E-Rechnung in Europa & international

Dr. Philipp Liegl

Speaker

Philipp Liegl

- E-invoicing standardisation contributor (UN/CEFACT, EN 16931, ebInterface)

- Over 15 years of e-invoicing and EDI project experience in FMCG, retail, manufacturing, industry and automotive

- Coordinated international EDI and e-invoicing projects as technical project leader

- Still loves to tinker around with integration challenges – in particular with SAP

Agenda

EDI vs. e-invoicing

ELECTRONIC DATA INTERCHANGE (EDI)
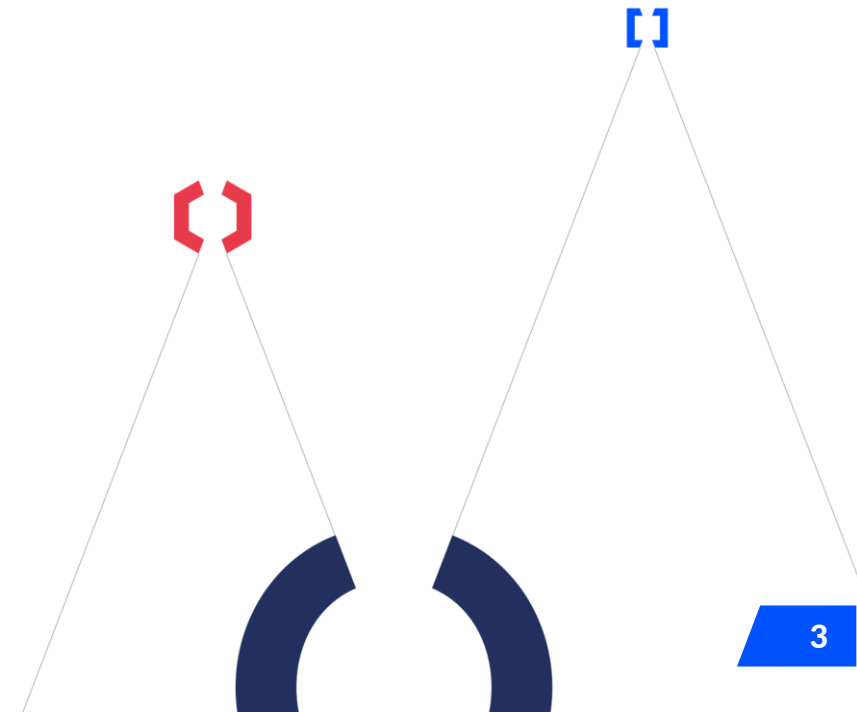
Purchase Order

Despatch Advice

E-invoicing

EDIFACT, ANSI, etc.

XML
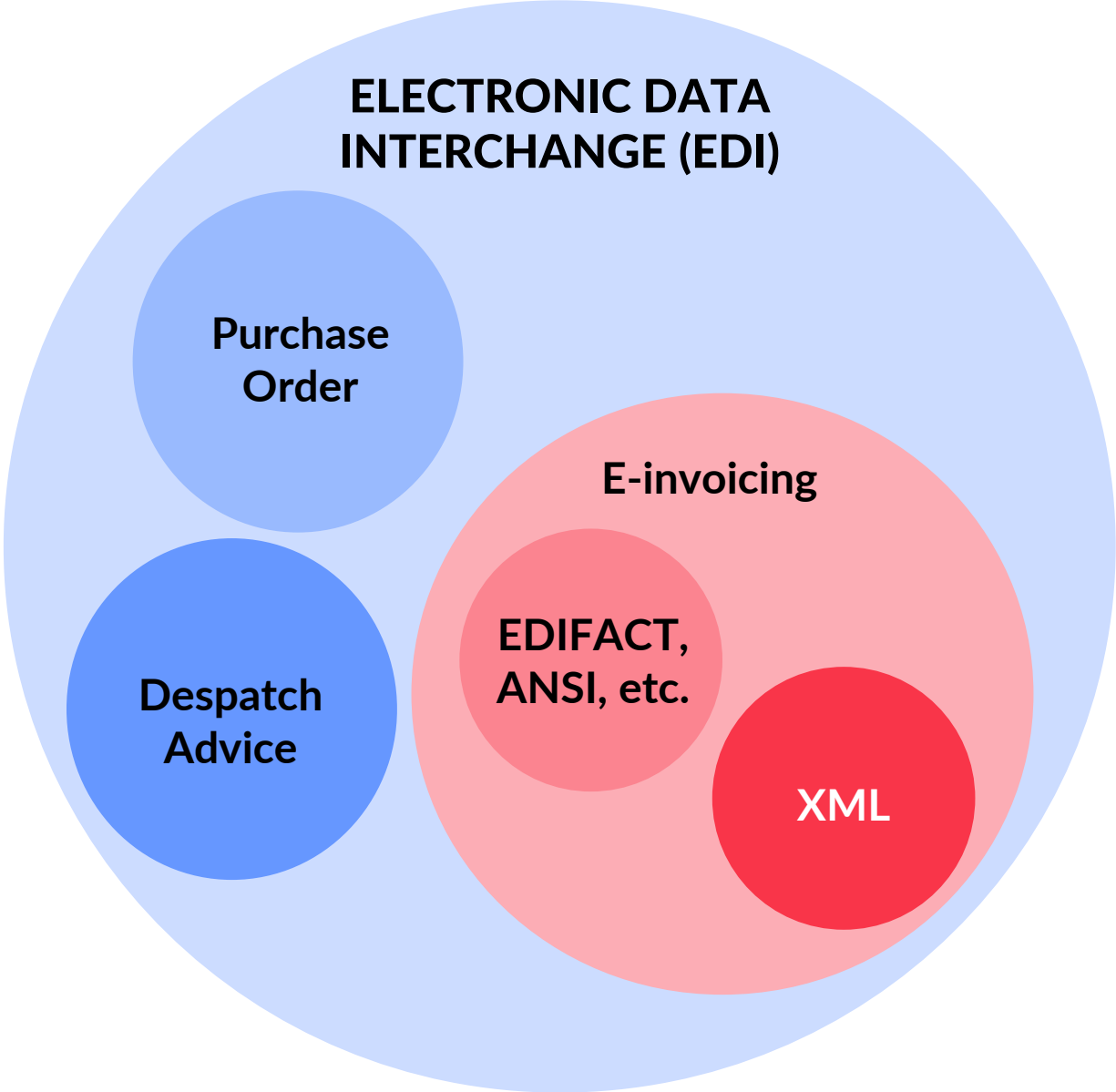
# What drives e-invoicing forward in companies today?

Intrinsic motivation

- Cost savings due to reduced manual processing
- Higher throughput and fewer errors

Extrinsic motivation

- The European Union enforces e-invoicing for public e-procurement (cf. EN 16931)
- National regulations enforce e-invoicing to fight tax fraud and tax evasion (e.g. Italy, France, Poland)

Applications of structured electronic invoices

45%

65%
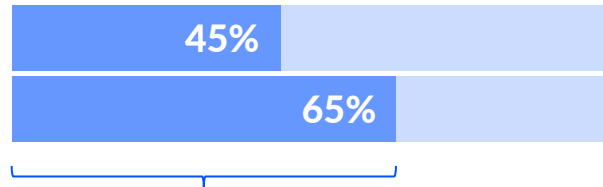
Typically, 45 - 65% are of all companies in a country supply to the public sector

