



## Deliverable 2.4



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### Pre Award eProcurement

### Virtual Company Dossier – PEPPOL EIA (Enterprise Interoperability Architecture)



**Version:** 1.01



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## 1 Preamble

In the Grant Agreement 1<sup>st</sup> amendment this deliverable scheduled for **30.08.2011** is called:

### **“2.4 PEPPOL eProcurement – VCD Best practice”.**

The objective of this deliverable was to collect and publish best practice cases from real PEPPOL pilots.

Since the piloting phase in the PEPPOL project has been delayed and reorganised (introducing the ISU), this deliverable has been renamed, refocused and re-planned in the 2<sup>nd</sup> amendment to:

### **“2.4 Pre Award VCD PEPPOL EIA (Enterprise Interoperability Architecture)”**

The delivery date is set to **30.04.2011**, which is aligned with the first production release of the PEPPOL EIA. The objective of the PEPPOL EIA is to have a unified artefact repository for the PEPPOL community, targeting the users and implementers of PEPPOL solutions.

- Logical entrance to PEPPOL communities
- Logical organisation of PEPPOL artefacts
- Single point of reference to PEPPOL artefacts
- Consistency in releases
- Consistency across communities, dimensions and abstraction levels

As a WP tool, the PEPPOL EIA helps in the reorganisation and refactoring process i.e. moving the PEPPOL solutions into a single and consistent production environment and prepare for long term sustainability.



## 2 Introduction

PEPPOL (Pan European Public Procurement On Line) is a 42 Month (May 1st 2008 – October 31<sup>st</sup> 2011) pilot project, funded by the European Commission under the ICT PSP - ICT Policy Support Programme - in the frame of the CIP - Competitiveness and Innovation Programme.

The project aims to align business processes for eProcurement across all Government Agencies within Europe.

The vision is that any company and in particular small and medium-sized enterprises (SMEs) in the EU can communicate electronically with any European governmental institution for the entire procurement process.

The PEPPOL consortium comprises the members from public eProcurement and ICT related agencies in Austria, Denmark, Finland, France, Germany, Greece, Italy, Hungary, Norway and Portugal, Sweden and the UK (Scotland).

The scope and structure of the PEPPOL project is shown in Figure 1 below. In addition to the work packages shown, WP6 provides project administration and WP7 supports awareness, training and consensus building.

For a wider introduction on PEPPOL please consult the project website at [www.peppol.eu](http://www.peppol.eu).

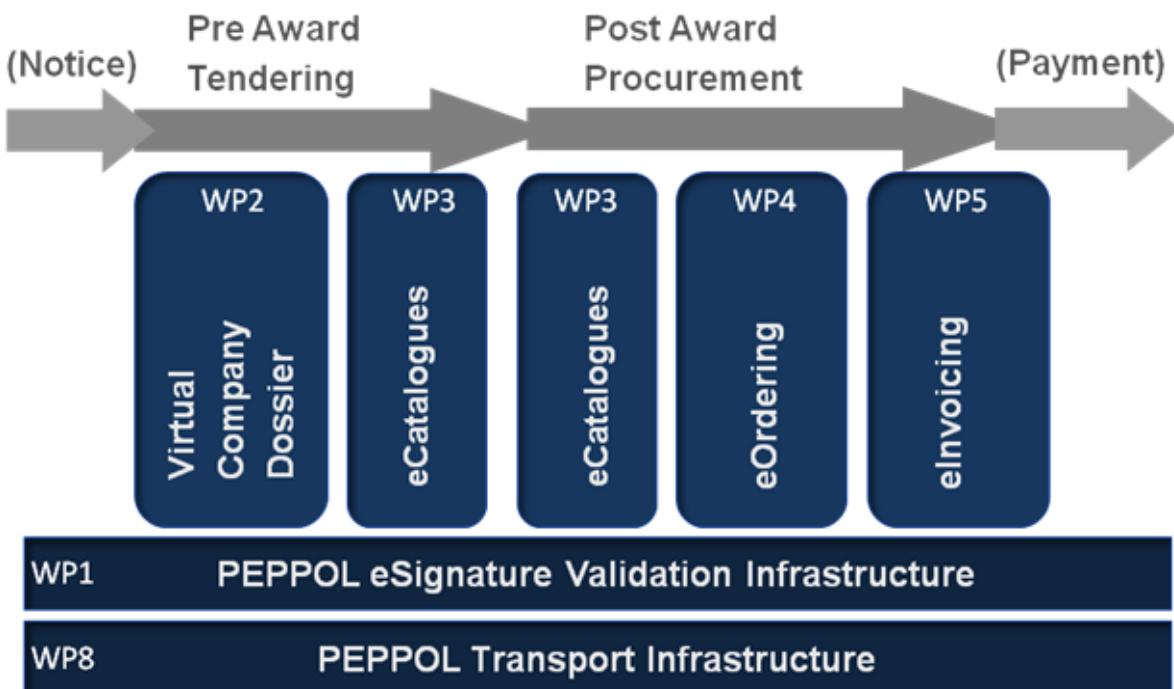


Figure 1: Structure of PEPPOL project

As the figure shows, the project structure has been broken down into different Work Packages, each dealing with one of the topics addressed by the project. This approach is extremely useful to ensure the best achievement of the results; however it has to be accompanied by the adoption of a single frame for describing the project interoperability architecture, so that the end users of the project can find the same approach across Work Packages, and are able to easily "locate" any deliverables within a consistent structure.

Such single frame is represented by the PEPPOL Enterprise Interoperability Architecture (EIA). The general structure of the EIA is described in more detail in Section 1.3, while the rest of the deliverable instantiates the EIA for the Virtual Company Dossier.

## 2.1 Objective and Scope

The Virtual Company Dossier (VCD) has been developed to address the demand for better interoperability in electronic tendering offering simplification, transparency and electronic monitoring of supplier qualifications in public procurements. The PEPPOL work package “Virtual Company Dossier” (VCD) develops a highly helpful and accurate procurement tool for tendering. It provides a standardized method and an electronic document solution to support Contracting Authorities and Economic Operators during the qualitative selection process in tendering procedures.

Participation in public tenders for any eligible Economic Operator means proof of fulfilment of the qualitative selection criteria requested by the Contracting Authority. The burden of proof lies at the shoulders of the Economic Operator, who has to collect evidences from different (national) sources and provide them to the Contracting Authority, at their legally instructed forms. The VCD aims at assisting Economic Operators and Contracting Authorities in their communication by providing a standardized structure to submit evidence that can be used for both, national and transnational procurement procedures.

The transnational dimension of procurement procedures causes several difficulties for the involved parties. The applied set of legal rules differs between the parties, hence qualitative selection criteria do not point at specific evidences, some evidences might not exist in a country or they exist in a different form. Moreover, competent issuing authorities are unknown across borders thus documents have to be legalized and translated by the Economic Operator. The Virtual Company Dossier (VCD) aims at reducing some of these barriers by providing an interoperable electronic document solution that supports the exchange of evidences. Its structure is defined according to the qualitative selection criteria introduced by the European Procurement Directive 2004/18/EC (Art. 45 – 50) but it also refers to corresponding national legislation. The VCD can be used by any Economic Operator from the European Union to prove compliance with criteria when participating in public (pan-European) tenders but it can also be used by Contracting Authorities for monitoring eligibility and suitability of national and foreign candidates.

The objective of this document is to reorganize existing works done in the field of the VCD and to consolidate and integrate them into a common PEPPOL view, the PEPPOL Enterprise Interoperability Architecture (EIA). Therefore several inputs have to be taken into consideration.

Deliverable 2.1 [D2.1, 2009] provided an analysis, synthesis and assessment of existing company dossier structures of individual Member State countries (AT, DE, IT, NO, etc.) and of other standard specifications. The deliverable also described the overall vision of the VCD, which was conceptualised throughout the first phase. Besides that, the legal, organizational and technical requirements for the VCD solution to be implemented were elaborated.

In phase two of the WP 2 activities, the organizational, semantic and technical specifications of the overall VCD concept have been realized. Deliverable 2.2 [D2.2, 2010] embarks on the VCD vision and requirements specified in D 2.1 and further details the VCD overall concept. The activities in phase two are comprised of

- a consolidation of existing solutions with the PEPPOL needs,
- a formal technical specification of the VCD concept for pan-European eProcurement and
- organizational and legal specifications for the pan-European VCD implementation and application.

The components developed for the VCD in phase 3 are described in Deliverable 2.3 [D2.3, 2011]. (Software building blocks enabling cross-border VCD) contains a software guideline for the software components and implementations of the specifications from Deliverable 2.2. It provides the results of phase 3, which confer mostly to the second work stream (Tool Development) as well as minor revisions to the first two work streams (Specification).

This Deliverable (D2.4 VCD Enterprise Interoperability Architecture (EIA)) aims to consolidate all results achieved putting them into a uniform context across the different PEPPOL work packages according to the PEPPOL Enterprise Architecture described in chapter 2.3. The PEPPOL EIA is a structured approach to present the PEPPOL Artefacts, in a way that gives different stakeholders different views on the artefacts, depending on their goals and approach, but still in a consistent and flexible way.



## 2.2 Audience

As an official deliverable of the PEPPOL project, one audience is represented by the European Commission itself, which has expressed great expectations from the project also in order to identify possible suggestions for its eProcurement policy. As official PEPPOL deliverable, another audience is represented by the independent experts who have to evaluate the project performance.

However, despite its nature of official deliverable makes this document suitable also for other purposes, the main goal of this deliverable is to organize the description of the project results in a way that makes it easily understandable to the PEPPOL Stakeholders, which are willing to implement the project results into real systems.

- PEPPOL Community Governance
- Contracting Authorities
- Economic Operators
- ICT Providers
- Service Providers

More specifically, the target audience within the above listed stakeholders includes the following roles:

- Chief Information Officers
- Business Experts
- ICT Architects
- ICT Developers
- ICT Governing participants

These different audiences have to be aware of the innovative nature of the matter dealt with by PEPPOL, i.e. cross border interoperability of eProcurement solutions, that requires an iterative approach to reach steady results. For this reason, the VCD PEPPOL EIA is the first release, which will be used also to collect inputs for further refinements and releases of the EIA itself.

## 2.3 PEPPOL EIA description

The PEPPOL EIA is a structured approach to present the PEPPOL Artefacts, in a way that gives different stakeholders different views on the artefacts, depending on their goals and approach, but still in a consistent and flexible way. As illustrated in Figure 2, the PEPPOL EIA is a 3 dimensional cube.



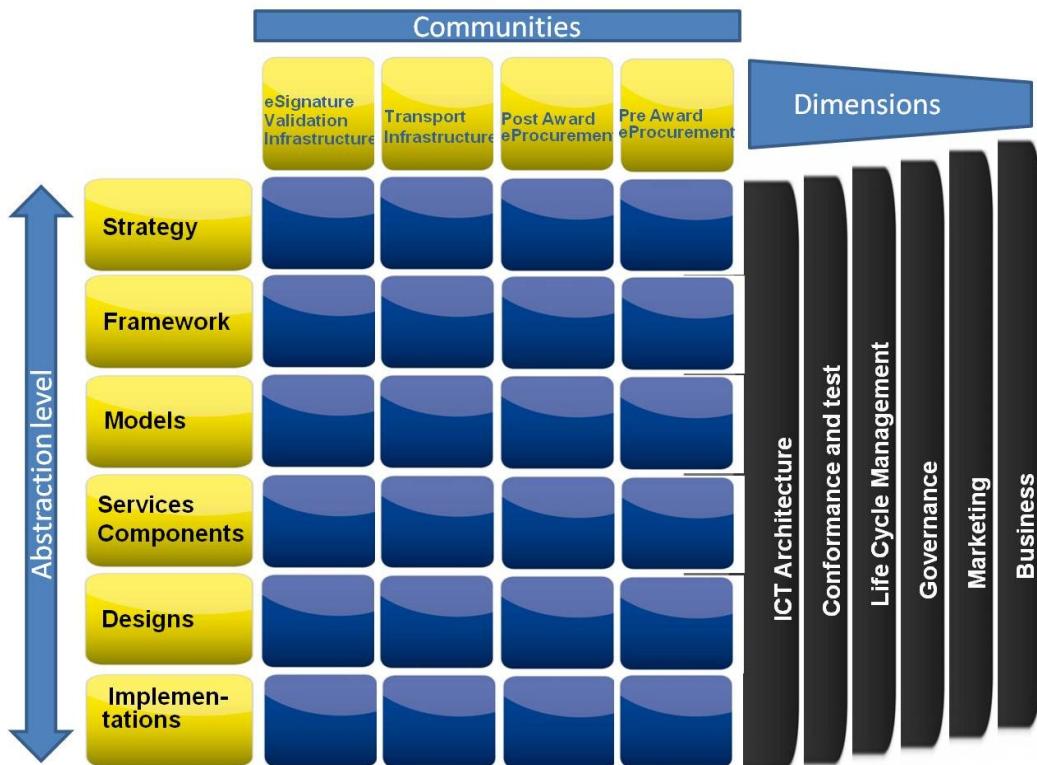


Figure 2: The PEPPOL EIA

### 2.3.1 PEPPOL EIA - Communities

The PEPPOL EIA consists of four interoperability communities which can be differentiated into two eProcurement communities and two infrastructure communities:

**PreAward eProcurement** - this part of the tendering process currently consists of eAttestation (VCD) and eCatalogue.

**PostAward eProcurement** - the purchasing process consists of eCatalogue, eOrdering and eInvoicing.

**eSignature Validation Infrastructure** - enables Pan European end to end electronic business document integrity and authenticity validation

**Transport Infrastructure** - enables Pan European eDelivery of Business documents between eProcurement Communities.

### 2.3.2 PEPPOL EIA - Dimensions

Each of the aforementioned communities has 6 dimensions:

**ICT architecture** - the ICT scope and ICT architecture of the interoperability community: The current deliverable that is equal to the PEPPOL release 1 has the primary focus of reorganising, refactoring and consolidation of the ICT Architecture. This means that the primary work has been done in the ICT Architecture dimension.

## INTRODUCTION

**Conformance and Test** – requirements, processes and tools for claiming conformance to the interoperability community: To make a large scale and scalable distributed community the testing of conformance in a well-structured and seamless way is essential. The Conformance and test methodologies and guidelines are being tested and will be the primary focus of release 2.

**Life Cycle Management (LCM)** – processes for LCM of Business- and ICT architectures: The Life Cycle Management is about giving continuously business value. This dimension is work-in-progress i.e. designs has been made and will be tested through the piloting phase. When a production maturity has been reached it will be entered into the PEPPOL EIA.

**Governance** - the Governance structure and -processes for the Business- and ICT architectures: Currently the future governance is being analysed and a design is work-in-progress. Since this dimension is concerned with the long term sustainability it is planned to be finalized in time for a transfer of ownership and operations.

**Marketing** – processes and material for awareness and recruitment of new participants to the community: Currently marketing material is stored in PEPPOL internal repository. At the end of the project this material will be consolidated and published in this dimension for future use.

**Business** – the business scope and business architecture of the interoperability community: Although a very important dimension, it is not yet decided on the ambition level for this dimension. Several artefacts like Business Cases will be inserted into the dimension, but the content scope, coverage and ambition level will be determined through lessons learned in the Piloting i.e. what information is important for different stakeholders in such a dimension.

### 2.3.3 PEPPOL EIA – Abstraction levels

Each dimension of a community is further divided into 5 abstraction levels:

**Strategy** – Strategy and principles for the dimensions

**Framework** – The top level view of the dimensions

**Models** – Guidelines and specifications of the different services and components of the architecture

**Services and Components** – Reusable services and components

**Designs** – Instantiated designs of the models

**Implementations** – Instantiated implementations of the models

In this way, the 5 abstraction levels should actually be seen in the following way

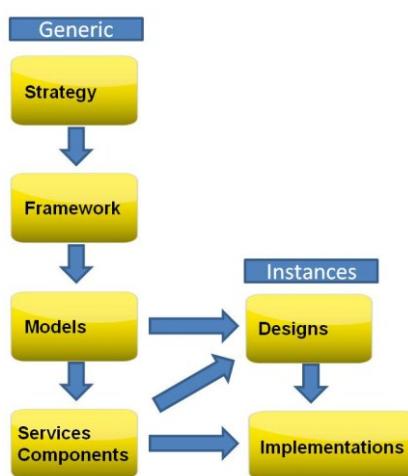


Figure 3: Relationship between the PEPPOL EIA abstraction levels

Strategy, Framework, Models, Services and Components are generic artifacts where the Models can be instantiated into specific designs and implementations. The Services and Components can be used in the specific designs and incorporated into the implementations.



## 2.3.4 PEPPOL EIA Release planning

This document is dealing with the Release 1 of PEPPOL EIA; however, more releases are planned until the project end, according to the list below:

Release 1: 1.5.2011

Release 2: 1.7.2011

Release 3: 1.12.2011

Release 4: 1.5.2011

Although some parts of each dimension is already present in this Release, a high level description of what is the expected progress of each PEPPOL EIA dimension through the different releases is provided below, to correctly set the expectations on the different releases.

### PEPPOL EIA – ICT Architecture

Release 1

### PEPPOL EIA – Conformance and tests

Planned: Release 2

### PEPPOL EIA – Life Cycle Management

Planned: Release 3

### PEPPOL EIA – Governance

Planned: Release 3

### PEPPOL EIA – Marketing

Planned: Release 4

### PEPPOL EIA – Business

Planned: Release 4



## 3 PEPPOL Interoperability Approach and Design Strategy

### 3.1 PEPPOL Interoperability Approach

The PEPPOL Interoperability approach is rooted in the European Interoperability Framework (EIF)<sup>1</sup>.

Summarizing, the European Interoperability Framework (EIF) goals are:

- To serve as the basis for European seamless interoperability in public services delivery, thereby providing better public services at EU level.
- To support the delivery of pan-European eGovernment Services (PEGS) by furthering cross-border and cross-sector interoperability.
- To supplement the various National Interoperability Frameworks in the pan-European dimension.

Version 2.0 of the EIF defines these interoperability layers as Political, Legal, Organizational, Semantic and Technical interoperability.

PEPPOL has decided to ensure interoperability through the use of generic profiles that modularize the procurement process into different collaborations. A PEPPOL BIS (Business Interoperability Specifications) defines, in detail, the requirements and specifications on all interoperability layers to a specific part of the PEPPOL eProcurement process.

In the post award, the PEPPOL BISs are based upon the profiles defined by the CEN Workshop CEN/ISSS BII, (Business Interoperability Interfaces). Such profiles are established in the CEN/ISSS BII Workshop Agreement<sup>2</sup> (CWA 16073-1) and define common requirements for business interoperability interfaces for European public eProcurement.

More in detail, a CEN ISSS WS/BII profile description is a technical specification describing business processes. It includes a detailed description of the way trading partners intend to play their respective roles, establish business relations and share responsibilities to interact efficiently with the support of their respective information systems, i.e.

- the business rules governing the execution of that business process.
- possible run-time scenarios and the business commitments achieved.
- the electronic messages exchanged as part of the business process.
- the sequence in which these documents are exchanged.
- the information content of the electronic messages exchanged.

As well as determining which documents are used, a profile restricts document content in terms of elements, their content and cardinality. The key aspect of the BII profile description is thus in the standardized semantics rather than the syntax. Consequently the messages within a profile can be structured based on different message standards/syntax as long as the chosen standard contains all the necessary data elements.

These enable implementers of BII (such as PEPPOL) to:

- Identify and document the required business interoperability interfaces related to pan-European electronic transactions in public procurement expressed as a set of technical specifications, developed by taking due account of current and emerging international standards in order to ensure global interoperability.
- Co-ordinate and provide support to pilot projects implementing the technical specifications in order to remove technical barriers preventing interoperability.

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<sup>1</sup> <http://ec.europa.eu/idabc/servlets/Doc?id=31597>

<sup>2</sup> CEN WORKSHOP AGREEMENT CWA 16073-1 see: <http://www.cen.eu/cwa/bii/specs/>



- To facilitate implementation of electronic commerce in a standardized way, thereby enabling the development of standardized software solutions as well as efficient connections between trading partners without case by case specification of the data interchange.
- Document required Business Interoperability Interfaces (BII) as formal profile descriptions.
- Reduce the cost of implementing electronic commerce to a level that is economical for small and medium size companies (SMEs) and institutions.

The profiles defined by CEN/BII in its CWA 16073-1 were not fully suitable for the needs of the pre-award; thus in this case PEPPOL proceeded by evolving the existing profiles, and providing the evolutions as input for the second edition of the Workshop, launched in February 2010.

This second CEN BII2 Workshop<sup>3</sup> is a perfect partner for ongoing governance and maintenance of these BII specifications. In addition, PEPPOL will work with the CEN BII2 Workshop (and other related CEN Workshops) to develop a common architecture and validation artefacts to support the profiles used.

Figure 4 provides an overview of the BII profiles relevant for PEPPOL's Business Interoperability Specifications (BIS).

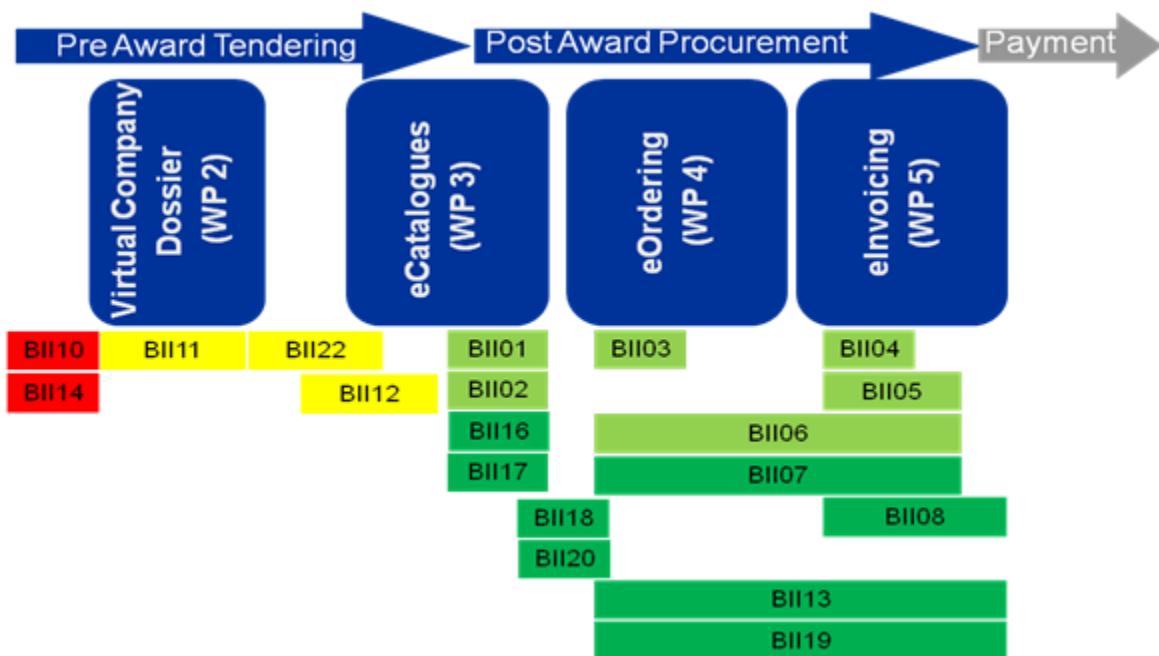


Figure 4: BII profiles relevant for PEPPOL BISs

### 3.2 PEPPOL Design Strategy

This section introduces the design approach followed when developing the PEPPOL pre-award eProcurement specifications.

The architectural concepts adopted by PEPPOL are outlined in Figure 5. This describes the terms used and relationships between them and so provides a framework for the approach taken when developing the PEPPOL building blocks.

