European Multi-Stakeholder Forum on E-Invoicing (EMSFEI)

Report on interoperability and transmission of e-invoices with a special focus on the needs of Small and Medium-sized Enterprises (SMEs)

October 2018

TABLE OF CONTENTS

1. Introduction and context

This Report has been prepared by sub-group 4 of the European Multi-Stakeholder Forum on e-Invoicing (EMSFEI). The Report was endorsed at a meeting of the EMSFEI on 24 October 2018. The sub-group was asked by the EMSFEI to develop a set of recommendations in the area of 'transmission and interoperability' with the following terms of reference:

'How do we ensure that suppliers, especially smaller suppliers, can safely and efficiently transmit or deliver by electronic means e-invoices to their buyers or contracting entities and how do we ensure that all buyers, can safely and efficiently receive by electronic means e-invoices in a form that they are able to process? What gaps, if any, exist in technical standards or business practices to support transmission and interoperability?

In approaching this subject, it was recognised that the transmission of e-invoices conforming to the recently agreed European Norm (EN16931) is of central importance, but that recommendations should also be useful in the context of e-invoicing generally and should also be applicable to related supply chain messages such as purchase orders.

Directive 2014/55/EU obliges all public contracting authorities in Europe to receive and process electronic invoices (e-invoices) conforming to EN16931 from April 2020. This builds on the reality that many contracting entities, both in the public and private sector, have already taken steps to oblige their suppliers to send invoices electronically. The semantic model set out in EN16931 and its related technical reports and specifications specify the content and formats for such e-invoices, primarily those used in B2G, although the Norm has also been designed to support common B2B use cases.

Practices for the transmission of e-invoices are currently a matter for Member States, or more generally for buyer-led initiatives based on a variety of market and technology solutions, including support for pan-European interoperability. As the European market for the supply of goods and services is open to all economic operators, large and small, it is important to ensure that the eco-system for transmission is fit-for-purpose and in particular does not create burdens or barriers for smaller enterprises when dealing with multiple buyers, both domestically and cross-border. Contracting entities and their suppliers need to have access to a balanced mix of delivery mechanisms so as not to hinder the uptake of electronic invoicing and permit all to take advantage of business opportunities in the Single Market.

The following elements of work have been completed and form the sections of this report:

1. Introduction and context
2. Key principles and objectives
3. Landscape description of the current transmission environment,
   and Diagnosis: what issues do we need to solve? The conclusions of the diagnosis are placed in the relevant sections of the landscape description.
4. Discussion of some key issues arising from the Landscape Description
5. Recommendations

Essential pre-reading for the sub-group has been the CEN/TC 434 Technical Report 'Guidelines for interoperability of electronic invoices at the transmission level EN16931-4', as an input and a starting point for this work. The CEN Workshop Agreement CWA 16460 also provides further useful background information. Readers may wish to refer to these documents.

2. Definitions, principles and objectives

2.1. Definitions

For better understanding, the following terms will be used in this document:

Electronic invoice: the most well established European definition of an electronic invoice is that included in the VAT Directive 2006/112/EC as amended by Directive 2010/45/EU, article 217. It is an invoice that contains the information specified in the Directive, and which has been issued and received in any electronic format. It can be a structured format capable of being machine readable and automatically processed, or a non-structured format represented by a humanly readable visual presentation of an electronic invoice (such as a simple PDF) or a combination of a structured and non-structured format, often referred to as a 'hybrid' invoice. These variations are discussed in further detail in the body of the paper.

In Directive 2014/55/EU on electronic invoicing in public procurement and the associated adoption of a European Standard for an electronic invoice in public procurement, electronic invoice is defined specifically as an invoice that has been issued, transmitted and received in a structured electronic format which allows for its automatic and electronic processing. This stricter definition is relevant for electronic invoicing conforming to Directive 2014/55/EU.

For the purposes of this paper the electronic invoice will likely be the most common message 'payload' requiring transmission, although the guidance for transmission applies to other documents and supply chain messages such as credit notes, purchase orders, dispatch advices and delivery notifications and remittance advices.

Electronic Data Interchange: is a form of transmission used in numerous industries for the two-way transmission of standardized structured data on a point-to-point basis and is cited as a method in the 2010 VAT Directive. It offers structured data transmission in a peer-to-peer mode based on shared fully documented and structured formats, languages such as EDIFACT or XML, protocols (such as AS2, AS4, FTP, FTPS, HTTP, SMTP, …) and using various file or message exchange tools, access points to exchange networks, or service providers.

Since then, the exchange of data in many forms and through many network models has developed and it seems appropriate to regard all these exchanges as EDI, as is common usage in many descriptions of electronic business. Consequently, the term Electronic Data Exchange (EDI) is used throughout this paper for all methods of structured data transmission and not only in the context of 'traditional' peer-to-peer EDI networks.

Interoperability: the ability of a seller or a buyer acting as trading parties to exchange e-invoices and other documents that contains the information elements required by both seller and buyer in a compliant form, irrespective of the information technology environment, e-invoicing solution or service used by each, and provided that the electronic network addresses used by the parties are known or easily discoverable.

Sender: is the Party that is legally the sender of the invoice, i.e. usually the Seller.

Sending Party: is the Party that sends the e-invoice, on behalf of the Sender. It can be the Sender's Service Provider (named Service Provider-Sender or **SPS**) or the Sender itself.

Receiver: is the Party that is legally the recipient of the invoice, i.e. usually the Buyer.

Receiving Party: is the Party that receives the e-invoice (the original invoice), on behalf of the Receiver. It may be the Receiver's Service Provider (named Service Provider-Receiver **SPR**) or the Receiver itself.

Service Provider: in the context of e-invoicing is an organization that typically provides its customers with services for the creation, delivery and processing of e-invoices and other related e-business transactions as well as supporting software and services.

It should be noted that the roles of Sender, Sending Party, Receiver, and Receiving Party may be fulfilled during the transmission process in whole or in part by parties other than the trading parties or their e-invoicing service providers. Examples include financial institutions or factors providing invoice finance, or other servicing entities such as accountants and business process outsource providers.

2.2. Key principles

The following principles have been developed as a way of encapsulating the key drivers for efficient and cost-effective transmission:

- **Principle 1 on reach and automation:** Economic operators should be able to reliably send, or make available, and receive e-invoices and related documents to and from all types of trading partner, public or private, in Europe and elsewhere. Transmission should support the automation objectives of these economic operators, whilst also supporting the need to employ manual processes when necessary, for example in the event of discrepancies or when automatic matching and processing is not possible for a receiver owing to the relative immaturity of its information systems and procedures (especially relating to smaller organizations).
- **Principle 2 on choice and interoperability**: All economic operators acting as suppliers should be able to choose the transmission tools, mechanisms, or service and solution providers that meet their requirements, provided that these are interoperable and compatible with the transmission mechanisms of buyers, whoever they may be. It is recognized that connections between highly heterogeneous economic operators need to made and sustained.
- **Principle 3 on solutions**: The use of service and solution providers is strictly a matter for economic operators. Providers offering business, information technology and communication services are encouraged to develop and continuously evolve efficient and cost-effective (not exceeding the cost of paper invoicing) products and services, which support business and technical interoperability, and, wherever feasible, remove the need for human intervention. The latter is dependent on the preparedness of economic operators to adapt their processes and deploy the necessary skills. The market for services should be competitive, innovative and offer choice to users of all sizes.
- **Principle 4 on fiscal compliance**: Transmission solutions should enable all economic operators to fully meet their obligations in respect of compliance with applicable fiscal rules, in particular VAT regulations, and requirements for authenticity, integrity and

legibility relating to e-invoices. This may increasingly require reporting and registration facilities to meet the requirements of tax authorities.

- **Principle 5 on standards**: The environment should embrace standard definitions, open and non-proprietary technical standards and well-established business practices to support ease of implementation, continuing use and maintenance. It should support the common models and methods of e-invoicing and electronic data interchange, and include provision for confidentiality and non-repudiation, appropriate levels of security, timely receipt and response messages, and, as required, visualization in human-readable form.
- **Principle 6 on addressing**: addressing, routing and identification mechanisms should be progressively standardized by the industry and should be easily discoverable through a registry or directly in an e-invoicing solution.
- **Principle 7 on governance**: Stakeholders need to take care to create and safeguard boundaries between the competitive space and the areas of cooperation appropriate to networked environments. Appropriate governance should be established for such cooperation models.

2.3. Report objectives

The key objectives of the report are:

- To identify a number of concrete issues in the area of transmission, the resolution of which will deliver improvements, especially for smaller economic enterprises. The creation of a fully interoperable eco-system for all economic operators is the central challenge.
- To make recommendations for actions that stakeholders (including the European Commission) could take to solve the issues and close the gaps, while recognizing that this is a competitive and heterogeneous area and where building on the basis of existing assets, is considered desirable excepting where clear deficiencies need new remedies.
- To concentrate on how to improve interoperability and not to evaluate any specific parties or organizations… 'How' not 'who'.
- To do this within a six-month timeframe based on the volunteer resources offered by members of EMSFEI.

It is important to place transmission and interoperability issues in the context of other aspects of achieving full scale e-invoicing adoption. The transmission space connects the two other spaces of the Supplier, where on-boarding and ease of use are critical, and the Buyer where ambitious integration into enterprise systems and processes are challenges to be faced. Change management, resources, motivation, benefits realization and managed migration are all major conditions for success.

3. Transmission practices Landscape Description & Diagnosis

3.1. Background

In objective and neutral summary form, this section presents the various transmission practices that are currently in use today and which are grouped in a number of logical categories. Underneath

each category is a discussion which expresses diagnostic conclusions that feed an inventory of gaps in technical standards or business practices that should be addressed so as to improve interoperability between trading parties and their service providers, if the latter are used. The transmission methods referred to in this document will invariably use the Internet, either what may be termed the public Internet, or private/virtual private networks employing IP protocols and web-services.