G2G

Government

B2G

G2C

B2B

C2C

Business

B2C

Consumer
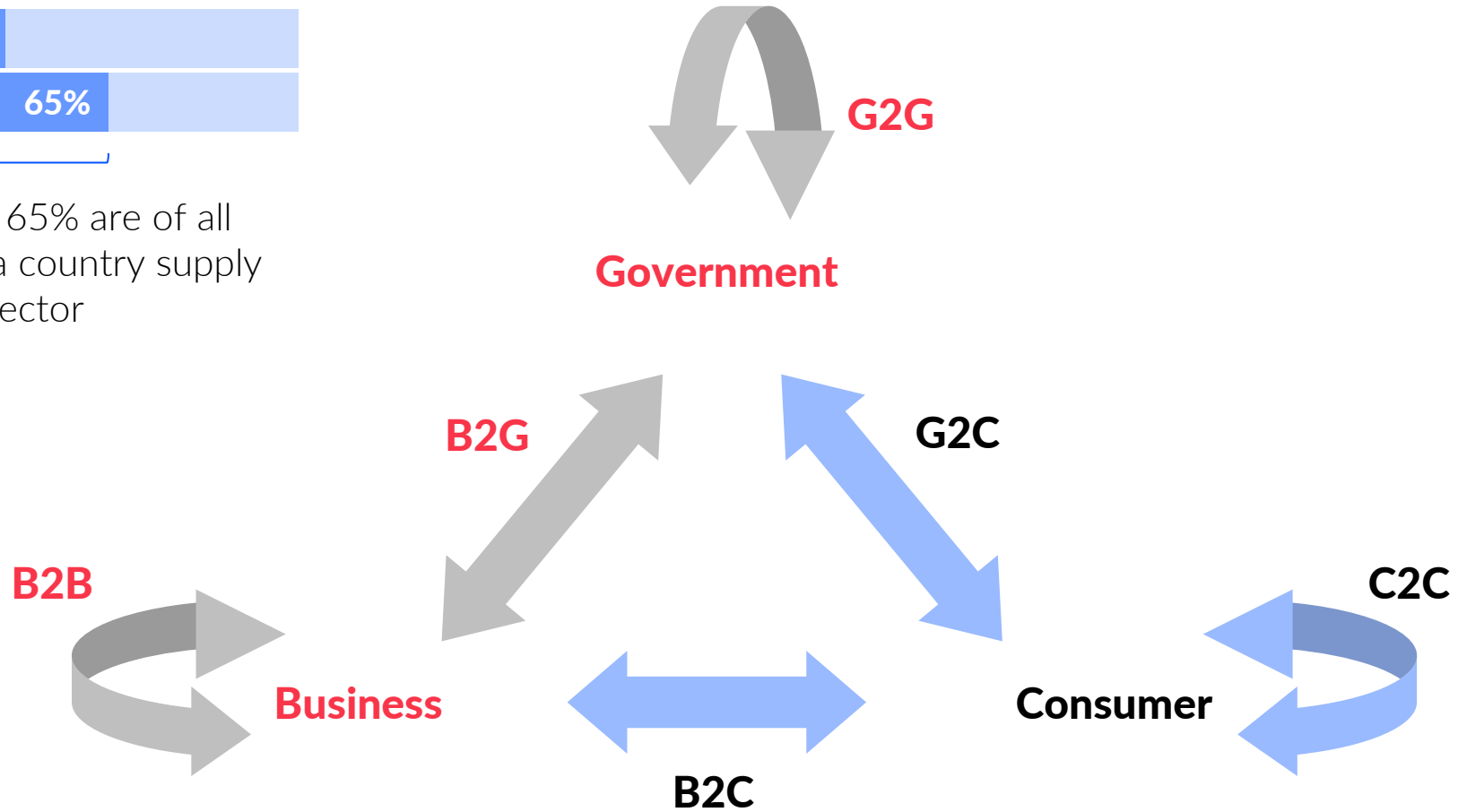
How difficult is it?

Image source: Wikimedia Commons

Move this from A to B

```
<?xmlversion="1.0"encoding="UTF-
8"?><ns0:Invoicexmlns:cac="..."><cbc:CustomizationID>urn:cen.eu:en16931:2017#
compliant#urn:xoev-
de:kosit:standard:xrechnung_2.2</cbc:CustomizationID><cbc:ID>1234567890</cbc:
ID><cbc:IssueDate>2018-10-15</cbc:IssueDate><cbc:DueDate>2018-10-
29</cbc:DueDate><cbc:InvoiceTypeCode>380</cbc:InvoiceTypeCode><cbc:Note>Achtu
ng neue
Bankverbindung!</cbc:Note><cbc:DocumentCurrencyCode>EUR</cbc:DocumentCurrency
Code><cbc:BuyerReference>99000000-01514-
29</cbc:BuyerReference><cac:InvoicePeriod><cbc:StartDate>2018-10-
16</cbc:StartDate><cbc:EndDate>2018-10-23</cbc:EndDate></cac:InvoicePeriod>
```

Move this from A to B

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ns0:Invoice xmlns:cac="...">
    <cbc:CustomizationID>urn:cen.
    eu:en16931:2017#compliant#urn:xoev-de:kosit:standard:xrechnung_2.2</
    cbc:CustomizationID>
    <cbc:ID>1234567890</cbc:ID>
    <cbc:IssueDate>2018-10-15</cbc:IssueDate>
    <cbc:DueDate>2018-10-29</cbc:DueDate>
    <cbc:InvoiceTypeCode>380</cbc:InvoiceTypeCode>
    <cbc:Note>Achtung - neue Bankverbindung!</cbc:Note>
    <cbc:DocumentCurrencyCode>EUR</cbc:DocumentCurrencyCode>
    <cbc:BuyerReference>99000000-01514-29</cbc:BuyerReference>
    <cac:InvoicePeriod>
        <cbc:StartDate>2018-10-16</cbc:StartDate>
        <cbc:EndDate>2018-10-23</cbc:EndDate>
    </cac:InvoicePeriod>
    <cac:OrderReference>
        <cbc:ID>2345678901</cbc:ID>
        <cbc:SalesOrderID>Auftragsreferenz</cbc:SalesOrderID>
```
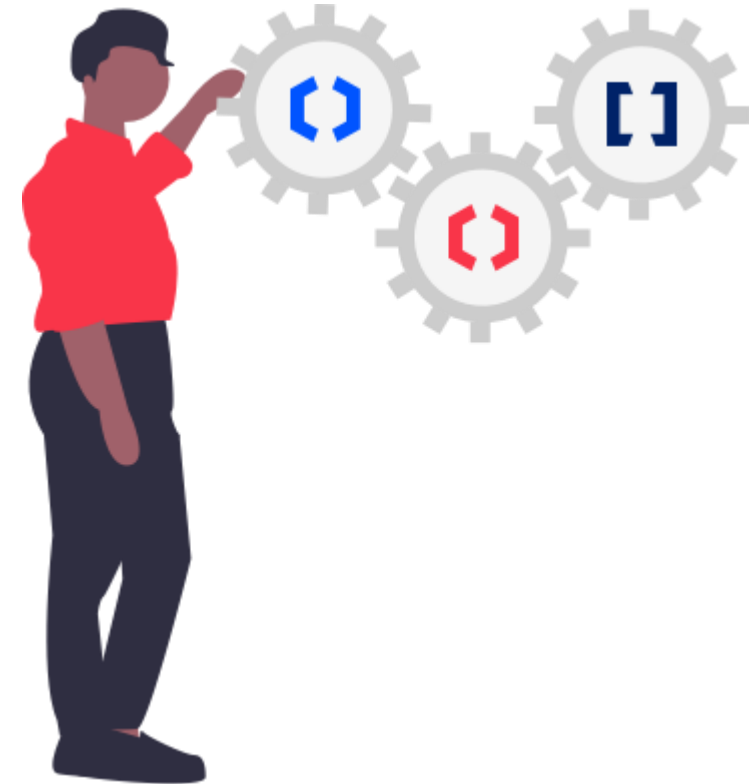
What do we need to consider for a working e-invoicing setup?

- Process choreography

- Document structure and semantics

- ERP Integration

- Proper master data
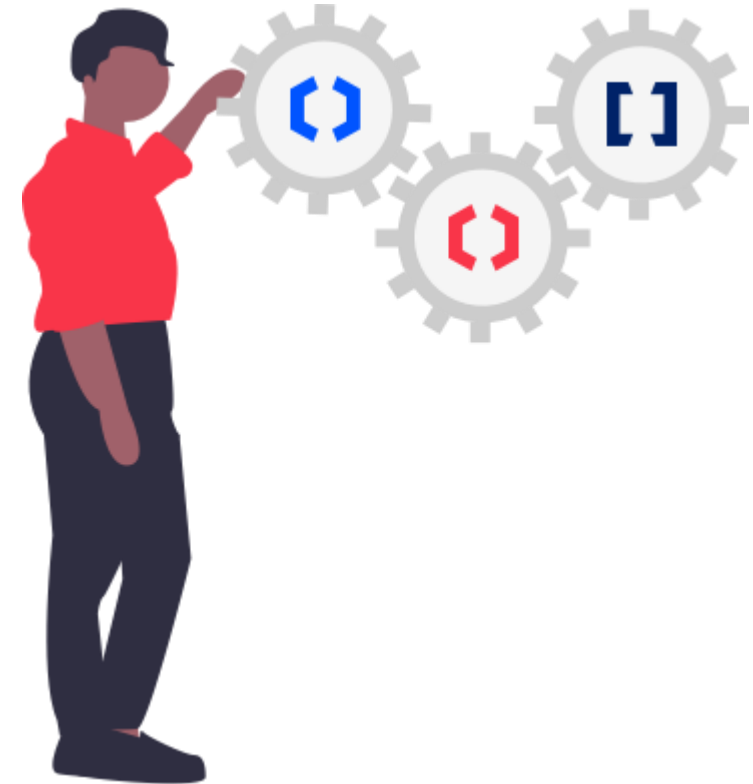
- Exchange protocol

- Setup, monitoring and support

What do we need to consider for a working e-invoicing setup?

- Process choreography

- Document structure and semantics

- ERP Integration

- **Proper** master data

- Exchange protocol

- Setup, monitoring and support

Invoice formats

Structured invoice formats: EDIFACT

Delimiter-based syntax

Official ISO Standard 9735

UN/EDIFACT: international industry-neutral standard for electronic business documents

Basis for numerous industry-specific subsets for retail, automotive, chemical, etc. sectors

- EDIFACT EANCOM D01B INVOIC
- VDA 4938

Little to no significance in the B2G sector

Second major international standard: ANSI ASC X12