<sup>3</sup> [http://www.cen.eu/CEN/sectors/sectors/isss/activity/Pages/ws\\_bii.aspx](http://www.cen.eu/CEN/sectors/sectors/isss/activity/Pages/ws_bii.aspx)

An overall PEPPOL Reference Architecture has several options for implementation (we call these implementation models). Every PEPPOL beneficiary has chosen to implement their architecture based on one of these models. Each component in the architecture is implemented using building blocks, which may (or may not) be those provided in open source form by PEPPOL. Equally some of the building blocks created by beneficiaries may become PEPPOL Reference Implementations.

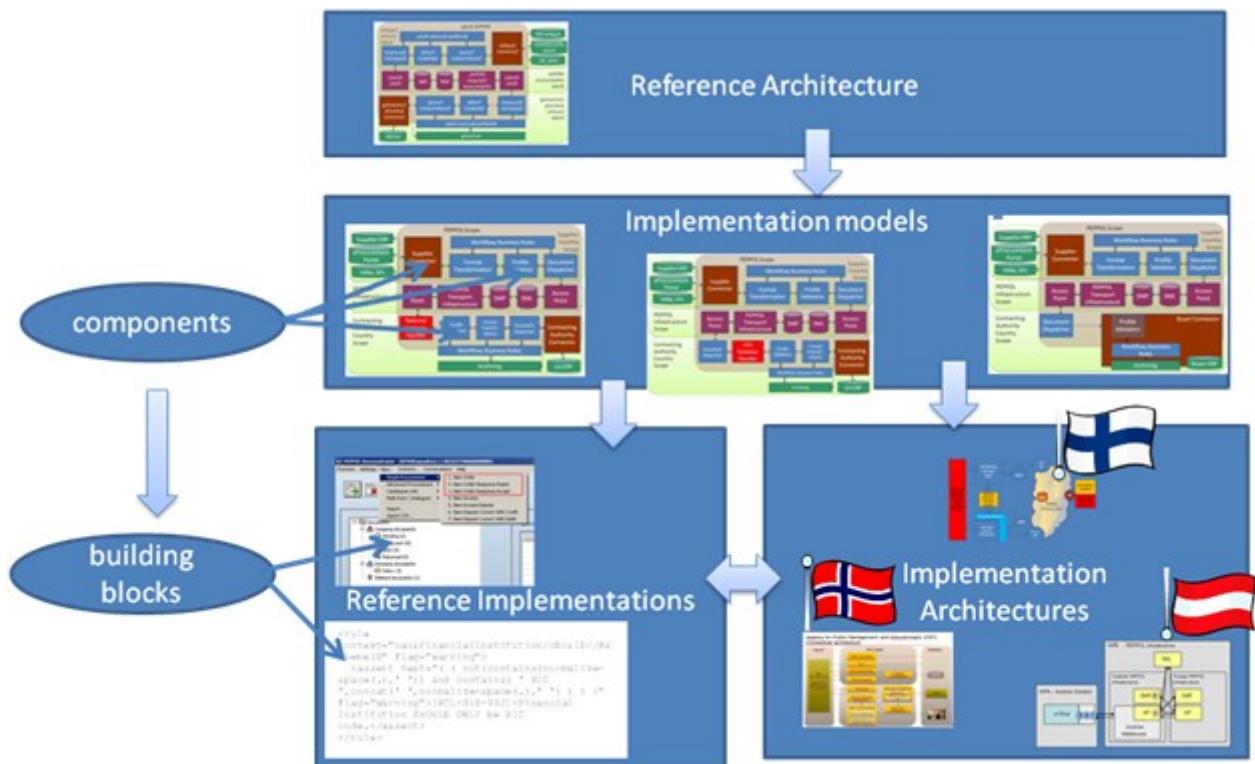


Figure 5: PEPPOL Architectural Concepts

Figure 6 describes how the PEPPOL project is divided into three phases. Each work package follows the processes specified in PEPPOL using a SCRUM based approach (cf. [Schwaber, 2004]).

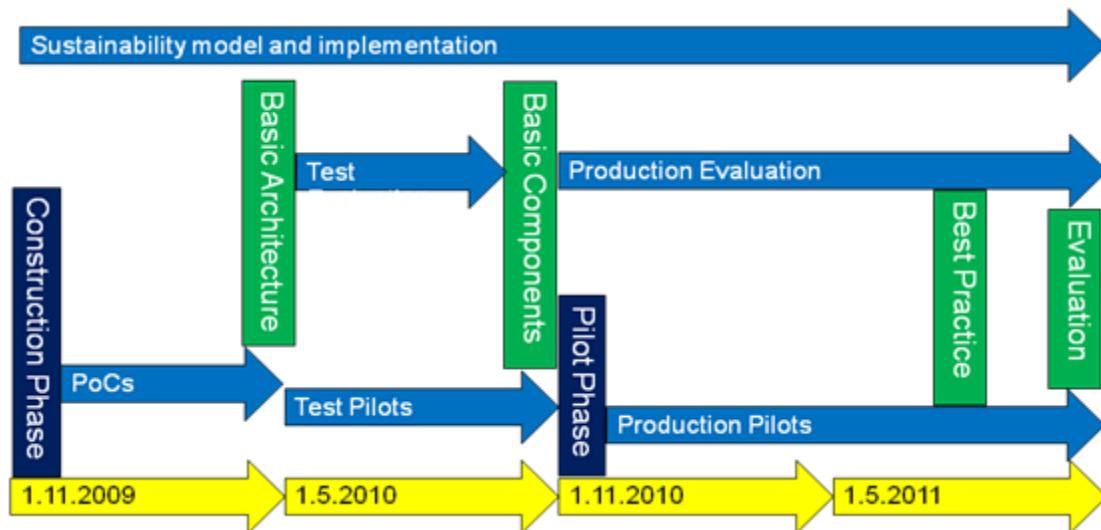


Figure 6: Main PEPPOL Schedule

A SCRUM based approach creates a fast, flexible and agile way of creating specifications and enabling software building blocks through each phase of the project:

- **Proof of Concept Pilot (PoC)** – Simulated operations (artificial participants, artificial data in a closed environment). This phase was mainly for addressing various eProcurement issues on one or more of the interoperability levels of the VCD solutions. The results are documented in deliverable 2.2 as specifications for the VCD solutions.
- **Test Pilots** – Involve actual cases of submitted qualification documents in e-tenders and test the VCD pilot solutions to generate the same results as the tender would have requested. This phase is performed with real test data but it is not operational with real business transactions.
- **Production Pilots** – Involve actual Contracting Authorities and Economic Operators using their actual business applications and actual data (i.e. true operational business transactions). This phase is currently prepared. It is to be mentioned that the VCD pilots are different from post-award pilots as in pre-award, the Economic Operators cannot be known in advance by the Contracting Authorities.

New specifications and software based on new requirements emerging from the Test Pilot and Production Pilot may be produced. These new specifications and software will go through the same cycle of development: PoC Pilot, Test Pilot and Production Pilot within dedicated task forces.

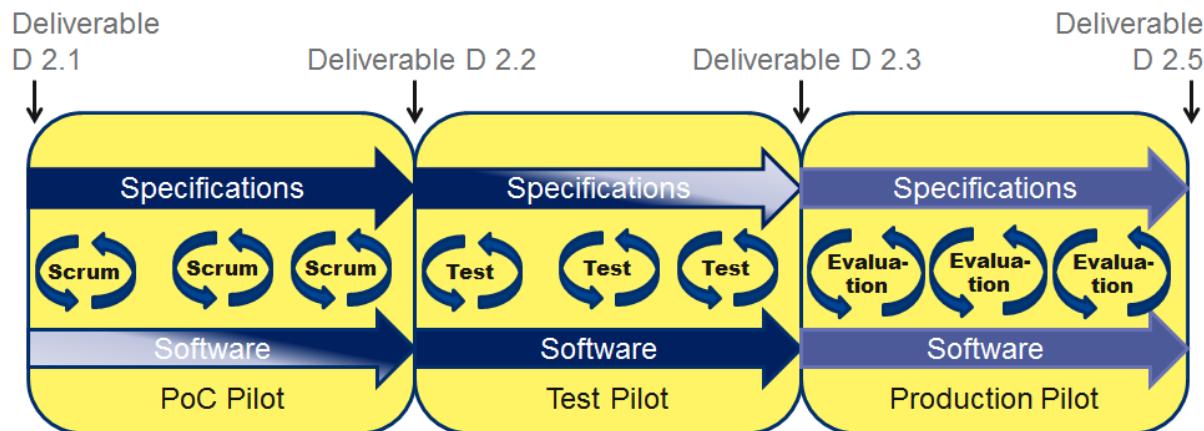


Figure 7: Deliverable Development Approach

As depicted in Figure 7 the adopted SCRUM based methodology together with the overall planning of the project, creates a hybrid, where specifications and software is created in parallel in the PoC phase. This continues into the Test Pilot, where both Software and Specifications are matured towards production. In the Production Pilot, the Specifications and Software is further matured to be scalable and pan-European. The consequence of this approach is that both Specifications and Software will evolve and new releases will be published throughout the project period.

## 4 Virtual Company Dossier: Background and Motivation

### 4.1 Motivation for a Virtual Company Dossier

The effective use of Information and Communication Technology (ICT) to enable interoperability in public procurement is an area of great significance for achieving the Lisbon objectives, i.e. to become the most competitive and dynamic knowledge-based economy in the world (see [Commission of the European Communities, 2005]). However, the current European public eProcurement infrastructure is inappropriate because it is characterized by a high market fragmentation and a lack of interoperability. Hence, a major objective of the European Commission is to enable European-wide eProcurement across borders by creating common principles and technical solutions that are applied within all Member States. eProcurement requires efforts to be done by public administrations, in particular to exploit new technologies for interoperability that enable easy information accessibility, improving the availability of pan-European services and interaction among citizens and businesses [European Dynamics SA, 2004].

Governments are the largest buyer in the European Union which purchase at a level of approximately 15-20% of GDP [Ministerial Declaration, 2005]. Governments are lagging behind major industries in exchanging relevant data with key actors such as suppliers. Common standards for electronic data exchange seem to be a key element for companies to participate in public eProcurement. A European-wide eProcurement infrastructure could save governments up to 5% on expenditure and the transaction costs for both buyers and suppliers could be reduced by 50-80%. A greater competition and efficiency in eProcurement will influence the whole economy and may also play an important role in achieving the Lisbon objectives, e.g. to become the most competitive and dynamic knowledge-based economy in the world [Commission of the European Communities, 2004].

The Manchester ministerial declaration of 24 November 2005 defines the target that [Ministerial Declaration, 2005, p.4]: "By 2010 all public administrations across Europe will have the capability of carrying out 100% of their procurement electronically, where legally permissible, thus creating a fairer and more transparent market for all companies independent of a company's size or location within the single market. By 2010 at least 50% of public procurement above the EU public procurement threshold will be carried out electronically. Over the period 2006-2010 Member States will focus their efforts on delivering those high impact services in Europe which will contribute most to the achievement of the Lisbon Agenda."

It is expected that an interoperable eProcurement infrastructure ensures equal treatment and non-discrimination and that it facilitates fairer and more effective competition in the European market by enabling suppliers to compete in an open and transparent way. However, current eProcurement infrastructures are inappropriate to reach this ambitious aim since these are characterized by a high market fragmentation. A lack of interoperability – different, non-operable and incompatible technical solutions – hinders suppliers in accessing eProcurement systems and discourages their participation cause of additional difficulties or increased costs [Commission Staff Working Document, 08.07.2005].

Across Europe, eProcurement systems have already been developed with a focus on the automation of different eProcurement procedures. Current systems reflect various country-specific public procurement needs and national laws, priorities, and practices. Systems are either centrally oriented or designed to reflect federated systems demands. In addition, varying terminologies are used within the European Member States. The lack of a unified eProcurement terminology is a major barrier which affects the possibility of a smooth collaboration between Member States and their eProcurement systems [Commission of the European Communities, 2004]. Legal, technical and organisational barriers prevent the development of a common Procurement infrastructure and are one of the greatest challenges to be solved by politics, governments, ICT industry and research [European Dynamics SA, 2004].

To facilitate EU-wide interoperability in public eProcurement, the European Commission co-funds the PEPPOL project in the ICT Policy Support Programme within the Competitiveness and Innovation framework Programme (CIP). PEPPOL aims at setting up pan-European pilot solutions that conjointly exist with national infrastructures.

Among the building blocks the PEPPOL consortium develops, the Virtual Company Dossier (VCD) focuses on an interoperable solution which contains the documents required from economic operators to evidence their qualification as well as qualitative selection or exclusion according to the directive 2004/18/EC (see [EC, 2004a]).



## 4.2 Need for a Virtual Company Dossier

A VCD will facilitate electronic Tendering by providing cross-border data and document solution that contains the necessary attestations and certificates typically required in eTendering. Thus it can be seen as a container for documents. Yet up to now, the tendering documents such as attestations and certificates required in public procurement procedures differ between Member States.

When a contracting authority publishes a contract notice, it shall include the criteria of qualitative selection and non-exclusion. The economic operators have to submit evidence and proof in respect of these criteria. Hence, during the preparation of the tender an economic operator needs to collect the respective evidences (i.e. certificates and qualification documents) from a number of issuing bodies (e.g. public registries, banks, pre-qualification bodies, etc.) to prove conformance with the given criteria of qualitative selection and non-exclusion.

The overall aims and expectations of a virtual company dossier solution as set out in the description of work can be described as follows:

1. The VCD will support any authorised entities (economic operator, intermediary, contracting authority or IT service such as an eTendering system) in creating an electronic information package consisting of the required documentation, evidences, proof, attestations, certificates, declarations and other data.
2. In order to create the VCD, an implemented IT system will have to collect certificates and attestations from existing registries. It also enables the economic operator to add self-declarations or to upload other documents of formal qualification.
3. Furthermore, the VCD solution supports economic operators in producing a VCD and in enabling them to submit the required documentation (assembled as an information package) to any contracting authority in Europe.
4. In the same way the VCD as an implemented IT system will enable contracting authorities or their eTendering systems to interpret and accept the documentation submitted and to prove the eligibility of economic operators.
5. Therefore the contracting authority must either specify the documentation that has to be submitted by economic operator or the criteria of qualitative selection and non-exclusion that have to be fulfilled by the economic operator.
6. For all parties (economic operator, intermediary, contracting authority, issuing bodies) it will be of high importance that the VCD Service Providers are trustworthy; this implies that the services are precise, up-to-date, available and reliable.

A major challenge of PEPPOLs' work package 2 is to integrate various stakeholders in the development process and to set up an IT system which supports a common set of evidences based on electronic business certificates and qualification documents that are most frequently required. The criteria must be consistent with directive 2004/18/EC [EC, 2004a]:

- **Article 45 - Personal situation of the candidate or tenderer:** e.g. absence of conviction, bankruptcy, fulfilment of payments of social security contributions or taxes, etc.
- **Article 46 - suitability to pursue a professional activity:** e.g. certificate of registration from the commercial register
- **Article 47 - economic and financial standing:** e.g. balance sheets
- **Article 48 - technical and/or professional ability of economic operators**, e.g. certificates of satisfactory execution of past works
- **Article 49 - quality assurance standards**, e.g. ISO certificates
- **Article 50 - environmental management standards**
- **Article 51 - Additional documentation and information**



Criteria are listed in the Directive and are typically referenced by the contracting authority within the contract notice (CN) or call for tender (CFT). A key aspect in the VCD development is to support a common set of criteria for qualitative selection and exclusion derived from the directive and their fulfillment through evidences. The link between individual evidences and the respective criteria they may approve for (as listed above) must be precisely indicated and mapped in order to support economic operators in their activity.

The VCD supports the use of a common set of attestations according to the VCD structure. Thereby it must be taken into account that some countries do not issue some documents or certificates (e.g. in Italy it is typically requested to provide an anti-mafia certification). This may hinder economic operators to evidence certain criteria. In such cases, economic operators can only provide similar evidences that fulfill the same criteria. These rules of mutual recognition are mentioned in directive 2004/18/EC: Where the country in question does not issue such documents or certificates, or where these do not cover all the cases they may be replaced by a declaration on oath, a solemn declaration, a notary or a competent professional or trade body, in the country of origin or in the country whence that person comes.

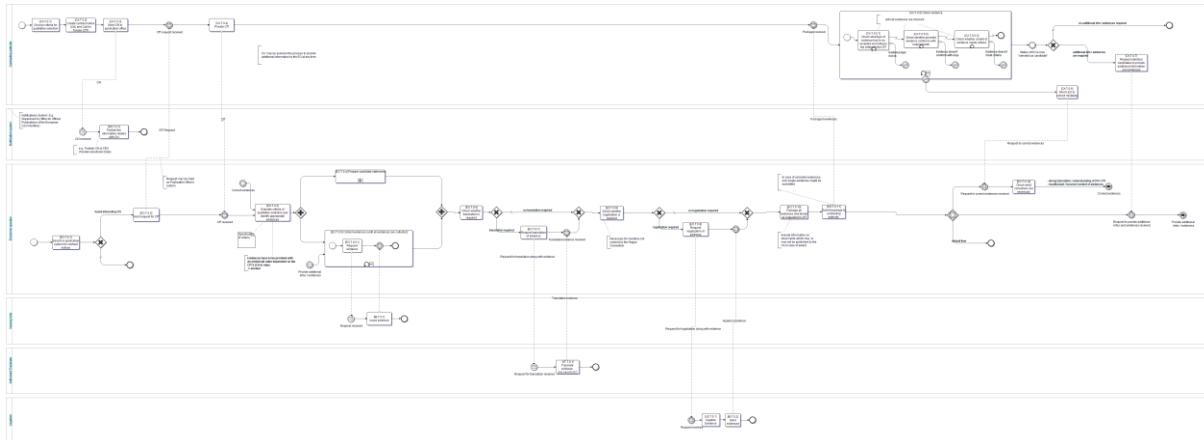
Besides the mapping of criteria and evidences in a respective country, directive 2004/18/EC indicates also the need for accessibility of “Official lists of approved economic operators and certification by bodies established under public or private law” (cf. Article 52). Article 52 indicates a potential solution which may be addressed in the VCD development too. However the overall acceptance of official lists of approved economic operators in cross border scenarios may require further alignment of the regulatory frameworks and a legal effect within the European Member States. Summing up the document handling of different countries, in most countries the management of documents that bear legal validity falls into the general arena of public documents handling - that means: outside the pure procurement context.

### **4.3 Status quo of evidencing criteria of qualitative selection and non-exclusion in generic tendering procedure**

The status quo process concerning tendering and its subparts for qualification of tenderers, observed in the European countries of this work package are depicted in a generic process description. The process models are created using the Business Process Modelling Notation (BPMN) and have been created for the different stages of the VCD (cf. chapter 5.1.1). All tasks referenced in the process models are numbered according to the following structure:

- [Business Partner.Task.Stage.Number].
- Example [EO.T.0.5] refers to [EconomicOperator.Task.Stage0.5]



Figure 8: Detailed process model of the status quo<sup>4</sup>

A Contracting Authority prepares a contract notice and the contract documentation, specifications, descriptive documents, contract documents and conditions, supporting documents and other information, together also referred to as the call for tender (or the invitation to tender in the case of restricted procedures, negotiated procedures with a publication of a contract notice, and the competitive dialogue) [CA.T.0.1; CA.T.0.2].

The contract notice is produced and transmitted to the official gazette such as the Tenders Electronic Daily (TED) when due [CA.T.0.3; NS.T.0.1]. It should be noted that a Contracting Authority who wishes to award a public contract or a framework agreement covered by the scope of Directive 2004/18/EC, inter alia above certain threshold values, the publication in the Official Journal of the European Union (TED) is, with a few exceptions, mandatory in accordance with Article 36 of the Directive.

Contracting Authorities may publish notices of public contracts in accordance with Article 36 which are not subject to the publication requirement laid down in the directive, inter alia below that threshold, or they may use other channels for the contract notice (depending on national legislation; e.g. contract notices may be mandatory in national official gazettes). Also other national tendering platforms can be used by the Contracting Authority. The steps of publishing the contract notice are part of the “eNotification” phase of public procurement.

An Economic Operator can use means such as the TED system, existing tendering platforms or official national gazettes to search for contract notices and to retrieve the relevant information about (active) tenders [EO.T.0.1]. Contract notices shall include the information mentioned in Annex VII A of the Directive, including the selection criteria regarding the personal situation of Economic Operators that may lead to their exclusion, and required information proving that they do not fall within the cases justifying exclusion; selection criteria and information concerning the Economic Operators' personal situation, information and any necessary formalities for assessment of the minimum economic and technical standards required of the Economic Operator, and where applicable, the legal form to be taken by the grouping of Economic Operators to whom the contract is to be awarded [CA.T.0.1].

Contract notices shall be published fully in an official language of the Community as chosen by the CA, this original language version constituting the sole authentic text. A summary of the important elements of each notice shall be published in the other official languages. The mandatory publication of contract notices in TED is a means to ensure transparency for public procurement throughout Europe and to enable a well-functioning single market. For contract notices below threshold, TED can also complement existing national sources through widespread information across borders. Sometimes, the information on a contract notice provided in TED is not complete. Hence, the Economic Operator must directly get the authentic contract no-

<sup>4</sup> A readable Version of this process model can be retrieved from [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Process\_models\_status\_quo

tice and exact conditions from the Contracting Authority (Call for Tender) in order to avoid a failure on interpreting the requirements for participation [EO.T.0.2; CA.T.0.4].

If an Economic Operator decides to participate in a cross border public tender, the appropriate selection and exclusion criteria have to be evaluated [EO.T.0.3]. This means that the Economic Operator has to match these criteria set out in the contract notice of the country the Contracting Authority with the evidences (attestations, candidate statements and certificates) of its own country in order to prove compliance. The evidences can be retrieved from the appropriate issuing bodies such as certifiers, source registers, banks, public authorities, etc. in the country where the Economic Operator is established [EO.T.0.5.; IB.T.0.1] or they have to be issued by the Economic Operator himself [EO.T.0.4]. Criteria to be proven and evidences are affected by various influencing factors such as the legal form of the Economic Operator, the specific structure of the Tenderer (e.g. whether he is part of a consortium or acting as a single tenderer) and of course both – the nationality of the Contracting Authority and the Nationality of the Economic Operator, all together leading to a very complex rule set of how to derive the relevant criteria and the appropriate evidences to prove them.

The step of retrieving these proofs of suitability and non-exclusion and collecting documents for the receiving entities becomes a necessary task and may take place at different times. In some Member States the “self-declaration” (a statement issued by the Economic Operator) is adopted to claim an initial suitability for applying and attending a tender. In this case, Economic Operators may retrieve the evidences only at a later stage if necessary at all.

In most cases an official translation of the documents submitted by the Economic Operator is required [EO.T.0.6; EO.T.0.7]. Some European countries are also imposing the submission of legally attested documents. In this case, accredited official translators, lawyers or notaries have to issue such legally attested translations of evidences [AT.T.0.1].

The following flows of documents have to be considered specifically:

- documents that cannot be generated in the target language by the originating authority;
- documents produced by the Economic Operator such as self-declarations;
- documents that must be accessed by the Contracting Authority from the official source.

The Economic Operator may also be requested to produce legalized documents for countries that are not covered by the Hague convention [EO.T.0.8]. The Hague Convention is overcoming the burden of legalization for public documents. It specifies modalities through which documents can be certified for legal purposes in countries that have signed the convention. Such a certification is called an apostille which is comparable to a notarization [EO.T.0.9; LE.T.0.1; LE.T.0.2]. The apostille is often added to documents. Sometimes two countries have a special treaty concerning the recognition of each other's documents.