Currently the diverse range of trading parties deploy a variety of transmission mechanisms:

- Many suppliers send e-invoices by e-mail to their buyers;
- Many suppliers use enterprise software and increasingly 'cloud' based Software as a Service (SaaS), that are capable of transmitting e-invoices through web-services directly to buyers or to an e-invoicing solution accessible to the buyer;
- Suppliers and their customers may use the services of service providers, to whom both are connected (3-corner model) and which may in turn be interconnected through a so-called 4-corner model;
- Many governmental and private sector contracting entities provide portals that allow uploading of e-invoices or the receipt of e-invoices through web-services;
- Some (larger) suppliers make their e-invoices available on a web-site where customers (typically consumers and small enterprises) may download them or arrange to receive them in Internet banking services.
- The various transmission solutions may be used in parallel to meet the needs of differing buyers or contracting entities.

Sellers and buyers use a variety of e-invoicing solutions to create, send and receive, transform, extract data, create a humanly readable visual presentation, or book and archive an e-invoice. It can be a software solution on premises, or software as a service (SaaS), hosted locally or in the 'cloud', or a service provided by a service provider that handles the above functions and provides the exchange of an e-invoice in a format and using an exchange protocol accepted by trading parties.

It is pointed out that although VAT regulations in Europe with respect to e-invoicing have been largely harmonized under the VAT Directives 2006 and 2010, there remain a variety of practices at Member State level and in commercial practice on the identification and processing of the 'original invoice', the sharing or otherwise of an identical format or document by the trading parties, the use of any visual representation, and the roles of the parties involved, including service providers, in areas such as archiving. It is recommended that the topic of fiscal compliance and compliance generally would bear further examination by the EMSFEI as a future project topic and a recommendation to that effect is included below. The issue is discussed to an extent below in relation to transmission, but not in any great length.

Full interoperability is reached when the Sending Party delivering an e-invoice to its contracting entities simply requires knowing to which address the e-invoice must be sent or made available, and the e-invoice provided contains the information elements required by both seller and buyer in a compliant legal form. It is an assumption of this position paper that when using the EN16931, the original invoice is the structured invoice rendered to a contacting entity in a form that meets the requirements of the semantic model and is rendered in one of the listed syntaxes.

The following main methods of transmission for electronic data interchange are used in the market today.

3.2. Direct or bilateral model usually peer-to-peer

The Sender and the Receiver agree on a secure way to exchange e-invoices and other messages and establish a private connection (e.g. using AS2, FTPS, or a private network). Such connections between the source and destination systems are set up, managed and maintained by and between each and every pair of trading parties. In most cases, no service providers are involved in the transmission and the Sender and Receiver take responsibility for the import, export and format conversion required to facilitate such exchange. In some instances, service providers might provide supportive technical services.

This model is mainly used in EDI exchange for high volume or concentrated flows of supply chain data and sees particular use in certain industries and is often confined to direct materials. It is usually well-secured and is capable of being fully compliant regarding fiscal and legal regulation, as the secure exchange sessions provide assurance for authenticity of origin, integrity of content, and identification of the same original e-invoice for both parties. A legible presentation can be rendered from the structured file or provided in an embedded pdf file.

Diagnosis: set-up, management and maintenance costs are often significant owing to variations in implementation and the need on both sides to continuously, manage and monitor the private bilateral connections.

Whilst elements of interoperability are achieved, it is not scalable as there are no network effects delivering a fully repeatable formula. This formula often normally imposed by one trading party on the other trading party and does not satisfy Principle 2 above, unless the link is established as a neutral capability of value to both parties in dealing with their trading partners. For SMEs it may be highly burdensome.

For high-volume standardized exchanges between larger contracting entities where the business case is compelling, this transmission method is well appreciated, but may shrink as a proportion of global volume.

3.3. 3-corner models where both supplier or buyer use the same platform

In a three-corner model Buyer and Supplier are connected by the same Service Provider, which provides a business and technical solution.

There are a number of variations of the 3-corner model.

- A very common instance arises when the Sender sends or makes available e-invoices on the Receiver's e-invoicing platform, which is usually but not exclusively provided by a Service Provider (identified as the SPR); this model is described as buyer-centric. The model is often based on the Receiver's motivation to organize a supply chain automation program and achieve benefits for both itself and its suppliers. E-invoicing may form part of a Procure-to-Pay system covering orders, delivery notes etc., which are also handled over the same platform.
- It can also arise when a larger economic operator acting as Sender expects the Receiver to use the Sender's e-invoicing Platform or the Sender's Service Provider (SPS) to receive its invoices. This use case is covered in a section below.
- A 3-corner model can arise where the Sender and the Receiver use the same Service Provider that simply offers a single e-invoicing platform with services equally focused on both Receivers and Senders. This is use case is commented on briefly in the sections below.

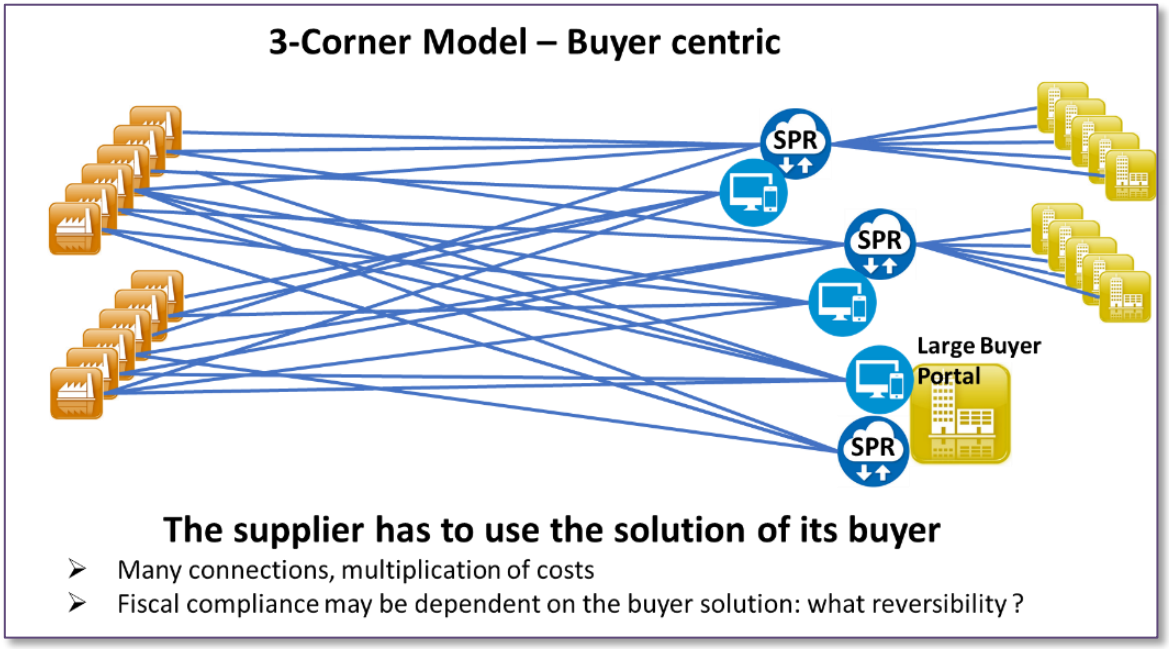
3.3.1. Buyer-centric models

The Receiver asks the Sender to use the Receiver's dedicated platform or use its Service Provider (SPR) to send its invoices. The Sender also becomes a client of SPR, which therefore also becomes the SPS. The Sender is a client in its own right with its own confidential commercial relationship with the Service Provider (SPS). To provide Invoices or invoice data by means of a direct link or through a dedicated Supplier Portal as described below.

For each instance of use of a service provider in the capacity of SPS, the Sender is required to enroll in the service and meet the operating needs for data or formats, log-in credentials, portal functionality, archiving tools etc., together with the commercial conditions applied. Where more than one of its Receivers is present on the same service provider platform, the Sender will normally be able to send invoices to those parties. Where the Sender is a smaller entity it may receive concessionary or free services for low volumes of transactions.

Where the Service Provider has entered into interoperability agreements with other providers of 3-corner models, it may provide services to its Receivers to import e-invoices from Senders on other platforms and conversely provide services to its enrolled suppliers as Senders to deliver e-invoices to other buyers present on other 3-corner platforms.

Whereas in the early stages of e-invoicing the 3-corner model has been a key agent of adoption it is now also forming the foundation for the establishment of a 'federated' 4-corner eco-system.



For the buyer-centric model, processes for the e-invoicing exchange, and fiscal and legal compliance are normally supported by the 3-corner platform acting in both SPS and SPR capacities as follows:

1. The original (legal) e-invoice may be generated by the Sender in a compliant format acceptable to the Receiver from its own back-office system. Alternatively, the SP acting as SPS may collect invoice data, or information from the Sender, and creates the original (legal) invoice in the right format as requested by the Receiver under its customer agreement. The 'first mile' transmission can be made over a dedicated secure connection (AS2, FTPS, etc.), a supplier portal, or perhaps by email attaching a csv file, the latter as an example of exchanging invoice information in a proprietary format for the SPS to create an original e-invoice.

2. In turn, the service provider in its SPR role delivers the e-invoice received or created on behalf of the Sender in the format required by the Receiver's system. If the SPR accepts to receive and process a different format than the one required by the Buyer, it may offer format conversion, full or partial. In this case, depending on applicable regulation, the original e-invoice that is received (and archived) is either the one that is received (before conversion), or could be the one that has been transformed (if it can be proved that the conversion guarantees integrity of content). The SPR may provide technical and business validation, work-flow and ERP/accounting integration services to the Receiver. The 'last mile' transmission is mainly carried out through a secure connection (AS2, FTPS, VPN. etc.)
3. Authenticity of the origin and Integrity of content are assured for both parties, this being made easier as the invoice is usually created, sent and received over the same platform. The e-invoice may be digitally signed. Where the Sender produces the original invoice this may be validated by SPS before being transmitted to the Receiver.
4. Dedicated archiving services may be provided for both Sender and Receiver, unless they elect do this for themselves.
5. A human readable presentation may be provided as required by the parties or by the local fiscal regulation.
6. It should be pointed out that responsibility for fiscal and legal compliance lies with the trading parties, but it is common for them to out-source elements of the process to service provider on a strictly defined basis through the above processes.

