

Guideline



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PostAward eProcurement CT – Model

Guideline for PostAward Conformance and Testing

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Editors:
 Alexander Forst-Rakoczy (BRZ/42virtual)



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Contributors

Organisations

DIFI (Direktoratet for forvaltning og IKT)¹, Norway, <http://www.difi.no>
NITA (IT- og Telestyrelsen)², Denmark, <http://www.itst.dk>
PEPPOL.AT/BBG (Bundesbeschaffung), Austria, <http://www.bbg.gv.at/>
PEPPOL.AT/BRZ (Bundesrechenzentrum)³, Austria, <http://www.brz.gv.at/>

Persons

Alexander Forst-Rakoczy, 42virtual (editor)
Andrea Leutgeb, PEPPOL.AT/BBG
Bergthor Skulason, NITA
Georg Birgisson, NITA/Eykur
Klaus V. Pedersen, DIFI
Oriol Bausá, NITA/Invinet
Philip Helger, PEPPOL.AT/BRZ

¹ English: Agency for Public Management and eGovernment

² English: National IT- and Telecom Agency

³ English: Austrian Federal Computing Centre

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1 Introduction

1.1 Objective and Scope

The scope of this document is to provide a guideline to PEPPOL conformance and interoperability as well as the PEPPOL agreed standards on quality assurance for testing of document contents in post award processes, catalogues, orders and invoices. The target group for this document is implementers of PEPPOL specifications – they should use it as a guideline for testing for BIS conformance as basis for claiming PEPPOL conformance.

1.2 Audience

The audience for this document is organizations wishing to be PEPPOL enabled for exchanging Catalogues, Orders, and Invoices and related documents via the PEPPOL transport infrastructure, i.e. the following PEPPOL Stakeholders:

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

More specific it is the following roles:

- ▶▶ Business Experts
- ▶▶ ICT Architects
- ▶▶ ICT Developers
- ▶▶ ICT Governing participants

1.3 The PEPPOL BIS – short overview

The PEPPOL BIS (Business Interoperability Specification) provides a set of specifications for implementing PEPPOL business documents. The specifications enable any company to issue electronic documents that fulfil legal and business processing requirement within the European Union and the EEA. It supports a subset of information that is used by most industries and enables users to issue documents (invoices, orders, etc...) that are valid for cross border trade within the European Union and the EEA⁴.

The BIS specifications are based on set of requirements to provide support for “common business processes” and legal requirements. The BIS identifies a small set of information elements and business rules as a basis for supporting these requirements. A selection of business rules places restrictions on the data elements to fulfil the requirements and clarify choices otherwise left open to implementers.

1.4 PEPPOL Implementation support

Information on implementation support can be found at PEPPOL Post Award support page, see [PEPPOL_PostAward].

PEPPOL has set up the PEPPOL Enterprise Interoperability Architecture (EIA) – that presents the PEPPOL artefacts in a repository. The EIA repository is a three dimensional matrix for organizing results of the project. The PEPPOL EIA is a 3 dimensional cube you can navigate by clicking a one of the blue cell in the frame. For more information about the PEPPOL EIA, see [PEPPOL_EIA].

The latest version of this document can be found in: Post Award eProcurement / Conformance and test / Models.

⁴ EEA is the European Economic Area. Current members are Iceland, Liechtenstein and Norway.