Finally, the translated documents are submitted as a package together with the offer to the Contracting Authority [EO.T.0.10; EO.T.0.11]. In some countries, the initial submission covers only the application with a set of self-declarations (two-phased tendering). At a later stage and following an explicit request, the submission of the evidence documents follows. The Contracting Authority checks their compliance with the appropriate (legal) requirements [CA.T.0.5]. The formal legal check of evidence is usually carried out in three separated checks:

- The first check concerns the type of evidence that has to be accepted according to the rules and criteria described in CFT and national legislation [CA.T.0.5.3].
- The second check identifies whether the evidence provided meets the defined requirements [CA.T.0.5.3].
- The third check evaluates the content of the evidence and whether the criteria specified in the CFT [CA.T.0.5.3] are actually met.

The step of submitting evidence (EO) and checking them (CA) might be performed through separated incremental cycles in cases where the evidence provided is formally not compliant, does not conform with the requirements or does not meet the criteria specification. In these cases it has to be corrected and the Econom-



ic Operator will be informed by the Contracting Authority about necessary corrections [CA.T.0.6]. The Economic Operator in turn has to check which corrections are necessary [EO.T.0.12] and might be able to identify appropriate evidence [EO.T.0.3].

If all checks on evidence are done and no errors are identified the status of Economic Operator is changed to a “selected candidate” – depending on the specific procurement process (one-phase or two-phase). Afterward changing the status of the Economic Operator the Contracting Authority can still request additional information and evidences [CA.T.0.7] which then have to be provided by the Economic Operator [EO.T.0.5].PEPPOL Interoperability Approach & Design Strategy.



## 5 VCD - ICT Architecture

The overall aim of PEPPOL Work Package 2 is to provide interoperable solutions for economic operators in any European country to utilize company information already registered somewhere, to assemble this company information into an electronic package and to submit this package electronically to any public sector awarding entity in Europe when these economic operators decide to apply for public contracts.

To achieve this goal, Deliverable 2.1 [D2.1, 2009] provided an analysis, synthesis and assessment of existing company dossier structures of individual Member State countries (AT, DE, IT, NO, etc.) and of other standard specifications. Therewith, it fulfilled the respective goal laid down in the technical annex. The deliverable also described the overall vision of the VCD, which was conceptualised throughout the first phase. Besides that, the legal, organisational and technical requirements for the VCD solution to be implemented were elaborated.

In phase two of the WP 2 activities, the organisational, semantic and technical specifications of the overall VCD concept are realised. The elaborations are based on the status quo report, the insights into existing company dossier structures and the specific VCD requirements as defined in D2.1. Deliverable 2.2 (Specification of architecture and components enabling cross-border VCD, [D2.2, 2010]) embarks on the VCD vision and requirements specified in D 2.1 and further details the VCD overall concept. It implements the second – more detailed – goal expressed in the technical annex, i.e. “consolidating existing solutions with the PEPPOL needs, and develop a technical specification of the VCD (in a standard schema format)”. The activities in phase two are comprised of (a) a consolidation of existing solutions with the PEPPOL needs, (b) a formal technical specification of the VCD concept for pan-European eProcurement and (c) organisational and legal specifications for the pan-European VCD implementation and application. The specifications of the VCD components form the interoperability architecture for cross border VCD, which addresses all interoperability layers in EIF 2.0. The specification of the VCD is mutually agreed upon by the participating partner countries and lead towards the implementation of several components and building blocks.

The components developed for the VCD in phase 3 are described in D2.3. Deliverable 2.3 (Software building blocks enabling cross-border VCD, [D2.3, 2011]) contains a software guideline for the software components and implementations of the specifications from deliverable 2.2. It provides the results of phase 3, which confer mostly to the second work stream (Tool Development) as well as minor revisions to the first two work streams (Specification). Deliverable 2.3 provides a summary of the revisions to specifications of components provided in the previous Deliverable D 2.2 and an overview of the relevant software artefacts that support the PEPPOL WP2 implementations, the integration of the software building blocks. Therefore it provides brief descriptions of the WP 2 building blocks delivered together with this deliverable. Furthermore deliverable 2.3 gives an overview of future implementations of software components to enrich the VCD solution architecture and provides an outlook concerning piloting, further developments and software improvement that will be dealt with in phase 4 of the project.

Deliverable D2.4 (VCD Enterprise Interoperability Architecture) aims to consolidate all results achieved putting them into a uniform context across the different PEPPOL work packages according to the PEPPOL Enterprise Architecture described in chapter 2.3.



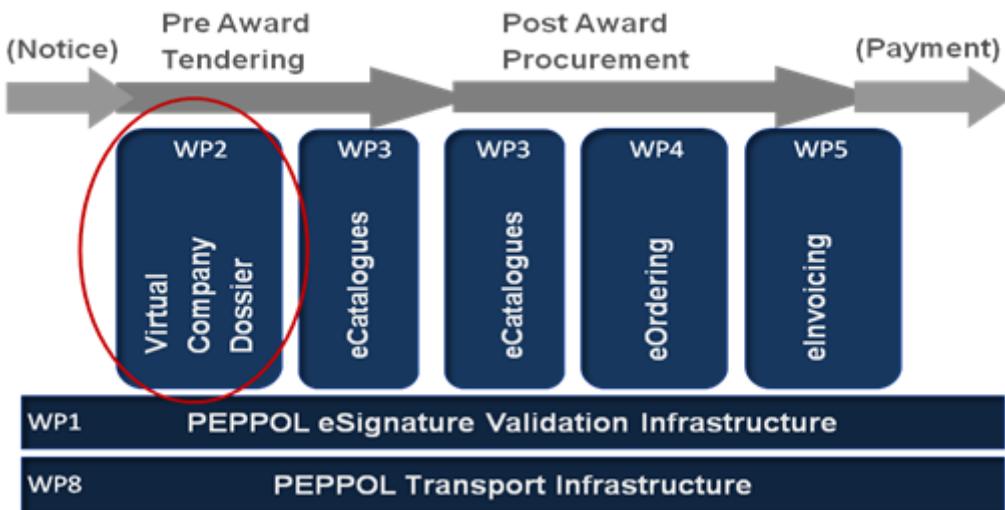


Figure 9: Scoping the VCD within the PEPPOL overall context.

Putting it into the overall PEPPOL context, the VCD addresses the pre-award phase and qualification of tenderers. The VCD specification and pilot implementation form a key building block for pan-European eProcurement through its uniquely described data to be exchanged between tenderers and contracting authorities across Member State countries. The PEPPOL VCD full support solution represents the highly advanced and comprehensive solution for the VCD concept. The main components of this PEPPOL VCD full support solution are described in Figure 10 and explanation below:

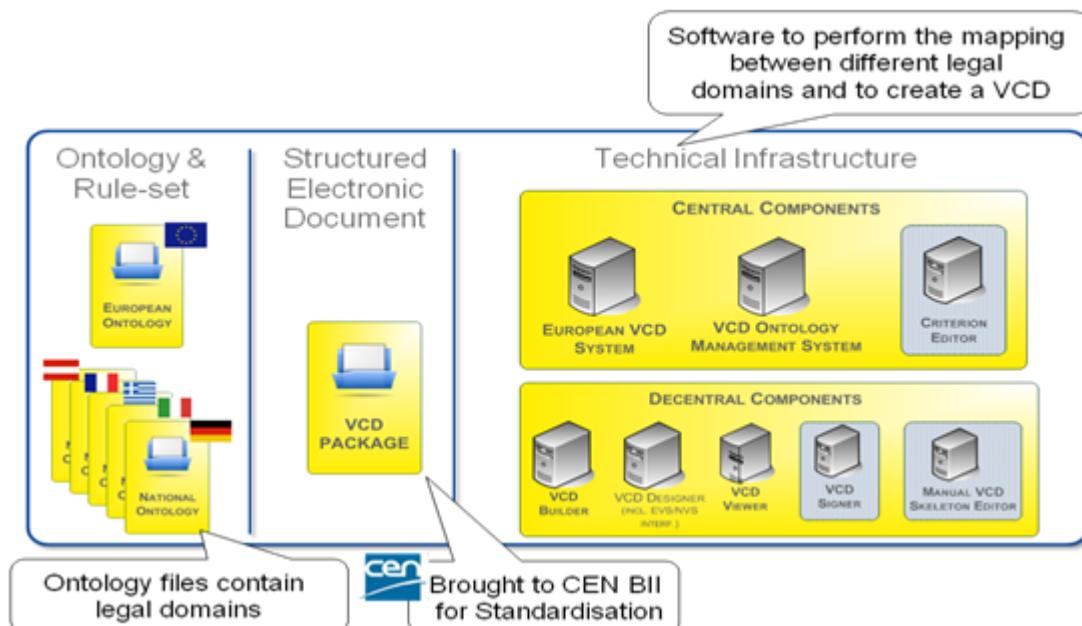


Figure 10: VCD components

- The **ontology and rule-set** represents the knowledge required for the legal mapping between criteria and evidences according to European and national procurement regulations.<sup>5</sup> It contains information about European and national criteria as well as evidences and defines the links between both, i.e. which evidences are sufficient to prove compliance to a given criterion.
- The **European VCD System (EVS)** provides decision support for deriving evidences based on the aforementioned ontologies in order to meet the required criteria defined in Call for Tenders pursuant to the underlying legal rule sets in accordance to European and national procurement legislation. The EVS provides reasoning and makes decision support accessible via system and user interfaces. It provides a tender specific VCD structure (VCD Skeleton Container) to the Economic Operator that can be used to include evidences accordingly. It also provides a service interface to the VCD Designer. The European VCD system is maintained via the **Ontology Management System (OMS)**. Therefore the rule sets of the EVS are represented as machine interpretable ontologies. The OMS provides the editing and management functionality for the different ontologies. The Ontology Management System can be used simultaneously by the different ontology editing teams to keep the legal rule sets up to date.
- The **National VCD System** provides a full range of VCD functionalities to the Economic Operator from the initial selection of criteria (via the VCD Designer) to the finalization of a validated VCD Container (through the VCD Builder). A core functionality of the NVS is to enter data and to upload evidences to a VCD. Depending on implementation architecture decisions, it can be provided as an authorized national service or integrated into existing tendering platforms or used as a stand-alone component. Implementers can use all parts of the NVS reference implementation. The **VCD designer** is a component allowing users to create a VCD Skeleton Container that can be used by the VCD Builder for the creation of the desired VCD. It uses the information about economic operators and their relationship among each other (tenderer structure), the criteria and other relevant information defined in Call for Tenders. It therefore provides an interface to the EVS in order to derive appropriate evidences pursuant to the underlying legal rule sets. Together with the VCD Builder, it can be used in a desktop or web-based NVS environment and is part of the NVS reference implementation. The **VCD Builder** is a web or desktop application allowing users to enter data and to upload evidences according to the VCD skeleton Container. It creates a VCD Package Container and is part of the NVS reference implementation.
- The **VCD Schema** specification, which consists of standardised document and container schema specifications for VCDs, VCD packages and VCD containers that are used by the European VCD System and National VCD Systems at distinct VCD Container production stages.
- The **VCD Viewer**, a component to view and navigate through the content of any VCD Container without having the possibility to edit or change content. This component is dedicated for Economic Operators and Contracting Authorities.

The Economic Operator can send the VCD Container to a Contracting Authority either by using the PEPPOL WP 8 infrastructure or by directly submitting it to a tendering platform or any other means of electronic communication accepted by Contracting Authority.

The **VCD Signer** will provide technical means to digitally sign VCD Packages and the included XML meta-data files according to the XAdES (XML Advanced Electronic Signatures) format. It will provide interfaces so that other components can directly access its functionality.

As not all EU Member States will have their corresponding national rule set defined in the ontology of the European VCD system from the beginning, the “PEPPOL VCD manual editor” supports Economic Operators

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<sup>5</sup> The criteria of qualitative selection are defined in directive 2004/18/EC and have been implemented in national procurement regulations and thus are adjusted to national requirements. Currently, the rule-sets for the five country-specific legal domains and the European legal domain exist (see Figure 10). More information about the legal specifications and mapping is given in chapter 5.3.2.1.



with a **manual VCD skeleton editor** as a simplified quick start solution having no compilation support, but optional some decision support. The Manual VCD Skeleton Editor is a building block that shall support those Economic Operators in creating a VCD Package whose national procurement legislations are not yet part of the European VCD System. In this case Economic Operators have to create the VCD structure with the suitable national evidences manually. The manual VCD Skeleton Editor is specifically aligned with eCertis<sup>6</sup>. Once the manual VCD Skeleton is created, the VCD Builder (stand-alone component) is used to input missing information and documents in order to compile a full VCD Package. In the PEPPOL VCD manual editor solution, the generated VCD Container content has a different quality. The submission of the VCD package to a Contracting Authority is planned to use the same channels as within the PEPPOL VCD full support solution. Likewise, the contracting authority uses the VCD viewer to view and navigate through the VCD Container generated by the VCD editor.

## 5.1 VCD ICT Strategy

### 5.1.1 VCD Vision: Staged maturity model of the VCD

A major point of discussion is a sustainable and reliable long-term vision for exchanging attestations among Member States. In the long-run the VCD should be able to adequately fulfill the contracting authorities' need to prove suitability and non-exclusion of economic operators according to certain criteria while reducing the burden of proof for the economic operator. This requires a paradigm shift towards electronic exchange of evidence and a next generation of attestations and certificates that are currently just barely available in electronic form. The creation of uniform infrastructure in this heterogeneous domain will take some time as several different environments and stakeholders need to be involved, and change may not be enforceable to all of them. In this respect the VCD should support current practices of exchanging evidence in the short run and lead towards smooth, reliable and sustainable exchange of electronic evidences among Member States in the long run.

In order to reach these goals we propose an approach with different stages of maturity that may be applied dependent on the readiness for the individual Member State. The aim is to support basic interoperability and exchange of documents on the lower maturity levels and leading towards direct electronic exchange of evidence in the higher maturity levels. Thereby each maturity level is built upon the lower ones thus allowing integration and step by step advancement.

In the following we will introduce the staged maturity model for the VCD as depicted in Figure 11.

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<sup>6</sup> **eCertis** ([www.ec.europa.eu/marke/ecdertis](http://www.ec.europa.eu/marke/ecdertis)) is a guide to the different documents and certificates frequently requested in procurement procedures across the 27 Member States, two candidate countries (Turkey and Croatia) and the three EEA countries (Iceland, Liechtenstein and Norway). Economic operators that wish to submit a proposal in response to a foreign Call for Tender and Contracting Authorities that have to evaluate a foreign tender are supported by eCertis to understand what information is being requested or provided.



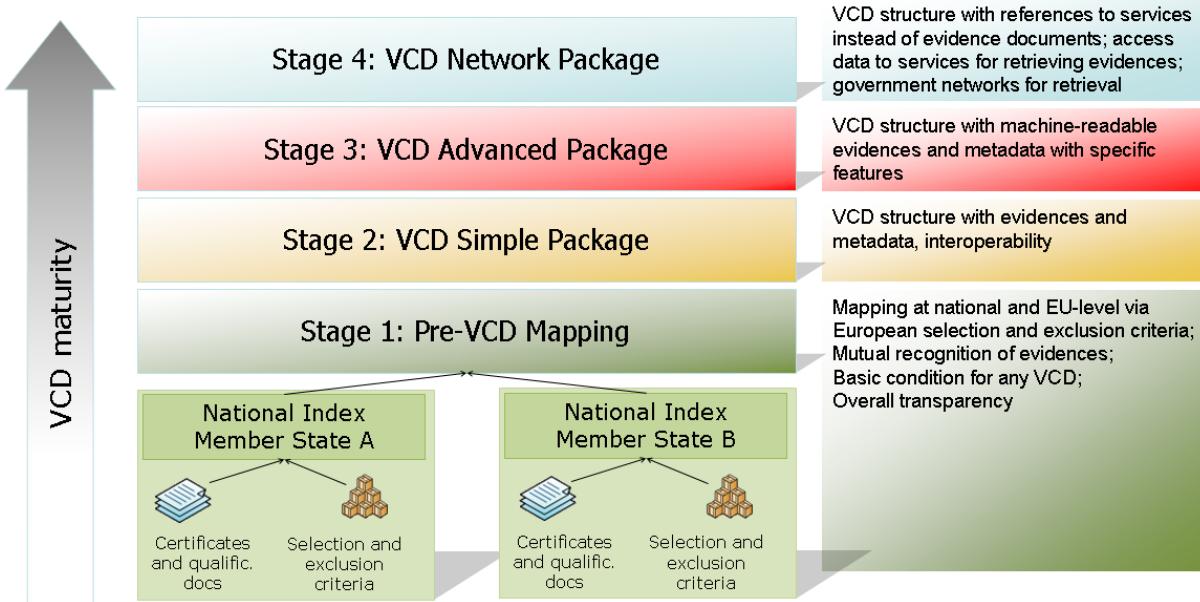


Figure 11: Vision of VCD (staged maturity model)

The stages express different levels of maturity with respect to interoperability. A staged implementation approach is necessary in order to handle the complexity of the domain and to take into account the needs of the Member States. Every Member State should develop a solution that meets the demands of basic interoperability. Basic interoperability can thereby be defined as a state where organizational transparency of cross-border tendering requirements is established (stage 1: pre-VCD mapping tool). The efforts and expenses to develop a solution that ensures basic interoperability ought to be manageable and affordable.

Member States who would like to advance their solution towards a higher level of interoperability can do so by adopting subsequent VCD maturity levels. The VCD specification must be generically and semantically extensible in order to reach a sustainable and fully-fledged solution in the final stage. An eTendering system and a contracting authority must be able to interpret a VCD package assembled by a VCD application regardless of the implementation stage of the VCD application and the eTendering system.

**Stage 1:** In terms of construction and implementation, the VCD may be seen as a solution focusing on the European interoperability on the basis of European/national requirements and legislation. It is therefore necessary to ensure national transparency by gathering national requirements on certificates and qualification documents. The first implementation level is dependent upon these national requirements and will define a basic semantic interoperability model that supports the mutual recognition of certificates and qualification documents (pre-VCD mapping tool).

**Stage 2:** The next step then is to define the structure of a VCD by adding several types of (meta)data into it (e.g. evidences, structural data of the evidences, translations etc.) and to build an application that is able to compile VCDs and enabling economic operators to submit this information electronically to contracting authorities.

**Stage 3:** Includes one of the most critical parts of a VCD which consist of making the evidences contained in a VCD comparable with regard to their contents (context-specific data) to enable automated processing and understanding of its contents across borders (stage 3 – VCD advanced package). Beside this, stage 3 will focus on additional services such as maintaining a VCD or composing a VCD from different economic operators in case of bidding consortia.

**Stage 4:** The VCD networked package will then provide a sophisticated method for changing the overall process from push to pull. A contracting authority will receive a VCD on the basis of stage 2 and 3 (push) but the documents itself will not be submitted anymore. Instead a contracting authority can request those documents on demand from a database (pull) hosted by national service providers of VCD services, or directly from the registration authority. The VCD networked package will provide the basis for further developments towards an electronic exchange of evidence.



The stages follow a generic approach and may be seen as the evolution or development according to an underlying maturity model. Throughout the activities in WP2, some drafts for context specific data and a VCD networked package have been elaborated. The lesson learnt from the discussions is that on one hand it is necessary to establish a structured process in a wider context, which enables cooperation between groups and specific communities on context-specific data in eTendering. On the other hand, this process should start with a detailed investigation of the real needs of contracting authorities, i.e. what exactly are the elements they assess of evidences, and what can be brought up to the level of standardized content. In order to allow a wider community to access these discussions the topic of context-specific data is handed over to the CEN BII workshop 2. Besides the context-specific data, the organisational and legal analyses have resumed from intense investigations that stage 4 – VCD networked package – is at this point in time too complex especially in cross-border scenarios. Hence, it has been put on lower priority and has not been detailed and specified further. Yet, the overall VCD Schema specification does support a stage 4 VCD package.

For a future maturity path of a VCD Service one has to take into consideration the most important points of the vision and the goals of a VCD, which are:

- Compiling a VCD Package is a service supporting Economic Operators and/or Contracting Authorities in procurement procedures
- Future vision means a paradigm shift from handling of documents to the handling of information and the electronic exchange of information in order to establish interoperability on the basis of mutual recognition
- The real benefit could be gained when the VCD Package (which may be seen as a container for documents – structured or unstructured – and additional information) is complete and accurate.

The following preconditions and assumptions that define the context of VCD Services and VCD Packages should be taken into consideration:

- Criteria for qualification and selection are in accordance with the Directives 2004/18/EC (public procurement) [EC, 2004a] and 2004/17/EC (utilities) [EC, 2004b], and are used to map among national requirements.
- Attestations give evidence for the fulfilment of one criterion or more criteria.
- One criterion may require one or more attestations in order to be proved
- Documents may be machine readable (digital copies, unstructured contents) or machine interpretable (structured content, thus can be processed by machines)
- An attestation is made up of one (or more) document(s) including machine interpretable data that describes these attestation (e.g. issuing date)
- VCD can provide direct access to attestation if there is a mandatory rule for it in law.
- VCD systems provide single point of contact to attestations from public sources and information necessary to prove conformance to a given call for tender.
- A VCD Package may be linked to exactly one call for tender thus it is tender specific
- A VCD Package may contain self-declarations and several other documents provided by the economic operator.
- The contracting authority analyses the evidences provided by the economic operator

### 5.1.2 VCD Maturity: Level of Support and Level of Completeness

In accordance to the above mentioned major visions and requirements two important dimensions are to be considered in order to assess the benefits of a VCD Service and a VCD Package: (1) The Level of support and (2) The Level of completeness (cf. Figure 12).



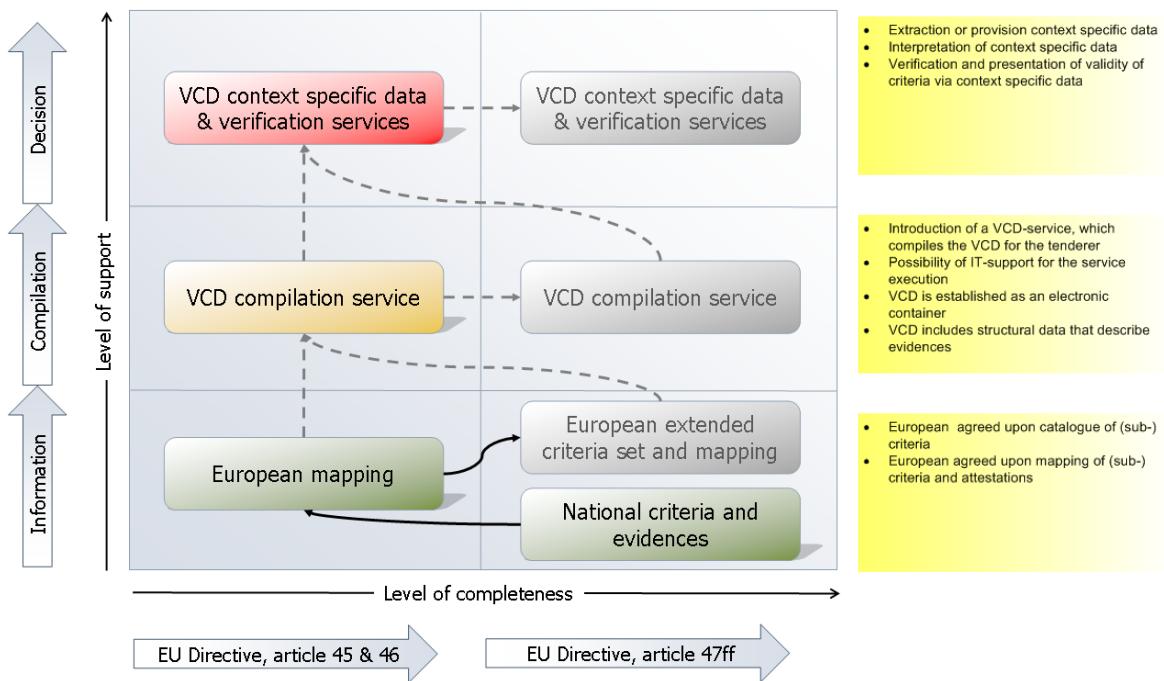


Figure 12: VCD maturity landscape

Presenting these two dimensions in a matrix-chart may give an understanding of possible, pragmatic and practical development paths. The level that will be reached by a Member State and the path to go will depend upon the goals and decisions of each single Member State.