Diagnosis: As market development for structured e-invoicing has largely originated from the buyer side, the buyer-centric model is the most common model for B2B and B2G e-invoicing, as it uses the buyer empowerment to roll out a solution for their suppliers and will usually yield high rates of adoption and customer satisfaction, provided that on-boarding is active. There will often be an element of compulsion pursued by the buyer to mandate e-invoicing and many regard this an essential success factor in achieving results.

However, there are a number of issues that need discussion and mitigation:

1. *The model usually obliges suppliers, and especially SMEs, to manage various means to send e-invoices to multiple buyers, when previously there was one paper and mail process, or the use of PDF invoices sent via email, although both of which do not provide material automation benefits. It means that Senders, especially SME, have to manage different sending processes, or access to various supplier portals, with their multiple requirements: this can be time consuming and inconvenient. As the Receiver is dominant, it expects the Sender to adapt its e-invoice procedures to the needs of its chosen e-invoicing platform (being both SPS and SPR), which then delivers the required interoperability between the Sender and the Receiver.*
2. *This model could, without further market development, constitute a natural brake to e-invoicing roll-out and has historically spawned the development by buyers of scanning/OCR services for SMEs based on paper or PDF invoices for the collection of invoices from Senders. Many Receivers however work hard to convince the Senders to use the real e-invoicing service. Adoption rates by Senders can be quite variable and success is a matter of effort and density of network penetration.*

3. *It should also be stressed that 3-corner models usually provide access to many buyers and consequently the number of bilateral transmissions is reduced by the number of instances where more than one buyer is present on a particular platform. Many such platforms have become very dense with multiple buyers and industry concentrations offering substantial network effects, individual total volumes for larger service provider exceeding 25 million items processed.*
4. *The reach of 3-corner models is further extended by the growing establishment of 4-corner models using interoperability agreements to provide access to Receivers and Senders present on other platforms. Indeed, the 3-corner model is the foundation and pre-cursor of the 4-corner model in practical experience. Since we are still in the early stages of e-invoicing adoption, the separation of 3-corner models appears to create breaks in the chain, but it can be argued that this is stage in the development of e-invoicing and market evolution will lead naturally to 'federation' of the eco-system, which will deliver the benefits enshrined in the Principles (especial Principle 2) set out in this paper, provided that market participants cooperate in their delivery.*
5. *A further benefit of the 3-corner model should be mentioned, namely in the area of full service procure-to-pay platforms covering catalogues, sourcing, orders, logistics, invoicing, payment instructions/advices, and early payment or supply chain finance facilities; these are of attraction to many buyers and their suppliers. They do involve many transaction types and the choreography of the message transmissions required in both directions are difficult to conceive as working in an open 4-corner model. It is perhaps likely that this business will continue to be transacted over single (or alliances of) platform providers, although such services should be able to join interoperable networks for invoice delivery.*
6. *The 3-corner model needs to meet the expectaions of cutomers in terms of convenience, ease of use, and value for money, covering timely and transparent services for e-invoice creation, validation and transmission, clarity on fiscal compliance, visual presentations (where required), service level agreements, archiving etc…..just like any business. All records need to be survivable in the event of the contractual relationship ceasing.*
7. *Where a buyer mandate exists this needs to be checkable by suppliers. In this context a buyer mandate refers to the situation where a buyer wishes to enrol all its suppliers for e-invoicing and remove all paper invoicing from its supply chain on a compulsory basis. Such an arrangement applies irrespective of transmission model: 2, 3, 4 corner. The buyer will specify the form of the e-invoice to be presented and the required reception point(s) .*
8. *A more detailed diagnosis of the 4-corner model is provided in the relevant section below.*

3.3.2. Supplier-centric models

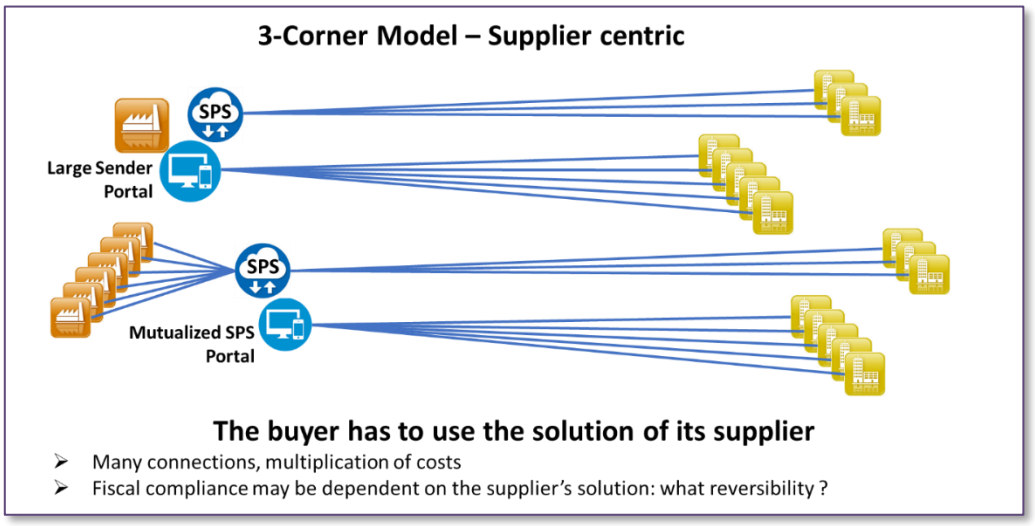
A supplier-centric model is used by larger volume Senders to make available invoices to their customers enrolled on a customer portal as Receivers Again the 3-corner platform acts as both SPS and SPR with the two commercial relationships separately established. The services are usually directed by large billers, such as utilities, towards consumers (B2C) and smaller enterprises (B2b), and is often linked to Electronic Invoice Presentment and Payment (EIPP), which is a common payment-related channel for invoice presentment and payment.

The customer portal may:

- Be provided by the Sender, often a large utility, over its own web-site.

- Be offered by a service provider
- Be integrated into an Internet Banking platform provided by a bank, or a payment service provider

The Sender creates the invoices in various formats, usually comprising one or more structured (EDI) formats and a PDF format. A frequent transmission feature is a notification via e-mail that invites the customer to view or download its invoice in a timely fashion on the identified customer portal. In general, a PDF invoice does not support process automation (not relevant for most consumers), but the provision of a structured file offers businesses automation possibilities. The Sender benefits from a proof of invoice reception, elimination of paper, reduced errors and a generally good payment performance. Aside from e-invoice delivery, the service offers an alternative to Direct Debit as a means of collecting receivables.



There is a current initiative led by the European Retail Payments Board, under the aegis of the European Central Bank, to develop standards for EIPP, in particular a Request-to-Pay message (ISO 20022 XML) and encourage adoption as part of open banking policies. This work commenced with an analysis of the landscape for EIPP services including benefits and barriers. This was followed by a detailed report on the required transaction flows which could be harmonized. The third phase of work is focused on the definition of the standards required including the Request-to-Pay message and other servicing messages.

There are other examples of supplier-centric services in the B2B market using a 3-corner model, where the platform puts the supplier at the center of its focus, or at least provides an equal focus to the interests of its buyers. Unlike the use case above for EIPP, where a large sender provides a volume concentration, acting for senders in relation to their total invoice volume requires attention to the destinations and modalities required in each sender use case, including support for paper invoicing. The development of interoperable frameworks such as those provided by EESPA or PEPPOL, could ease this model over time.

Diagnosis: Requiring consumers and SMEs (and even sometime larger companies) to visit multiple customer portals to view or download invoices is time consuming and manually intensive. Accordingly, mechanisms that concentrate these flows into EIPP platforms or other Fintech solutions would seem the way forward. Providing tools for invoice receivers, which require process automation is also important.

Supplier-centric services in the B2B/B2G market need greater e-invoicing adoption in both the public and private sector to create critical mass and mitigate the diffusion of the opportunity as compared with the now well-established buyer-centric models led by buyers. The growth of interoperable 4-corner models is an essential ingredient to develop interoperability between trading parties beyond the limited scope of single 3-corner platforms.

3.4. The 4-Corner model where supplier and buyer use different platforms

The 4-corner model arises where the sender and Receiver are enrolled on different service provider platforms, so the SPS and SPR are distinct. Under interoperability schemes or agreements, the two service providers transmit or accept invoices on behalf of their customers emanating from the other service provider.

The Sender may operate a number of arrangements with its service provider(s) to interconnect with various trading parties in this way or to uniquely rely on one service provider solution to send all its e-invoices in the capacity of SPS. Some of these e-invoices may be directed to Receivers present on the same platform, but many will be directed to other platforms used by other Receivers. Other supply chain messages may be exchanged in the same way.

All interoperability arrangements are generally documented by customer agreements and service provider-to-service provider agreements that include service descriptions and the allocation of tasks and responsibilities. Such agreements create a clear end-to-end chain of authority and mutual obligations between the parties. In a four-corner model, SPR and SPS will satisfy themselves as to the status, technical and compliance capabilities of the other party acting in their own and their client's interests. Ultimately the SPS and SPR each have the right to refrain from dealing with the other party.

There are currently three varieties of interoperable 4-corner model in use in Europe:

- Bilateral arrangements between SPS and SPR include various national or sectorial interoperability facilities, which for the purposes of classification have been placed in this heterogeneous category.
- That in use by members of EESPA (the European e-invoicing Service Providers Association).
- The use of the PEPPOL (Pan-European Public Procurement On-line) specifications by members of the Open PEPPOL Association.