1.5 References

- [PEPPOL] <http://www.peppol.eu/>
- [PEPPOL_EIA] http://www.peppol.eu/peppol_components/peppol-eia/eia
- [PEPPOL_PostAward] http://www.peppol.eu/peppol_components/peppol-eia/eia#ict-architecture/post-award-eprocurement/models
<http://www.peppol.eu/PostAward>
- [PEPPOL_Transp] http://www.peppol.eu/peppol_components/peppol-eia/eia#ict-architecture/transport-infrastructure/models
<http://www.peppol.eu/Transport>
- [PHLOC] PEPPOL Test Management and Development
<http://peppol.phloc.com/>
<http://peppol.phloc.com/config>
- [GITB] Global eBusiness Interoperability Test Bed methodologies
<http://www.cen.eu/cen/Sectors/Sectors/ISSS/Workshops/Pages/Testbed.aspx>
ftp://ftp.cen.eu/CEN/Sectors/List/ICT/GITB2_draft_CWA.pdf
- [CEN_BII] www.cen.eu/cwa/bii/specs
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<http://www.cen.eu/cwa/bii/specs/Pilot/IndexWG4.html>
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- [BISSWG] ICT-PostAward-BIS_Software_Guideline-100.pdf
http://www.peppol.eu/peppol_components/peppol-eia/eia#ict-architecture/post-award-eprocurement/services-components
https://joinup.ec.europa.eu/svn/peppol/PEPPOL_EIA/1-ICT_Architecture/1-ICT-PostAward_eProcurement/14-ICT-Services-Components/ICT-PostAward-BIS_Software_Guideline-100.pdf
- [EIF] European Interoperability Framework 2.0, found at:
http://ec.europa.eu/isa/library/index_en.htm
http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf
- [CTPATF] Conformance and Testing, PostAward Test Framework
http://www.peppol.eu/peppol_components/peppol-eia/eia#conformance-test/post-award-eprocurement/framework
https://joinup.ec.europa.eu/svn/peppol/PEPPOL_EIA/2-Conformance_Test/2-CT-PostAward_eProcurement/22-CT-Framework/CT-PostAward-Test_Framework_100.pdf
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2 Overall PEPPOL QA and testing landscape

2.1 PEPPOL Interoperability and clarification of terms

The goal of PEPPOL interoperability is to electronically enable parties to exchange a set of information to be used within a minimal but well defined set of procurement processes without previous bi lateral setup of data, content rules and process specifications. Electronic documents that are conformant to PEPPOL BIS specifications can be exchanged widely within Europe in open procurement communities using the PEPPOL Transport Infrastructure that ensures transparent transport between existing eProcurement solutions. An issuer of a document can with high degree of certainty expect the document to pass validation by the receiver. The conformance specifications also serve as a basis for bi lateral specification of additional information to be exchanged between trading parties. In this way, PEPPOL does deliver both transport interoperability as well as content interoperability.

An important cornerstone for the Test Guidelines is the European Interoperability Framework [EIF], an initiative run by IDABC (Interoperable Delivery of European eGovernment Services to public Administrations, Business and Citizens).

PEPPOL has aligned its testing scope and terminology with the GITB Testing Framework [GITB]. PEPPOL strongly recommends a test bed which allows automatic testing.

2.1.1 PEPPOL conformance

PEPPOL compliance means, that a solution or implementation of PEPPOL process is conformant to specific legal and business requirements, process, semantic and technical solutions defined by PEPPOL or committed and approved by PEPPOL.

