	/Document/FinInvc/TradAgrmt/Sellr/PtyId
26	INV014		Name					=>	/Document/FinInvc/TradAgrmt/Sellr/PtyId/Nm
27								=>	
28			PostalTradeAddress						
29	INV015		LineOne					=>	/Document/FinInvc/TradAgrmt/Sellr/PtyId/PstlAdr/StrtNm
30	INV016		CityName					=>	/Document/FinInvc/TradAgrmt/Sellr/PtyId/PstlAdr/TwnNm
31	INV019		CountryID					=>	/Document/FinInvc/TradAgrmt/Sellr/PtyId/PstlAdr/Ctry
32								=>	

889

890 5.3 Adoption

891 The adoption of e-Invoice specifications will change over time as depicted in diagram below.
 892 The number of country specific elements will decrease as a consequence of further
 893 harmonisation on a European level. Sector extensions, currently implicit and undocumented,
 894 will be explicitly defined with reference to a semantic registry. Cross sector invoices and
 895 invoices for facility goods and services will only contain a common core.

896 The differences per organisation¹³ should disappear by:

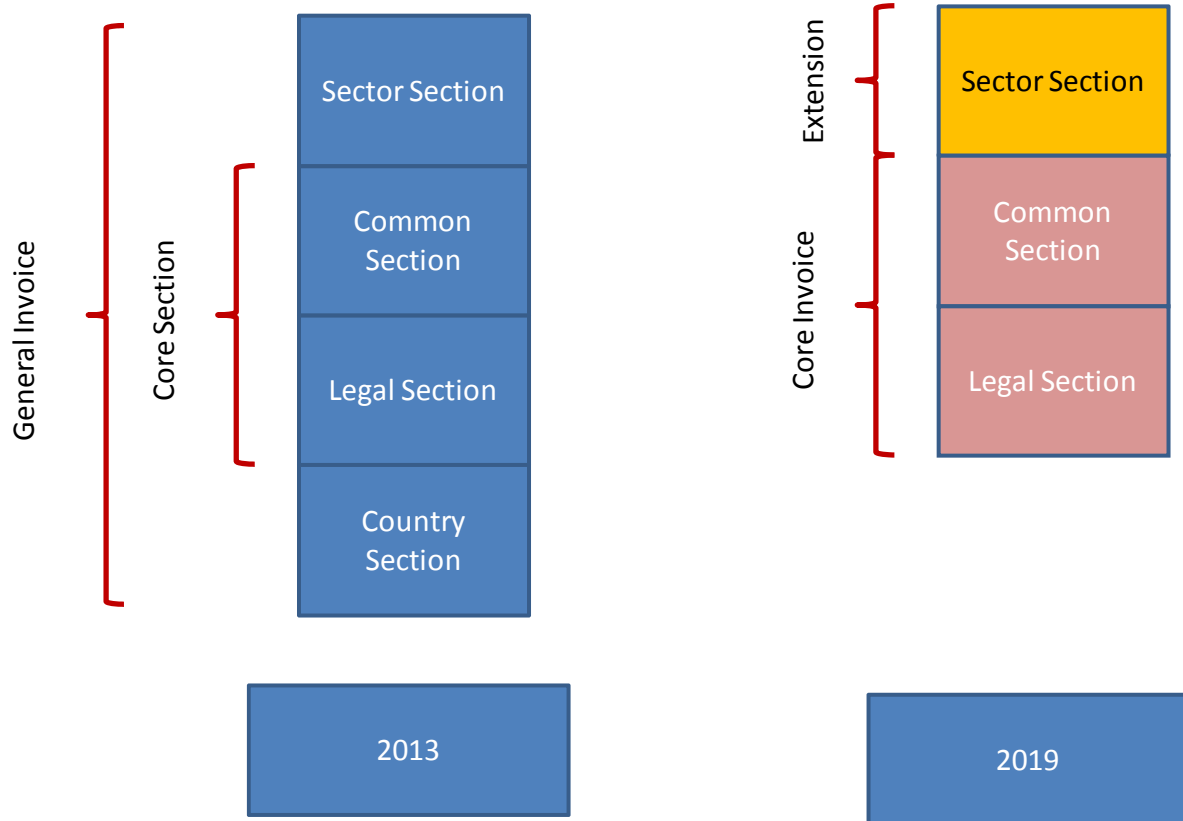
- 897 • Requiring organisations to publish their deviations (short term)
- 898 • Requiring organisations to publicly state self-conformance (mid term)
- 899 • Requiring mappings to publicly demonstrate conformance (long term)
- 900 • Consider certifying conformance by independent auditors (long term)

901 Differences per country should disappear by:

- 902 • Letting the deviations only apply to domestic (and not to cross-border) invoices
 903 (short term)
- 904 • Let the country adapt its legislation (long term)

905 All implementations should be capable and prepared to receive and process core invoices.
 906 Organisations that receive invoices that conform to (core) specifications should be obliged to
 907 accept them. They may of course dispute the contents, but not the fact that the invoice was
 908 sent electronically.

13 An organisation, for these purposes, is such a body which represents the requirements for a specific industry sector, supply chain, business process or product type



909

910 By requiring organisations to show conformance to a reference data model provides a
 911 separation of concerns. Business and legal concerns will be separated from technical
 912 implementation concerns. Convergence towards interoperability will occur by using the
 913 following statements:

- 914 • The Legal Section is concerned with both Tax and trade laws common
 915 throughout the EU.
- 916 • The Core Section contains the Legal Section and other commonly used
 917 elements, which are not sector or country specific.
- 918 • Sector Specific are those elements which are only a concern of a specific
 919 industry sector, supply chain, business process or product type. (Sector Section)
- 920 • Country Specific are those elements which are only the concern of a specific
 921 country e.g. legal requirements not used elsewhere in the EU. (Country Section)
- 922 • If organisations ensured that they reused the Common elements cross sector
 923 interoperability would be enhanced
- 924 • If Governments ensured they did not create Country Specific elements; cross-
 925 border interoperability would be achieved.
- 926 • Ideally an Invoice should have no Country Specific and few Sector Specific
 927 elements.
- 928 • Ideally the Core should strive to be simple, stable and designed to be easily
 929 implemented to ensure adoption.
- 930 • Governments and sectors should work with appropriate groups such as CEN to
 931 maintain the Core.