3.4.1. Bilateral arrangements between service providers including national and sectoral facilities

Service providers acting for Buyers and Suppliers may bilaterally agree to exchange electronic invoices or other business documents on behalf of their clients. Such agreements between service providers often include more than simply a protocol or standards for reliable messaging and may cover:

- Addressing mechanisms (how to address a Buyer that is connected to another service provider)
- Cost distribution and sharing, if any.

- End-to-end reliability (the protocol between service providers may not cover the successful receipt and processing by the end-user, although the use of receipts and invoice response messages is becoming common)
- Responsibility and Liability (e.g. will it be clear who is responsible in case of loss or alteration of messages)
- Fiscal and Legal Compliance

Diagnosis: Although bilateral arrangements between service providers have grown up historically and may continue to be needed to fulfill specific client needs, the model is not very convenient, and it is usually based on a plethora of standards and practices that are not harmonized and may result in incomplete even insufficient interoperability agreements. For service providers eventually to be able to connect to all other service providers and consistently cover all aspects mentioned above, in differing ways, the relationship management and maintenance effort will be shown to be too high and potentially confusing, even disruptive, to smooth interoperability. Similar factors apply to various one-off, often ad hoc national and sectoral solutions. Space does not permit more detailed review.

3.4.2. EESPA interoperability

EESPA members currently use two types of agreement, the EESPA provided standard bilateral Model Interoperability Agreement (MIA), and more recently the new EESPA Multilateral Interoperability Framework Agreement (MIFA) (bilateral agreements concluded historically, as described in 3.4.1 are not covered further). The scope of the EESPA Model Agreements for interoperability covers much more than the arrangements for transmission. Given the heterogeneity of the B2B and growing B2G flows handled by the EESPA Agreements, the agreements are suitably drafted to permit this diversity of business requirement.

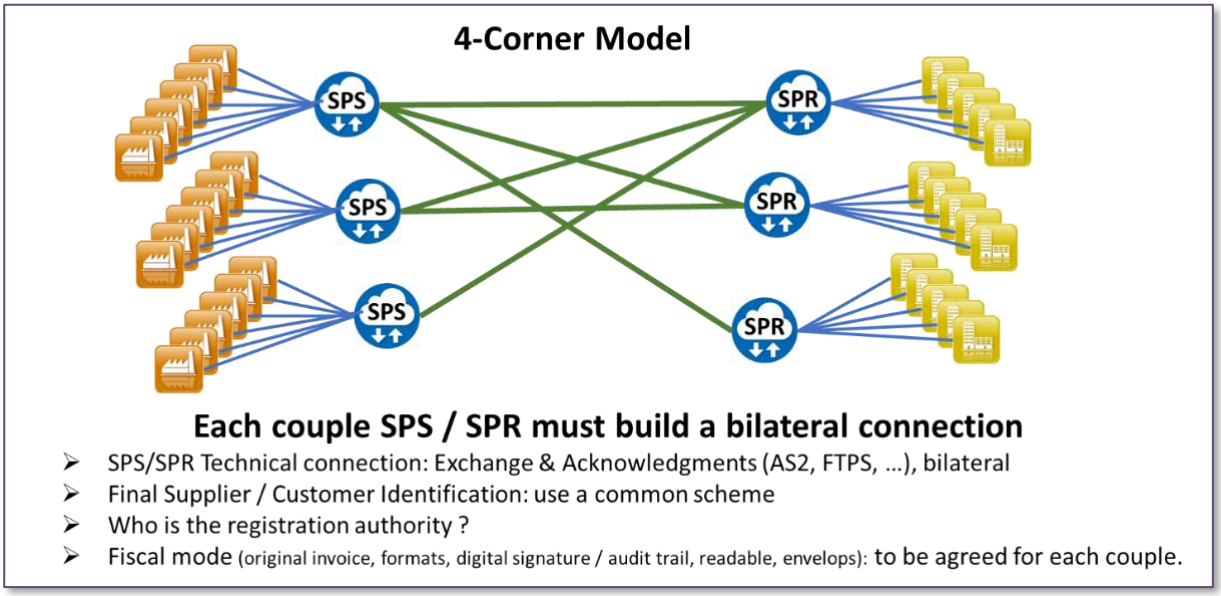
In the case of the MIFA, the two service providers agree on the formats, modalities, addressing and routing, compliance procedures (including fiscal), and business profiles to be covered. Because the range of e-invoicing covers B2B and B2G, is global in scope, and involves many legal jurisdictions, the agreement of these business profiles is considered important. In general, SPS and SPR agree on a single e-invoice format, usually UBL 2.1, to be exchanged (although other formats may be used or other documents transmitted complementary to the structured version, such as a PDF). At the technical level they establish a unique connection to exchange messages, although increasingly these are based on a single set of standards. They also agree on a common way to identify their respective customers. The MIA supports a number of 'Modes' for fiscal compliance.

With the new MIFA (now in version 3), EESPA members adopt a single framework agreement based on common legal clauses and a single set of standards that cannot be varied. Current work is going on to evaluate the impact of EN16931 and the potential use of it, or a Core Invoice Usage Specification (CIUS) as an exchange format. In specific implementations business profiles are still required, although they may be open, given the points made in the preceding paragraph.

The EESPA MIFA uses the AS2 transport protocol and the Standard Business Document Header (SBDH). It supports a range of Response messages, including processing status, approved for payment etc.

For both types of agreement, the connection with other Service Providers is entered into voluntarily in response to the demands and authorization of its customers on both the receiving and the sending side depending on their interoperability needs. It should be stressed that a service provider

will always seek the authorization of its customer before using an interoperability connection. Activity and volumes transmitted are growing rapidly as customers benefit from a networked environment and an increasingly standardized approach. In the 2017 Aggregate Survey of volumes (number of items) processed by participating EESPA members, a total of 198 million B2B/B2G interoperability transactions were reported representing 19% of the total. [The latest survey is published in September 2018 reflects a further substantial growth in such transactions]



EESPA is a not-for profit trade association formed under Belgian law and admits members according to a transparent governance process.

Diagnosis: current interoperability volumes are relatively low and there is far from 100% coverage by interoperability agreements. The fact that the connection between service providers is voluntary, means that Senders cannot always rely on their service provider to be connected to the providers of all their potential customers. To a large extent this is a function of market growth and the need for evolution from the present range of 15-40% true e-invoicing penetration in many European countries, with Nordic countries achieving more than 40%, (figures according to www.billentis.com) towards irreversible critical mass. Indeed, there is no universal fully connected infrastructure or framework for e-invoicing in use anywhere today through which all buyers and suppliers are connected. The important requirement is for those involved, economic operators, service and solution providers to proactively adopt interoperability agreements and establish volume through these channels.

The requirement of Principle 2 above 'all economic operators acting as suppliers should be able to choose the transmission tools, mechanisms, or service and solution providers that meet their requirements, provided that these are interoperable and compatible with the transmission mechanisms of buyers, whoever they may be' creates an expectation that providers will multiply their interoperability connections and not unreasonably withhold consent to do so, guided as required by their customers, and with the interests of smaller businesses in mind.

The development of the MIFA is an encouraging development based as it is on common standards and offers a full interoperability model. It would be interesting to hear of further plans to roll-out the MIFA and also whether some form of certification would be appropriate to certify readiness and fiscal compliance on an end-to-end basis.

3.4.3. Interoperability through PEPPOL

PEPPOL offers a uniform framework of rules and procedures, underpinned by legal agreements that enable cooperation within a community of service providers interconnected over the PEPPOL eDelivery Network, which adheres to a 4-corner mode architecture.

On this basis, PEPPOL gives to Access Points the capability to exchange invoices and other eProcurement or supply chain documents between trading parties. The scope of interoperability achieved through PEPPOL covers more than the arrangements for transmission; it also addresses heterogeneity of business patterns, and the governance needed for sustainable cooperation by applying a single set of agreements through its network. Furthermore, it incorporates the concept of a PEPPOL Authority, a specific kind of member that is in most cases a public national authority entrusted with a role of governing national requirements and facilitating the national markets of service providers. At the same time, PEPPOL Authorities are preserving market neutrality and seamless communication of service providers across national borders, in a federated cooperation model.

Since the successful conclusion of the PEPPOL project in 2012, the ownership and maintenance of the PEPPOL specifications has been transferred to OpenPEPPOL AISBL. This is an international not-for-profit association based in Belgium, in which PEPPOL Authorities, service providers, end user and other interested actors and stakeholders are members. The service providers use the PEPPOL eDelivery Network to enable interoperable, PEPPOL-compliant e-procurement services to connect public and private buyers with their suppliers (referred to as 'participants'). OpenPEPPOL provides an open and transparent governance model which is continuously involving in directions that meet the requirements and expectations of its members in the public and private sector, such as the latest drive towards implementing the EN for eInvoicing.

Although the Association includes many private sector members from various countries and sectors, OpenPEPPOL has a strong anchor in the public sector. It provides a governance framework of a non-competitive, market-neutral nature and is designed to support public sector objectives in the area of public procurement. Consequently, a substantial element of the financial and human resourcing of the OpenPEPPOL management structure is provided by the public sector, mainly through the engagement of the more active PEPPOL Authorities.

OpenPEPPOL enables trading partners to exchange standards-based electronic documents over the PEPPOL eDelivery Network, which is a common EU building block, based on the '4-corner' model and open, unrestricted communication between all Access Points. It does not necessarily conflict with the '3 corner' model when buyers and suppliers are customer of the same Service Provider. The most common use cases at present cover the post-award procurement cycle (e-orders, despatch advice, e-invoices, e-catalogues, etc.). Moreover, OpenPEPPOL community work is focused on further extension of scope towards the pre-award cycle.