#### *Level of Support given to economic operators and contracting authorities*

The different levels of support address both the maturity of the service and the maturity of the VCD package, where the latter corresponds to the semantic richness of the provided information. On the Peppol/WP2 strategy there is explicit interest to have parallel increments on both sides, assuming that the semantic enrichment of the VCD package requires a corresponding enriched supporting system. This means, the higher the level of support, the higher the interoperability between the Member States (enabled by richer semantics of the information provided in the VCD Package).

**Information Support:** Provides information about criteria and attestations including:

- Which attestations, certificates or statements provide evidence for which criteria (making up the mapping), including the possibility of using self-declarations;
- How (i.e. the service) and from whom (e.g. issuing authority) the evidences are provided. Services can be human beings, organisations as well as IT-services.

On this level of support the VCD rule set is defined as a reference model which is manually or semi-automatically consulted by the economic operator and/or the contracting authority. There are no VCD Services established which compile, validate or deliver VCD-Packages. Information support is fully provided by the European VCD System. It is realised through an ontology and a rule set that maps the European Directive's criteria to national procurement laws and further to evidences available at national level. The mapping also includes the peculiarities on what evidence to provide in a specific case (e.g. if no corresponding evidence exists in a country). Besides that, it provides a first compilation support by generating the VCD package skeleton;

**Compilation Support:** Helps the responsible player (in most cases the economic operator) to compile a VCD Package according to the defined definitions/regulations/rule set/model by means of a specialized VCD Service (not necessarily implying an IT-System):

- The evidences included in the VCD Package are digitally represented, yet the contents can not necessarily be processed by machines;
- The individual evidences are enriched with additional descriptions/metadata (adding structural data of evidence);
- The VCD Package as a whole contains additional metadata, describing the VCD package itself (VCD package data, e.g. compilation date).

On this level of support, the VCD Service can deduce from the provided structural metadata, whether the VCD Package is complete or not and if its evidences are valid or outdated. Compilation support is tackled through the specifications of the national VCD System and the VCD package skeleton.

**Decision Support:** Decision Support enhances the compilation support by processing content- and context-specific data:

- Evidences are provided in a structured and machine interpretable form, at least those that can be easily transformed in such representation;
- The contracting authority may control whether or not the evidences prove the required criteria (as opposed to the level of compilation support, where one only could check if the VCD is complete and the attestations are valid).

On this level of support, ALL necessary information (structural data of evidence and context specific data) of the included evidences are provided and the contracting authority is able to make a decision about the suitability of the economic operator. The European VCD service gives guidance to the economic operator by identifying the evidences that should be provided to prove the criteria laid out in the contract notice of the cross-border tender. The decision support through the ontology provides a qualified support as the peculiarities of e.g. cascading rules, tenderer constellations and structures, evidences specific to peculiar person-types (natural persons, organisations) are taken into account. The European VCD Service therewith provides an interactive means of support to find the right evidences for the given situation complying with the legal conditions in both countries. Hence, the output of the European VCD System is tailored to the specific call for tender issued in country A and a specific tenderer from country B with its individual situation (tenderer constellations and structures). While the decision support for the economic operator is fully realised, the context specific data supporting decision making of contracting authorities is not part of these specifications (reason is the lack of context-specific data specification).

#### *Level of Completeness provided by a VCD solution*

A VCD Package will show its full potential when all the requested evidences (all that are necessary to prove all requested criteria) are contained in it. The range of evidences varies from self-declarations to official attestations or certificates issued by public authorities. From a pragmatic point of view, it seems reasonable to focus on a subset of evidences in a first step and to complete the VCD Package later on. It is also reasonable to define a default package list that has to be provided in most public tenders by economic operators independently of particular criteria mentioned by the "Call for Tender". This would reduce the burden of reading or interpreting the Call for Tender but would increase the need for interpreting other requirements and would not ensure a high level of completeness of a VCD. From these considerations we can derive the following approach:

1. Create a VCD package;
2. Focus on the evidences of criteria according to Articles 45 - 46 in the Directive 2004/18/EC first (see [EC, 2004a]);
3. Create a tender-specific VCD Package through interconnection of VCD and call for tender;
4. Develop possibilities to map and add other documents (self-declarations or statements from banks etc.) needed to proof criteria according to Articles 47 - 50 in the Directive 2004/18/EC later on in order to create a complete VCD-Package.

The concept of level of completeness as detailed in D 2.1 is fully reflected in the VCD concept with regard to the scope of articles and criteria covered. All relevant articles of the EC directive and their corresponding im-



implementations in national public procurement acts are covered within the European VCD system. Thus the coverage of criteria has reached a good level in the VCD solution. In contrast the automatic interconnection of the VCD solution to previous process like the call for tender has not been in focus of WP2 yet.

### 5.1.3 VCD Scope: Criteria of qualitative selection and non-exclusion

The criteria for qualitative selection and non-exclusion as defined in the Directive 2004/18/EC are the common ground for building a cross border VCD service. The figure below shows the relevant criteria as defined in Articles 45-50 as these are regarded the most common ground when mapping any national criteria to the European ones.

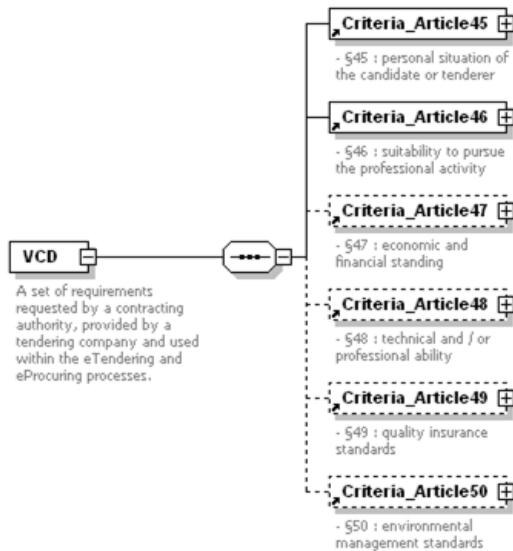


Figure 13: Criteria of qualitative selection and non-exclusion according to directive 2004/18/EC

Mapping evidences to the criteria will be done on sub-criterion group and atomic criterion level since the articles mentioned above can be further split into subsections. The personal situation of a candidate (Article 45) can be for example further described by:

- Sub-criterion group: Personal situation with regard to absence of conviction (sec. 45 §1 and §2 (c, d, g))
- Atomic criteria: has been convicted by final judgment of the participation in a criminal organisation
- Atomic criteria: has been convicted by final judgment of corruption
- Atomic criteria: has been convicted by final judgment of fraud
- Atomic criteria: has been convicted by final judgment of money laundering
- Atomic criteria: has been convicted of an offence concerning his professional conduct by a judgement which has the force of res judicata
- ...
- Sub-criterion group: Personal situation with regard to non-bankruptcy and financial status (sec. 45 §2 (a-b))
- Sub-criterion group: Personal situation with regard compliance with fiscal and social obligations (sec. 45 § 2 (e-f))

A detailed mapping between those criteria mentioned in Articles 45 and 46 will enable a precise comparison between different tender specific requirements within the Member States enabling wide information support for both, economic operators and contracting authorities.

## 5.2 VCD ICT Framework

### 5.2.1 Internal requirements: Analysis of the identified stages of VCD maturity

As described in the VCD > ICT > Strategy the vision for the VCD consists of four different stages (pre-VCD mapping, simple VCD package, advanced VCD package, networked VCD package) that constitute the overall path of development. Within deliverable 2.1 each stage has been further described through several elements that reflect the analysis done and that shall provide the input for the design and specifications of the VCD solutions. The analysis of each stage has taken the following aspects into consideration:

- **Visions statement:** A statement or picture drafting the specific VCD solution or VCD stage in the future. The vision statement is used as framework for the planning process of a VCD solution. Each statement is consolidated by a table summarizing the outcome, the approach, its benefits, efforts and eventual limitations of a stage.
- **Use Case description:** Use case diagrams and associated descriptions show the main actors and functions for a specific VCD solution or stage.
- **Major Features, Requirements and Quality Attributes:** This subsection lists the major features and quality attributes for a specific VCD solution or stage in the form of functional and non-functional requirements according to the use cases identified.
- **Expected Benefits for stakeholders:** This subsection describes the expected benefits according to the use cases identified
- **Scope, Limitations, Assumptions and Dependencies:** This subsection reflects the environment for a VCD solution or stage as well as dependencies with other stages or VCD solutions by defining its scope, limitations, assumptions and dependencies.

### 5.2.2 External requirements: The VCD and the European Interoperability Framework

Interoperability is a major topic being discussed in eGovernment for a while now. Already in 2003, the EC has published a working document, the European Interoperability Framework (EIF), where the authors defined IOP as “*the means by which the interlinking of systems, information and ways of working, whether within or between administrations, nationally or across Europe, or with the enterprise sector, occurs*” (see [IDABC, 2004, pp.6]). The document recalls Interoperability needs on technical, semantic and organizational layer with a rather wide understanding. In late 2008 a draft for a revised European Interoperability Framework was published by IDABC extending the requirement for Interoperability to five levels.

The aim of interrelating the aspects of the VCD to the levels of interoperability within deliverable 2.1 is to draw a picture about the current situation applied in the countries with regard to potentially placement of a VCD in the MS according to the European Interoperability Framework version 2 (EIF2):

- The legal framework thereby refers to appropriate synchronization of the legislation in the cooperating MS so that electronic data originating in any given MS is accorded to proper legal weight and recognition wherever it needs to be used in other MS. This includes rules with regard to tendering, submission and awarding including certificates and attestations that are typically required and their mapping to evidences and exclusion and selection criteria from a legal point of view.
- The organizational framework then refers to the processes by which different organizations such as different public administrations collaborate to achieve their mutually agreed eGovernment service-related goals. This includes best practices for tendering, submission and awarding derived from activities such as stakeholder analysis and stakeholder questionnaires that have been developed.
- The semantic framework ensures that the precise meaning of exchanged information (concepts, organization, services, etc) is preserved and well understood. It includes data aspects of the target so-



lution with regard to common understanding, agreement procedure on shared definition of terms and mapping of evidence.

- The technical framework refers to technical issues involved in linking computer systems and services (interfaces, interconnection services, middleware, data exchange, accessibility, security services, and validation service...). It specifically includes aspects with regard to the PEPPOL infrastructure and for submitting a VCD across borders.

Each layer of the EIF is described by a set of specific requirements that have been found on this layer. Each requirement is described, named and measured and verified against the defined VCD stages in order to prove the feasibility of VCD solutions in the wider context of the EIF. A summary embraces these requirements and provides an introduction to the different layers of the EIF.

### **5.2.3 Business requirements: Elaborating information entities of the VCD**

PEPPOL WP2 and the CEN BII2 workshop have elaborated business requirements about the information entities that scope a VCD data model. The rationales and requirements for business information entities captured inside a VCD data model are described through these business requirements. The business requirements shall capture and document business functions of information entities in order to remove ambiguity and interpretation within the data model. Without having a clear understanding about the reason why a requirement exists, it becomes difficult for the users to understand if they share the requirement.

The documentation of business requirement for the VCD answers the following questions concerning an information entity:

- What is needed?
- Why is it needed?
- When is it needed?
- Who needs it?

The list of business requirements elaborating information entities of the VCD can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA ->ICT Architecture -> PreAward eProcurement -> Framework -> VCD Information Entities Business Requirements 100.

### **5.2.4 Overall concept for the PEPPOL VCD implementation**

Implementing the VCD concept as introduced in this report has cross-border as well as national and/or regional dimensions. Figure 14 depicts the overall concept of the VCD system implementations. As shown in the figure and introduced before, the key technical elements of the VCD implementation are:

- On one hand the European Service Provider, who ensures the functioning of the pre-VCD mapping (stage 1 - mapping tender qualification, selection and non-exclusion criteria of a contracting authority in Country B to the evidences existing for an economic operator in Country A and corresponding to the demands of the contracting authority in Country B);
- On the other hand, the VCD Service Provider in a respective country, who communicates with the European Service Provider for the mapping, and who implements the compilation of a VCD for the economic operator in his/her country (supporting stages 2 – 4 of the VCD concept introduced).



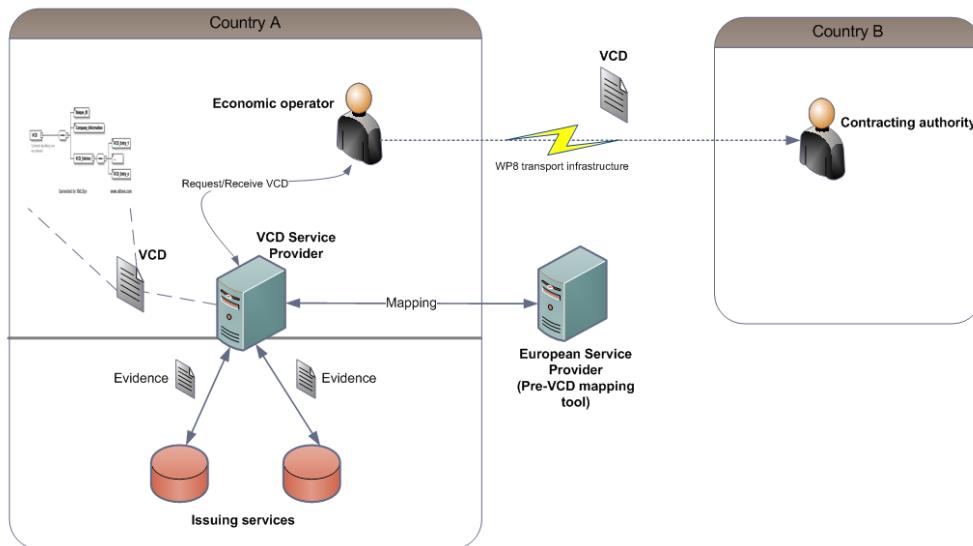


Figure 14: Overall concept for the PEPPOL VCD implementation

The European Service Provider and the VCD Service Provider serve cross-border submission of evidences via the VCD packages (simple / advanced / network). Hence, these implementations are part of PEPPOL WP 2 pilot implementations.

Since the VCD implementation also touches national demands for existing infrastructures to access and retrieve evidences from issuing bodies (see the lower part of Country A in Figure 14), such infrastructures and required identity and access management for accessing local issuing bodies are considered as parts of national infrastructures where PEPPOL will embark on. Hence, individual Member State countries will already have such infrastructures and access mechanisms in place or will have to implement them within national scope. The PEPPOL pilot implementations will give indications of technical implementations at national level and how the PEPPOL pan-European VCD systems may interact and be interconnected with national and/or regional systems of issuing bodies for further rollout of the VCD concept in Europe.

## 5.3 VCD ICT Models

### 5.3.1 Process models and descriptions of the Virtual Company Dossier

The VCD aims to support Economic Operators in collecting evidences via national VCD service providers and to submit them assembled as information packages to any Contracting Authority. Furthermore it aims to support contracting authorities for proving suitability of Economic Operators. The overall process description is shown in Figure 15

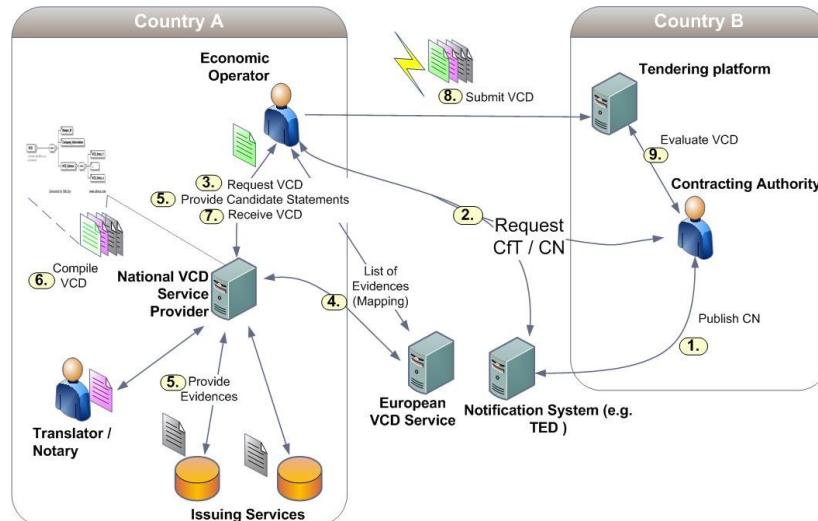


Figure 15: VCD process description

The overall VCD process can be described as follows. A Contracting Authority in country B publishes a contract notice (CN) on notification system (1.) and Economic Operator from country B wishes to participate by requesting the Call for Tender (CFT) and CN (2.). The CN/CFT must specify formal documentation that has to be submitted by Economic Operator or more precisely the criteria of qualitative selection and non-exclusion that have to be fulfilled by the Economic Operator (1.- 2.).

Economic Operators can query the European VCD service for standard criteria on European and national level and map them to related evidences available in their Member states (4.). Accordingly they can create an electronic information package (VCD) consisting of the required evidences for responding to public tenders including attestations, candidate statements and other relevant data (3-5). In order to create the VCD, an implemented IT system at a national VCD service provider will have to collect evidences from existing registries. It also enables the Economic Operator to add candidate statements or other documents of formal qualification (5.).

National VCD service providers enable Economic Operators in compiling a VCD from this (6) which can be submitted to any Contracting Authority in Europe (8.). In the same way the VCD will enable contracting authorities or their e-Tendering systems to interpret and accept the documentation submitted by the Economic Operator (9.). For all parties (Economic Operator, intermediary, Contracting Authority, issuing bodies) it will be of high importance that the VCD Services are trustworthy; this implies that the services are precise, up-to-date, available and reliable.

### 5.3.1.1 Processes related to the European VCD system

As described before, Stage 1 of the PEPPOL VCD framework introduces a European VCD System that provides a semantic interoperability model of European criteria and evidences available in the Member States. The processes related to the European VCD system have been described on the basis of the status quo process model as introduced in chapter 4.3. These process models are created using the Business Process Modelling Notation (BPMN) and have been interconnected to the different stages of the VCD. All tasks referenced in the process models are numbered according to the following structure<sup>7</sup>:

- [Business Partner.Task.Stage.Number].
- Example [EO.T.0.5] refers to [EconomicOperator.Task.Stage0.5]

<sup>7</sup> The process model can be retrieved from [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Process\_models\_stage\_1



Both Contracting Authorities and Economic Operators will be able to use the European VCD System for legal consultancy and usage of commonly defined criteria.

- A Contracting Authority prepares a contract notice and the call for tender outside the PEPPOL WP2 context [CA.T.1.1].
- The Economic Operator uses the European VCD system to define his tenderer structure and his nationality on the one hand and nationality of the Contracting Authority on the other hand.
- The European VCD system uses the legal rule sets from the VCD ontology to render the suggestion for the criteria which the Economic Operator has to approve or to revise having the criteria of the CN/CFT at hand<sup>8</sup>.
- The tool than renders the relevant evidences by using the national rule set of the Economic Operators in the VCD ontology [ESP.T.1.1.1] and presents the results to the user [ESP.T.1.1.2].
- The user has to approve or revise this suggestion.
- Afterwards a VCD Skeleton Container is being delivered to the Economic Operator [ESP.T.1.1.3] or is passed to the (national) VCD System, which,
- Adds relevant data like the evidence documents.

The VCD Skeleton Container is an artefact created by the European VCD system which contains structured and well defined information about the tenderer(s), the Contracting Authority, the call for tender, the relevant criteria and possible evidences for a specific call for tender. The subsequent processes are carried out in the same way as described in the status quo process.

### 5.3.1.2 Processes related to national VCD System

Stage 2 and 3<sup>9</sup> introduce the concept of a national VCD service provider which hosts a VCD System in order to provide Economic Operators with the services necessary to create a full VCD Container. The national VCD service provider operates a system to create VCD Containers. There are two distinct scenarios depending on the level of integration between the European VCD system and national VCD system.

In the first scenario, Economic Operators request support from the national VCD System having the necessary CFT/CN at hand. The national VCD System has to forward the request from the Economic Operator to interact with the European VCD System [NSP.T.2.1] in order to retrieve a VCD Skeleton Container as described in the previous section. When the national VCD System receives a VCD Skeleton Container it decides which evidences can be retrieved from the issuing bodies through direct interfaces [NSP.T.2.3.1]. In this scenario the national VCD System acts as single point of contact for the Economic Operator or the requester and issuing bodies create requested evidences [IB.T.2.1.1] and sent them back to the national VCD System [IB.T.2.1.4]. Also the national VCD System will send a list of evidences to the Economic Operator that cannot be directly retrieved or that have to be issued by the Economic Operator himself [NSP.T.2.2].

In the second scenario the Economic Operator uses the functionality of the European VCD system directly to create and receive a VCD skeleton Container first. Then he submits/uploads this container as input to the national VCD system. The remaining process is the same as in the first scenario.

<sup>8</sup> The Economic Operator may alter the recommendations made by the European VCD System. He may not understand the recommendations made by the tool or he has the opinion that some evidences are not necessary according to their own legal advice. If this is the case he should ask for clarification to the Contracting Authority at any time

<sup>9</sup> The process model can be retrieved from [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Process\_models\_stage\_2\_and\_3



Stage 3 also introduces the concept of context specific data. Context specific data are being collected at several points according to the national model applied and on dependence of the type of evidence. Usually they should be directly provided by the issuing body [IB.T.2.1.2]. Alternatively they are either being filled into the VCD by the Economic Operator [EO.T.2.6] or they are being extracted by the national VCD System [NSP.T.2.4] which may leads to different levels of trust. When the national VCD System has received necessary translations and legalized evidences the national VCD system will be able to compile the entire VCD container [NSP.T.2.5] and provided it to the Economic Operator [NSP.T.2.6]. Subsequent processes are carried out in accordance to the stage 1 and status quo process description.

### 5.3.1.3 Challenges of the VCD networked package in PEPPOL

Stage 4 introduces a set of ideas and possibilities how further value can be added to a Virtual Company Dossier. The key idea of Stage 4 is to create a network for the VCD that allows retrieving attestations in a more flexible way. Potentially a direct exchange from issuing bodies to Contracting Authorities could therefore be implemented. The Virtual Company Dossier then consists of some references to issuing services which mandate a Contracting Authority to obtain information directly, e.g. as a predefined query to the specific evidence.

Our analysis has brought up some challenges when applying the VCD networked package in cross border scenarios<sup>10</sup>. Obviously the biggest challenge is the creation of translations, legalization and context specific data at the time of awarding. The Contracting Authority requires the availability of the entire documentation at the time of awarding in order to perform the necessary checks. Overall the scenario of a VCD networked package seems to raise the complexity and costs dramatically while having limited perspective to create an added value for the actors involved. WP2 may further elaborate a scenario of a VCD networked package however this will not be the major focus for implementation as currently there are only some partners involved that wish to implement such functionally.

### 5.3.2 Legal concepts and specifications of the Virtual Company Dossier

The specifications that define the legal scope of the VCD system are elaborated in Deliverable 2.2. Most of the legal specifications relate to the European VCD service in particular the legal conditions enabling these. Therefore general principles are introduced such as the principle of mutual recognition. Also this section introduces the legally specified mapping mechanism. Therefore WP2 has developed a mapping template to collect the national inputs for the European VCD service in consistent manner. The mapping template is introduced as well as conformance and adaptability requirements that have to be considered when carrying out tests on the European VCD system. Furthermore the legal specifications address trust and confidence in the European VCD Service which is considered from legal viewpoints in order to ensure adoption and reliability of the European VCD service. The last section finally analysis legal condition with regard to validity of documents, requirements on copy and translation quality. The following list shows the major aspects that have been targeted at in the legal specifications:

- Mutual Recognition
- Substitution Rules for Evidences
- Categories of evidence and substitution levels
- Conformance and adaptability of mapping
- Addressing Trust and Confidences
- Legal validity of documents
- Prove of eligibility with regard to legal persons and natural persons

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<sup>10</sup> The full description about challenges with regard to the VCD networked package can be found in Deliverable 2.2: Specification of architecture and components enabling cross-border VCD [D2.2, 2010].