932 **5.4 Service interoperability**

933 All European e-Invoice Service Providers systems should be interoperable. No double fee
 934 should be chargeable when sending invoices through 2 e-Invoice Service Providers.
 935 Unfortunately this is currently the case for many SMEs.

936 PEPPOL already supports this and provides specifications which make it easy for all e-
937 Invoice Service Providers to become involved. These specifications already include CEN BII
938 artefacts which can conform to the same model and automatically provide compliance to
939 existing and future users.

940 EESPA should also be convinced to participate and accept the recommendations. EESPA
941 members, already participated in CEN workshops particularly CWA 16464-3, which provides
942 Conformance Criteria for Interoperability between electronic invoicing Services.

943 **6 Finding the rationales**

944 **6.1 General**

945 Exchange of business documents in an electronic way is not a new phenomenon. The
946 benefits of this exchange were appreciated first by large corporations in the 70s of the last
947 century. In the Internet era, electronic collaboration is possible for the majority of companies
948 operating in a market economy.

949 Invoice is a proof of the sale of goods or services and invoice issuing and delivering to the
950 buyer is the seller's duty, required by law in business and public administration around the
951 world. The main reason for its validity are tax regulations which require confirmation of
952 details of transactions and tax calculations for evidential purposes. Invoice receiving by the
953 buyer is also a trigger for his financial obligation.

954 Traditional invoicing methods (in paper form) do not bring any added value to the business
955 and public administration as opposed to electronic means which have a positive and proven
956 impact on the effectiveness of other business processes conducted electronically (associated
957 within the whole cycle of commercial transaction, including financial processes - see Chapter
958 2).

959 Obligatory invoicing methods in electronic form in public administration in Denmark, Norway
960 and Sweden are the proofs of successful actions for the sake of public interest (public
961 administration expenses and budget optimisation). But e-invoicing solutions and methods
962 implemented in those countries differ from country to country, making cross-border e-invoice
963 exchange complicated.

964 Different electronic document standards implemented in different business sectors and
965 countries make the overall electronic cooperation picture fragmented into islands of different
966 e-invoice specifications. E-invoice exchange between such different islands is a challenge so
967 far.

968 Creation of the Single Market in the European Union requires a harmonized way of cross-
969 border invoicing, in particular there is a need for a common model of electronic invoices in
970 order to achieve the benefits of common electronic invoicing throughout the European Union.

971 **6.1.1 The benefits of the invoice in electronic form**

972 Electronic form of the invoice is another form of the invoice data organization and
973 presentation. All the invoice data used in its paper form can be formed into electronic file,
974 representing invoice content in electronic form in compliance with general invoicing rules.

975 The need for use of the invoice in electronic form comes from the fact that the vast majority
976 of invoices today are produced by electronic tools. Different business IT applications and
977 ERP systems mean the mostly used tools for the invoice preparation and issue.

978 Paper form of the invoice is an obstacle in electronic form of business process organization.
979 On the invoice receiver side, the content of the invoice must be traditionally received, read
980 and manually entered into the IT system for further processing.

981 Electronic form of the invoice allows for sending, immediate automatic receiving and
982 processing of the invoice data on the invoice receiver (buyer) side.

983 Benefits of automated communication and processing of business documents in electronic
984 form include:

- 985 • elimination of traditional communication costs, environmental cost savings
- 986 • reduction of traditional document receiving and processing costs (including
987 human errors elimination)

- 988 • shortening of business documents transfer time, business transactions cycle
- 989 acceleration
- 990 • new way of business processes organization thanks to business data automatic
- 991 flow

992 To allow the IT system for automatic receiving and processing the electronic invoice data,
993 there is a need for use of suitable format of an electronic invoice.

994 There are two kind of electronic formats practically used by business to send business data
995 today:

- 996 • structured formats, having data elements divided into information items organized
997 as an information fields according to defined structure of the document (e.g.
998 invoice number as information element is separated from other information and
999 located in relevant field of document structure). Each information field can be
1000 processed separately by the IT system on the invoice receiving side.
- 1001 • unstructured formats¹⁴, which contain business document content graphical
1002 representation ("document image") - e.g. plain PDF, JPG and other graphics
1003 formats, which cannot be automatically processed by ERP or other business
1004 applications.

1005 Electronic documents in structured formats are the foundation for different standards of
1006 electronic document exchange.

1007 **6.1.2 (The need for) Interoperability**

1008 There are many different standards of electronic structured business documents exchange in
1009 use by business. From pan-european perspective (as well as from worldwide one), since
1010 their different data definition and organization, they created the 'island of standards' in use,
1011 having no relations between them. It makes serious difficulties for those, who would try to
1012 send electronic invoice in the form typical for one standard to the recipient which use the
1013 documents of another standard. Automatic document receiving and processing will be not
1014 possible in that case.

1015 Since none of existing standard has won significant advantage in market today, there is a
1016 need for solving the problem of standards incompatibility to allow easy e-invoice flow over
1017 the borders and business sectors. Even if buyer and seller are within the same 'community',
1018 then they may have interaction with other actors like customs, transporters, financial service
1019 providers.

1020 The Activity 4 group of the European Multistakeholder Forum on e-Invoicing has formed an
1021 idea which is to be a foundational assumption for the future creation of a standards
1022 compatibility framework. The key term for such compatibility is 'semantic interoperability'
1023 meant as "ensuring that the precise meaning of exchanged information (concept,
1024 organisation, services etc) is preserved and well understood".¹⁵

1025 The Semantic Data Model concept proposed by this Activity 4 group in this report, as the
1026 base of semantic interoperability, will allow for different standards alignment at semantic level
1027 of interoperability.