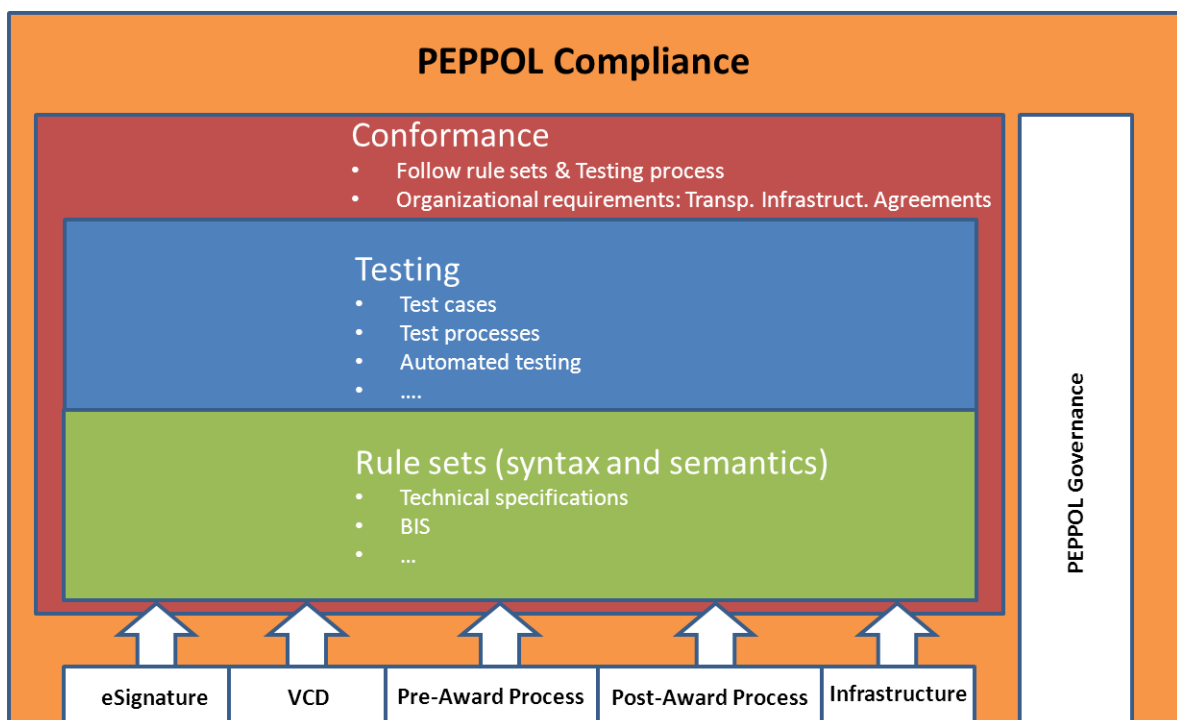


Figure 1: Overview of compliance, conformance and testing.

PEPPOL conformance testing is defined as a process for implementers to claim conformance to a set of legal and technical specifications defined by PEPPOL. PEPPOL conformance is therefore based on self-assessment. Figure 1 explains the relationship between compliance and conformance and demonstrates the role of testing in conformance.

2.1.2 Role of Testing and Validation

Testing and validation provide the processes and tools for participant to claim conformance. PEPPOL testing therefore defines a set of activities containing test processes and test cases to ensure the functional and non-functional requirements of the system work together as defined by the different PEPPOL artefact interoperability requirements (eSignature validation, Pre Award eProcurement, Post Award eProcurement and Transport Infrastructure).

The **rule sets** are the PEPPOL BIS specifications, the relevant specifications that must be tested for claiming conformance.

2.1.3 How is conformance achieved

Pilot participants must claim conformance to PEPPOL specifications. This is based on a self-assessment process supported by guidelines, test documents and compliance criteria's.

Trading partners or solution providers can claim conformance for the *Solution*, i.e., their system and software that is connected to the PEPPOL infrastructure and sends/receives document instances.

2.1.4 Conformance criteria for PEPPOL Communities

Every PEPPOL Community defines a set of specifications and requirements that must be fulfilled as part of definition of conformance for that Community. These are the rule sets (requirements) that must be met by all who claim conformance in the Community.

For the PEPPOL Post Award, conformance is defined as:

- ▶ The *Solution*⁵ must be able to receive and/or send documents according to one role in a PEPPOL BIS.
- ▶ The *Solution* can create document instances which must conform to the document specifications and business rules that apply to the content.
- ▶ Conformance is defined in terms of buyer and seller (systems). Service providers CAN take on a role on their behalf, but they do NOT by themselves play any role in PostAward conformance.
- ▶ The solution provider must execute the relevant test cases according to the Solution's role in a PEPPOL BIS.

In terms of electronic documents an **XML instance is conformant** to a PEPPOL BIS specification when:

- ▶ It is a valid instance in terms of its syntactical structure.
- ▶ It has no other elements than the ones considered valid according to the declared Customization Identifier.
- ▶ It fulfils the business rules defined by the PEPPOL BIS.

More information about PEPPOL conformance and validation architecture can be found in the document: "Validation Artefacts for Post Award BIS" that can be located in [PEPPOL_PostAward].

2.2 General QA and Testing Methodology

The general QA and testing methodology follows the V-Model of the CEN ISSS WS/BII Test Guidelines [CENBIITG] which has been adapted for PEPPOL in the PostAward Testing Framework [CTPATF]. The testing scope and terminology is also influenced by the GITB Testing Framework [GITB] because the recommendation to use a test bed which allows automatic testing.

The PHLOC server is used as a repository for test cases and Test Bed [PHLOC].