### 5.3.2.1 Legally specified mapping template mechanism

In order to define the national input for the European VCD Service, WP2 has developed a mapping template. The template reflects rules and principles with regard to mapping between criteria at European and National levels and the corresponding evidences that prove these criteria. The mapping template follows the structure indicated in the following figure.

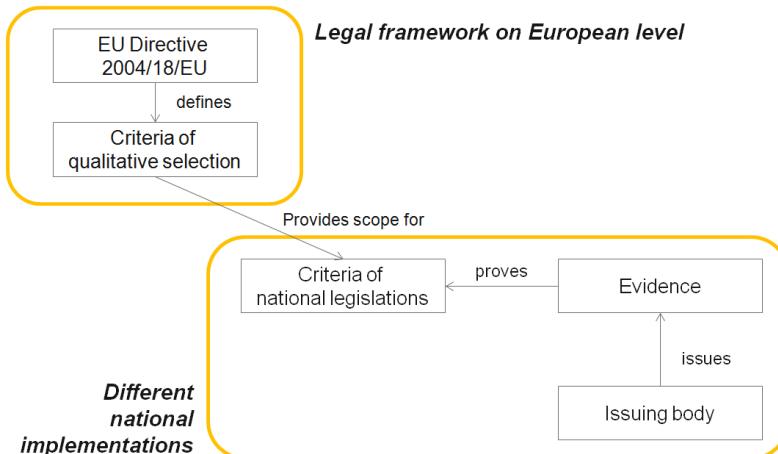


Figure 16: Mapping between different Member State regulations

The specification of the mapping template describes the way how the template is designed and how the national inputs can be defined accordingly. When filling in the template the focus should be set on the majority of cases which hold true for a general legal proof. The mapping template is based upon the European legislation which will be interlinked to the national public procurement domains. For every domain we suppose to get a representation of a national index which provides an overview of national criteria demanded in public procurement, and how these are evidenced (i.e. which attestations and/or statements provide what evidence). In this respect, the European criteria of qualitative selection and non-exclusion criteria, which are derived from the European Directive 2004/18/EC, can be considered the reference criteria, while the national criteria which are the basis for individual public tenders in respective countries are considered the local criteria. No new legal rules will be created by the mapping procedure. The mapping is solely based on the existing national and European legal framework.

The mapping of criteria and linking to evidences are a comprehensive legal supporting system which can be used according to the requirements described in a call for tender. The interpretation of the Call for Tender (CfT) with regards to criteria is the Economic Operator's responsibility.

The mapping templates for the different countries can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Legal\_Specifications -> Mapping table

### 5.3.2.2 Terms and Conditions of the European VCD service

The terms and conditions of the European service are rules which pilot participants must agree to in order to use a service. The terms and conditions are legally binding and have to be accepted as part of the registration process for the European VCD service. The terms and conditions of the European VCD service reflect the following elements:

- Introduction
- Parties
- Services
- Acceptance of Terms
- Proprietary rights
- Data protection



- Charges
- Termination
- Disclaimer/Liability
- Force Majeure
- Changes to the terms and conditions
- Jurisdiction/Governing Law

The terms and conditions can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA ->ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Legal\_Specifications -> VCD Terms and Conditions

### 5.3.3 Reference Implementations of the Virtual Company Dossier

PEPPOL also provides Reference Implementations (see [Curren, 2003]) of the Virtual Company Dossier specifications that...

- ...have been developed concurrently with the specification
- ...verify that specification is implementable (proving the concepts)
- ...enable testing
- ...serve as reference against which other implementations can be measured
- ...help to clarify the intent of the specifications

As such they implement the PEPPOL specifications with enough functionality to support test pilots but are not intended to be for production use. Reference Implementations are also provided to the IT industry for incorporation into their own platforms and systems and provide the embryo of open source tools that the PEPPOL user community can adopt and evolve over time.

The overall architecture describes the roles of the national VCD System and the European VCD System as well as the four interaction-scenarios possible between these components. Successively, the high level components of the National VCD System and the European VCD System are introduced from a functional perspective.

The **European VCD System** as a centralised system is responsible for deriving the proper evidences for an Economic Operator in a specific tenderer situation, taking into account the role of the Economic Operator within the tenderer setting (e.g. a consortium), his legal form and his national legal framework as well as the national legal framework of the Contracting Authority. The European Service Provider is performing reasoning tasks and is delivering the information about the appropriate Criteria and Evidences in form of a VCD Skeleton Container either to the Economic Operator or directly via System Interface to the National Service Provider. The European VCD System is a “virtual” System within the Austrian National System and is operated by PEPPOL.AT during the course of the project.

The **National VCD System**, operated by an VCD Service Providers in a Member State individually, is supplementing the information the European VCD System provides, by adding the Evidence Documents and further Evidence relevant Data from the (national) Evidence Issuing Bodies, resp. Services, is creating a VCD Container and is delivering it to the Economic Operator. There are two possible ways, how the National VCD System is involved:

- 1) Either it is acting as the single point of contact for the Economic Operator and exchanges the relevant data with the European VCD System (VCD Pre-Skeleton Container to the European VCD System and VCD Skeleton Container from the European VCD System) via a service interface (full integration scenario), or



- 2) the Economic Operator acts as a “data bridge” between the two Systems, calling first the European VCD System and then (manually) calling the National VCD System with the VCD Skeleton Container assembled by the European VCD System as input.

The **VCD Viewer** is an autonomous tool to view the final VCD Container. Alternatively, the VCD Systems (like the national VCD System) also provide means of showing the data included in the VCD.

For Economic Operators from Member States who do not have a National VCD System established and/or do not have their national ontology included in the overall Ontology (and therefore in the European VCD System), a **manual VCD skeleton editor** as a low level XML-Editor is offered. When using the VCD Editor, all missing data has to be filled in manually by the Economic Operator. If there is no national Ontology in place, no information and decision support as well as assembly support can be provided. The Economic Operator has to intellectually derive the needed Evidences and collect them manually. The manual VCD skeleton Editor serves as a first entrance point for those countries, which have not reached PEPPOL compliance yet.

To sum it up, four high level scenarios are supported by the VCD Systems, showing descending System Support for the Economic Operator:

Scenario	Description
1) Interaction Scenario 1: Fully automated Interaction between European VCD System and National VCD System	The Economic Operator is interacting with the National VCD System as a single point of contact, which in turn calls the European VCD System via service interface and supplements the data to a full VCD Container.
2) Interaction Scenario 2: Interaction between European VCD System and National VCD System via Economic Operator	The Economic Operator is interacting with both Systems, acting as a data-bridge between them.
3) Interaction Scenario 3: Semi manual VCD Assembly by the Economic Operator (only European VCD System)	The Economic Operator is calling the European VCD System and is filling in the Evidence data and Documents into the VCD Container manually using the VCD Editor without further support.
4) Interaction Scenario 4: Fully manual VCD assembly by the Economic Operator	The Economic Operator has no decision and information support at all and is filling in all data manually using the manual VCD skeleton Editor

Table 1: High level scenarios of the VCD reference implementation.

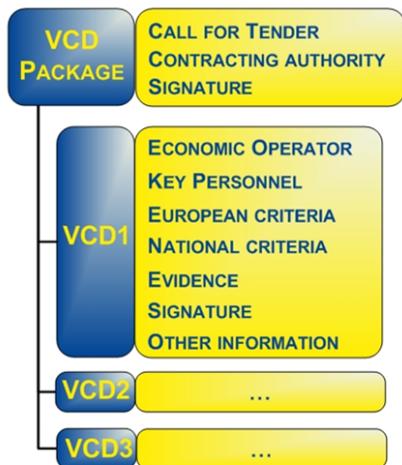
The reference implementation is focussing on the overall technical concept of the VCD by describing the general VCD architecture and four high level scenarios that show different implementation opportunities. Deliverable 2.2 provides a further insight into the interaction steps of the four scenarios by describing the relevant process steps of each interaction in the form of rich pictures and sequence diagrams.

### 5.3.4 Data model Specification of the Virtual Company Dossier

Core component of the VCD system is a document structure functioning as an electronic record for carrying and submitting evidences in the course of a tendering procedure. Although built to support both national and international procurements, it is specifically designed to cover requirements evolving from a transnational dimension. The VCD system utilizes qualitative selection criteria requested in Call for Tenders for suggesting the most suitable kind of evidences to Economic Operators. Economic Operators are enabled to bundle rele-



vant information together and submit this information to the Contracting Authority. The figure below describes a conceptual view of the VCD data model.



A VCD (Package) provides information about the:

- Contracting Authority and the relevant Call for Tender,
- Economic Operator or consortium responding to the Call for Tender,
- key personnel of the Economic Operators (e.g. authorized representatives),
- evidences and files included (e.g. Attestation, translation or legalizations),
- references to competent issuing bodies,
- references to qualitative selection criteria that have been requested in Call for Tenders according to European and national regulations and procurement acts.

Figure 17: Conceptual view of the VCD data model

A VCD Package is specifically designed for a Call for Tender and Contracting Authority. In contrast, each VCD is Economic Operator specific and contains relevant information about the Economic Operator and his qualifications. Qualifications are interconnected to the criteria of qualitative selection which are requested by the Contracting Authority. In case of bidding consortium, the VCD package bundles several VCDs together.

According to the creation of a VCD Package with the involvement of the European VCD System, in particular the invocation of the EVS interface (see chapter 5.3.5), several VCD Skeleton types exist, namely T-, TC- and TCE-Skeleton. Each of them is a subset of a full VCD Package. Information about the Economic Operators (so called tenderer (T)), requested criteria (C) and information about suitable evidences (E) are included in a stepwise process. By inputting concrete evidence documents, a VCD Skeleton becomes a full VCD, several VCDs of different Economic Operators then comprise a full VCD Package that is delivered as a ZIP file, the so called VCD Container.

Specifications and results of PEPPOL are coordinated with the CEN ISSS BII 2 (BII 2) workshop<sup>11</sup>. The objectives of the workshop are to provide a basic framework for technical interoperability in pan-European electronic transactions, expressed as a set of technical specifications that cross-refer to relevant activities, and in particular are compatible with UN/CEFACT - in order to ensure global interoperability. The workshop is focusing on implementation facilitations and coordinating pilots that implement the technical specifications. The requirements and final specifications of CEN ISSS BII 2 are input into UN/CEFACT.

The schema specification consists of the parts which are introduced in the following subsections.

#### 5.3.4.1 VCD package data model

The VCD Package can be considered as an envelope. It holds common information related to a certain call for tender which are valid for all economic operators involved in the application for that call. The VCD package contains for example an identifier of the respective call for tender and the structure of the tenderer or the bidding consortium. The tenderer structure as depicted in the data model allows for complex bidding consor-

<sup>11</sup> A main purpose of the CEN BII 2 workshop is to establish a forum by providing technical support for adopters and implementers, providing a forum for governance, life cycle management and further refinements of the CWA published by CEN WS/BII and contributing to coordination and harmonization amongst European initiatives addressing various aspects of e-procurement. Please visit <http://spec2.cenbii.eu/>



tia setups including subcontracting. Each tenderer structure element listed in the VCD package contains a reference to a VCD of an economic operator.

The specification of the VCD Package Data Model used in a VCD Package and VCD is available in ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Data\_Model -> VCD Data Model Spreadsheat.

The VCD Package data model heavily utilizes the Universal Business Language (UBL)<sup>12</sup> for the precise and standard conform definition of the various elements. Only those VCD Concepts which are not reflected appropriately in UBL are specified separately.

#### **5.3.4.2 VCD data model**

Each VCD is economic operator specific but it may be re-used in further VCD Packages. Thus it additionally includes information on the economic operator and information on relevant key personnel at the economic operator's organisation. Besides this direct information on the economic operator, the VCD carries references on different kinds of documents. Within the VCD data model, evidences and other documents are differentiated. Both are not regarded as a single document but as a group of documents. Such group of documents typically consists of a core document and supplementing documents. A typical example for a supplementing document would be a translations or notarization.

Each single document is represented as document reference. It is composed of information like issuing date and time. Additionally the physical document files are referenced by a URL pointing to a location relative to the VCD or an absolute URL pointing to some location outside the VCD Container.

Evidences prove one or more criteria of qualitative selection and non-exclusion. Criteria are also related to the economic operators' VCD or one or more relevant VCD persons. Each criterion in the data model references respective criteria of the contracting authorities' national legislation, the economic operators' national legislation and the legislation on the European level.

The specification of the VCD Package Data Model used in a VCD Package and VCD is available in [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA ->ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Data\_Model -> VCD Data Model Spreadsheat.

The VCD data model heavily utilizes UBL for the precise and standard conform definition of the various elements. Only those VCD Concepts which are not reflected appropriately in UBL are specified separately.

#### **5.3.4.3 VCD Container format: physical structure and intra-container naming**

A VCD Package is delivered as a zip file, the so called VCD Container. The VCD Container format specifies the physical structure of a VCD Container as well as the naming of files and folders that are referenced inside a VCD Package or VCD. In particular, it defines

- the structure of a VCD Container, i.e. a VCD Package delivered as a zip file,
- the folder structure of a VCD Package that is present in a VCD Container,
- folder naming of VCD Package folders and VCD folders,
- file naming of VCD Container, VCD Package(XML), VCDs(XML) and document files,
- referencing VCDs from a VCD Package,
- referencing files from VCD Package meta-data files and VCD meta-data files and
- internal references inside a VCD

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<sup>12</sup> Universal Business Language (UBL) is a library of standard electronic XML business documents such as purchase orders and invoices. UBL was developed by an OASIS Technical Committee with participation from a variety of industry data standards organizations. UBL is designed to plug directly into existing business, legal, auditing, and records management practices. For more information please visit <http://UBL.XML.ORG/>



The full specification of the VCD container format can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA ->ICT Architecture -> PreAward eProcurement -> Models -> VCD\_Container\_Structure

#### 5.3.4.4 Code lists

Regarding the elements of the data model that require controlled vocabularies of allowed values, D2.2 already specified the use of code lists. WP2 has started to define a set of code lists using spread sheets to define and maintain values and different translations for every code list. Some of them rely on existing standards, such as ISO 3166-1<sup>13</sup> for country codes; others require values internally defined by WP2, such as ValidateResultCode. To provide these code lists in a machine readable format that can be used by the WP2 software components, the genericode format<sup>14</sup> is used.

### 5.3.5 High level components of the European VCD system

Figure 18 shows the high level components of the European VCD System from a functional perspective.

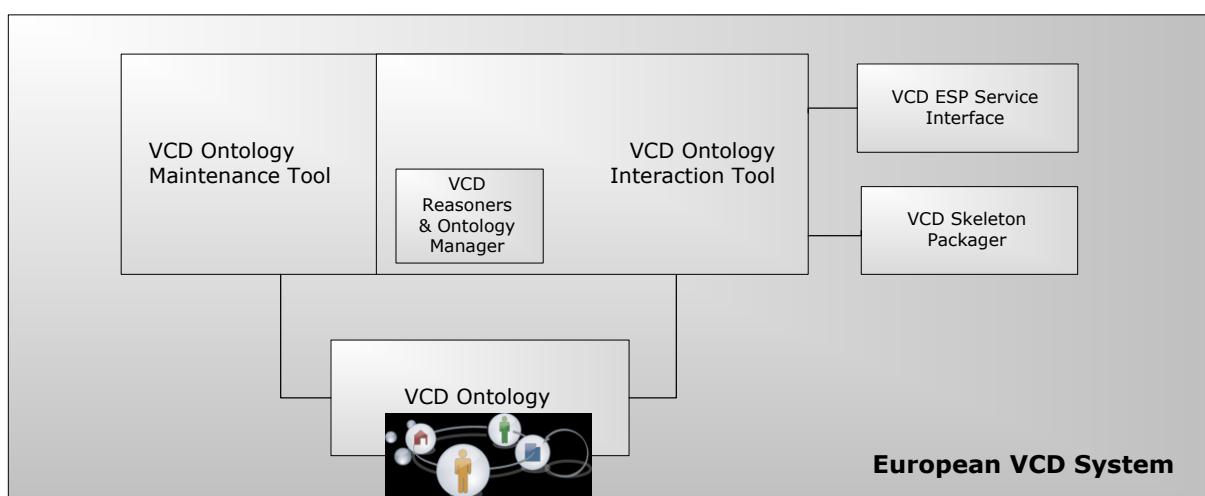


Figure 18: High level components of the European VCD System

#### VCD Ontology Interaction Tool and VCD Skeleton Packager

The system parts of the European VCD System, which have been already briefly described in the previous chapter, are grouped together into a high level component “VCD Ontology Interaction Tool”. This component is responsible for interacting with the National VCD Systems and the Economic Operator during the process of VCD Container creation and is in charge of calculating the proper Evidences according to the specific instance. For creating the VCD Skeleton Container the VCD Ontology Interaction Tool makes use of the VCD Skeleton Packager.

#### VCD Ontology Maintenance Tool

<sup>13</sup> [http://www.iso.org/iso/english\\_country\\_names\\_and\\_code\\_elements](http://www.iso.org/iso/english_country_names_and_code_elements)

<sup>14</sup> [http://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=codelist](http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=codelist)



The VCD Ontology Maintenance Tool provides functionality to keep the Ontology up to date on a national and international level. It includes a user interface for Ontology maintenance as well as a system interface to integrate ontology parts, which have been changed by external systems (e.g. National VCD Systems).

### **VCD Ontology**

The VCD Ontology (represented in the standardized language OWL-DL) is the machine interpretable formalization of the rule sets of the Member States as well as the common European concepts. The Ontology is the ground base for the VCD Ontology Interaction Tool as well as the VCD Ontology Maintenance Tool. The VCD Ontology as well as the Reasoning Services and the reasoning process are described in detail later in this document.

### **VCD Reasoners and Ontology Manager**

The functionality for the management of the ontology and its contained data is provided by the component VCD Ontology Manager. The Reasoners are deriving new out of existing data according to their underlying rules etc. Both, the VCD Ontology Interaction Tool and the Ontology Maintenance Tool utilize this component bundle.

### **VCD User Interface**

Similar to the VCD Reasoners and Ontology Manager, the VCD User Interface provides functionality for the VCD Ontology Interaction Tool as well as the Ontology Maintenance Tool. This subcomponent generates and provides the appropriate GUI for the given tasks, directly building upon the Ontology.

### **VCD Skeleton Packager**

For creating the VCD Skeleton Container the VCD Ontology Interaction Tool makes use of the VCD Skeleton Packager. This component creates a VCD Skeleton Package according to the agreed upon XML Schema including for example the selected qualification criteria and suitable evidences to be delivered by an Economic Operator.

### **VCD ESP Service Interface**

The VCD ESP Service Interface provides functionality for the National VCD System to interact with the European VCD System. The relevant data provided by the Economic Operator is passed from the National VCD System via a VCD Pre-Skeleton Container to the European VCD System. There the possible evidences are derived and packed and an enriched container (VCD Skeleton Container) is passed back to the National VCD System via this Service-Interface. It also provides some initial ideas for a TED interface that could be used as a bridge.

According to the interaction between the National VCD System and the European VCD System via this ESP Service interface taking place during the generation of a VCD Skeleton, three pre-VCD Skeleton types exist. For each, a sub-schema has been derived from the common base VCD schema, according to the stages of this interaction (see Figure 19).



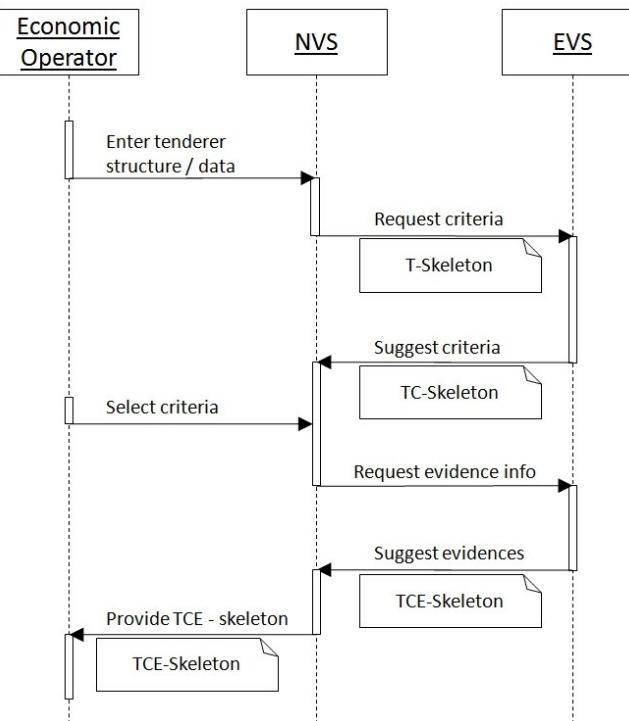


Figure 19: NVS/EVS interaction

In the first step, the Economic Operator provides information about the tenderer structure (i.e. different Economic Operators preparing a specific tender and their relationships such as main contractors as sub-contractors). In the next two steps, the EVS provides information about the criteria as well as suitable evidences by performing the criteria-evidence-mapping. This leads to the following Pre-VCD Skeleton types:

1. T-Skeleton: Skeleton only containing information about the tendering Economic Operators (T = Tenderer).
2. TC-Skeleton: A T-Skeleton enriched with information about the criteria, for which Economic Operators have to provide suitable evidences. This information is derived by the EVS based on the information about the nationality of each tenderer as well as their relationship among each other (main contractor, sub-contractor).
3. TCE-Skeleton: A TC-Skeleton enriched with information about the evidences that each of the Economic Operators has to provide. This information is derived by the EVS with respect to the different nationalities of Economic Operators and requested criteria.

#### 5.3.5.1 Use cases and other UML representations of the European VCD system

Attachment C of Deliverable 2.2<sup>15</sup> provides an overview over the main use-cases and functions of the European VCD system including non-functional aspects. It specifies relevant aspects of the VCD ontology maintenance tool through use case descriptions and provides in depth specifications of the European VCD system and its core functions. Each use case is thereby described through a use case diagram, an activity diagram and a table summarising major aspects of each use case. Furthermore it provides an overview

<sup>15</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT\_Architecture -> PreAward eProcurement -> Models -> European VCD system Specification\_101

about the VCD skeleton packager including mock-ups describing an initial graphical user interface for the VCD skeleton packager. It also provides an outlook for a potential TED interface that could be implemented in order to enable contracting authorities to publish criteria of qualitative selection and non-exclusion in a standardized format.

### 5.3.5.2 PEPPOL VCD Ontology and Reasoning Specification

The PEPPOL WP2 Pre-VCD ontology and reasoning specification<sup>16</sup> further describes the different aspects and specifications related to the ontologies and reasoning mechanisms of the European VCD system. It describes the specification with regard to the Upper Level Concepts of the VCD Ontology: common schema, criterion schema, tenderer schema, tenderer-criterion schema and result schema. Furthermore it describes the reasoning process and provides an example for it.

## 5.3.6 High level components of the National VCD system

National VCD Services are performed by the collaborative work of systems and sub-systems. The present specification covers a portion of the main construction dealing with the core tasks of assembling a VCD, a VCD Package and a VCD Container through the execution of compiling and packaging functions. These operations are performed by different implementations of the National VCD System in cooperation with the European VCD System.