1028 **6.2 Business requirements**

1029 The beneficiaries of the Single Market are companies and citizens in EU. Proposals
1030 recommended by this Activity 4 group to solve the problem of a lack of a unified approach to
1031 electronic invoicing in the European Union Member States are to contribute to:

¹⁴ unstructured formats can carry structured formats like for example implementation of PDF/A-3 (ISO 19005-3)

¹⁵ Final Report of the Expert Group on e-Invoicing, DG Internal Market and Services, DG Enterprise and Industry, November 2009

- 1032 • reduction of companies operating costs by eliminating extensive business
1033 processes performed by utilizing traditional paper documents,
1034 • optimizing business processes implemented through the use of electronic means
1035 and the creation of innovative and more efficient business models (models of
1036 commercial cooperation and internal processes of enterprises)

1037 The most effective way to achieve the benefits of electronic exchange of business
1038 documents (including e-invoices) is the dematerialization of all documents in the transaction
1039 cycle - from ordering until the direct debit.

1040 In this model it is possible to automate 'three way match'¹⁶ procedure, which is the most
1041 common method companies use to recognize a valid financial obligation.

1042 This will help to increase the efficiency and competitiveness of enterprises, to release the
1043 funds and to improve their financial situation. This will have an impact on business
1044 opportunities and boost labour market.

1045 Dissemination of cross-border and cross-sector approach to exchange invoices and other
1046 business documents in electronic form will stimulate the development of new, innovative
1047 services and products of e-invoicing, also contributing to the creation of new innovative
1048 companies.

1049 The introduction of electronic invoicing in public administration will improve the economic
1050 efficiency of procurement processes and reducing the budgetary costs of the Member States.

1051 **6.3 E-invoicing practices**

1052 **6.3.1 Highlighting EDI**

1053 Electronic Data Interchange (EDI) stands for exchange of standard formatted, structured
1054 messages between trading partners systems (computers) with minimal human intervention.

1055 Electronic structured EDI messages contain business, financial and tax data in the form of
1056 regular information items structure which can be recognized and automatically processed by
1057 a computer system. Consequently it allows for new invoicing process organization.

1058 EDI based e-invoicing as a part of trade transaction cycle (see Chapter 2), can be
1059 complemented by other structured electronic business messages (documents) exchange e.g.
1060 orders, delivery notes and acknowledge etc. Automatic EDI message creation, sending,
1061 receiving and processing by computer system makes the trade cooperation process fully
1062 automated.

1063 Standardized format of structured EDI messages means that the message structure comply
1064 with specific data model described by relevant standard specification (e.g. EANCOM /
1065 EDIFACT, UN/CEFACT CII, GS1 XML, UBL, ISO20022 etc). The role of electronic data
1066 exchange standards is described in Chapter 4.

1067 As an opposition, unstructured electronic documents (e.g. in PDF plain format) cannot be
1068 automatically processed without extra content interpretation and data convergence (e.g. with
1069 OCR technique involved when possible), they usually require manual intervention.

1070 Electronic business documents (EDI messages) exchange allows for business processes
1071 information flow and this way, for business processes automatic cooperation. The most
1072 promising benefits of EDI therefore come from its ability of processes automation:

- 1073 • operational costs reduction

16 Generally, an attempt is made to 'match' every incoming invoice to a valid purchase order and an approved packing slip or receipt. Many companies will not consider an invoice to be payable until they have a purchase order with a price that matches the price on the invoice, and some sort of document from the requisitioner that indicates that the items or services were received in good order.

- 1074 • document flow acceleration
- 1075 • documents standardization – enables IT solutions scalability
- 1076 • data errors elimination
- 1077 • data flow business model flexibility

1078 Those above direct features are the building blocks for higher level benefits:

- 1079 • accurate, on time information
- 1080 • improved forecasting and decision-making capabilities
- 1081 • lower administrative costs
- 1082 • the release of working capital
- 1083 • acceleration of trade procedures
- 1084 • the flow of payments improving
- 1085 • lead times shortening
- 1086 • inventory optimization
- 1087 • improved management of goods (receiving and storing)
- 1088 • trading relationships improvement

1089 **6.3.2 Business controls**

1090 'Business controls' term is introduced by current VAT Directive and is meant as "a method,
1091 that provides a reliable audit trail between the invoice and the supply, and that assure the
1092 identity of the supplier or issuer of the invoice (authenticity of origin), that the VAT details (the
1093 invoice content required by the VAT Directive) on the invoice are unchanged (integrity of
1094 content) and that the invoice is legible"¹⁷.

1095 Such a definition can be applied to traditional methods of invoicing as well as to electronic
1096 invoicing procedures. Every company in the history of economy has used some ways to
1097 check whether its obligation to pay for a goods or services matched real delivery quantity,
1098 quality and other ordered requirements.

1099 The whole transaction cycle business documents dematerialisation and their organisation
1100 into coherent process driven electronically allow for maximisation of the benefits from
1101 processes automation.

1102 **6.4 Business drivers**

1103 Regarding to the benefits of the invoice and other business documents in electronic form
1104 (described above), there are some examples of business process models which are
1105 applicable for the sake of operational efficiency and finally resulting in financially positive
1106 effects.

1107 Working Capital Management

1108 The aim of the business models driven electronically is to optimise working capital by
1109 operating costs reduction, improve effectiveness by process reengineering, optimize cash
1110 flow and company liquidity.

1111 Supply Chain Finance

1112 The model used to the flow of money optimization, enabled by the introduction of electronic
1113 invoice and logistics and other business documents information. As mentioned above,
1114 different 'islands' of standards used in the supply chains are the obstacle in their full
1115 integration. Semantic Data Model will allow to solve this problem when different standards
1116 used along supply chain will align to the common model of information exchanged.