```
UNA:+.? '
UNB+UNOC:3+3483498746374:14+9837483748375:14+191216:0201+105323'
UNH+147569586+INVOIC:D:01B:UN:EAN010'
BGM+380+0032122232+9'
DTM+137:20191216:102'
DTM+35:20191216:102'
FTX+AAK+1++ES BESTEHEN VEREINBARUNGEN, AUS DENEN SICH NACHTRAEGLICHE:MINDERUNG
RFF+DQ:332345'
DTM+171:20191216:102'
RFF+ON:43534234244'
DTM+171:20191210:102'
RFF+ABO:0037752737'
DTM+171:20191216:102'
RFF+CT:1'
NAD+SU+3483498746374::9'
RFF+FC:17/629/60092'
RFF+VA:DE269726552'
NAD+BY+9837483748323::9'
NAD+IV+9837483743234::9'
NAD+DP+9837483323434::9'
TAX+7+VAT+++:::7+S'
CUX+2:EUR:4'
LIN+1++3483498743232:SRV'
PIA+1+32334332:SA::91'
IMD+C++SG::9'
IMD+A++:::Schrauben groß, 6er Pack'
QTY+46:28.000:PCE'
```

Structured invoice formats: XML

Extensible **M**arkup **L**anguage

Separation between markup (structure) and actual content

- Markup: red and orange
- Content: white and green

Used concepts

- Structure definition: **XML schema**
- Integrity rules: **Schematron**
- Selection of elements/attributes: **XPath**
- Concrete invoice: also called **XML instance**

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Invoice  xmlns:cac="urn:oasis:names:specification:ubl:schema:xsd:CommonAggregateComponents-2"
 xmlns:cbc="urn:oasis:names:specification:ubl:schema:xsd:CommonBasicComponents-2"
 xmlns:qdt="urn:oasis:names:specification:ubl:schema:xsd:QualifiedDataTypes-2"
 xmlns:udt="urn:oasis:names:specification:ubl:schema:xsd:UnqualifiedDataTypes-2"
 xmlns:ccts="urn:un:unece:uncefact:documentation:2"
 xmlns="urn:oasis:names:specification:ubl:schema:xsd:Invoice-2">
    <cbc:CustomizationID>urn:cen.eu:en16931:2017#compliant#urn:xoev-de:kosit:standard:xrechnung_1.2</
    cbc:CustomizationID>
    <cbc:ID>12115118</cbc:ID>
    <cbc:IssueDate>2015-01-09</cbc:IssueDate>
    <cbc:DueDate>2015-01-09</cbc:DueDate>
    <cbc:InvoiceTypeCode>380</cbc:InvoiceTypeCode>
    <cbc:DocumentCurrencyCode>EUR</cbc:DocumentCurrencyCode>
    <cbc:BuyerReference>A test buyer reference</cbc:BuyerReference>
    <cac:AccountingSupplierParty>
        <cac:Party>
            <cac:PostalAddress>
                <cbc:StreetName>Postbus 7l</cbc:StreetName>
                <cbc:CityName>Velsen-Noord</cbc:CityName>
                <cbc:PostalZone>1950 AB</cbc:PostalZone>
                <cac:Country>
                    <cbc:IdentificationCode>NL</cbc:IdentificationCode>
                </cac:Country>
            </cac:PostalAddress>
            <cac:PartyTaxScheme>
                <cbc:CompanyID>NL8200.98.395.B.01</cbc:CompanyID>
                <cac:TaxScheme>
                    <cbc:ID>VAT</cbc:ID>
                </cac:TaxScheme>
            </cac:PartyTaxScheme>
            <cac:PartyLegalEntity>
                <cbc:RegistrationName>De Koksmaat</cbc:RegistrationName>
                <cbc:CompanyID>57151520</cbc:CompanyID>
            </cac:PartyLegalEntity>
            <cac:Contact>
```

Hybrid invoice formats: ZUGFeRD

ZUGFeRD 2.1.1/Factur-X

French/German e-invoice standard based on PDF and XML

Combines the visual document (PDF) and the relevant raw data (XML) into one PDF/A-3 file

XML structure according to Cross Industry Invoice (CII)

Specific profile for EN 16931 compliance available

Legislations and challenges

Legislations

- E-invoicing is on the rise
- More and more B2G and B2B initiatives are started
- There is only one direction: upwards towards more B2B and B2G automation

Legislations and challenges

Legislations

- E-invoicing is on the rise
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Challenges

- Multitude of different standards and protocols (mostly Web Services) to support
- Legislations change and updates to the standards are introduced
- New document types are being introduced (e.g. orders in addition to invoices)
- Specific archiving requirements on a per-country basis
- Language challenges (e.g. FatturaPA in Italy: the XML standard is in Italian or KSeF in Poland)
- Compliance is not a nice-to-have but a legal must

EU Directive for B2G E-invoicing

EU Directive 2014/55/EU

Mandates the development of a common EU-wide e-invoice standard

Mandates the use of e-invoicing for public procurement in Europe

Contracting authorities must accept electronic invoices from contractors

EU Directive resulted in EN 16931 (syntax neutral)

Two officially supported syntaxes

- Universal Business Language (UBL)
- Cross Industry Invoice (CII)

In Germany **contractors must use** XRechnung (and not only authorities must accept it)

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Contents

I   Legislative acts

page

DIRECTIVES

* **Directive 2014/55/EU of the European Parliament and of the Council of 16 April 2014**   1
  on electronic invoicing in public procurement (¹)

Application example of EN16931: XRechnung in Germany

https://xeinkauf.de/xrechnung/

XRechnung is a Core Invoice Usage Specification (CIUS) of the European Norm EN 16931

It contains restrictions specific to German requirements (e.g. Leitweg ID, use of discounts)

Current version: 2.3.1 (until 31.01.2024)

Next version: 3.0.1 (starting 01.02.2024)

Valid syntaxes:

- **Cross Industry Invoice** (CII)

  - XML standard, which is used in ZUGFeRD
  - A ZUGFeRD 2.1.1 invoice is also a valid XRechnung (only if the used profile is EN 16931)
  - XML of ZUGFeRD only – not the PDF!

- **Universal Business Language** (UBL)

  - XML-based standard for electronic documents, which is used as part of Peppol

CIUS XRechnung is defined by the BT-24 entry in XML

```
urn:cen.eu:en16931:2017#compliant#urn:xoev-de:kosit:standard:xrechnung_2.3
```

Example for XRechnung

UBL – Universal Business Language

```xml
<?xml version="1.0" encoding="UTF-8"?>
<ubl:Invoice xmlns:ubl="urn:oasis:names:specification:ubl:schema:xsd:Invoice-2"
          xmlns:cac="urn:oasis:names:specification:ubl:schema:xsd:CommonAggregateComponents-2"
          xmlns:cbc="urn:oasis:names:specification:ubl:schema:xsd:CommonBasicComponents-2"
          xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:schemaLocation="urn:oasis:names:specification:ubl:schema:xsd:Invoice-2 http://docs.oasis-open.org/ubl/os-
    <cbc:CustomizationID>urn:cen.eu:en16931:2017#compliant#urn:xoev-de:kosit:standard:xrechnung_1.2</cbc:CustomizationID>
    <cbc:ID>PRG1502112</cbc:ID>
    <cbc:IssueDate>2015-04-24+01:00</cbc:IssueDate>
    <cbc:InvoiceTypeCode>380</cbc:InvoiceTypeCode>
    <cbc:Note>#ADU#Trainer: Herr [...]</cbc:Note>
    <cbc:DocumentCurrencyCode>EUR</cbc:DocumentCurrencyCode>
    <cbc:TaxCurrencyCode>EUR</cbc:TaxCurrencyCode>
    <cbc:BuyerReference>99000000-18188-16</cbc:BuyerReference>
    <cac:InvoicePeriod>
        <cbc:StartDate>2015-04-20+01:00</cbc:StartDate>
        <cbc:EndDate>2015-04-24+01:00</cbc:EndDate>
    </cac:InvoicePeriod>
    <cac:ProjectReference>
        <cbc:ID>PR456789</cbc:ID>
    </cac:ProjectReference>
```