The PEPPOL eDelivery Network has two main components:

- Access Points, which use the PEPPOL eDelivery Network to provide sending and receiving capabilities to participants (suppliers and buyers) connected to them. In order to guarantee that all Access Points have the appropriate capabilities, each new Access Point is required to meet conformance tests. Service Providers operating an Access Point may also provide a range of other services and are responsible for establishing the communication links with the participants that use its services.

- Service Metadata Publishers (SMP) are publicly accessible registries where the receiving capabilities of participants are listed, allowing any sending participant (or its service provider) to discover their routing address. In turn SMPs are connected to the Service Metadata Locator (SML), a DNS based system, which registers the unique identifier of each receiving participant and the location of their SMP. The SML is hosted and managed by the European Commission.

By utilizing the PEPPOL eDelivery Network, which provides the transport infrastructure, participants can exchange various document types, the content and syntax of which can follow various formats, if two conditions are met:

1. Each document type must be properly described in a way similar to a PEPPOL BIS (Business Interoperability Specification) and registered on the PEPPOL eDelivery Network, with a unique identifier – this underlines that any party wishing to make a specific format or document available in the PEPPOL eDelivery Network, will be subject to an approval and registration process, which concludes with the allocation of the document identifier by OpenPEPPOL.
2. A participant that wishes to receive a certain document type (e.g. an invoice) must be connected through a service provider that supports by default the corresponding PEPPOL BIS format (see below).

Consequently, under the above-mentioned conditions, the PEPPOL eDelivery Network can support the exchange of any document in various sectoral, domain-specific or national formats, including those expressed in the UN/CEFACT XML Cross Industry Invoice, D16B (CII) and other syntaxes, and based on various semantic models or syntaxes. It should be noted that receivers of invoices can register in the SMP to receive CII invoices alongside the mandatory UBL version, which is relevant to the requirements of the European Norm- EN16931.

The PEPPOL Business Interoperability Specification (BIS) is the 'common denominator' format. It is based on a CEN Workshop Agreement, and it is mandatory support is the cornerstone of PEPPOL interoperability, as it delivers certainty that any participant will always be able to make an end-to-end transaction with any other participant over the PEPPOL eDelivery Network. Access Points are required to provide support for the BIS format for all their participants.

One of the requirements of the development of EN 16931 is its alignment with the CEN BII2 Invoice format. Before 2018, the PEPPOL BIS invoice (version 2) was based on the CENBII2 Invoice format. From February 2018, the migration to the EN16931-based PEPPOL BIS version 3 has started, and by April 2019, all participants will be required to support this new format. Service providers acting as Access Points are currently updating their infrastructure accordingly. The adoption of the EN16931 format by OpenPEPPOL is consistent with Directive 2014/55/EU.

OpenPEPPOL uses the AS2 transport protocol (with a planned move to AS4) and the Standard Business Document Header (SBDH) in the PEPPOL eDelivery Network.

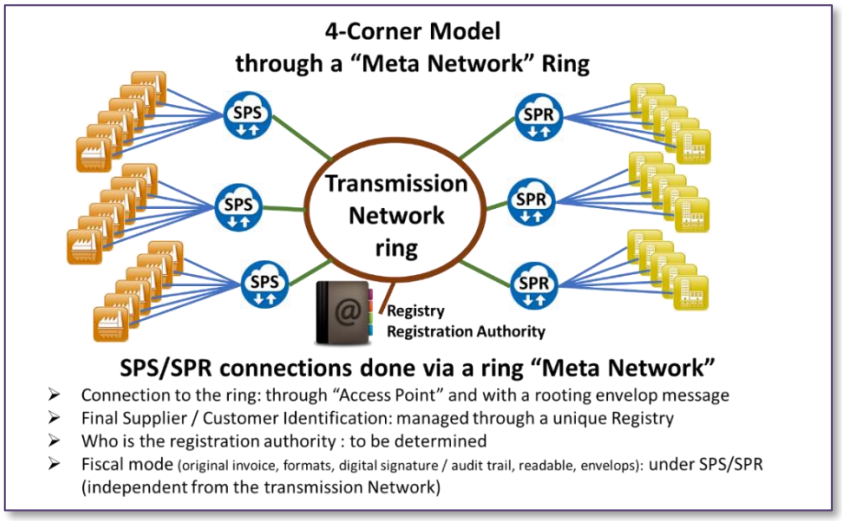
For use of the PEPPOL eDelivery Network and in the required BIS documents, each participant (end-user) is identified with a unique party identifier. PEPPOL does not implement its own scheme for identifying Parties. Instead, it exclusively supports a federated system for uniquely identifying parties following the ISO 15459 format scheme for unique identifiers. This standard incorporates the use of unique Issuing Agency Codes for identification schemes required by PEPPOL implementations. Each PEPPOL Party identifier to be used in the federated system is a combination of the Issuing Agency Code and the value given by the Issuing Agency.

In a typical scenario, the sending participant's Access Point provider will look up the SML for the location of the receiving participant's SMP, then collects the receiving participant capabilities, then matches the most suitable common format (at least they will have the BIS in common), prepares and validates the document in the selected format, and sends the document to the receiving participant's Access Point.

To deliver legal certainty to participants and service providers, but also to enforce the same common baseline of rules and procedures, OpenPEPPOL uses a contractual framework known as the PEPPOL Transport Infrastructure Agreements (PEPPOL TIA), and a federated governance model giving a specific role to national PEPPOL Authorities. Service providers (Access Point providers and/or SMP providers) sign a PEPPOL TIA with a PEPPOL Authority of their choice, whilst each PEPPOL Authority signs the same Community Agreement with a single Coordinating authority, which is OpenPEPPOL AISBL itself. This contractual framework provides the legal governance underpinning real-life operations in the PEPPOL eDelivery Network. PEPPOL Authorities are responsible for the rollout of the PEPPOL framework within their jurisdiction and have the right to request that national requirements or complementary specifications are included in the PEPPOL specifications. This approach allows the federated governance model of PEPPOL to include local variations that the local context, on condition that such variations do not breach compliance with the basic PEPPOL rules and do not jeopardize interoperability and global reach ensured by the ubiquity of the PEPPOL BIS and the PEPPOL eDelivery Network.

In order to achieve timely and effective maintenance of the PEPPOL specifications and allow them to keep up to date with the ongoing evolution of technology, standards, and expectations of public buyers and their suppliers, the OpenPEPPOL governance model includes a Change Management layer, which ensures that an open and transparent process of editing and reviewing delivers regularly recurring updates of the PEPPOL BIS series and the relevant validation artefacts, the transport protocols, the PEPPOL TIA and other elements, as well as the required migration schedules. OpenPEPPOL organizes communities and working groups to achieve these results.

In terms of market penetration and coverage, OpenPEPPOL has 288 members from 31 countries, and the PEPPOL eDelivery Network has 186 Access Points in 23 European countries and North America. PEPPOL Authorities are currently established in 10 European countries: Germany, Italy, Belgium, UK, Norway, Denmark, Sweden, Poland, Ireland and the Netherlands. In May 2018, the first non-European government, Singapore, signed on as a PEPPOL Authority, making PEPPOL support the backbone of their national eInvoicing strategy. The intensity of use varies from countries such as Norway where PEPPOL carries the majority of public sector invoices and a growing number of B2B transactions, to other countries where PEPPOL may be a complementary channel to other transmission methods, or where the country is in a build-up phase. It has been recently announced that the German Federal Government will mandate use of the PEPPOL eDelivery Network and support PEPPOL BIS. This development and the recent agreement in Singapore reveals the potential of PEPPOL as a European product on the global market.



Diagnosis: The PEPPOL model is in line with the above defined Principles, as each Sender can reach each Receiver, provided that both are connected to an Access Point, and service providers may offer various additional services (invoice creation, archiving, syntax conversion, compliance checks, etc.) to the end-users for whom they act as Access Point. As PEPPOL evolves the network reach is expected to expand significantly; as an EU artefact PEPPOL has the potential to reach many more Senders and Receivers than the current 100,000 cited on its web-site.

Both the EESPA MIFA and the PEPPOL approach are scalable and conform to the seven principles set out in section 2 above. Convergence between the two environments will further improve interoperability and this is planned through mutual cooperation at association and member level. Both communities are using a stack of common standards for transmission such as the AS2 protocol (planned to move to AS4), the Standard Business Document Header (SBDH) developed by GS1 and are working closely to create a standard set of Response Messages.

The 4-corner model reduces the issue of end-to-end connection between Senders and Receivers to an end-to-end connection between service providers (that are less numerous). EESPA model agreements and PEPPOL specifications bring solutions to inter-connect service providers together, but they ultimately remain based on voluntary principle driven by market forces. However, in a number of countries government contracting authorities oblige the use of PEPPOL for their suppliers to send invoices and as the scope and reach of PEPPOL widens the vast majority of service providers active in the markets where PEPPOL is present are likely to join the network.

In addition, the model implies that Sender and Receiver must use the services of a PEPPOL Access Point or install an Access Point themselves. For smaller suppliers, engaging a PEPPOL Access Point to connect their own invoicing/sales management or accounting solutions to that of their customers is their likely approach. Larger suppliers may install their own Access Point.