The following section provides an overview of the VCD systems architecture. This representation combines different system entities to form a reference modelling framework that every WP2 piloting partner will implement in a locally customized way, therewith implementing its National VCD System. The reference model is based on systems, sub-systems and packages.

Deliverable 2.2 (see [D2.2, 2010]) describes different reference system architectures which can be constructed by combining the defined components of the National VCD System components specification. It thereby distinguishes between:

- Reference System 1 – Desktop VCD System
- Reference System 2 – Online VCD System
- Reference System 3 – Manual VCD skeleton Editor

In the following reference system 2, the online VCD system, shall be introduced as it provides the most comprehensive solution that includes all potential subcomponents. The desktop VCD system and the manual VCD skeleton Editor solely use a subset of Online VCD system. The online VCD system reference architecture combines components which are needed to assemble a VCD Container as an online system, therefore having for example a user and access management component in place. The following figure and its subsequent description show the high level components of this architecture.

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<sup>16</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT\_Architecture -> PreAward eProcurement -> Models -> VCD Ontology and Reasoning specification\_100



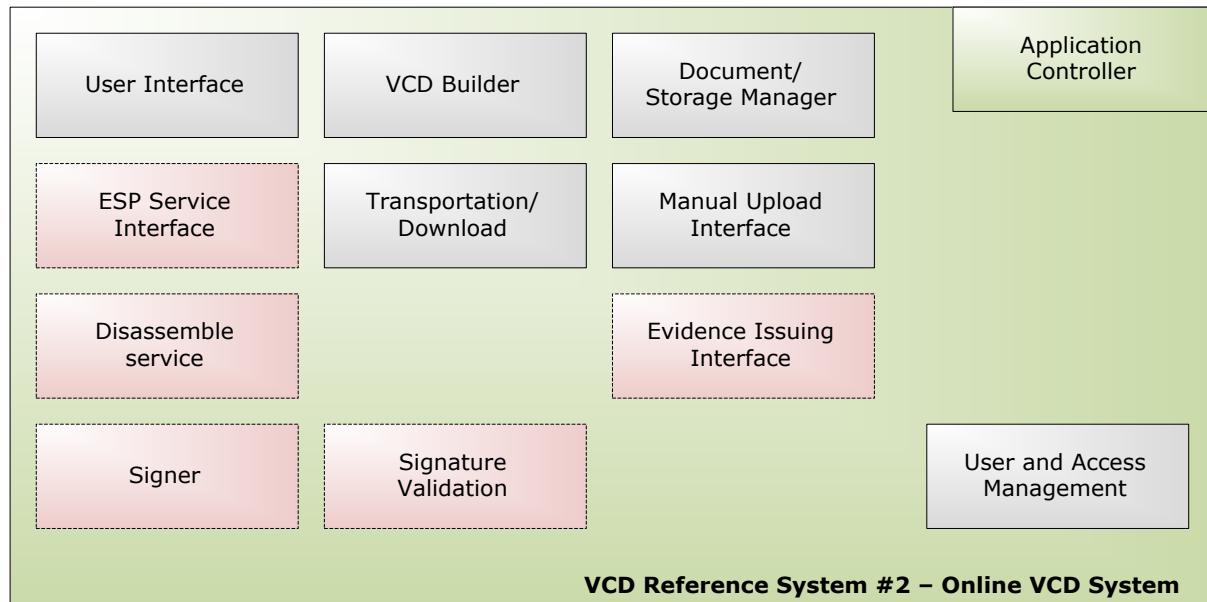


Figure 20: Components of the Reference System 2 - Online VCD system

### User Interface

The User Interface provides functionality to allow the user to interact with the other system parts. Providing user input forms and displaying system feedback are the two main functionalities of this component.

### VCD Builder

The VCD builder is the component which assembles the data collected from the Manual Upload Interface, the User Interface and the Document/Storage Manager into a VCD Container. It therefore performs the creation of the following artefacts in accordance to their specifications:

- VCD Package XML file
- VCD XML files
- VCD Container file

### Document/Storage Manager

The Document/Storage Manager acts as a temporary or permanent storage for the data which is collected via the Manual Upload Interface and the User Interface.

### Transportation/Download

This component provides functionality to deliver a VCD Container, which has been constructed by the VCD Builder. There are two possible ways of delivering a VCD Container:

- a) The user downloads the VCD Container from a defined (temporary) download space, provided by the system
- b) The system delivers the VCD Container to a PEPPOL End Point, which has be defined by the Requester in advance by using the PEPPOL BusDoX infrastructure.

### **Manual Upload Interface**

The Manual Upload Interface provides functionality to allow the user the upload of documents into the Document/Storage Manager and to input additional data which is needed for VCD Container assembly.

### **Application controller**

This component is responsible for the process and data flow between all other components.

### **ESP Service Interface (optional)**

This optional interface is the National side of the ESP/NSP Service Interface which can be used to receive a VCD Skeleton Container from the European VCD Service. The VCD Skeleton Container is then stored in the Document/Storage Manager and can be processed by the VCD Builder.

### **VCD Signer (optional)**

This optional component can be used to sign a VCD Container or contained artefacts (e.g. VCD Container, VCD Package XML, and VCD XML), by qualified existing means.

### **User and Access Management**

This component provides functionality for registering, storing and validating user credential and user access rights information. This component therefore implements a VCD System specific user and access database or uses existing data sources by implementing interfaces to them.

### **Disassembly Service (optional)**

This optional component is capable of loading an existing VCD Container or VCD Skeleton Container and to extract the existing information from this artefact in order to reuse the data for a new VCD Container or VCD Skeleton Container instance.

### **Signature Validation (optional)**

This optional component is responsible for validating signatures which are attached to external documents, either documents which are uploaded using the Manual Upload Interface or documents which are received via an Evidence Issuing Interface.

### **Evidence Issuing Service (optional)**

This optional component(s) handle(s) the receipt of documents and other data from one or several evidence issuing services of issuing bodies. It interacts with the Document/ Storage Manager for storing received documents and data.

#### **5.3.6.1 Use cases and other UML representations of the National VCD system**

The overall modelling strategy for the representation of national VCD systems have been further elaborated in PEPPOL D2.2 - Attachment A - Use cases and other UML representations of the National VCD system<sup>17</sup>.

<sup>17</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT\_Architecture -> PreAward eProcurement -> Models -> National VCD system Specification\_101



The specification adopts the multidimensional design possibilities given by the UML language through the coordinated production of Use-Case diagrams, Activity diagrams, UML-diagrams and Sequence diagrams. The following use-case groups have been elaborated within the specification:

- Use-Case Group “VCD Builder and User Interface”
- Use-Case Group “User Identity and Access management incl. authentication”
- Use-Case Group “Signature Functions”
- Use-Case Group “Signature validation interface”
- Use Case Group “VCD System”
- Use-Case Group “VCD Builder”
- Use-Case Group “VCD Container Creator”
- Use-Case Group “VCD transportation interface incl. authentication”
- Use-Case Group “Interface to VCD dictionary (incl. Code lists, schemas...)”
- Use-Case Group “Interface to PEPPOL registries”
- Use-Case Group “Interface to European VCD service”
- Use-Case Group “interface to notification systems”

Beside these use case groups the document contains a functional specification for preparing/completing a VCD Skeleton by describing the core functions. It also contains functional specifications for the VCD Viewer including physical implementation considerations.

### 5.3.6.2 User stories for National VCD systems

A user story is one or more sentences in natural language that captures what the user wants to achieve. User stories are used within PEPPOL for Agile software development according to the scrum methodology and they reflect the features that have to be implemented within a component. User stories have been used as a quick method to handle requirements and to respond faster and with less overhead to changing requirements. User stories emphasize verbal rather than written communication. User stories are comprehensible by both, the architects and the developers. User stories are the right size for planning and they work for iterative development and they encourage deferring detail until you have the best understanding you are going to have about what you really need. WP2 has used Jira<sup>18</sup>, a software for issue and project tracking for software development to capture, organise and maintain the user stories identified.

### 5.3.7 Concept database of the Virtual Company Dossier

The VCD concept database<sup>19</sup> contains all VCD concepts existing in the domain of the VCD system. The purpose of VCD concept database is to have an aggregated list of all concepts that occur in the domain of the VCD and its software components. It is used to define each concept and specify the rules for creation of values as well as representing these concept values on graphical user interfaces. Hence it shall serve the need for documenting the VCD concepts and provide support for developers that are implementing VCD software

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<sup>18</sup> Jira: Issue and project tracking for software development teams; URL: <http://coeus.ds.unipi.gr>

<sup>19</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD Concept Database



to decide how to represent and collect values for a concept. The following figure shows the major elements of the VCD concept database.

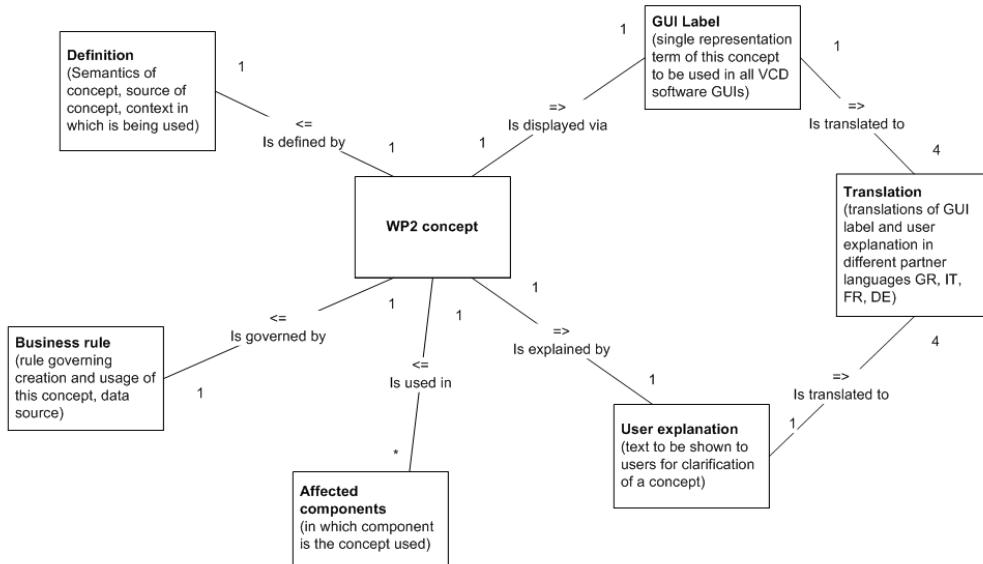


Figure 21: Major elements of the VCD concept database

The different tables of the concept database define the following categories of information that are being collected:

- VCD Concepts: Contains a list of all concepts which are used as reference concepts to which the other tables refer to.
- Definitions and labels: Contains definitions as well as GUI labels and user explanations (including different translations) of each concept.
- Business rules: Contains rules that govern the creation and usage of each concept (if applicable). Business rules control or influence the behavior of the VCD concepts. They help to achieve the goals by capturing information constraints that define the use or value of information elements.
- Implementation: Contains information on how to visualize information of each VCD concept and where this information is sourced. It is intended to support implementers of the different phases of handling a VCD from its creation - ontology supported or not - to its visualization. The criterion editing is a separate field that is also present in this table.
- Concept source: Gives information about the source of each concept (e.g. VCD schema, ontology, GUI design)

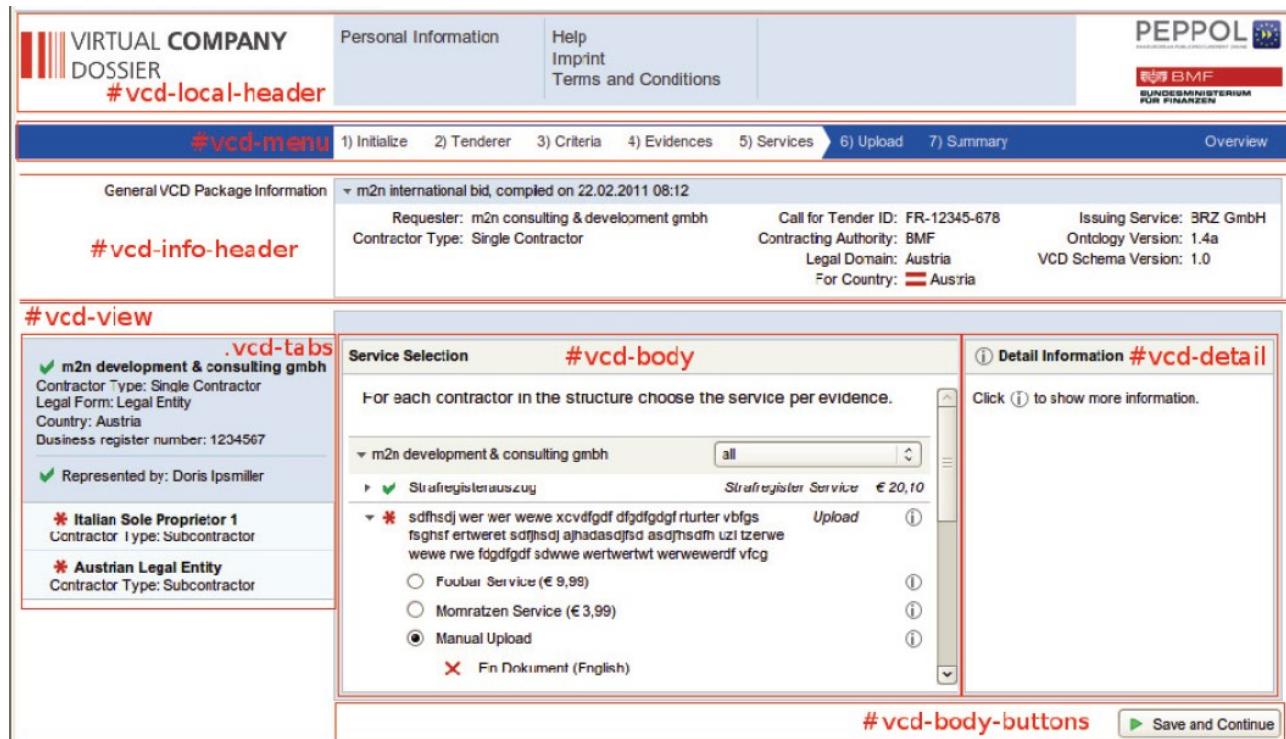
### 5.3.8 Common Graphical User Interface (GUI) design for the Virtual Company Dossier

A common graphical user interface (GUI)<sup>20</sup> has been designed in order to allow users to interact with the different VCD services and components in a uniform manner. The common GUI represents the VCD infor-

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<sup>20</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Models -> VCD Common GUI Design

mation items and actions available through graphical icons, elements and labels. It defines the flow of activities, colour palettes and style sheets. The following figure shows a screenshot of the GUI design with its different elements.



The common GUI for the VCD consists of the following elements:

- VCD local header: can be customized for a specific implementation within a country,
- VCD menu: indicates the flow and status of actions
- VCD info header: reflects general information about a VCD package
- VCD view: reflects individual information about the different VCDs
  - VCD tabs: reflects the structure of tenderers including key personal
  - VCD body: displays main information elements for each step and tenderer structure element
  - VCD detail: displays detailed information about an information element
  - VCD body buttons: let the users navigate through the individual step

## 5.4 VCD ICT Components

This section describes the ICT components of the VCD System representing the technical implementations of the specifications as described in chapter 5.3. The first subsection provides an overview about the various building blocks and components of the VCD System. Furthermore, details about functionality and current development statuses are given in the subsequent sections. The final subsection describes these building blocks in the context of a tendering process and illustrates different scenarios of the VCD reference implementation.

Figure 22 illustrates the different VCD ICT components distinguishing between ontology and rule-set components, core electronic document component as well as technical infrastructure components.



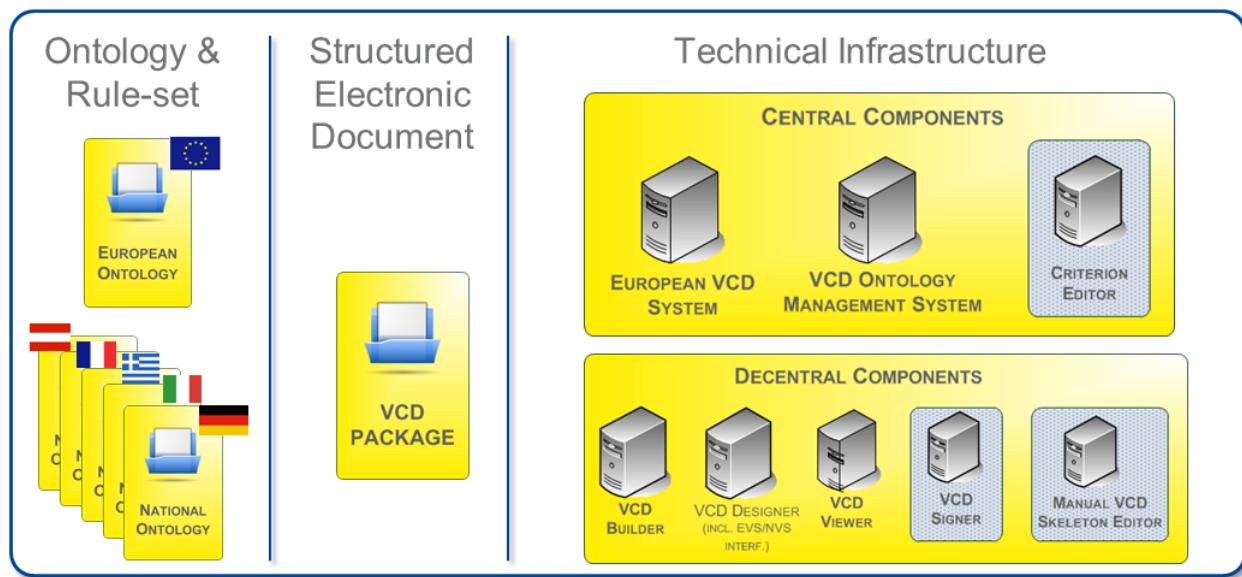


Figure 22: Overview of the VCD ICT Components

The ontology and rule-set components represent the implementation of legal requirements in order to achieve the mapping between different national procurement regulations. Hence it provides the means to achieve semantic and legal interoperability. Currently, five national ontologies (regarding the nationalities of the different project members) as well as the European ontology are implemented.

As a structured electronic document, a VCD Package instantiates the data model specifications and is the core component to achieve technical interoperability.

Finally, several software components developed to support users in interacting with the VCD System and create or process VCD Packages make up the technical infrastructure. Except for the VCD Signer, Manual VCD Skeleton Editor and the Criterion Editor (boxes with grey background), all software components exist.

As indicated in the figure by the different background colours, several components already exist whereas others are currently in their specification phase and will be distributed in later releases. The current release of the VCD System (release version 1.0) and its building blocks is available online.<sup>21</sup> It contains the components described in the following subsections.

#### 5.4.1 Ontology & Rule-set

The ontology and rule-set consists on the one hand of several ontology schema files, which describe the structure of specific ontology instance files, which on the other hand, represent the actual rule-set.

The ontology schemas define for instance how criteria and evidences as well as the mapping between both have to be modelled. The result of the modelling of the EU and national criteria and evidences as well as specific criterion requirements and evidence restrictions lead to several ontology instance files. These ontologies provide the basic set of information upon which the rule-based reasoners base their decisions.

<sup>21</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture –PreAward eProcurement –Services and Components. This EIA folder also contains further technical details about the various software components.

## 5.4.2 VCD Package XML Schema Definition

Each VCD Package is based on the data model and specification already described in chapter 5.3.4. The technical implementation of these specifications is represented by a set of XML schema definition files (XSD): According to the specification of the structure of a VCD Package, two XSD files exist for a VCD Package (WP2-VirtualCompanyDossier-1.xsd) and each VCD (WP2-VirtualCompanyDossierPackage-1.xsd) that is present within it.<sup>22</sup>

According to the specification of the EVS interface (see chapter 5.3.5) and the interaction between the EVS and the NVS, additional XSDs for T-, TC- and TCE-Skeletons exist, each of them being a subset of WP2-VirtualCompanyDossier-1.xsd. This means, that each of these schemas modifies the base VCD and VCD Package schemas by removing unused elements.

## 5.4.3 European VCD System (EVS)

The core service of the European VCD System provides the decision support for deriving the evidences in order to meet the required criteria pursuant to the underlying legal rule-sets (see chapter 5.4.1). The EVS hosts the ontologies, provides the reasoning and makes decision support accessible via system and user interfaces.

The outcome of an EVS query is a document skeleton compliant to the VCD schema (see TCE-Skeleton in chapter 5.4.2). This skeleton is used by national VCD systems (VCD Designer, see chapter 5.4.4.1, and VCD Builder, see chapter 5.4.4.2) to compile VCDs and VCD Packages.

In particular, the EVS consists of the following components:

- **Reasoner components:** These components provide ontology reasoning in order to derive criteria, evidences and services according to a specific tenderer setting. The underlying rule-set is defined in the ontology schema and ontology instances files (see chapter 5.4.1).
- **EVS/NVS Service Interface:** The EVS provides reasoning services for the NVSs as it derives criteria and evidence suggestions regarding a specific tenderer setting. To allow the NVSs to call these services, a SOAP interface is provided by the EVS. The calls to and replies from this SOAP interface contain unfinished VCD Packages. The exact states as modifications of the full VCD Package Specification (Skeleton Schemas) are also specified.
- **Ontology Management System:** Provides the editing and management functionality for the different ontologies the EVS is basing its decision support on. The Ontology Management System can be used simultaneously by the different ontology editing teams to keep the legal rule-set up to date.

## 5.4.4 National VCD System (NVS)

The National VCD System provides a full range of VCD functionalities to the Economic Operator from the initial selection of criteria (via the VCD Designer) to the finalization of a validated VCD Container (through the VCD Builder). Depending on national implementation architecture decisions, implementers can use all or

<sup>22</sup> The entire XML schema definition can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Services and Components -> VCD System Release (Version 1.0 and Version 2.0) -> VCD\_Schema. The code lists can be found at [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> ICT Architecture -> PreAward eProcurement -> Services and Components -> VCD System Release (Version 2.0) -> VCD\_CodeLists



part of the reference implementations for a NVS. The following two sections provide more details about the two main NVS components, the VCD Designer and the VCD Builder.

#### 5.4.4.1 VCD Designer

The VCD Designer is a component allowing users to create a TCE Skeleton that can be used by the VCD Builder for the creation of the desired VCD, taking into account the tender structure and the suggestions from the EVS. Together with the VCD Builder, it can be used in a desktop or web-based NVS environment.

As a logical building block, it implements the EVS/NVS Service Interface in order to derive criteria and evidence information based on the user's input, starting from the initial input of tender data structure until the final compilation of the TCE-Skeleton. At the end of the process, the user is able to either download the TCE-Skeleton Package received or redirect the workflow to the VCD Builder.

The VCD Designer is available either as a standalone client configuration that be executed from the user's desktop or as a web client.

#### 5.4.4.2 VCD Builder

The VCD Builder is either available as a web or as a desktop application allowing users to create/build a VCD Package. Similar to the VCD Designer, it is part of the NVS reference implementation.

Its purpose is to compile a VCD Package on the basis of a TCE-Skeleton which was delivered by the VCD Designer (see chapter 5.4.4.1). For this purpose, the VCD Builder allows the user to include actual evidence documents as indicated in the TCE-Skeleton and then builds the VCD Package.

VCD Builder is available in two configurations:

- A standalone client configuration that be executed from the user's desktop
- A Web Client

#### 5.4.5 VCD Viewer

The VCD Viewer allows users to view and navigate through the content of VCD Containers. Depending on implementation architecture decisions, it can be provided as authorized national service or integrated into existing tendering platforms or used as stand-alone component. In particular it will support Contracting Authorities in proving eligibility of Economic Operators.