CII – Cross Industry Invoice

```xml
<?xml version="1.0" encoding="UTF-8"?>
<rsm:CrossIndustryInvoice xmlns:rsm="urn:un:unece:uncefact:data:standard:CrossIndustryInvoice:100"
                      xmlns:ram="urn:un:unece:uncefact:data:standard:ReusableAggregateBusinessInforma
                      xmlns:udt="urn:un:unece:uncefact:data:standard:UnqualifiedDataType:100"
                      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
                      xsi:schemaLocation="urn:un:unece:uncefact:data:standard:CrossIndustryInvoice:10
    <rsm:ExchangedDocumentContext>
        <ram:GuidelineSpecifiedDocumentContextParameter>
            <ram:ID>urn:cen.eu:en16931:2017#compliant#urn:xoev-de:kosit:standard:xrechnung_1.2</ram:ID>
        </ram:GuidelineSpecifiedDocumentContextParameter>
    </rsm:ExchangedDocumentContext>
    <rsm:ExchangedDocument>
        <ram:ID>PRG1502112</ram:ID>
        <ram:TypeCode>380</ram:TypeCode>
        <ram:IssueDateTime>
            <udt:DateTimeString format="102">20150424</udt:DateTimeString>
        </ram:IssueDateTime>
        <ram:IncludedNote>
            <ram:Content>Trainer: Herr [...]</ram:Content>
            <ram:SubjectCode>ADU</ram:SubjectCode>
        </ram:IncludedNote>
```

VAT in the Digital Age (ViDA)

Value Added Tax (VAT)

VAT is the **major contributor to the budgets** of the EU members states

In 2020 the amount of **uncollected VAT was EUR 93 billion**

The **administration** of VAT is still widely **paper-based** and digitisation is low

New business models impose an additional challenge on VAT (e.g. Airbnb)

The three main pillars of the VAT in the Digital Age (ViDA) proposal

1) Introduction of Digital Reporting Requirement (DRR) and e-invoicing

The introduction of DRR for intra-community supplies and ensuring interoperability

2) Single VAT Registration

Reducing the need for businesses to register in another Member State

3) Addressing the Platform Economy

Platforms in transport and short-term accommodation sectors to account for the VAT rather than the underlying supplier

Introduction of Digital Reporting Requirement (DRR) and e-invoicing

New real-time digital reporting system, based on e-invoicing

- Every cross-border transaction must be reported using e-invoicing, replacing monthly/quarterly recapitulative statements

- Proposed format for e-invoicing: EN 16931

- Both, supplier and customer must report the cross-border transaction

- In case there is a national e-invoicing system in place, it must support the EU format as well

- Start of mandatory cross-border e-invoicing: ~~2028~~ expected 2030 or 2032

CTC and PTC

CTC = Continuous Transaction Controls

- Real-time reporting and clearance of e-invoices

- Transmission shortly after or at the time of invoice creation

- Required data usually stems from a single ERP document (usually an invoice - e.g. INVOIC02 IDoc in case of SAP)

PTC = Periodic Transaction Controls

- Reportings based on SAF-T standards, VAT Listing

- Transmission in batches on a periodic basis (e.g. weekly, monthly)

- Required data may stem from different systems and an aggregation may be required upfront

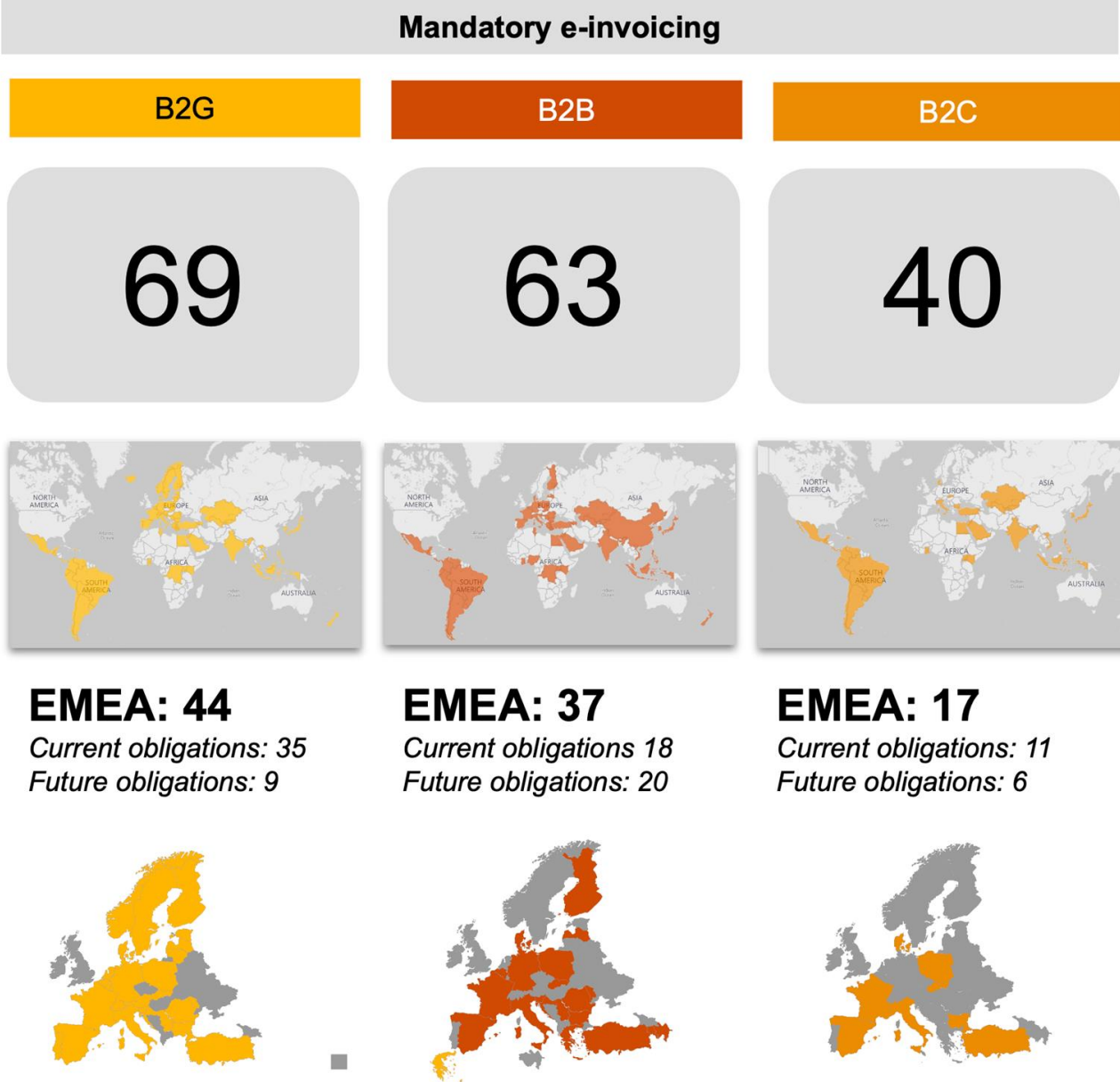# E-invoicing initiatives and technical approaches

Mandatory E-Invoicing and VAT reporting are on the rise

- **Romania** (e-reporting): 1 January 2024

- **Romania** (B2B e-invoicing): 1 July 2024

- **Poland** (B2B e-invoicing): 1 July 2024

- **Slovakia** (B2B e-invoicing): 2025

- **Spain** (B2B e-invoicing): Spring 2025

- **Belgium** (B2B e-invoicing): 1 January 2026

- **Germany** (B2B e-invoicing): 1 January 2025 (receiving), 1 January 2026 - January 2027 (issuing: phased roll-out)

- **France** (B2B e-invoicing & e-reporting): 1 September 2026 (issuing for majority and receiving for all), 1 September 2027 (issuing for small customers)