3.5. National Platforms

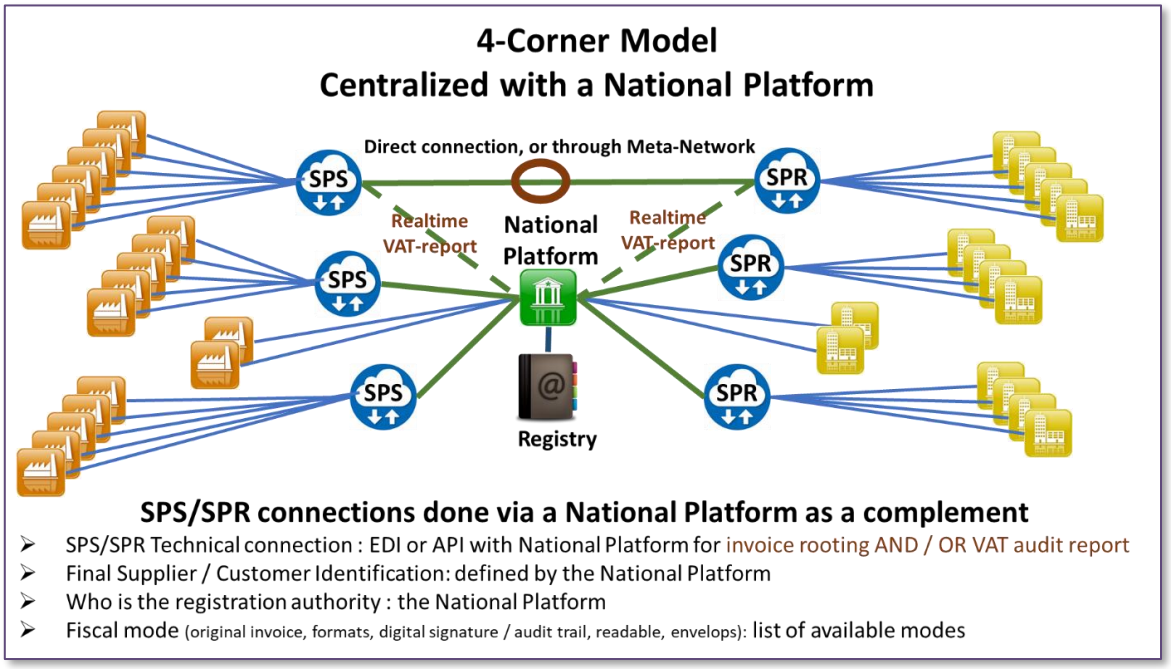
A number of EU Member States have implemented state-provided National Platforms for the transmission and processing of e-procurement and/or e-invoicing transactions. Such platforms can provide:

1. A mechanism for the collection and distribution of e-invoices (and other supply chain documents) to and from the private sector (Senders) to the Public Sector, usually in order to

facilitate an obligatory electronic process. In some cases, it could be envisaged that the platform could also be used for B2B e-invoice routing and distribution.

2. A mechanism to fulfill fiscal compliance obligations such as 'real time' VAT reporting and control, invoice registration, 'clearance' or a simple transaction based VAT audit reporting. Such use of a national platform only applies where such fiscal requirements exist. In such cases, any e-invoice exchanged between a Sender and a Receiver must trigger a message (containing the e-invoice or a sub-set) to the fiscal administration. This additional destination for transmission is increasingly referred to as the 'fifth corner' and the platform involved may or may not be separate from the platform used in point 1 above.

The result is that a large number of contracting entities in a Member State will be identified on and able to exchange e-invoice-related messages through a unique, but country-specific platform. In reality, service providers are a key part of the ecosystem as they may create the connection between their customer and the National Platforms. In cases where PEPPOL is used it obviates the need for national platform at least in respect of transmission but could also provide a link from end-users to the National Platform or serve as a complementary channel.



Such National Platforms can be viewed as national 'service provider' for public contracting entities and as a mechanism for the interconnection of service providers and in turn their customers. In some respects, National Platforms act as a giant 3-corner model at the transmission level providing a hub for the receipt of e-invoices which are then distributed to the very numerous public contracting entities. It can also act in a 4-corner mode.

Examples of National Platforms include Chorus Pro in France, FACe in Spain, Sistema di Interscambio in Italy, Platforms BASE and Compras in Portugal, and the PPA and related systems in Slovenia.

Diagnosis: National Platforms are motivated by a number of considerations such as: the desire to maximize adoption of e-invoicing and electronic processes in the country concerned, to provide the capability to meet specific standards and fiscal or business practices within a Member State, and to

facilitate real-time or near real-time fiscal reporting. The latter is based on the understandable motive to improve VAT collection and close the 'tax gap'.

For example, ChorusPro in France has an ambition to quickly achieve 100% e-invoicing in the public sector and has promoted Factur-X (which is also ZUGFERD 2.0), a standardized 'hybrid' invoice containing an EN 16931-compliant structured invoice format together with a human readable presentation in the same container. SDI in Italy is being rolled out to meet fiscal reporting requirements and provide a delivery mechanism for B2G and eventually B2B and B2C invoices based on a simple FatturaXML format

National Platforms provide facilities for electronic data exchange through file transfer mechanisms supplemented by portals. The Portal typically provide a 'core and basic' service for SME suppliers based on free or concessionary service. Indeed, the promotion of national platforms are seen as having a catalytic role in enabling SMEs to engage in e-invoicing and digital processes.

Some questions arise in relation to the creation or possible proliferation of National Platforms in terms of what impact these developments could have on the Single Market and an integrated EU Digital Agenda and whether there are emerging barriers to interoperability through the proliferation of different practices and versions of standards. Is cross-border interoperability well served? Are there other ways of building the interoperable eco-system that mobilizes public and private sector partnerships and existing capabilities in a competitive market and what is the impact on creating a level playing field for the provision of business services?

A specific area in which National Platforms could support a harmonized transmission environment lies in the area of standards, and in particular supporting convergence on the transmission standards highlighted in the section on PEPPOL above. Creating a more uniform 'look and feel' and ease of use in the operation of Portals in conjunction with private sector operators could also be fruitful.

The proliferation of additional reporting requirements for fiscal compliance has already been the subject of a report by Sub-Group 3 of the EMSFEI, which contains recommendations to reduce complexity, promote more harmonization and ensure that the real benefits of supply chain automation are not submerged under priorities for VAT maximization. E-invoicing is much more than delivery and tax collection, there are many benefits in terms of automation. Cost savings, better controls etc. supported by checks and controls at the technical and business level.

3.6. Email exchange

A common solution for e-invoice transmission is email. Email offers the advantage that it is interoperable by design, ubiquitous, and free and easy to use.

In relation to e-invoicing the common use cases are:

- Attaching a human readable PDF to an email, effectively providing an electronic version of a 'paper' invoice, which may be printed, processed and archived. Such invoices are 'unstructured' and represent limited opportunities for automated processing perhaps through OCR (Optical Character Recognition). They are mainly handled in the same way as paper invoices.
- Attaching a machine-readable PDF or a 'hybrid' invoice (partly structured information and partly human readable), containing some potential for automation.
- Providing invoice data in the 'first mile' of transmission to a service provider; also in the last mile for invoice delivery.

Despite the fact that emails are not considered by many experts as a secure or reliable way to exchange mission-critical messages and especially those that are to be submitted to automatic processes, they are nevertheless widely used especially by SMEs to exchange any kind of message with each other, including for invoices. They are much less used for secure transmission to a large or complex buyer in the public or private sector where automated processes are typically deployed.

The fact that the Sender email is not very secure is not very different from the situation with regard paper invoices sent by post: in that case also there is also no guarantee that the sender is actually the Sender or the Sending Party. Indeed, what is important is that the invoice is related to a real delivery of goods or services, and that the Sender identified on the invoice is already set up in the Receiver's information system (including payment information on bank accounts). If the Sender is referenced, if the invoice is matched to a delivery and if the Sender Payment information is set up and regularly controlled on the Receiver side, the email itself is of reduced importance.

Diagnosis: E-mail is a very popular mechanism, especially among smaller senders and receivers of e-invoices, but it has many flaws and security risks, for example:

- *the Sender email address can be easily corrupted, or subject to abuse*
- *Emails can be deleted by anti-spam solutions or lost in a large organization, so never received.*
- *Non-repudiation of message receipt is not supported*
- *Email could represent a threat to a buyer's system in terms of fraud and error*
- *Limited potential for automation*

The fact the invoice is not always delivered is also not very different from paper invoice. However, as many expect a better level of service with electronic exchange to justify adoption, there are solutions to re-inforce an email exchange:

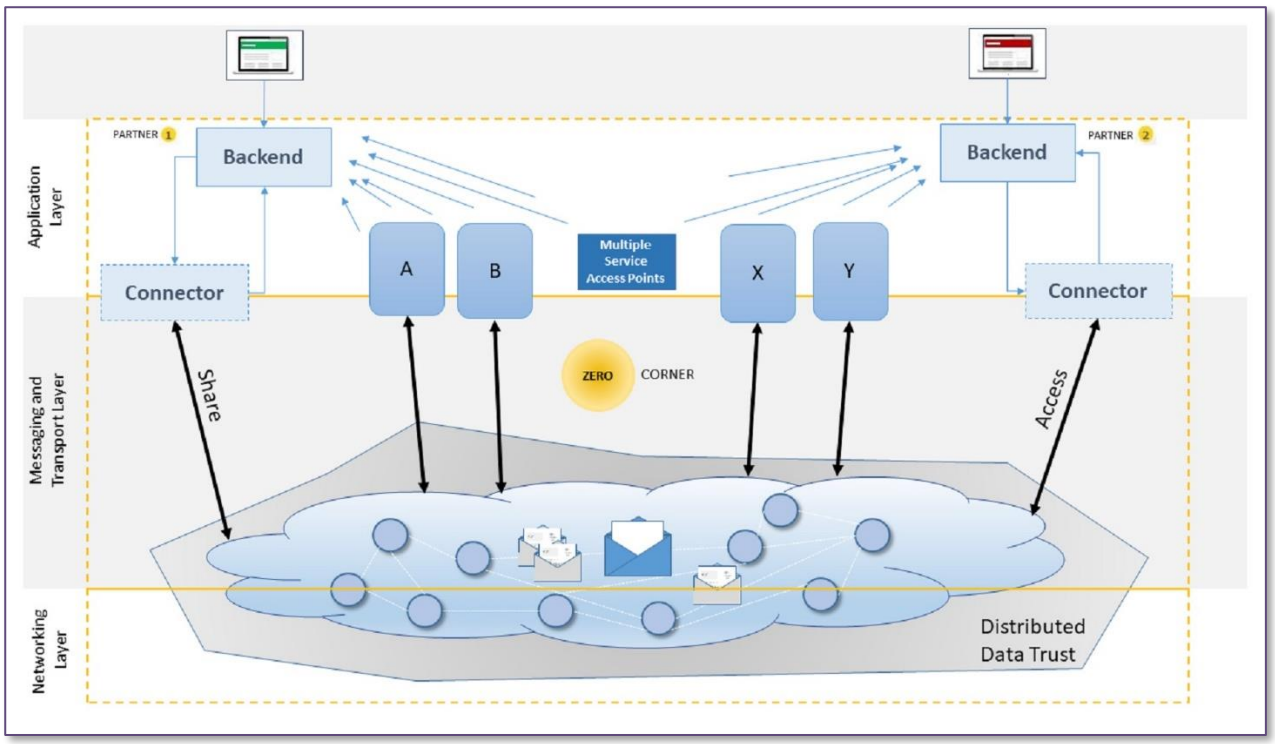
- *Using sending email addresses that reduce antispam action (such as for marketing emails)*
- *Avoiding personal email on the Receiving side, but functional email addresses like accountpayables@company.com,*
- *Asking for an acknowledgement message for each invoice sent,*
- *Using Electronic Registered Delivery Services as provided for in EU legislation, although this may involve more complexity,*
- *Using a digital signature to secure integrity or authentication of the Sender or Sending Party on its behalf recognizing that these may reduce the attractiveness of email, with a potential risk that it may not be supported by the receiver,*
- *Using business controls to secure identification of the contracting entities when the relationship is set up, and an automatic matching + approval process in order to make sure each invoice received corresponds to a real delivery of goods or services,*
- *Relying on a service provider to establish a secure email channel, recognizing that they use different more secure mechanisms for dealing with other external parties,*
- *Requesting Receivers to open one or more alternative channels for delivery.*

In general, for communicating with automated systems and processes email is best avoided, but may remain in common use between SMEs for the exchange of PDF and hybrid invoices and in B2C exchanges.

3.7. Emerging solutions: the Zero-corner model and Block Chain

The development of 'cloud' technology may facilitate new paradigms for transmission based on 'data sharing' rather than a model based on 'sending' and 'receiving', with the sharing of information resting on 1/ digital access rights 2/ distributed systems in many business and technical forms. The latter includes distributed ledger technology, as but one example. The concept facilitates a move away from 'e-delivery' towards the principle of data sharing in all document management processes including e-invoicing[1].

The key to making this work for e-invoicing and supply chain automation is to create a number of instances where both centrally provided and distributed service platforms are connected together and with many end-users to allow data access, event management and ongoing services and processing.



It is referred to here as a Zero-corner model because instead of operating a 3 or 4 corner transmission model the emphasis moves to a data-centric concept with a separation of the data itself from the services, which are demanded and delivered by the many players. Services are facilitated at the data level rather than by interconnecting heterogeneous systems directly. The model can be viewed as a network of independent 3-corner model platforms working on shared, distributed data instead of the data residing on a single storage device of a service provider or other actor.

[1] http://europa.eu/rapid/press-release_IP-18-521_en

The Zero Corner model would likely use the 'Smart Document' principle with the recognition that most operations do not need all data elements of a document, but a restricted "view" only. In order to have smart documents the data capture is essential to create structures where all individual data elements can be individually addressed and managed. The quality of the data is improved by providing self-service data capture. All the same issues that apply in other models such as the adoption of standards and creating workable interoperability arrangements apply in this model.

Block Chain is seen as a promising technology that along with other technologies support this mode. In view of current perceptions on cost and complexity the Block Chain is seen as having a role in managing access rights and supporting the integrity of data held in the model.

Diagnosis: Advocates of the zero-corner model emphasize the benefits of a transparent transactional approach based on full interactivity, capability for bi-directional and symmetric operations, a freedom to access (permitted) data not originated in a player's own systems, a freedom to create own processes, services and functions, an ability to interface with 'any' process and 'any' documents by 'any' partner based on ***access control****, access to information at the data element level, confidentiality and privacy (GDPR), interoperability, security, and an ability to coexist with legacy systems. Further investigation of these concepts as applied to e-invoice transmission could be made paying due regard to feasibility, cost and compliance.*

4. Discussion of some key issues arising from the Landscape Description

The truly massive adoption of e-invoicing, especially among SMEs, is dependent on two groups of issues being properly addressed:

- The ease with which e-invoices can be created in a fiscally compliant form, that suits both the processing environment of the supplier and that of the contracting entity, and in circumstances, where either or both parties operate with high levels of automation, and where one or both parties operate at a more manual level. Clearly the benefits of e-invoicing are not realized at the transmission level but are the benefits arising from progressive automation (invoice creation and processing).
- The ease with which the electronic address of the Receiver can be identified and the invoice sent or made available with a satisfactory level of security, confidentiality and reliability, whilst continuing to meet the required fiscal compliance (invoice addressing and transmission).

4.1. Invoice creation and processing

For the first group of issues, the EN16931, as a core set of semantic information elements supported by a listed syntax, is a powerful answer. The EN needs to be adopted rapidly by the majority of economic operators and contracting public entities and their service and solution providers. The EN in structured form will lend itself to automated processing by suppliers, buyers and their service and solution providers.

In some cases, the European Norm will need to be further specified with the use of a Core Invoice Usage Specification or extended according to the Extension Methodology where further information is required.

For Senders and Receivers, the provision of a visual presentation to complement the structured invoice XML data file may be provided or rendered on demand at any stage in the process, including when it is provided by the Sender or its SPS on invoice creation, and embedded in the structured invoice XML file or the other way around in 'hybrid' invoices. One of the formats needs to be identified as the original or legal invoice, unless a 'hybrid' invoice format is used in which case the original can be identified as the single presentation, which contains both a structured format and a human readable version. These requirements need to be taken into account as required at the transmission level.

The processes for invoice creation and transmission need to support the fiscal compliance requirements established in the jurisdiction(s) relevant to the invoice and to the parties concerned. This has already been enshrined in Principle 4 above, and for the transmission level is further discussed below.

The business and technical procedures adopted by suppliers and buyers for the creation and processing of the information in an invoice (i.e. the payload of the message) lie outside the scope of this Report. Suffice to say the parties need to deploy systems, software and human processes, many of which can be outsourced to solution or service providers, provided the market offers solutions that suit their needs and context. (In so doing they will determine the appropriate level of automation that is feasible and desirable for their circumstances).

There are a wide variety of tools to support various forms of electronic invoice creation (PDF, hybrid or fully-structured) by SMEs, including installed software, cloud solutions, virtual printers, service portals, and data extraction tools (OCR) to extract core invoice information from a non-structured e-invoice, ….

The capability to create a fully structured invoice depends on the capability of the invoicing tools used by SMEs to manage invoice information as data (linked to a database semantically compatible with a structured invoice such as the EN16931). This implies a restriction on the use of free text or text zones to provide unstructured invoice information. As an illustration, most invoice creation tools for SMEs only manage one or two business references whereas the EN16931 manages more than five references at document level. This reality is the main reason of the development of 'hybrid' invoices for SMEs.

4.2. Invoice addressing and transmission

For the second group of issues the above Principles have set the key requirements for transmission and the Landscape Description has set out the variety of market models available as services or solutions to support transmission. Some issues are worthy of further discussion as set out in the three paragraphs below:

1. Addressing: there is no universal global addressing scheme that can be used in the same way for all parties in electronic data exchange. Analogies with telephony and email point to the importance of the use of a unique addressing model for example to support the transmission of voice conversations and messages over interoperable technical frameworks, on the basis of which value-added services are offered.

   An addressing model consists of two parts: the electronic address on the one hand and, the technical network or means of delivery through which a party is addressable on the other hand. Current schemes such as PEPPOL and EESPA make use of existing identifiers and routing systems- in the case of PEPPOL using a Service Meta Locator (SML). In many cases

the electronic address needs to be able to point to a destination in many addressable systems within the same receiver environment.

An invoice results from a contractual or commercial relationship through which information about electronic addresses and routing can be supplied bilaterally. Contracting entities can be complex and use multiple addresses based on trading entities, various ERP systems, shared service centers, locations etc. Discovery of the right electronic address needs precision. The development and implementation of standards for managing and communicating such information could be valuable, so as to provide a higher level of integration and ease of use especially for SMEs. The progressive adoption for the identification and connections between legal entities would also be of benefit.

There is as yet no global registry or many local registries where e-invoice addresses of all contracting entities can be found and updated (except in certain Member States where e-invoicing is mandatory and centralized). Indeed, for reasons of the complexity already described, confidentiality and security many contracting entities would reluctant to publish their electronic addresses in the public domain. But there are various solutions available to solve this problem and it would be sensible to encourage the development of registries at the network level and to find a way to progressively federate these instances based on a set of standards. Such facilities would also support regulatory requirements such as 'Know your customer' and 'Know your supplier', as well as using emerging norms for e-identity.

2. Separation of fiscal compliance from transmission: it appears rational and appropriate to disconnect the "fiscal compliance" of an invoice and the pure delivery of an invoice at the transmission level. The fiscal compliance component is the ability to provide a compliant e-invoice, with invoice data usually in a structured format, including the legibility (that can be assured through XML visualization, a PDF or 'hybrid' format), and possibly to seal it with digital signature (for authenticity and integrity). This can be provided by software (including by cloud services) or service providers, or both. The fiscal compliance mechanisms fall into the payload of the message rather than in the operation of the transmission level. Since country and tax-payer practices vary, there are no universally agreed practices that can be provided at the transmission level beyond the normal efficiency expectations. The key principle is that the transmission level must support the user requirements for fiscal compliance and not frustrate them.