1117 Invoice discount / dynamic discounting / early payment discounting

17 Explanatory notes VAT invoicing rules (to) Council Directive 2010/45/EU

1118 The idea behind those models is to allow the change of the terms of payments for those
1119 companies, who are keen to pay their obligation before the term of payment appointed in the
1120 invoice. The payment conditions are the subject of possible change, payment due can be
1121 lowered when made before the term appointed.

1122 Intensive management of the payments due to pay requires access to actual, accurate
1123 information concerning payment details as well as other controlling information. Effectiveness
1124 of such method of payment management depends on the amount of invoices managed.
1125 Ideally, all the invoices received should be managed that way. But the diversity of forms and
1126 standards of electronic invoices coming from different customers limits the effectiveness of
1127 such method.

1128 The single Semantic Data Model proposed by Activity 4 group, its approach to different
1129 sectors as well as to the cross-sector needs will allow for much wider uptake of this financial
1130 management method.

1131

1132 **7 Towards conclusions and recommendations**

1133 In the previous chapters the invoice and its role in the supply chain, financial processes
1134 and for book-keeping and tax issues have been described. Also the more technical aspects
1135 of electronic invoicing, namely the electronic transfer of invoicing information through the
1136 value chain, has been explored. Last the e-invoice standardisation work has been
1137 described.

1138 This chapter summarises that and in fact provides the building blocks for the
1139 Recommendation.

1140 ***7.1 Structured data (in e-invoices) gives greater benefits for all***

1141 In the context of automated processing, the benefits are larger when using structured data
1142 than when using unstructured data, as described in chapter 6. To contribute to the
1143 objective of 'e-Invoicing predominant in 2020', there should be adequate focus on initiatives
1144 that contribute to delivering standards enabling structured data to be used electronically.

1145 ***7.2 Focus on common semantics***

1146 E-invoicing is nothing new, it is actually already widely in use in many parts of the
1147 European community. In chapter 2 the plentitude of initiatives and variations of standards
1148 being used today has been shown. Different standards exist to meet different needs in the
1149 various contexts in which e-invoicing is used. In some cases this is ok, but it be realised
1150 that this phenomenon may actually contribute to market fragmentation.

1151 Initially the work programme for the European Multistakeholder Forum on e-Invoicing
1152 stated that Activity 4 should aim at "Migration towards a single e-invoice standard data
1153 model". This approach can be labelled the single format approach.

1154 During the work it has been clear that this first approach was a bit too drastic. Current
1155 investments in existing standards cannot be ignored. If the aim is to make e-invoicing
1156 predominant in Europe by 2020 (or earlier), then the potential of current installed base
1157 cannot be spoiled.

1158 Therefore the work has been shifted ways in which contributions to the objective could be
1159 made instead; it was soon realised that it was necessary to focus on key initiatives to foster
1160 interoperability in a situation where several e-invoicing communities co-exist and trade.
1161 This approach was discussed in the plenary meeting of the European Multistakeholder
1162 Forum on e-Invoicing in March 2012 and was approved by its plenary meeting in
1163 September 2012; it was explicitly reconfirmed in the plenary meeting in March 2013. This
1164 new approach has been labelled the interoperability approach.

1165 With the interoperability approach, described in the previous chapters 3, 5 and 6, the focus
1166 is on facilitating e-invoicing between communities where relevant. To this goal the
1167 standardisation of e-invoicing content is a key element, that is a focus on a common
1168 semantic model rather than a single syntax. Also the work focuses on how to find
1169 mechanisms to improve interoperability when two trading business parties operate in
1170 different countries or sectors. This is described in the earlier chapters 2 and 5.

1171 ***7.3 A core invoice is needed, but not enough***

1172 The international standards like for instance Cross Industry Invoice provided by
1173 UNCEFACT and the Universal Business Language provided by OASIS are wide and
1174 contain thousands of elements in order to be truly universal.

1175 However there is a need to contextualise the e-invoice to make it more practical for using.
1176 This is nothing new. It has been done with EDIFACT for several years in different user

1177 communities and it has also been the goal for several initiatives like the MUG project and
1178 the subsequent CEN BII Workshops under the CEN-umbrella over the last couple of years.

1179 The concept of a core invoice is a way to agree on a common set of information for e-
1180 invoices that can be used in many situations according to a 80/20-rule. For many users the
1181 core invoice is enough and several initiatives, for instance in the public sector across
1182 Europe, have shown that this can be a good way to promote e-invoicing in large scale. In
1183 some cases, for specific value chains and for specific domestic legislation, there is a need
1184 for extensions of the content of the core invoice.

1185 ***7.4 Start from what is already existing rather than building new***

1186 In chapter 4 it has been shown that there are indeed several very successful initiatives for
1187 e-invoice standards, both in Europe and on a global level. It is wise to benefit from these
1188 initiatives rather than creating yet another standard.

1189 Even if the focus of the European Multistakeholder Forum on e-Invoicing is on the
1190 European Union, there is a need to base the up-coming work on international standards.
1191 For many companies in Europe their business context is global, and therefore e-invoice
1192 standards promoted need to consider this.

1193 There are also several initiatives in specific industry sectors working on a global level with
1194 large user communities already using not only e-invoicing but a full supply chain process.
1195 Examples on this are organisations like for instance Odette for the automotive industry,
1196 GS1 in the retail industry and, to a different extent, ISO 20022 in the financial sector.

1197 With this situation in mind, one can easily understand that there is no need for creating a
1198 new "standard". Rather the focus for future initiatives should be on bringing the existing
1199 initiatives closer to one another. It is recommended to establish a common semantic
1200 reference data model that different organisations can adhere to. This will foster
1201 interoperability and a bridge between communities as it is described in chapter 5.

1202 In the current situation where several standards for e-invoices co-exist, the introduction of a
1203 common semantic reference data model for e-invoices can foster collaboration between
1204 different communities and facilitate conversions between different formats. With this
1205 approach the European e-invoicing initiative can both piggy-back on others and also make
1206 possible greater interoperability between communities.