FINVOICE

Peppol: UBL

Peppol:UBL

Peppol

2026

Peppol: xRechnung, ZUGFeRD

2025 - 2027

KSeF: FA2

2024

PPF (B2B) | Chorus Pro (B2G): CII, UBL, Factur-X

2026 - 2027

ebInterface

2025

NAV: NAV XML 3.0

2021

RO e-Factura: UBL, CII

2024

UBL   FACe: FacturaE

2025

SDI: FacturaPA

2019

Non exhaustive list

E-invoicing international

Mandatory e-invoicing

B2G	B2B	B2C
69	63	40

EMEA: 44
Current obligations: 35
Future obligations: 9

EMEA: 37
Current obligations 18
Future obligations: 20

EMEA: 17
Current obligations: 11
Future obligations: 6

Source: PwC

Existing CTC Models

Reporting of transactional data to CTC platform in near-time **to exchange**
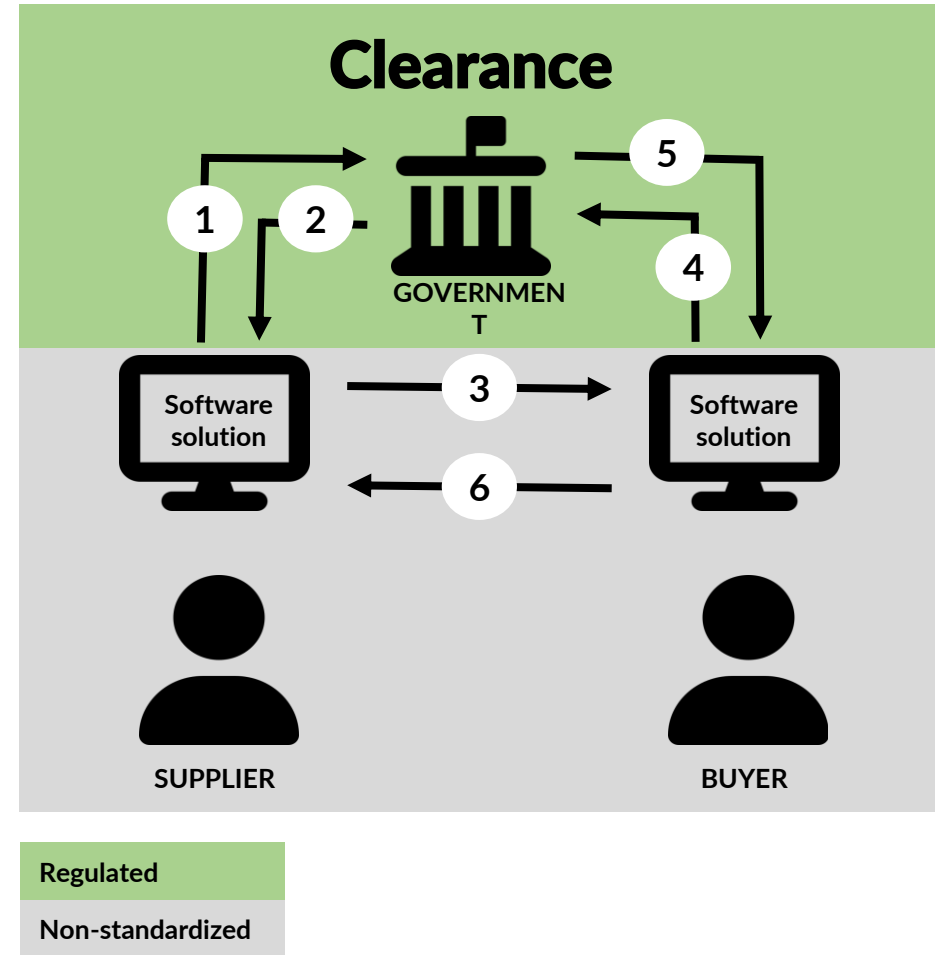
🇭🇺   Hungary

🇰🇷   South Korea

Real-time reporting

2   3

GOVERNMENT

Software solution   1   Software solution

4

SUPPLIER   **BUYER**

Regulated

Non-standardized
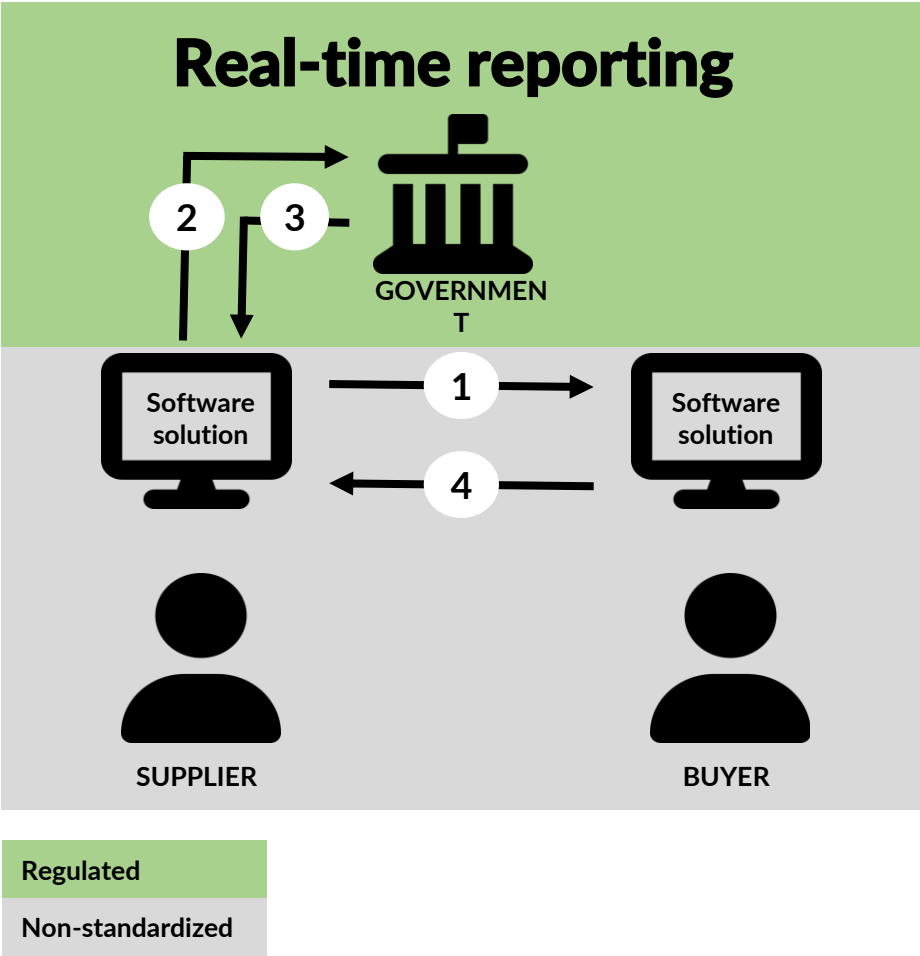
Existing CTC Models

Validation by CTC platform in near-real time to exchange and/or validation post reception
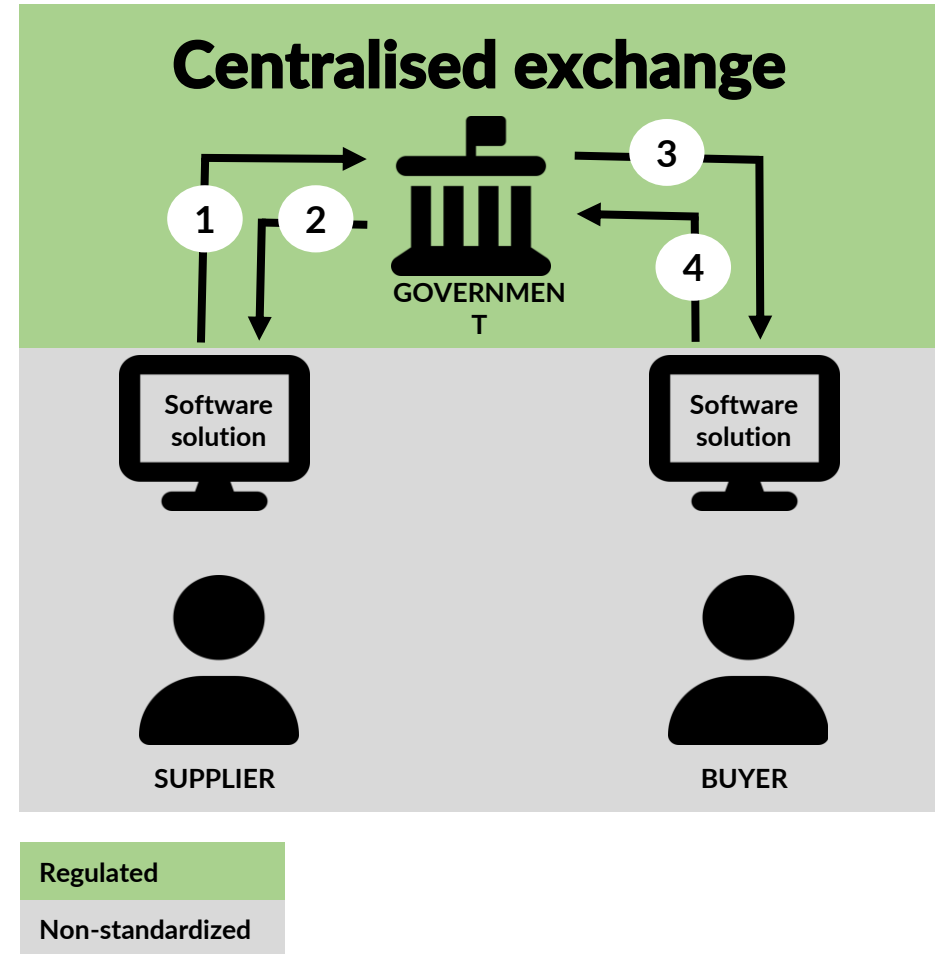
🇨🇱 Chile

🇲🇽 Mexico

Clearance

GOVERNMENT

1 2

5

4

3

6

Software solution

Software solution

SUPPLIER

BUYER

Regulated

Non-standardized

Existing CTC Models

Transactions are **validated and exchanged by CTC platform**

🇮🇹 Italy

🇹🇷 Turkey

Centralised exchange

1 2 GOVERNMENT 3 4

Software solution

Software solution

SUPPLIER

BUYER

Regulated

Non-standardized

Existing CTC Models

Decentralised exchange with validations and reporting
via network of certified providers