The VCD Viewer is a web application used to visualize the content of VCD Packages which can be uploaded via the GUI. The application extracts all documents and information from the container and the meta-data files and presents it via a web browser. The Viewer is developed to support Contracting Authorities in visualizing the content of received tenders, as well as evaluating the Economic Operators with respect to the required criteria and submitted evidence documents. Economic Operators may also use this tool to visualize the content of created VCDs before submitting them to a Contracting Authority.

#### 5.4.6 Planned VCD building blocks

The components described in sections 5.4.1 – 5.4.5 provide basic reference implementations to run the VCD solution within pilots. Yet further functionality is scheduled to be added. Therefore, this chapter provides an outlook on future software components, which will be included in the VCD solution in the next phase. This section provides an overview of the planned components to be developed until November 2011.



#### 5.4.6.1 Manual VCD Skeleton Editor

This component will be an add-on to the VCD Designer enabling manual creation of VCDs in cases where no ontology is modelled (i.e. the legal rule set to derive evidence information from requested criteria is not available) for certain Member States. The criteria-evidence mapping will be performed manually by the user with support of the eCertis (respectively other information sources) system (instead of the automatic mapping via the EVS).

As the Manual VCD Skeleton Editor will be developed as an add-on to the VCD Designer, the interface to the VCD Builder is also available: After the TCE-Skeleton is generated the Economic Operator can use the existing VCD Builder to compile the VCD Package.

#### 5.4.6.2 Criterion Editor

The Criterion editor will support Contracting Authorities in providing relevant criteria of qualitative selection in a structured and standardised way that can be automatically computed via the VCD solution (criterion specification). It will simplify the compilation of a VCD through automatic support via the VCD solution.

#### 5.4.6.3 VCD Signer

The VCD Signer will provide technical means to digitally sign VCD Packages and the included XML meta-data files according to the XAdES (XML Advanced Electronic Signatures) format. It will provide interfaces so that other components can directly access its functionality.

The VCD Signer performs multiple digital signature functions for electronic structured documents according to the XAdES-BES for UBL specifications. A subcomponent of the VCD Signature Component will support multiple digital verify functions for any electronic document being part of a VCD Package instance. This will utilize the signature validation service developed by PEPPOL work package 1 to provide the capability to prove validity of foreign signature certificates.

### 5.4.7 VCD Reference Implementation

The aforementioned components can be deployed in several architectural ways depending on the degree of integration. The VCD Designer and the VCD Builder for instance can be deployed in a national VCD system, but can also be deployed as stand-alone applications. Furthermore, the flow of creating a VCD Package can be transferred from the VCD Designer to the VCD Builder in case they are provided as an integrated platform.

Besides these architectural decisions, the VCD reference implementation and architecture distinguishes between central (deployed on a central European system for all member states and users) and decentral components (deployed on national systems in each Member State). Furthermore, two basic scenarios with a slightly different component set-up exist: a comprehensive and a manual scenario. Both are described in the following subsections.

#### 5.4.7.1 Comprehensive scenario

Figure 23 illustrates the comprehensive scenario of the VCD reference implementation as well as major building blocks within a tendering process. Each VCD building block thereby indicates for which user groups it is intended (Economic Operators, Contracting Authorities or eTendering solutions providers). The figure also differentiates between the different statuses of development and implementation (available and planned) and how it can be used (web-based, stand-alone or integrated into tendering platforms).

Comprehensive in this context refers to the existence of a European VCD System and a National VCD System. Furthermore, the rule-set of a Member State has to be modelled as an ontology within the EVS.



## VCD - ICT ARCHITECTURE

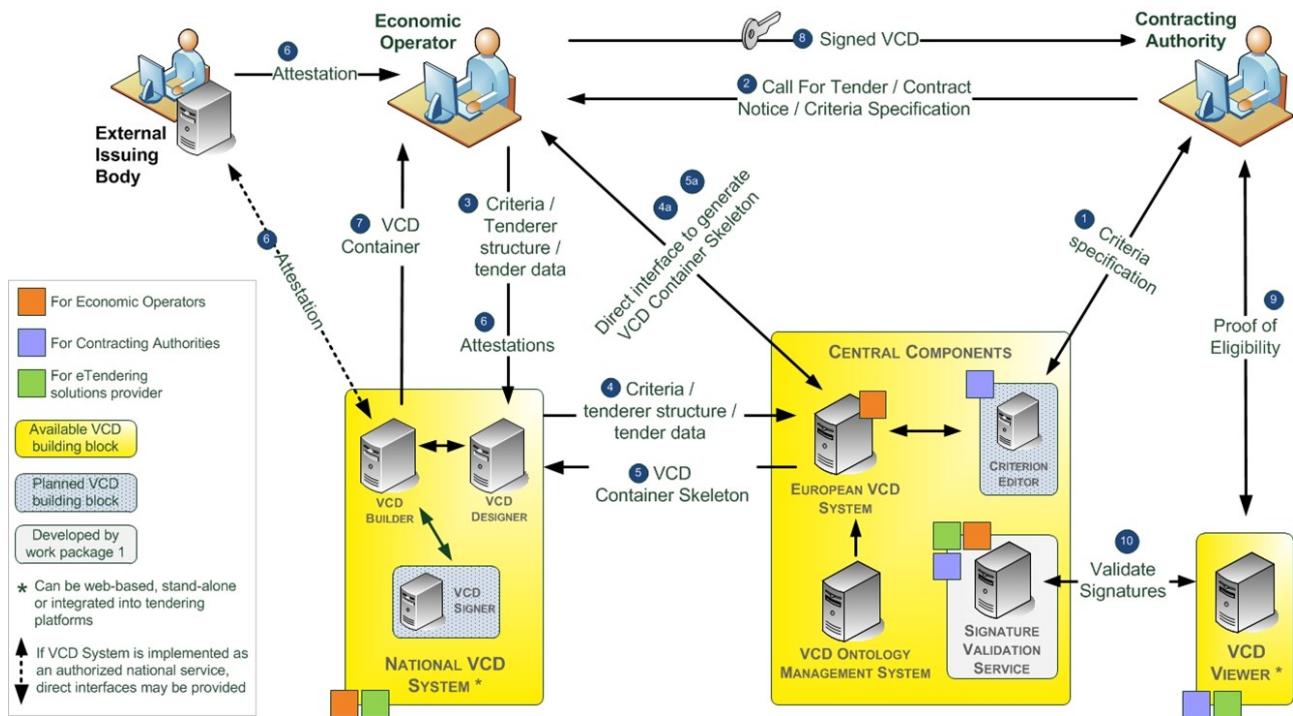


Figure 23: Comprehensive scenario of the VCD reference implementation and its building blocks

The flow of interaction which is depicted in Figure 23 consists of the following steps:

1. A Contracting Authority uses the criterion editor to define relevant criteria in a structured and standardized way.
2. A Contracting Authority publishes a contract notice (CN). An Economic Operator wishes to participate by requesting the Call for Tender (CFT) and the criteria specification.
3. The Economic Operator submits criteria, tenderer structure and other tender data to the VCD Designer.
4. Having these inputs defined in the VCD Designer, the Economic Operator can now invoke the European VCD System via system to system interface. Alternatively the European VCD System also provides a direct user interface to generate a VCD Container Skeleton (4a/5a).
5. The European VCD Service creates a VCD Container structure consisting of relevant criteria and suitable evidences to be provided by the Economic Operator.
6. The VCD Container structure is passed over to the VCD Builder. The Economic Operator can now fill the structure with attestations and candidate statements. In countries where the VCD system is implemented as an authorized National service direct interfaces to issuing bodies may be provided.
7. Having filled the VCD structure with all relevant data, the customized VCD Container is provided to the Economic Operator. It may be signed by the VCD signer before (not yet implemented)
8. The VCD is submitted to the Contracting Authority or relevant tendering platform.
9. The Contracting Authority can use the VCD Viewer to display the VCD contents and to proof the eligibility of candidates. The VCD Viewer offers a convenient graphical user interface for checking qualifications in a consistent manner.
10. The VCD Viewer has an interface to the PEPPOL signature validation service (WP1) which provides the capability to prove validity of foreign signature certificates.

### 5.4.7.2 Manual scenario

Figure 24: Manual scenario of the VCD reference implementation and its building blocks illustrates in the same way as above the manual scenario of the VCD reference implementation. In this scenario, neither a National nor a European VCD System exists. This implies that rule-sets do also not exist for a Member State. In such cases, the economic operator needs additional support that overcomes the non-existence of an automatic identification of evidences.

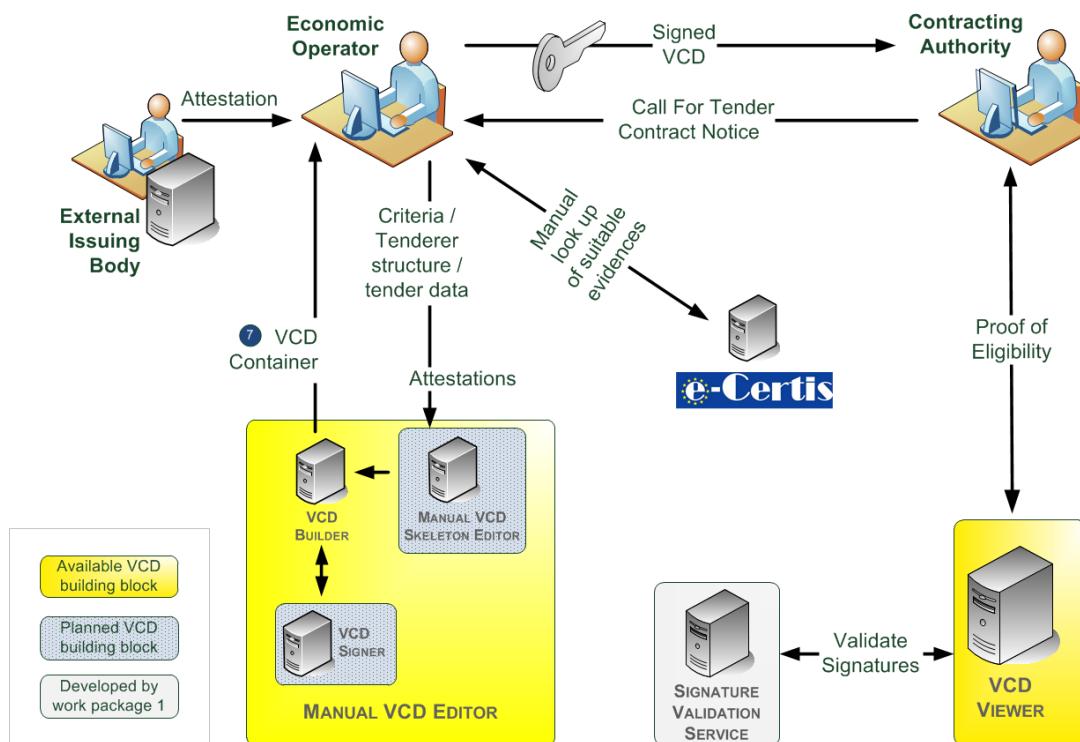


Figure 24: Manual scenario of the VCD reference implementation and its building blocks

The main differences compared to the comprehensive scenario are:

- Neither national nor European VCD System exists.
- No ontology support is present to identify suitable evidences
- The economic operator has to perform a manual lookup of suitable evidences with respect to the requested criteria defined in a call for tender.
- eCertis is used as the main information source for the mapping between criteria and evidences.

The Manual VCD Skeleton Editor provides the graphical user interface for the economic operator to create the TCE-Skeleton. It is aligned with eCertis to support the manual mapping and lookup of criteria and suitable evidences.

## 6 VCD - Conformance and Test

### 6.1 VCD Conformance and Test Strategy

According to the different ICT components developed for the VCD, the overall testing objective has several facets. On the one hand, conforming implementations are a necessary prerequisite for achieving interoperability among implementations. It is crucial to ensure that different components can electronically exchange VCD documents; hence, software components built for the VCD system must be able to create, receive and understand valid VCD document instances. Furthermore, quality of the various software components has to be ensured. Therefore, it must be verified that all requirements – functional as well as non-functional – are implemented and specifications are met.

Two major testing scopes can be derived from this:

1. Conformance testing: Enabling stakeholders (software, service or platform providers, etc.) to claim conformance to the VCD specifications. In particular this refers to determining whether the VCD data model and schema specifications are met by VCD software components or any other systems.
2. Functional and non-functional testing: To ensure that VCD software components meet their requirements and specifications. This in particular refers to determining whether VCD software components implement all required functionality and meet non-functional requirements such as usability, performance and security.

Figure 25 illustrates the identified test groups (conformance test and validation as well as functional/non-functional software tests) and defines several test types, tools and documentation facilities for each group.

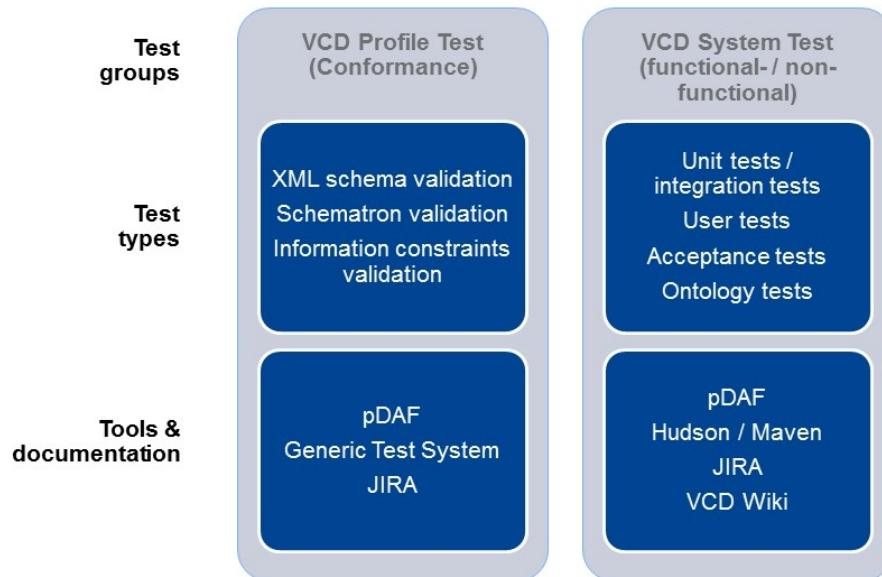


Figure 25: VCD Conformance and Test Groups and Types

This figure outlines the scope of the overall conformance and test strategy for the VCD and will be broken down into framework, models and components in the subsequent sections.



## 6.2 VCD Conformance and Test Framework

### 6.2.1 Test group Conformance Testing and Validation

#### 6.2.1.1 Test types and Objectives

The aim of VCD conformance testing is to test whether software components are able to generate and understand correct document instances. Document instances are correct if they are valid regarding:

- Well-formed XML structure
- Mandatory / optional elements and cardinalities
- Element data types
- Element values (code lists, value patterns: e.g. URI, UUID, etc.)
- Semantic validity
- Further information constraints (e.g. file reference checks)

These validation objectives shall ensure that both technical and semantic conformance of VCD instances can be tested and ensured. Hence, both the technical structure and additional semantic information constraints and business rules have to be defined in order to validate document instances against these rules.

The test types of the VCD conformance testing group cover the validation objectives listed above. In particular, this includes XML schema validation, Schematron validation as well as validation of additional information constraints (which cannot be covered by the two previous test types).

#### 6.2.1.2 Conformance testing and validation approach

Figure 26 depicts the overall approach of the conformance testing by defining four phases of specification and testing activities.



Figure 26: Conformance testing approach

#### Definition of validation rules

This first phase covers the definition of validation requirements, business rules and information constraints that define the rules and constraints against which document instances are being validated.

#### Application profiling

Based on the validation rules defined in the previous phase, application profiles (also known as domain profiles) are created in order to provide the technical basis for implementing the tests. Profiles being created are: T-profile, TC-profile, TCE-profile, VCD-profile and VCDPackage-profile.

These profiles are grouped according to the VCD generation phase. This is necessary as different domains or applications, in which VCD documents are processed, have (slightly) different rules regarding allowed data elements, cardinalities and information constraints (e.g. evidence documents are not foreseen to be part of a T-Skeleton).

### Test case implementation and execution

For the actual testing of VCD documents, each application profile and corresponding validation rules have to be implemented. There are three different types of possible implementations according to the test scope:

1. Unit tests: Validation and tests performed during development to ensure that a unit of software produces correct document instances.
2. Runtime validation: Validation performed during runtime to validate the document instances that are created (output) or read (input) by software components.
3. Generic Test System validation: Manual validation using a specific configuration of the Generic Test System.<sup>23</sup>

Unit tests and runtime validation in the narrow sense are part of the functional testing of software components. Hence, runtime validation is a feature that is built into software components to avoid errors caused by inputting or transferring wrong data. Unit tests are defined and executed to ensure that a software component that is processing VCD instances has been implemented correctly.

Generic Test System validation refers to validation triggered by testers using a configured test system. Document instances, such as VCD Packages, can be validated with these test systems to determine whether they conform to the VCD specifications.

### Test reporting and analysis

The results of test runs are documented in a common way. Hence, test protocols and validation reports are created for the different test runs. Based on the results of test execution and error reports, a test analysis should lead to decisions on how errors or bugs can be fixed.

## 6.2.2 Test group Functional / non-functional testing

### 6.2.2.1 Test types and Objectives

This test group covers all functional and non-functional software testing. Functional tests are intended to ensure that the implemented functionality complies with the specifications and that all requirements are met. Non-functional testing shall cover all user and acceptance tests to ensure that the software is working well and has a good level of usability.

Functional tests cover the developed functionality. The testing approach is in line with the Scrum approach which is followed by the development team. This affects primarily the definition of test cases and bugs for each of the defined user stories.

To enlarge the functional testing and to ensure a good usability and user acceptance of software components, additional non-functional and acceptance tests are defined and executed. This means, that the developed software is tested from the end user's point of view, including testing of graphical user interfaces, usability and performance.

To also address legal requirements that have to be covered by the VCD, the data quality of national and European rule sets that is stored in the ontology has to be tested as well. As the mapping of criteria to evidences is a core feature of the VCD system, ensuring the quality of data on which this mapping is based is very crucial.

The different test types of this group cover functional unit and integration tests as well as user and acceptance tests.

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<sup>23</sup> The Generic Test System is a validation software that can be configured to validate VCD documents against XSD, Schematron rules and additional constraints; it has been developed at the University of Koblenz, Institute for Knowledge Media ([http://www.uni-koblenz-landau.de/koblenz/iwm?set\\_language=en](http://www.uni-koblenz-landau.de/koblenz/iwm?set_language=en)).



### 6.2.2.2 Functional / non-functional Testing Approach

Figure 27 shows the phases of the functional and non-functional testing approach, from the planning and definition of tests, through test implementation and execution to reporting and result analysis.

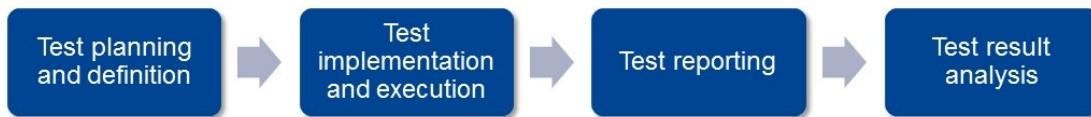


Figure 27: Functional / non-functional testing approach

#### Test planning and definition

Test planning and definition contains the required steps to specify the tests that should be executed. Most important is the definition of test cases, which describe in detail what is being tested (software module, user story, requirement, etc.), what are the pre- and post-conditions, expected results, test steps as well as test data being used for test execution.

#### Test implementation and execution

In case of manual tests, the test implementation and execution comprises setting up the environment, i.e. configuring the software component being tested, setting up pre-conditions, providing test data, etc., as well as executing the test following the “test protocol” defined in the test case.

#### Test reporting

Test reporting comprises the documentation of test outcomes once a test has been executed. Most important here is the reporting of bugs and issues explored during the test execution.

#### Test result analysis

Based on the test and bug reports, it has to be analysed and decided, how bugs can be fixed or which functionality has to be changed or added to resolve an error. These results are used as input for development teams to perform required implementation tasks.

### 6.2.3 Testing suite and artefacts

The testing suite for conformance testing and validation as well as functional/non-functional tests contains several software tools to create, document and store the various testing artefacts. More details about the different artefacts are given in the next section.

Testing artefacts are:

- Validation rules
- Application profiles (XSDs, Schematron files, Test System Configurations)
- Test cases
- Test data
- Test case execution reports
- Bug reports



The testing suite consists of the following software tools:

- pDAF is used as a general test management system that allows documentation, maintenance and reporting of test cases and test executions.
- JIRA is used to manage user stories defining the required software features of VCD components. Furthermore it is used as a bug-tracking system.
- Generic test system is used to validate VCD document instances and test whether they conform to the VCD data model and schema specifications.
- Hudson is used for automatic unit testing.<sup>24</sup>
- Selenium is used for execution of automatic GUI tests (GUI testing).<sup>25</sup>

## 6.3 VCD Conformance and Test Models

### 6.3.1 Validation rules

The business rules<sup>26</sup> specified for the VCD data model specification are transformed into validation rules which can be expressed as constraints within the XML schema definitions, as Schematron validation rules or as additional information constraints.

Table 2: Constraint types for VCD conformance testing lists the various constraint types expressed by the business rules and their corresponding representation as validation rules. XSD thereby refers to the definition of rules for a specific constraint within XML schema definitions; Schematron refers to defining Schematron rules for certain constraints and additional constraints are transformed into specific Generic Test System configurations.

Constraint type	Description	Rule representation
Document structure	Correctness of the structure and data elements of an XML instance as defined in the corresponding XML schema	XSD
Element cardinalities	Optional elements MAY exist, mandatory elements MUST exist. Prohibited elements will not be part of a profile XML schema. <ul style="list-style-type: none"> <li>- 0..1 = optional, zero or one occurrence</li> <li>- 0..* = optional, zero or more occurrences</li> <li>- 1 = mandatory, one occurrence</li> <li>- 1..* = mandatory, one or more occurrences</li> </ul>	XSD
Data types	String, integer, float, date, time, boolean	XSD
Value ranges	<ul style="list-style-type: none"> <li>- Length (for elements of type string)</li> <li>- Range (for elements of types integer, float, date and time)</li> </ul>	XSD

<sup>24</sup> Hudson is a platform for building and testing software projects and to monitor the execution of the build process (see <http://wiki.hudson-ci.org/display/HUDSON/Meet+Hudson>)

<sup>25</sup> Selenium is a browser plug-in that allows the definition and execution of automatic web application tests (see <http://seleniumhq.org/>)

<sup>26</sup> See concept data base described in chapter 5.3.7



CodeLists	Correct use of values as defined in CodeLists	Schematron / additional constraint
References	<ul style="list-style-type: none"> <li>- Correct file references in a document (cbc:FileName)</li> <li>- Existence of VCD sub folders for economic operators defined in the VCD Package meta-data file (cac:VCDReferenceID).</li> <li>- Correct element references (cbc:ProvesCriterionID, cbc:ProvingEvidenceID)</li> </ul>	Additional constraint
Value patterns	<p>Correct values and format of specific element values, e.g.:</p> <ul style="list-style-type: none"> <li>- UUID: UUID version 4 (random UUID)</li> <li>- Date: yyyy-mm-dd</li> <li>- Time: hh:mm:ss</li> </ul>	Additional constraint

Table 2: Constraint types for VCD conformance testing

### 6.3.2 Application profiles

Application profiles are modifications of a given document base specification for a specific context or domain of application. In the VCD context, the base specification is represented by the VCD data model and schema specification. For each of the different stages of creating a full VCD Package (T-, TC-, TCE-Skeleton), several modifications are derived due to specific requirements. Application profiles are created for T-, TC-, TCE-Skeleton as well as VCD and VCD Package, each of them consisting of XML schema definitions (XSD), Schematron rules and Generic Test System configurations.<sup>27</sup>

### 6.3.3 Test cases

The specifications of the VCD software components have been transformed into user stories that have been implemented into concrete units of software functionality. They provide input for the functional and non-functional software testing as corresponding test cases have been defined for each user story.