1207 ***7.5 The public sector can be a driver if not treated in isolation***

1208 The European Commission has started investigating the potential of e-invoicing in public
1209 procurement and investigating benefits in actions to promote interoperability and up-take by
1210 measures of the European Commission¹⁸.

1211 Considering the large amount of companies selling goods and services to government, this
1212 can indeed be a leverage for the initiative. With this in mind there is a need to combine the
1213 initiatives to foster e-invoicing in the public sector with the similar in private sector. E-
1214 invoicing in public sector should not be treated as something different according to the
1215 argument in chapter 2.

1216 ***7.6 Do not forget about the SME's***

1217 99 per cent of companies in Europe are represented by Small and Medium-sized
1218 Enterprises (SME)¹⁹. According to a report by the European Parliament only 22 per cent of

¹⁸ http://ec.europa.eu/internal_market/consultations/2012/e-Invoicing_en.htm

¹⁹ Defined as enterprises with up to 250 employees.

1219 European Small and Medium-sized Enterprises send or receive e-invoices²⁰. In the
1220 communication Reaping the benefits of e-invoicing²¹ the European Commission states that
1221 the overall goal of making e-invoicing predominant cannot be reached without a focus on
1222 SME's.

1223 Usually SMEs do not have a strong ICT component: no ERP system, manual operations to
1224 the larger part facilitating business processes, where applications are supposed to support
1225 these manual operations. SMEs are rather interested in these applications and the best
1226 way in which these support their business processes, rather than the standards that are
1227 used.²²

1228 A Semantic Data Model - as a concept - is thus in fact of less importance to (end-user)
1229 SMEs, but the more of relevance for SMEs that develop applications, for the adoption of
1230 electronic invoicing. Such adoption is out-of-scope for this document.

1231 Measures that are to be developed should take into account the SME environment, where
1232 paper invoices mean contact moments and there is no business incentive to replace it. In
1233 addition, these measures should take into account that SMEs may interface with corporate
1234 clients to receive order information and return invoice information using web-portal based
1235 technology, heavily relying on manual interaction.

1236 e-Invoicing adoption here should not focus on the adoption in the SME business
1237 processes, but rather on a mechanism where e.g. invoice information is sent to a
1238 'consolidator'²³ that takes care of handling of data and subsequently forwarding it to the
1239 buyer; a Semantic Data Model could play a role in the latter, but certainly less in the
1240 business process of the SME.

1241 The above means that SME's do not literally 'see' the e-invoice as it may be bundled in the
1242 software or the services they are using offered by IT-providers or banks, or hidden in their
1243 printing process. There are ERP and accounting systems targeted at SME's with support for
1244 e-invoices in some cases, but most are using web based solutions. Still there is a need for
1245 keeping in mind the needs and limitations imposed by SME's when it comes to designing
1246 standards to be used.

1247 ***7.7 Interoperability improved by initiatives in standardisation***

1248 The further fragmentation of the e-invoicing landscape should be avoided as indicated in
1249 chapter 1, in stead actions are needed to foster harmonisation and convergence. Such a
1250 work will take several years to complete. It is important to start quickly in order to avoid
1251 member states and other communities to invest in solutions that are not aligned with the
1252 upcoming common semantic reference model for e-invoices. There is a need for taking
1253 measures to improve interoperability and in this area standardisation work within CEN can
1254 be a key initiative. A European Standard (EN) automatically becomes a national standard in
1255 all National Members. As have been shown in chapter 4 there is a value in more formal
1256 standardisation work than the current initiatives in CEN that are restricted to deliver CEN
1257 Workshop Agreements. To make a common semantic reference data model for the core e-
1258 invoice in Europe successful there is a need to give this model a formal status like would
1259 be the case of a CEN European Standard (EN).

²⁰ <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0083&language=EN>

²¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0712:FIN:en:PDF>

²² Note the essential difference between 'use of a standard' and 'support of a standard'; nowadays almost every citizen uses GSM standards, almost no citizen supports it.

²³ this may be done by something simple as replacing a printer driver, taking care that instead of being printed on paper, the invoice information is sent electronically to a service provider. This would have no influence on the SME business process at all.

1260 Even with a European approach as described above, it is possible to combine this with an
1261 international perspective if work is based on work in international standards organisations.
1262 That way the European e-invoice initiative also can boost the work on the interational
1263 scene.

1264 An observation from the work in the European Multistakeholder Forum on e-Invoicing is
1265 that the public sector has different levels of maturity in different member states. The
1266 European Parliament has identified Denmark, Finland, Italy, Spain and Sweden as
1267 leaders²⁴. In its report the European Parliament addresses the need for coordination of
1268 national initiatives.

1269 It is of importance when member states undertake new initiatives to promote e-invoicing
1270 that those national initiatives need to be aligned with the European standardisation
1271 initiatives proposed in this report. Interoperability in e-invoicing in Europe is important to
1272 strengthen the internal market. Member states need to take responsibility to make this
1273 possible.

1274

²⁴ <http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2012-0083&language=EN>

1275 **8. Recommendation and conclusions**

1276 Contributing to the objective 'e-Invoicing predominant in 2020' boils down to a number of
1277 initiatives, measures and activities that need to be developed and carried out in harmony.

1278 The various layers of the European Interoperability Framework, that has been shown as an
1279 example in Chapter 3, depict individual layers on which agreements need to be made. A
1280 holistic approach is necessary, guaranteeing that the progress made on one layer is not
1281 hampered by a different speed of progress on one or more of the other layer.

1282 Elaborating that in full is beyond the scope of this document.

1283 This document focuses on the contribution that is presumed possible to the objective, by
1284 helping interoperability between communities where relevant, the role that a Semantic Data
1285 Model can play and the reasons behind that.