EESPA

Peppol

Decentralised CTC and exchange

GOVERNMENT

2 3

5

4

1

Software
solution

Software
solution

6

SUPPLIER

BUYER
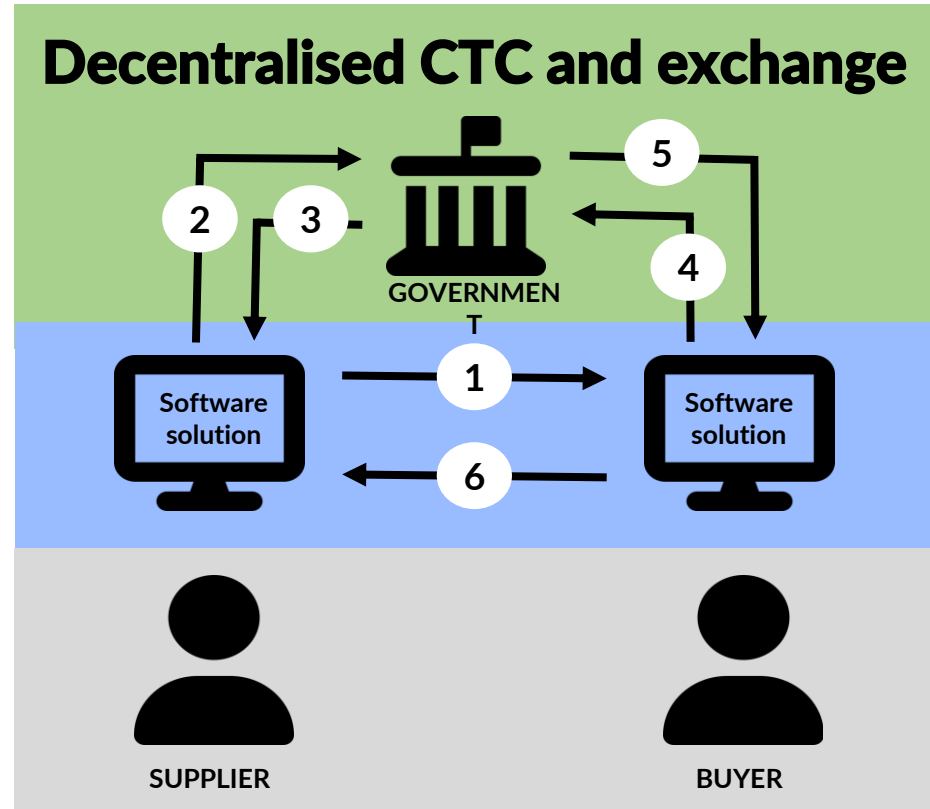
Regulated

Standardized

Non-standardized

The rise of Peppol

Challenges when exchanging electronic documents

- Each industry has specific standards and exchange protocols

- Each partner has different e-invoice formats

- Each partner has different exchange protocols

- Each partner executes onboarding projects differently

- Each partner has different requirements regarding testing
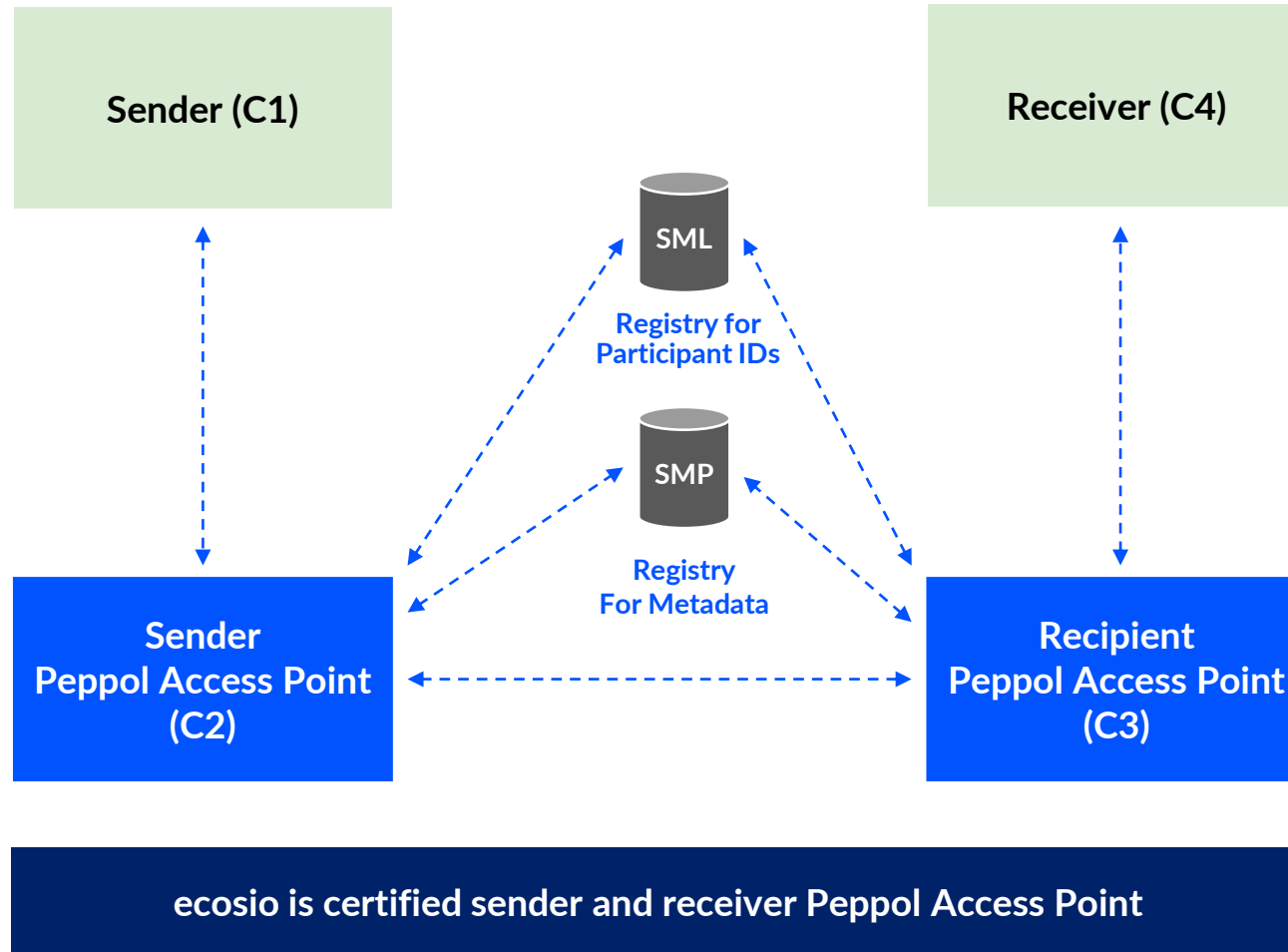
- Some partners support parallel phase operations

- …
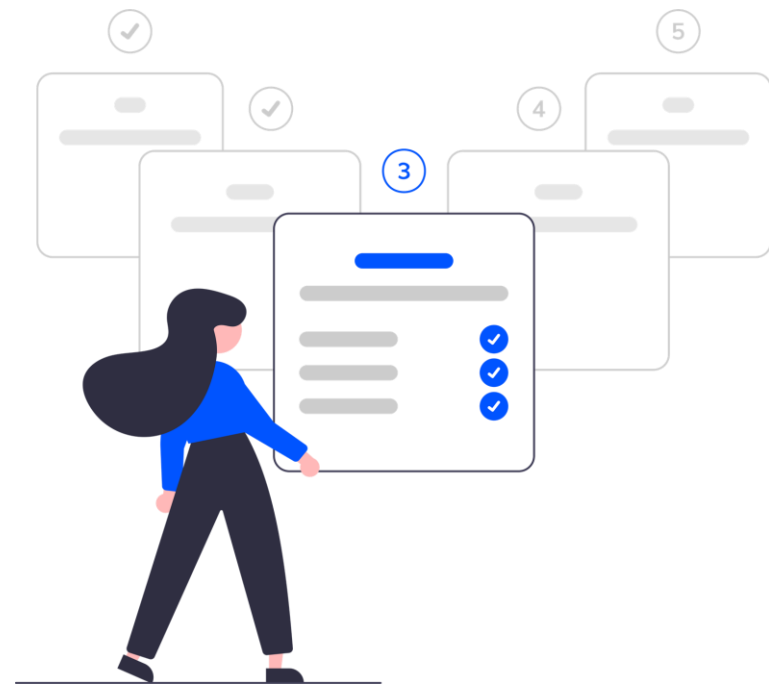
What if?