For the conformance testing and validation, additional test cases have been defined which specifically address the creation and processing of VCD and VCD Package instances as well as their sub-sets (T-, TC-, TCE-Skeletons).

Figure 28 illustrates the test cases that have been defined for the various VCD components. To give an example, the test cases for functional and non-functional testing as well as conformance testing and validation for the VCD Designer are highlighted.

Figure 29 furthermore provides an insight into a detailed test case definition of a specific conformance testing case. For each test case, pre-conditions, underlying specifications and test steps to be performed during its execution are specified.

<sup>27</sup> Currently, only XSD files and basic test system configuration exist; Schematron rules are under construction and will be included into the test systems. The current versions of the application profiles are delivered within the Test Systems. See chapter 6.4.3 for more information.



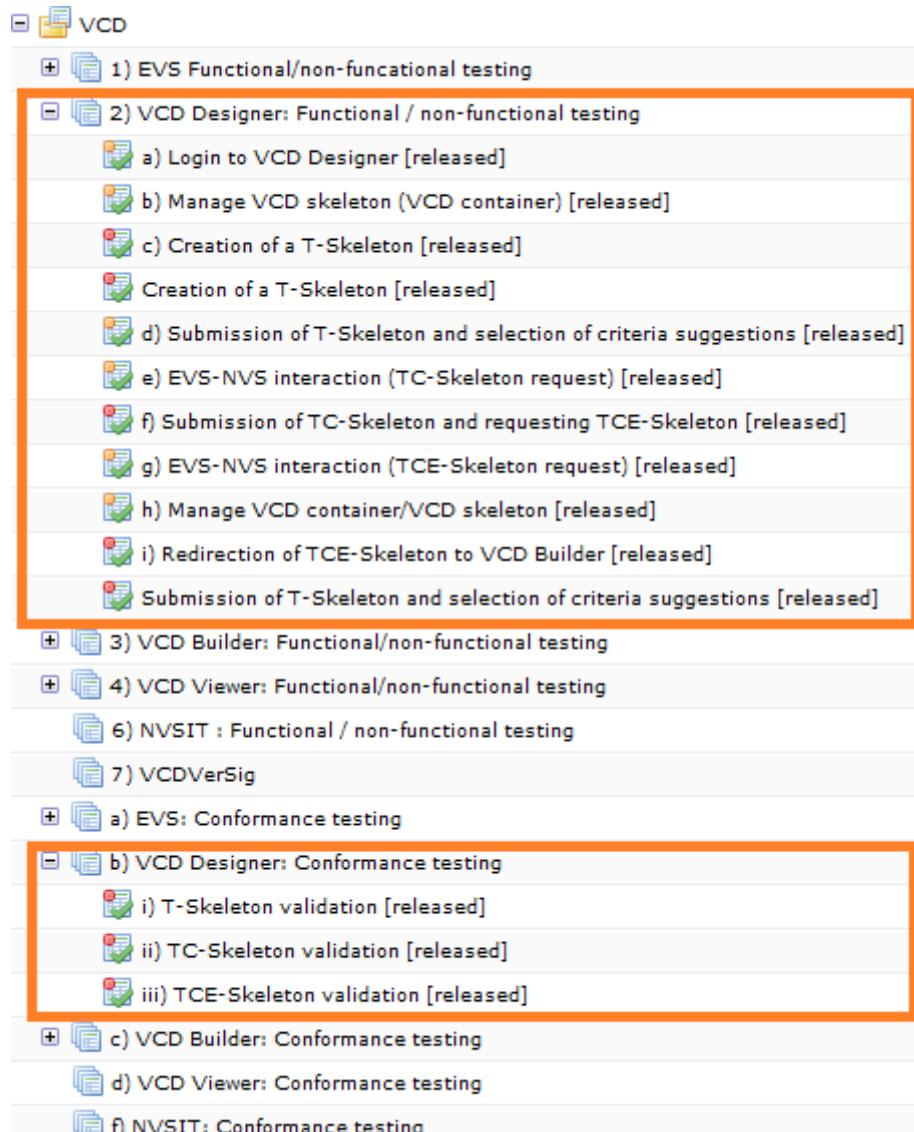


Figure 28: pDAF Test Cases

<b>Test category:</b>	VCD		
<b>Test area:</b>	b) VCD Designer: Conformance testing		
<b>Test case name:</b>	iii) TCE-Skeleton validation		
<b>Created:</b>	30-Mar-2011 10:55:41 by Daniel Reiser		
<b>Last modification:</b>	31-Mar-2011 13:12:35 by Daniel Reiser		
<b>Test level:</b>	Unit test		
<b>Test type:</b>	Unit		
<b>Test priority:</b>	high		
<b>Released:</b>	Yes		
<b>Summary:</b>	The test case is intended to check whether the software is capable of producing valid TCE-Skeleton instances. The produced TCE-Skeleton has to be conformant to the TCE-Skeleton profile and the validation rules and information constraints.		
<b>Underlying specification:</b>	Use-Case Group "Interface to European VCD service"		
<b>Data preconditions:</b>	The test case "2) VCD Designer: Functional / non-functional testing, g) EVS-NVS interaction (TCE-Skeleton request)" should be performed before. The produced TCE-Skeleton should be input for this test case.		
<b>Test steps:</b>	<table border="1"> <tr> <td>1. step:</td> <td> <b>Description:</b> Execute test case "g) EVS-NVS interaction (TCE-Skeleton request)" and use the created TCE-Skeleton as input for the TCE-Skeleton Testsystem.  <b>Expected result:</b> The validation report should list all potential errors present in the document instances.         </td> </tr> </table>	1. step:	<b>Description:</b> Execute test case "g) EVS-NVS interaction (TCE-Skeleton request)" and use the created TCE-Skeleton as input for the TCE-Skeleton Testsystem. <b>Expected result:</b> The validation report should list all potential errors present in the document instances.
1. step:	<b>Description:</b> Execute test case "g) EVS-NVS interaction (TCE-Skeleton request)" and use the created TCE-Skeleton as input for the TCE-Skeleton Testsystem. <b>Expected result:</b> The validation report should list all potential errors present in the document instances.		

Figure 29: Detailed test case definition





## 6.4 VCD Conformance and Test Components

### 6.4.1 Test objects

According to the grouping of test areas in section 6.1 into conformance testing and validation as well as functional/non-functional testing, the range of test objects varies from VCD software components to VCD document instances.

Software components being tested are:

- VCD Builder
- EVS (incl. Ontology reasoning output)
- VCD Designer (incl. EVS/NVS interface)
- VCD Viewer

VCD Document instances being tested are:

- VCD and VCD Packages
- T-Skeletons
- TC-Skeletons
- TCE-Skeletons

### 6.4.2 Test data

In order to execute test cases, a set of sample data has been created for the application profiles. It provides sample TCE-Skeletons as well as VCD Packages.

To execute the conformance testing and validation test cases, the functional test cases are executed in order to create VCD document instances. Those are then tested with the corresponding Generic Test System.

### 6.4.3 Test tools

The pDAF test management platform is used as a general test management system that supports the definition and reporting of test executions of the various test cases.

Figure 30 illustrates an example of a test case execution of a “TCE-Skeleton validation” test case. According to the definition of the test case, pDAF supports the reporting of the test execution, outcome and results of the defined test steps.

Test case:	TCE-Skeleton validation				
Execution:	01-Apr-2011 09:49:02 by Daniel Reiser				
Overall success:	Successful				
Data preconditions:	A TCE-Skeleton exists				
Value of data preconditions	Main contractor only / TCE skeleton ( <a href="http://bscw.uni-koblenz.de/bscw/bscw.cgi/d1892239/VCDPackage_c1a2a068-1cf4-42db-9704-fe7c334ab61b.zip">http://bscw.uni-koblenz.de/bscw/bscw.cgi/d1892239/VCDPackage_c1a2a068-1cf4-42db-9704-fe7c334ab61b.zip</a> )				
1. step:	<table border="1"> <tr> <td>Result:</td><td>No errors reported. Used test syste: TCESkeletonTestsystem_win.zip [0.1] of 2011-04-01 09:41</td></tr> <tr> <td>Success:</td><td> Successful</td></tr> </table>	Result:	No errors reported. Used test syste: TCESkeletonTestsystem_win.zip [0.1] of 2011-04-01 09:41	Success:	Successful
Result:	No errors reported. Used test syste: TCESkeletonTestsystem_win.zip [0.1] of 2011-04-01 09:41				
Success:	Successful				

Figure 30: Test case execution example

If bugs are discovered, they are reported in JIRA, which is used as a bug-tracking system for the VCD software components. Figure 31 shows an example of reported bugs for the VCD Viewer.



T	Key	Summary	Assignee	Reporter	P	Status	Resolution	Created	Updated	Due
●	VCD-211	Upload von VCD-packages is not possible	Daniel Reiser	Erik Stabentheiner	⬆️	Open	Unresolved	28/Mar/11	28/Mar/11	⚙️
●	VCD-182	Viewer freezes if folder in VCD package is missing	Daniel Reiser	Markus Klein	⬆️	Open	Unresolved	16/Mar/11	18/Apr/11	
●	VCD-181	Null Pointer Exception	Daniel Reiser	Markus Klein	⬆️	Open	Unresolved	16/Mar/11	16/Mar/11	
●	VCD-180	Exception while opening an evidence document	Daniel Reiser	Markus Klein	⬆️	Open	Unresolved	15/Mar/11	28/Mar/11	
●	VCD-153	VCD Package from builder not working in viewer	Daniel Reiser	Laborie Matthieu	⬆️	Open	Reopened	26/Jan/11	16/Mar/11	

Displaying issues 1 to 5 of 5 matching issues.

Figure 31: List of known issues and bugs

For the execution of validation test cases, the Generic Test System is used. For each of the different application profiles, a certain executable test system exists that<sup>28</sup> allows validating instances of a specific application profile. Figure 32 shows the main window of a test system that has been configured for the VCD Package profile.

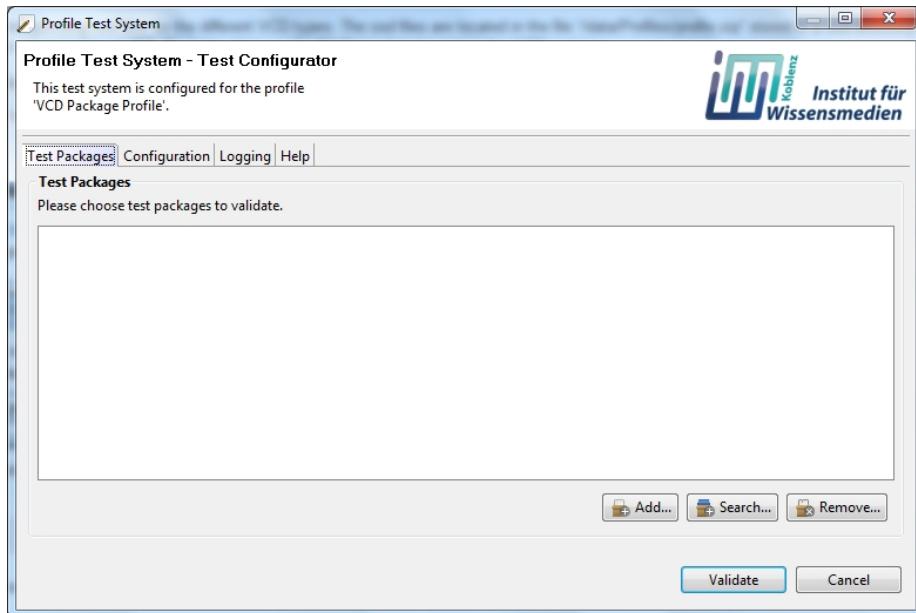


Figure 32: Test system for VCD Package application profile

After providing a VCD Package instance and running the validation, a detailed validation report is generated as shown in Figure 33.

<sup>28</sup> See [www.peppol.eu](http://www.peppol.eu), PEPPOL Components -> PEPPOL EIA -> Conformance and Test -> PreAward eProcurement -> Services and Components -> VCD Test Systems



Firefox file:///F:/IWWI%20...0474459/index.html + file:///F:/IWWI Arbeit/pilot-testing/tests/ConformanceTesting/03\_Test case implementation and execution/VcdPackageTests Google

**Test System Reports for Test Package VCDPackage 5f947d80-0dba-11e0-81e0-0800200c9a66.zip**

Date: 2011-03-31+02:00  
Time: 12:35:28.565+02:00

**Overview**

Testsystem	Logged				Link
	Fatal Errors	Errors	Warnings	Total	
data/ReferenceValidator/ReferenceValidator.jar	0	0	2	2	<a href="#">To the Results...</a>
data/SchemaValidator/SchemaValidator.jar	0	82	0	82	<a href="#">To the Results...</a>



Figure 33: Test system execution report

## 7 VCD - Life Cycle management

Within the PEPPOL EIA, the Life Cycle Management has the goal to describe the processes for LCM of Business- and ICT architectures of the PEPPOL EIA itself, aimed at giving continuously business value.

As in other cases, the LCM dimension does not follow all the five standard levels foreseen in the PEPPOL EIA.

This Pre-Award VCD LCM is not delivered within this release 1.0.0 of the PEPPOL EIA. It will be delivered in future releases, as a single artefact valid for all the PEPPOL communities; in fact, the LCM has a general application, which makes it suitable in different communities of the PEPPOL EIA. When a production maturity has been reached it will be entered into the PEPPOL EIA (Planned: Release 3).



## 8 VCD – Marketing

The Marketing dimension has the goal to describe the marketing strategy and tools as well as marketing processes and material for awareness and recruitment of new participants to the community.

This chapter contains a first draft and general perspective on the pre-Award VCD marketing strategy and first artefacts created for disseminating the VCD and pilot recruitment. Further details are planned for later EIA releases.

The PEPPOL WP2 team has developed a marketing brochure<sup>29</sup> about the VCD addressing major elements of PEPPOL and its VCD concept. The brochure introduces the VCD, provides an explanation about the goals and benefits of the VCD and describes how the VCD system works. It also introduces the major building blocks of the VCD and provides an overview about a potential piloting participation. In summary the VCD marketing brochure consists of the following elements:

**PEPPOL and the Virtual Company Dossier:** The PEPPOL project is an EU project facilitating interoperability in public eProcurement by setting up pan-European pilot solutions. The Virtual Company Dossier is a highly helpful, accurate and suggestive procurement tool for tendering.

**What is the Virtual Company Dossier?** The Virtual Company Dossier is a technical system that provides a convenient tendering solution to Economic Operators and contracting authorities. At its core, it's an electronic record for supplier qualifications.

**Major benefits of the VCD approach** The VCD system provides a viable and comfortable driver for Contracting Authorities and Economic Operators during qualitative selection, guiding safely through standardization, easy monitoring, less bureaucracy, less time and less paper.

**How does the VCD system work?** The VCD reference implementation is designed to support Economic Operators in creating a VCD. Contracting authorities can use the VCD reference implementation for proving eligibility of Economic Operators.

**VCD building blocks** The VCD core components (building blocks) are developed to enhance communication between Economic Operators and Contracting Authorities. An overview about the building blocks is provided in this section.

**Additional VCD building blocks** To enhance the VCD system several additional building blocks are planned in the next period.

**VCD pilot participation** Governments, Economic Operators and software companies are invited to use the VCD system. The project also invites all other initiatives relevant for public eProcurement to link with PEPPOL.

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<sup>29</sup> Link to marketing brochure: [http://www.peppol.eu/work\\_in\\_progress/wp2-virtual-company-dossier/vcd-brochure](http://www.peppol.eu/work_in_progress/wp2-virtual-company-dossier/vcd-brochure)



**How to become a VCD pilot participant?** Promote the VCD system in call for tenders and receive accurate supplier qualifications bundled as VCD package. Integrate the VCD building blocks into your tendering system or platform.

**Contact us & participate!** You are kindly requested to contact PEPPOL participants of the Virtual Company Dossier responsible for your country.



## 9 VCD – Governance

The Governance dimension has the goal to describe the Governance structure and –processes for the Business- and ICT architectures of the PEPPOL EIA. Currently the future governance is being analysed and a design is work-in-progress

This chapter contains a first draft and general perspective on the pre-Award VCD Governance. Further details are planned for later EIA releases that will deal with the Governance processes and long term sustainability in more detail.

Governance can be defined as “the establishment of policies, and continuous monitoring of their proper implementation, by the members of a governing body of an organization. It includes the mechanisms required to balance the powers of the members (with the associated accountability), and their primary duty of enhancing the prosperity and viability of the organization.”<sup>30</sup>

This definition covers in particular the reference to policies. A policy can be defined as a set of basic principles and associated guidelines, formulated and enforced by the governing body of an organization, to direct and limit its actions in pursuit of long-term goals. In order to reach long-term goals in a large scale Pilot project like PEPPOL and to ensure sustainability it will be crucial to deal with the interest and the relationships among the stakeholders involved.

Thus a wider definition of corporate governance calls it the framework of rules and practices by which a steering committee ensures accountability, fairness, and transparency in the relationship with its stakeholders. Thereby maintenance plays an important role because systems involved have to be adapted frequently according to a changing environment. As there are so many different organisations and countries involved in the PEPPOL project we can assume that changes will occur on a very frequent basis. From the PEPPOL perspective governance could be defined as the process to effectively operate the PEPPOL solutions and to propose how to keep them alive after the end of the Project (long-term sustainability). PEPPOL will settle a set of new concepts and standards, will involve several stakeholders, and will influence ways of working.

According to the EIF<sup>31</sup>, governance is concerned with the ownership, definition, development, maintenance, monitoring and communication of the various elements (policies, standards, requirements, components etc).<sup>32</sup> In PEPPOL governance implies mastery of the technology, systems and organisations in question, ensuring that their combined activities serve the strategic goals and objectives set out by the EC, the governing board and the beneficiaries for the run-time of the project and beyond.

There are quite a few supporting references developed to guide the implementation of information technology governance. Four of the most well-known frameworks are EIF, CobIT, ITIL and ISO 27001/27002. Taken together, these provide a comprehensive guidance and leading practices for IT Governance. Following the EIF approach on governance in a first step a Governance structure/model has to be defined, encompassing involvement of the stakeholders in the governance activities. This model should focus on the following aspects:

- Specifying decision rights: What has to be governed? Which kind of decisions need to be made? Who can make them?
- Specifying and managing the life-cycles for the artefacts and components of PEPPOL WP2 (VCD): This includes periodic reviews, top-down re-assessments, and taking into account paradigm shifts when they occur in respect to changing environment;

<sup>30</sup> <http://www.businessdictionary.com/definition/governance.html>

<sup>31</sup> The European Interoperability Framework (EIF) was developed within the Interchange of Data between Administrations (IDA) programme of the European Commission and presents a framework for a common understanding of interoperability.

<sup>32</sup> <http://ec.europa.eu/idabc/servlets/Doc?id=31597>



- Measuring effectiveness: Defining metrics (e.g. key success indicators) as well as using them to evaluate and monitor WP2 related artefacts and take appropriate actions whenever needed.

Those aspects mentioned above (decision-making, life-cycle management, monitoring) shall be looked at during and after the project. In particular after the project these aspects get an increased importance and new context. Processes and procedures would have to be established to deal with the application of the metrics, to ensure compliance and provide effective enforcement. In addition economic aspects of sustainable operation of PEPPOL solutions have to be clarified.

The objective of EIF is to support the European Union's strategy of providing user-centred eGovernment services by facilitating, at a pan-European level, the interoperability of services. In this context by adding the pan-European dimension, EIF supplements national frameworks, rather than replacing them. It offers a comprehensive set of principles for European cooperation in e-government by giving recommendations and guidelines with regard to legal, organisational, semantic and technical aspects of interoperability as well as the political context. Governance can be seen as an importance aspect to ensure interoperability in long term on the different layers introduced by the EIF:

- Political aspects of Governance: There is political will to maintain compatible vision developed in PEPPOL and to facilitate the operation of PEPPOL solutions after the project.
- Legal aspects of Governance: The possibility to adapt new regulations on the European Level that will strengthen and support PEPPOL solutions. Also a consistent synchronization with legislation in the co-operating MS has to be ensured.
- Organisational aspects of Governance: The processes, roles and responsibilities necessary to enable decision making and cross border interaction have to be defined.
- Semantic aspects of Governance: Aligning terminology (e.g. to be found in data models, identifiers, code lists, UI) and ensuring the consistent usage across PEPPOL, in the community of procurement in Europe (e.g. CEN) and beyond (e.g. UNCEFACT).
- Technical aspects of Governance: To ensure that infrastructures and architectures (interfaces, components, and artefacts) are maintained and monitored. This may include the interlinking of PEPPOL solutions with other computer systems.



## 10 VCD – Business

The Business dimension of the PEPPOL EIA has the goal to describe the scope and business architecture of the interoperability community: Although a very important dimension, it is not yet decided on the ambition level for this dimension.

Several artefacts like business cases will be inserted into the dimension, but the content scope, coverage and ambition level will be determined through lessons learned in the piloting i.e. what information is important for different stakeholders in such a dimension. Hence, specifics about this dimension are planned for later PEPPOL EIA releases.



## 11 Concluding Remarks

This document provides an aggregated view on the VCD specifications and artefacts from previous deliverables enlarged with most recent results of current developments. By aligning this to the PEPPOL EIA, the deliverable provides a comprehensive description of the VCD system and its ICT Architecture and Conformance and Test dimensions. Initial input also exists for the dimensions Marketing and Governance. The Life Cycle Management and Business Dimension of the Virtual Company Dossier are out of scope of this deliverable as it mainly addresses the need to restructure and to consolidate existing results across PEPPOL WPs according to the PEPPOL EIA. Further elaboration and information about each of the four latter dimensions is scheduled for upcoming releases of the PEPPOL EIA integrating viewpoints of the piloting phase of the PEPPOL VCD solutions.

The abstraction levels of the EIA provide detailed insights into the specific dimensions of the VCD such as its ICT Architecture and Conformance and Test methods that are being used. Each dimension of the VCD is described through strategic aspects like the VCD vision, the overall framework summarized for example in the form of requirements, models that reflect the relevant specifications for the VCD and components that show the reference implementations of the overall VCD system.

While the VCD strategy stays rather stable, business requirements, specifications and VCD components are subject of concurrent developments and updates. This becomes visible in the different components that are scheduled for future releases of the VCD system. Sources for such updates are new business requirements that result in updates of specifications and developments of additional building blocks (see chapter 5.4.6). Another source for revisions and updates is the testing of the VCD system (see chapter 6) which may reveal additional features to be implemented supporting the adequate handling of requirements that are observed during the piloting period of PEPPOL.

The lower abstraction levels (designs and implementations) that are instances of the abstraction levels models and components of the PEPPOL EIA have not been focus of this deliverable yet. The inclusion of these abstraction levels will also be part of the upcoming releases provided within the next period. These dimensions will show that different national implementations of the VCD exist within PEPPOL countries, each of them reflecting different strategies and conditions. They will show the different implementations of a VCD system for example as an authorized national service, as an integration module to an eTendering platform or as a stand-alone service.

The VCD PEPPOL EIA will help to manage all relevant artefacts of the VCD that have been produced during the PEPPOL lifetime. The uniform EIA repository reflects the different aspects of PEPPOL and is an important step towards sustainability and governance of PEPPOL solutions. It helps to cope with such a dynamic system environment created by PEPPOL and lays the ground for governance and transfer of ownership by providing common and consolidated viewpoints on the PEPPOL VCD. Although initial input has been provided for the governance dimension (see chapter 9), it has to be further elaborated in greater detail and will be published with future releases of the PEPPOL EIA in coordination with the other PEPPOL work packages.



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