   For example, service providers and their clients should be aware of and responsible for any unintentional impact on fiscal compliance during e-invoice processing and transmission (especially when they transform data from one format to another).

   Interoperability Agreements and their functioning perhaps may need to be strengthened to cover these compliance obligations. In summary for this Report, the principle of separation of fiscal compliance from transmission is supported.

3. Interoperability and choice of transmission networks and interfaces: trading counterparties need to be able to agree on or find acceptable suitable transmission methods that suit their requirements and allow an invoice to be speedily and reliably delivered in accordance with the Principles set out above. They need to be able to send and receive an e-invoice the format that they require, including any request for a visual presentation, and in conjunction with any other adjacent supply chain documents such as purchase orders. These solutions will range from secure networks offered by service providers and the interoperability

arrangements they establish, PEPPOL as a secure meta-network, National platforms and in some circumstances email transmission.

These methods in turn should have effective addressing mechanisms including registries, where contracting entities can publish their transmission information such as their electronic address, service provider or access point, and the formats accepted or provided.

Efforts can be made to connect secure networks with each other and where required with classic email networks, for example the promotion of specific and cheap SMTP access points could be encouraged and provided by service or solution providers.

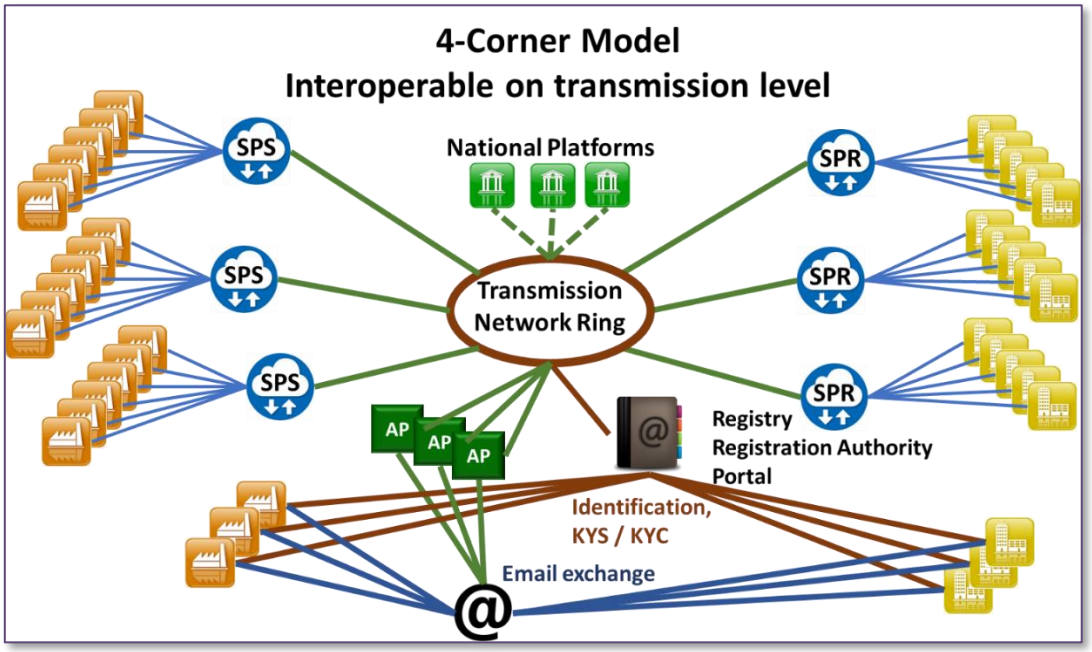
Service providers are not all connected together, although the tools and frameworks exist and there should be strong encouragement to make this happen.

The overall cost to users connecting to networks and related services needs to be clear, transparent and affordable for SMEs. Companies must be able to keep the capability in appropriate circumstances to exchange via solutions such as email, recognizing that the surrounding controls require substantial effort for mission-critical documents like invoices.

A final issue in relation to interfaces relates to the use of Application Programming Interfaces (API), which might play a part at the infrastructure level and in relation to services provided by platforms of various kinds.

The following diagram illustrates these requirements:

- Registry or a set of Federated Registries (that can be shared among local registration authorities, including national platforms, service providers and their users).
- Secure transmission networks, secured, able to transport different e-invoice formats, including visual presentation.
- Gateways with SMTP email to allow SMEs to connect easily only to reach their contracting authorities.



5. Recommendations

1. Stakeholders are urged to implement the **defined principles herein** at all levels of the eco-system and pay attention to the **CEN Guidelines for Interoperability at the Transmission level.**
2. Service and solution providers **need to meet the expectations of customers** in terms of convenience, ease of use, and value for money, covering timely and transparent services for e-invoice creation, validation, transmission and processing, clarity on fiscal compliance, visual presentations (where required), service level agreements, and archiving etc. **All records need to be survivable in the event of a contractual relationship ceasing.**
3. Transmission and interoperability mechanisms should be **cost effective and tailored to the needs of user segments** by providing both 'core and basic' levels of service with scope for additional value-added services.
4. The service and solutions industry and its governance frameworks **should more concretely support the needs of SMEs** with a very immediate focus on providing easy-to-use services for creating and delivering invoices containing invoice data in a structured format such as those required to be conformant with EN16931. **Such services need to provide easy-to-use and transparent facilities to enable users to switch service providers.**
5. **Service and solution providers are encouraged to support interoperability according to the EESPA Model Agreements and PEPPOL**, and preferably both as client demands require. They both represent best practice examples for interoperability **and are discussing convergence of standards and practices**, which is welcome. The services and solutions industry is encouraged to be open to the emergence of equivalent or improved frameworks in the future.
6. **All interoperability arrangements should be documented** by customer agreements and service provider-to-service provider agreements that include service descriptions and the allocation of tasks and responsibilities. Such agreements should create a clear end-to-end chain of authority and mutual obligations between the parties. In a four-corner model, SPR and SPS will satisfy themselves as to the status, technical and compliance capabilities of the other party acting in their own and their client's interests. SPS and SPR should be able to validate the compliance of each other to the terms of an interoperability agreement. All parties should be open to reasonably sharing information about the roles performed in their dealings along the chain of agreements.
7. Transmission protocols should make use of open and non-proprietary standards and **there should be widespread adoption of technical and business-level response messages.**
8. **Further efforts should be made to promote more standardization in the use of identifiers, electronic addresses and routing. This should include the concept of a federation of registries. This should also address the issue of portability, which is the possibility for a trading entity to change its service provider with a minimum impact on the existing routing and addressing set-up for its trading parties.**
9. National Platforms should adopt well-accepted standards and practices and consider the re-use of existing well-proven artefacts and network services. Such national initiatives should foster competition and innovation in support of the market for services and solutions and not provide inappropriate state-funded competition. **National Platforms should provide**

appropriate PEPPOL capabilities to support intra-EU capability at least for inbound public sector invoicing transactions.

10. **Through cooperation with the payments industry** more pervasive EIPP services should be made available **to provide more convenience for consumers and small business in aggregating and paying invoices**, including the necessary linkages to enterprise systems used by SMEs.
11. **Attention should be paid to portals which are proliferating.** It should be possible to develop a set of standards and best practices for the way these operate to create a more uniform customer experience for end-users in terms of ease of use and cost-effective solutions. **Application Programming Interfaces (API) should be evaluated as to their potential in relation to the customer experience. Given the availability of interoperability agreements service providers should provide facilities for receiving e-invoices through their portals destined for buyers on other platforms, especially for SMEs, who would benefit from a 'one-stop shop'.**
12. **Email should not be recommended for transmission within an automated process environment. It is recognized however that email is a common and accepted means of transmission for SMEs and will likely remain a means for 'first mile' invoice (or data) collection in an automated process chain, and as an important exchange mechanism between SMEs themselves.** As long as email usage persists it is recommended that it is reinforced by additional means such as digital signatures or e-seals applied to the e-invoice, acknowledgement and response messages, and potentially by means of Electronic Registered Delivery Services, as recognized by the e-IDAS regulations.
13. Developments in e-invoice reporting and registration for fiscal purposes **should be harmonized on common definitions**, practices and messaging requirements as has been proposed in a recent EMSFEI paper.
14. **The topic of fiscal compliance should be the subject of a separate project within the EMSFEI agenda.**
15. Investigation should be made of the potential and concrete **benefits of the Zero-corner model and Block-Chain** to e-invoicing.
16. EMSFEI should consider a future project to examine and extract **lessons from the numerous country experiences** already available[2].

---

[2] See country descriptions at: https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/eInvoicing+in+each+member+state

ANNEX
Contributors

EMSFEI -Sub-group 4
April – October 2018

Chair: Cyrille Sautereau, FNFE-MPE (French National Forum for e-Invoicing), FR

Editors:

- Charles Bryant, EESPA
- Fred van Blommestein, Flowcanto, NL

Group Members:

- Ahti Allikas, Opus Capita, EE
- Gérard Soisson, Luxemburg Administration, LU
- Serge Libert, Belgium Administration BOSA, BE
- Andras Kelen, TRIAD, HU
- Jose Vicente, EBA (Euro Banking Association)
- Thomas Jorgensen, TrueCommerce Denmark Aps, DK
- Anna Norden, Sovos (Trustweaver), SE
- Andreas Michalewicz, Hessisches Ministerium der Finanzen, DE
- Christakis Papamarkides, Deloitte, CY
- Bernhard Misak, Austrian Federal Procurement Agency, AT
- Nelson Roda Inacio, PT Taxes Authority, PT
- Pirjo Ilola, Finance Finland, FI
- Rok Bojanc, Slovenian National Forum for eInvoicing, SI
- Salvatore Stanziale, Ministero dell'Economia e delle Finanze, IT
- Andrzej Zbikowski, EUF (EU federation for factoring & commercial finance)
- Ivo Moszynski, FERD, DE