Source: https://commons.wikimedia.org/wiki/File:Crowd_of_people_with_phones.jpg

Peppol overview

Sender (C1)

Receiver (C4)

SML

**Registry for
Participant IDs**

SMP

**Registry
For Metadata**

Sender
Peppol Access Point
(C2)

Recipient
Peppol Access Point
(C3)

ecosio is certified sender and receiver Peppol Access Point

Four-corner
model for cross border
e-procurement

Sender und receiver
may choose any
Peppol Access Point

"Connect once –
reach all"

No roaming fees
between the APs

Delivery of an invoice via Peppol

Necessary data: Peppol Participant Identifier of the receiver

- E.g. Leitweg ID: **0204:991-11263-21**

Lookup of Peppol ID via SMP will reveal:

- Supported services of the Peppol participant
  (Service Metadata Reference)

- Each Service Metadata Reference contains:
  - Supported **processes**
  - Associated AS4 **endpoints**
  - **Certificates** for the AS4 endpoints
  - Supported **document types**

- Based on that information the target document can be
  created and be sent to the service endpoint

Peppol
Access Point
CERTIFIED PROVIDER

Example lookup: https://peppol.helger.com/public/locale-en_US/menuitem-tools-participant?scheme=iso6523-actorid-upis&value=0204%3A991-11263-21&sml=autodetect

Delivery using Peppol – representation of IDs in UBL

```xml
<StandardBusinessDocument xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns="http://www.unece.org/cefact/namespaces/StandardBusinessDocumentHeader">
  <StandardBusinessDocumentHeader>
    <HeaderVersion>1.0</HeaderVersion>
    <Sender>
      <Identifier Authority="iso6523-actorid-upis">9930:DE283482838</Identifier>
    </Sender>
    <Receiver>
      <Identifier Authority="iso6523-actorid-upis">0204:04011000-12346-33</Identifier>
    </Receiver>
    ...
  </StandardBusinessDocumentHeader>
<?xml version="1.0" encoding="UTF-8"?>
<ubl:Invoice xmlns:ubl="urn:oasis:names:specification:ubl:schema:xsd:Invoice-2"
  xmlns:cac="urn:oasis:names:specification:ubl:schema:xsd:CommonAggregateComponents-2"
  xmlns:cbc="urn:oasis:names:specification:ubl:schema:xsd:CommonBasicComponents-2"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:oasis:name
  ...
  <cbc:DocumentCurrencyCode>EUR</cbc:DocumentCurrencyCode>
  <cbc:TaxCurrencyCode>EUR</cbc:TaxCurrencyCode>
  <cbc:BuyerReference>04011000-12346-33</cbc:BuyerReference>
  <cac:AccountingSupplierParty>
      <cac:Party>
          <cbc:EndpointID schemeID="9930">
                  DE283482838
          </cbc:EndpointID>
          <cac:PartyIdentification>
              <cbc:ID>DE12345678</cbc:ID>
          </cac:PartyIdentification>
          ...
      </cac:Party>
  </cac:AccountingSupplierParty>
  <cac:AccountingCustomerParty>
      <cac:Party>
          <cbc:EndpointID schemeID="0204">
                  04011000-12346-33
          </cbc:EndpointID>
          <cac:PartyIdentification>
              <cbc:ID>BI12345678</cbc:ID>
          </cac:PartyIdentification>
              ...
      </cac:Party>
  </cac:AccountingCustomerParty>
  ...
</ubl:Invoice>
</StandardBusinessDocument>
```