1286 To satisfy a request of the European Commission, the originally 'monolithic' work of Activity
1287 4 has been split in two parallel, but nevertheless related, tracks:

- 1288 • The development of a 'Recommendation'
- 1289 • The development of a 'Background document' (i.e. this document)

1290 Although the 'Recommendations' is a self-contained document that enables review and
1291 decision making, the accompanying 'Background document' provides addition information
1292 to highlight rationale, intended use and follow-up of the 'Recommendation'. It contains
1293 descriptions of actions that need to be carried out in order to allow the full benefits of the
1294 Recommendation to be reaped.

1295

1296 9 Organising for implementation

1297 The objective 'e-Invoicing predominant in 2020' focuses on electronic invoicing in the
1298 context of Europe 2020, the Digital Single Market, etc. Implementing measures to achieve
1299 this goal should also recognise the fact that 'out there' there is not a 'Greenfield' situation -
1300 electronic business is happening; trade is taking place and 'dematerialisation of business
1301 processes' (i.e. the replacement of paper used for the exchange of information in trade and
1302 its supporting processes by electronic messages) and already now several initiatives and
1303 solutions exist in and across various markets – both in the private and the public sector
1304 providing answers to many business requests from various communities.

1305 Respecting that these solutions have been implemented in order to address specific
1306 identified business needs relevant for that specific community, and to increase the uptake
1307 of e-Invoicing in general, is one of the main reasons for the recommendation to focus on
1308 semantic interoperability (see section 3.3) between communities.

1309 It is further suggested that such semantic interoperability is best achieved by focusing on
1310 the concept of a "Core Invoice" (see section 2.4) and nominating a common point of
1311 reference – a semantic reference model (see section 5.2).

1312 In organizing for the implementation of these recommendations several aspects need to be
1313 considered, including:

- 1314 1. Establishing a "European Core Invoice"
- 1315 2. Methodology for "extending the Core"
- 1316 3. Nomination of the "common point of reference"
- 1317 4. Statements of conformance
- 1318 5. Public sector engagement

1319 Each of these aspects are further elaborated in the following sub-sections.

1320 It is necessary to recognise that a 'business drive' is essential. Public sector initiatives tend
1321 not to experience a vivid market uptake, and may vanish from the scene again, if they are
1322 not adopted because of filling a need given by practical market requirements. Public sector
1323 initiatives need to exploit the special competences to provide help, where the private sector
1324 cannot achieve the required progress on its own or does not have the possibility to.

1325 **Establishing a "European Core Invoice"**

1326 The concept of a "Core Invoice" as discussed in section 2.4 assumes "that a (small) set of
1327 information elements can be defined that supports the core invoice functions". The concept
1328 of a "Core Invoice" has been adopted by e.g. the CEN WS/BII and the CEN MUG project,
1329 and has later gained wide attractions by a number of initiatives.

1330

Sub-Action 1: In the process of establishing the Terms of Reference for continued actions to
establishing a "European Core Invoice", the relevant existing deliverables should be identified
and referenced as a starting point.

1331

1332 In order to achieve the goal of European-wide increase in the uptake of e-Invoicing it is
1333 obvious that any actions to establish such a "European Core Invoice" should take place
1334 within an organizational structure that allow for an open and balanced representation of all
1335 interests concerned at a European level with a view to achieve a wide agreement through a
1336 consensus building process. Such an approach would also ensure that the Semantic Data
1337 Model is not developed in isolation, just for the e-Invoice.

1338 Leaving the further definition and elaboration of activities to the stakeholders in trade also
1339 reduces the risk of European Union local developments only. Trade, in general, is global
1340 and a European Union dedicated solution would put global trade by private sector entities
1341 in Europe in an exceptional position, hampering in the filling in of trade, i.e. the physical
1342 and the financial supply chain with Europe while these may in fact be directed at emerging
1343 economies.

1344

Sub-Action 2: The "European Core Invoice" should be developed as a European Norm (EN) within an appropriate CEN Technical Committee which ensures a balanced representation of all interests concerned.

1345

1346 A key target group for the "European Core Invoice" are the SMEs. SMEs typically depend
1347 on solution providers and communities as their source for relevant information.

1348

Sub-Action 3: Trading parties or their service providers should be encouraged to use the "European Core Invoice" as the basis for the formats and syntaxes implemented in their solutions.

1349

1350 To support adoption by the SMEs the cost of obtaining information and relevant solutions
1351 should also be kept to an absolute minimum.

1352

Sub-Action 4: The EN should be made available to interested stakeholders at zero cost, implying an absolutely zero threshold to obtain the information regarding the "European Core Invoice". A similar approach should be considered for "rulebooks" and "implementation guidelines".

1353

1354 The associated costs could be covered from public sector funding, as for instance from the
1355 'Connecting Europe Facility'²⁵.

1356 **Methodology for "extending the Core"**

1357 The concept of a "Core Invoice" also recognises that the "... (small) set of information
1358 elements ..." may, from the outset, not necessarily meet the specific requirements of a
1359 given country or supply chain (see sections 2.5 and 2.6).

1360 Thus supply chain specific or country specific extensions could be expected, especially in
1361 the first years of adoption. It is however expected that, as experience is gained and the
1362 legal landscape is further harmonised, especially the "country specific extensions" will
1363 gradually be eliminated.

1364

Sub-Action 5: Member States should ensure that they do not create or perpetuate the mandatory use of Country Specific data elements in order to facilitate a greater measure of interoperability.

1365

1366 **Nomination of the "common point of reference"**

1367 In order to secure global interoperability the information elements contained in the
1368 "European Core Invoice" should be mapped to a "common point of reference".

1369 The work of UN/CEFACT has a global scope and is based on the requirements of different
1370 industries and sectors. As such it is well suited to serve as a global common point of
1371 reference to which other initiatives can relate, in order to achieve global interoperability.

²⁵ <https://ec.europa.eu/digital-agenda/en/connecting-europe-facility>

Sub-Action 6: The UN/CEFACT work should be nominated as a common point of reference, to be incorporated in Sub-Action 1 in order to achieve global interoperability.