Peppol Sender ID
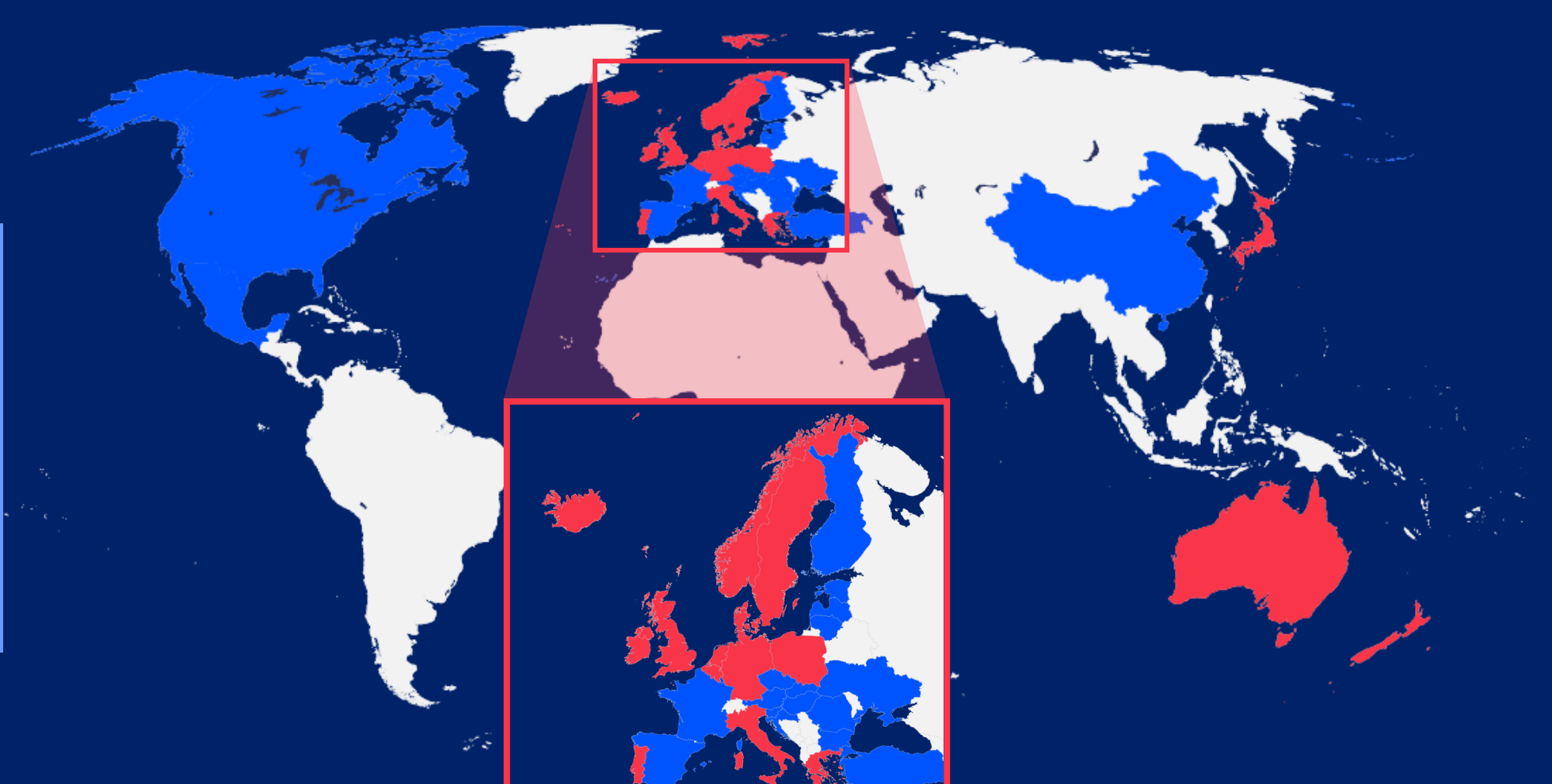
Peppol Receiver ID

Leitweg ID

Peppol Sender ID

Peppol Receiver ID

Peppol usage worldwide

KEY

- 🟦 Peppol supported
- 🟥 Has local Peppol authority
- ⬜ Peppol not supported

Technical Approaches to E-invoicing

Technical approaches for EDI and e-invoicing

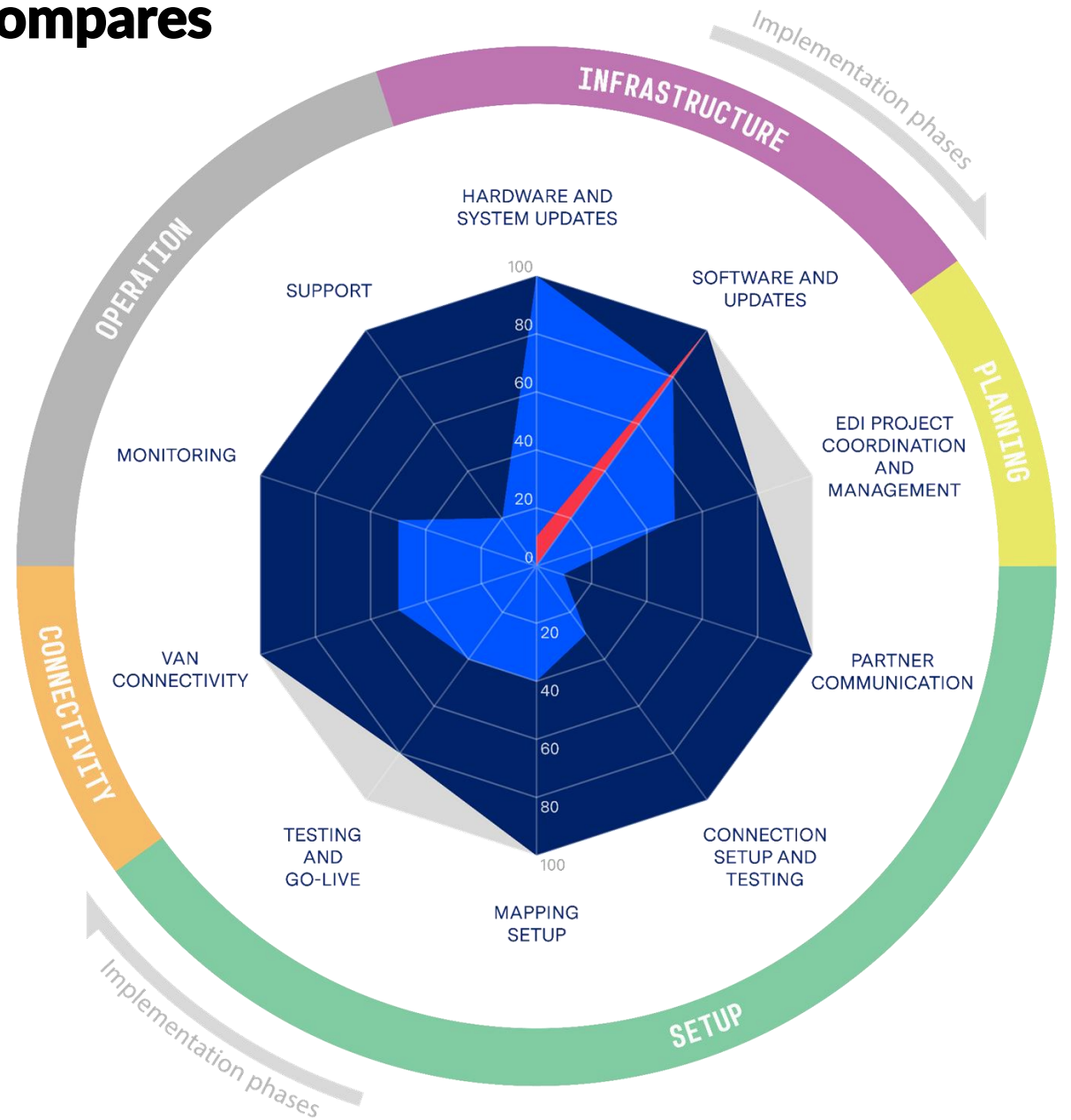| Local **EDI Converter**	Integration **Platform as a Service** Solution (iPaaS)	**EDI/E-invoicing as a Service** Solution

Your responsibility

External responsibility

How EDI/E-invoicing as a Service compares

Key

- **Local EDI Converter** (red)
- **Integration Platform as a Service Solution (iPaaS)** (blue)
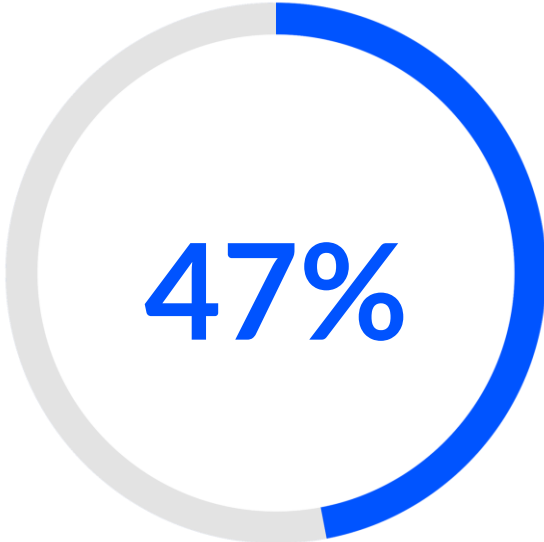- **EDI/E-invoicing as a Service Solution** (dark blue)

How much work is done by the external partner?

Local converter (on-premise)

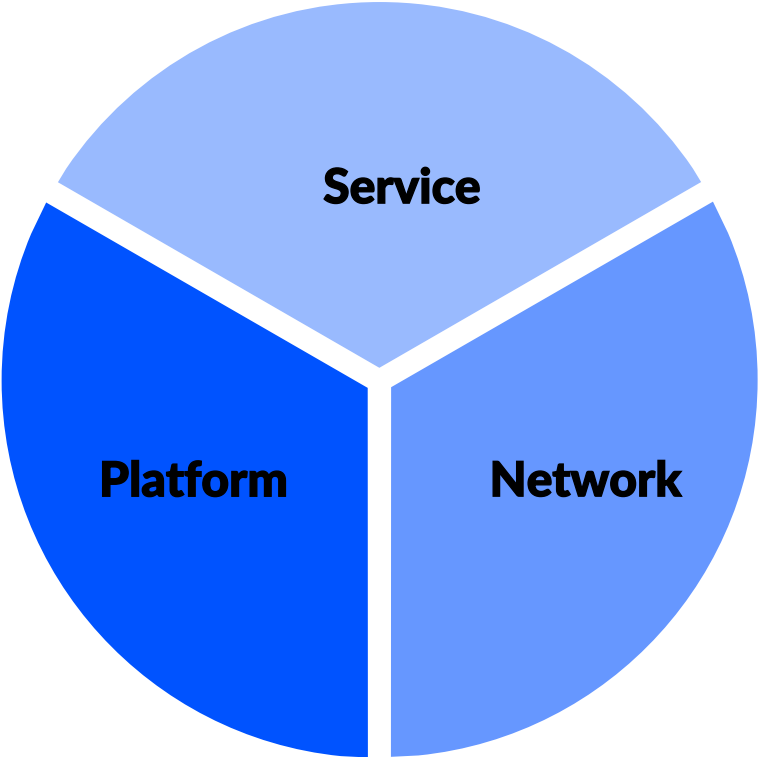**11%**

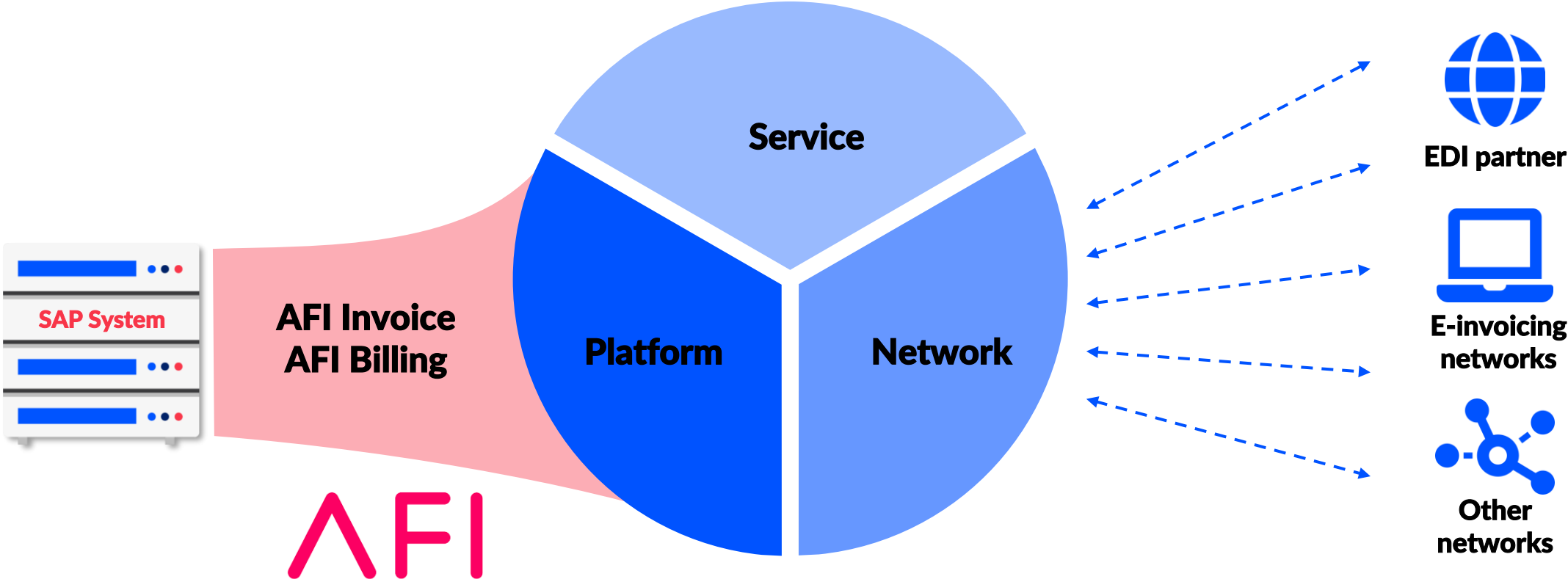Integration Platform as a Service Solution (iPaaS)

47%

EDI/E-invoicing as a Service

96%

E-invoicing as a Service

E-invoicing as a Service

Your responsibility

ecosio's responsibility

SAP System

AFI Invoice
AFI Billing

AFI

Service

Platform

Network

EDI partner

E-invoicing
networks

Other
networks

CONNECTIONS THAT WORK

Close to our customers

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