1372

1373 **Statements of conformance**

1374 The availability of a "European Core Invoice" and "UN/CEFACT requirements reference
1375 model" as a global point of reference to support semantic interoperability would also
1376 provide a means for users to establish that their applications are conformant with it, to the
1377 degree which will support interoperability. To achieve this, the idea of self-conformance is
1378 an attractive one, as it avoids the high resource demands of proactive conformance testing.

1379 Self-conformance could be achieved by providing two resources: a methodology for
1380 establishing and describing conformance; and a conformance registry, to provide visibility
1381 to trading partners and other communities of users. The methodology would provide a
1382 standard means of describing how business requirements and possibly existing syntaxes
1383 relate to specific portions of the "European Core Invoice" and "UN/CEFACT requirements
1384 reference model", including whatever qualifications for particular mappings might be
1385 needed. This includes both high level statements of conformance, and granular detail.
1386 Without this full set of information, semantic interoperability is not possible.

1387

Sub-Action 7: A methodology and templates for use by users and solution providers to claim conformance to the "European Core Invoice" and the "relevant UN/CEFACT work" should be established.

1388

1389 The conformance registry is a simpler idea – effectively just a repository of conformance
1390 information, accessible as a website or possibly programmatically. The conformance
1391 registry would e.g. hold user's information in reference to the "European Core Invoice" and
1392 "UN/CEFACT requirements reference model", indicating where they are the same (that is,
1393 where they conform) and where they may be differences (that is, where they are not
1394 conformant).

1395

Sub-Action 8: A registry for publication of self-conformance statements to be used by users and solution providers claiming conformance to the "European Core Invoice" and the "relevant UN/CEFACT work" should be established.

1396

1397 **Public sector engagement**

1398 Public sector entities have two important roles in relation to the goals of increasing the
1399 uptake of e-Invoicing.

1400 Firstly as a user of e-invoicing, both as receivers of e-invoices and as issuers of e-invoices
1401 for services rendered to the market. In this respect a public sector entity as an actor in
1402 trade differs in nothing from a private sector entity in the same role - and does not justify
1403 any dedicated approach, standard, or measure. Based on business justification the public
1404 sector may however take the role as a "launching or demanding customer" in order to boost
1405 developments. This would be especially true in cases where the special competences of
1406 the public sector may remove hindrances for which the private sector lacks these
1407 competences to be able to remove them.

1408 Secondly as a facilitator for the implementation of the actions outlined above. In this
1409 respect it is important to ensure that actions are consistently implemented across the public
1410 sector entities and initiatives involved. Uncertainty in the market about the implications of
1411 Directives and Regulation that are seemingly developed in isolation are likely to cause
1412 uncertainty in the market and will hamper investments in new concepts and hence
1413 adoption.

Sub-Action 9: The European Commission should ensure that its efforts related to the adoption of e-Invoicing are harmonized Commission internally. Uncertainty in the market about implications of Directives and Regulation that are seemingly developed in isolation, or from efforts as the ICT Standardisation MultiStakeholder Platform cause fragmentation - and hence uncertainty - in the market, hampering investments in new concepts and hence adoption

1414

1415 Note that proper uptake of electronic invoicing should not lead to the distinction of artificial
1416 roles: a public sector entity as an actor in trade differs in nothing from a private sector entity
1417 in the same role in trade - and does not justify any dedicated approach, standard, or
1418 measure. That would lack the business rationale, jeopardise uniformity and hence never
1419 experience the adoption.

1420

Sub-Action 10: Sub-action 9 also implies taking care or harmonization and synchronisation with initiatives like eSENS. It should be considered that eSENS and its accompanying funding in CEF may provide excellent tools to help progress the outcome of the European Multistakeholder Forum on e-Invoicing, while its contribution is a logical step to the further development of the functionality as envisaged in eSENS as they strive after in fact the same objectives.

1421

1422

1423

1424 **Annex 0**

1425 To be completed

1426 **Annex 1 List of contribuants**

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1434 Various contributions from participants in constituencies, from 'ex-ante-verification' with
1435 potential stakeholders

1436 **Annex 2 Guidelines for SMEs in adopting electronic invoicing**

1437 In the terms of use of structured electronic invoices, the level of e-invoicing uptake in the
1438 SME sector is relatively low. According to Eurostat, 17 percent of SME's are receiving and
1439 ca 7 percent are sending e-invoices in a standard structure suitable for automatic
1440 processing.

1441 There are several reasons of such situation.

1442 First and the most basic problem of SME's readiness for e-invoicing is low ICT applications
1443 adoption level. The most often identified problem is a lack or limited automatic e-invoice
1444 issuing, receiving and processing features of ICT applications used by SME's.

1445 Non-standardized, non-interoperable IT applications and solutions dedicated for SME's
1446 electronic cooperation hinder the use of advanced, efficient, technology independent e-
1447 invoice exchange models. A part of the problem is the lack of standardization need
1448 awareness between ICT applications suppliers.

1449 According to the Activity 1 Interim report of the European Multistakeholder Forum on e-
1450 Invoicing, some of operational barriers for e-invoicing inside SME's are:

- 1451 • no software support for e-invoicing functionality development
- 1452 • not sufficient expertise of staff and applications or service suppliers

1453 Activity 1 and Activity 2 of the European Multistakeholder Forum on e-Invoicing had
1454 specified other problems and barriers of e-invoicing uptake in the SME sector. Activity 3 of
1455 the European Multistakeholder Forum on e-Invoicing aims at solving legal barriers (see
1456 Activity 3 report and recommendations).

1457 Activity 4 group focused on removing existing barriers for automatic e-invoice exchange
1458 between automated processes and (ERP) systems by introduction of a Semantic Data
1459 Model to be used as reference for the purpose of interoperability.

1460 Although the Activity 4 group recommendations may not obviously solve all SME's
1461 problems concerning e-invoicing issues, some features of the model will support
1462 standardized, SME's dedicated solutions creation and deployment.

1463 The Semantic Data Model to be used as reference for the purpose of interoperability
1464 proposed by this Activity 4 group will:

- 1465 • deliver a base for common invoice content standard

- 1466 • define simplified invoice content (Core part)
- 1467 The common invoice content standard and its Core part can result in possible
1468 implementation of e-invoice model suitable for use in every sector and every Member State
1469 in EU (including SME's).
- 1470 But e-invoicing as a part of electronic business cooperation between SME's and their
1471 business partners is still perceived as a troubleshooting investment, having unclear or low
1472 cost / benefit ratio. Some experiences observed in some Members States suggest that the
1473 more holistic approach to the electronic cooperation can be more beneficial for SME's.
1474 According to those observations, wider approach to SME's needs should cover possibly the
1475 whole Purchase to Pay or Order to Payment process.
- 1476 Figure 2.1 in Chapter 2.1 depicts Purchase to Pay process as an example of most typical
1477 transaction cycle supported by electronic business documents. Next to the standardization
1478 (interoperability) efforts, this example can stand for a starting point for SME's electronic
1479 cooperation implementation (including e-invoicing). Implementation of basic business
1480 documents in electronic form or e-procurement models will increase cost / benefit ratio of
1481 investment.
- 1482 Because SME's stand for 98 percent of European economy, there is a need for centralised
1483 support in e-invoicing implementation in this sector.
- 1484 Activity 4 group recommends EC to form and introduce new action concerning financing
1485 necessary activities related to e-invoicing investments in SME's sector:
- 1486 • for ICT suppliers – to raise their standardization (interoperability) awareness
1487 (GS1 Cooperation with Service Providers activity can stand for an example)
 - 1488 • for SME's – to help to gather necessary e-skills (e.g. CEN gateway for SME's
1489 development, business organizations involvement, guidelines preparation)

1490 **Annex 3 Electronic Simple European Networked Services (e-SENS)**

1491 This annex provides a short introduction to e-SENS, with the objective to help explorations
1492 about progressing the recommendations of the European Multistakeholder Forum on e-
1493 Invoicing in a potentially supported context

1494 **Overview**

1495 On the 1st April 2013, the new Large Scale Pilot (LSP) “Electronic Simple European
1496 Networked Services” - e-SENS²⁶ was launched. e-SENS is another EU-funded project within
1497 the ICT Policy Support Programme (ICT PSP), under the Competitiveness and Innovation
1498 Framework Programme (CIP), focused on strengthening the digital single market and
1499 facilitating public services across borders.

1500 In today’s digital world, numerous challenges are faced by public administrations in Europe,
1501 varying from the semantic, organizational, and legal level to the more complex technical
1502 issues surrounding interoperability. Previously started LSP projects: e-CODEX, epSOS,
1503 PEPPOL, SPOCS and STORK have already proven that providing electronic cross-border
1504 services can be simpler and more efficient by using interoperable ICT solutions.

1505 In various domains, technical building blocks have been developed and tested in real life
1506 situations relevant for business and citizens. The new LSP project – e-SENS has been
1507 formed to consolidate and solidify the work done in previous LSP projects, and to extend
1508 these solutions to new domains.

1509 e-SENS is expected in particular to:

- 1510 • develop a common infrastructure for interoperable public services;
1511 • enable higher interoperability between public administrations all over Europe;
1512 • provide the foundation for the platform of “core services” for the e-Government
1513 cross-border digital infrastructure as foreseen in the draft regulation for
1514 implementing the Connecting Europe Facility (CEF)²⁷
1515 • support the creation of the European digital single market.

1516 To achieve the aforementioned goals the e-SENS project will consolidate the work of the
1517 existing Large Scale Pilots, focusing on the core building blocks such as e-ID, e-Documents,
1518 e-Delivery, e-Signatures and semantics. The building blocks will be tested in numerous
1519 domains such as e-Health, e-Justice, business setup, and e-Procurement to prove their re-
1520 usability and scalability.

1521 The e-SENS consortium is composed of 22 partners representing 20 European countries,
1522 including Norway and Turkey. OpenPEPPOL AISBL²⁸ is also part of the consortium.

1523 **e-SENS and e-Invoicing**

1524 In the e-Procurement domain of e-SENS, priority will be given to facilitate cross border e-
1525 Invoicing and thus provide support for Key Action 10 “Make electronic invoicing the standard
1526 invoicing mode for public procurement.” in the “Single Market Act II – Together for new
1527 growth” (COM(2012) 573 final, 3.10.2012).

1528 The introduction of legislative measures making e-invoicing a standard practice in public
1529 procurement will make the public sector the leading market for e-Invoicing and spearhead its
1530 wider use in the economy. e-SENS will demonstrate that it is feasible, realistic and
1531 sustainable to deploy real-life ICT services within and amongst countries across Europe.

1532 Support for interoperable post-award procurement processes have been developed to a
1533 good maturity level through the efforts of PEPPOL, CEN BII²⁹ and OASIS. In particular,

²⁶ <http://www.esens.eu/home.html>

²⁷ <https://ec.europa.eu/digital-agenda/en/connecting-europe-facility>

²⁸ <http://www.peppol.eu/>

1534 PEPPOL is the foundation for the piloting envisaged in the e-Procurement domain of e-
1535 SENS, and therefore in e-Invoicing.

1536 The main purpose of the planned post-award specification and piloting activities will be to
1537 take this a step further through the introduction of refined business interoperability
1538 specifications, testing of new versions of the e-Delivery building block, as well as other
1539 relevant building blocks to be developed, and attracting new users.

1540 The pilots will be in production pilot environments where actual transactions among public
1541 administrations, or between them and European citizens and businesses, can take place,
1542 based on technological building blocks in a cross border context. These building blocks can
1543 in turn be re-used and integrated in different combinations and scenarios, such as C2B and
1544 B2B.

1545

1546 **Glossary**

1547 Currently separate document; issued before

1548 **References**

1549 To be completed

1550