⁵ The *Solution* is the system or software that sends/receives document instances.

3 Overall Testing Process

3.1 Test Roles

When executing tests, different roles must be assigned [GITB]. One person can often easily be assigned to several roles; the purpose of describing several roles is to simplify the division of responsibility in larger test assignments.

The names of the roles come from [GITB]. Corresponding roles from [CTPATF] are in parentheses.

Role	Responsibilities	Assignment
Test Designer (Test manager, Test data manager)	Creates test suites (test cases, document assertion tests, configuration artefacts) Understands eBusiness domain Understands testing conditions and constraints Familiar with the testing framework methodology and best practices	Mandatory
Test Participant (Tester)	Owens or operates the SUT (System Under Test) Responsible for eBusiness implementation Must have business domain expertise	Mandatory
Test Manager (Test manager)	Responsible for executing Test Suites Coordinates with Test Participants Assists Test Participants in using the Test Bed Familiar with the Test Suite Logic and related eBusiness domain	Recommended
Test Bed Provider (Test environment manager)	Operates the Test Bed Responsible for keeping the Test Bed functionally operational	Recommended

3.2 Test Process

The Test Process follows the sub processes that are outlined in [CTPATF]: Mobilise, Prepare, Execute, and Summarize. Figure 2 gives a more detailed overview.



Figure 2: QA and testing process

- ▶ Test planning and controlling (Mobilize)
 - ▶▶ Requirements analysis: Determine what aspects of a design are testable and with which parameters those tests work.
 - ▶▶ Create the test concept
 - ▶▶ Define the test environment and infrastructure, e.g. Hardware, Software
 - ▶▶ Define the functions or components to be tested according to the requirements analysis
 - ▶▶ Define the acceptance criteria
 - ▶▶ Organize the test team
 - ▶▶ Allocate resources and budget
- ▶ Test preparation (Prepare)
 - ▶▶ Kick-off workshop for the test team
 - ▶▶ Setup the test environment and infrastructure

- ▶▶ Create a test plan
- ▶▶ Define test data and test scripts
- ▶ Test case design (Prepare)
 - ▶▶ Review the test cases on the Test Bed
 - ▶▶ Recommended: Create new test cases and upload them on the Test Bed
- ▶ Test execution and documentation (Execute)
 - ▶▶ Execute the test cases based on the test plan
 - ▶▶ Re-test any previous defects that have been solved by the development team.
 - ▶▶ Test Participants report any errors to the Test Designer (and Test Manager if available)
- ▶ Defect management (Execute)
 - ▶▶ Record defects and monitor bug fixing
 - ▶▶ Regression tests: Build a subset of tests for each integration test phase of new, modified, or fixed software in order to ensure that the software is still working correctly.
- ▶ Reporting (Summarize)
 - ▶▶ Once the test meets the exit criteria report the results, key outputs, logs, and related documents.

4 Functional Testing Scope

The functional testing scope covers the recommended CEN ISSS WS/BII Test levels [CENBITG, CTPATF] (Process level, Semantic level, and Technical level – profile dependent) and follows the testing methodologies of [GITB], specifically:

- ▶ Standalone Document Validation
- ▶ SUT-Interactive Conformance Testing

4.1 Standalone Document Validation

Document validation verifies an artefact, e.g., an invoice, against the rules defined in the specification. This form of testing doesn't directly involve a SUT but rather an artefact that was produced by a SUT. This type of testing follows the “down part” of the V-Model of [CTPATF].

The document under test is obtained somehow by a Test Participant, e.g., by generating an invoice by the SUT, and submits this artefact to the validation service on [PHLOC].

Test Case Criteria	Conformance
An XML instance generated by the sender must be based on PEPPOL BIS specifications of the relevant CORE document	mandatory
The artefact must fulfil BII profile conformance, i.e., technical structure, basic common rules, and process rules must be valid	mandatory
The artefact must fulfil national and EU legal requirements; invoices must be valid legal documents in the country of origin	mandatory

4.2 SUT-Interactive Conformance Testing

Fully automatic SUT-Interactive Conformance Testing according to [GITB] is not possible at the moment. Manual testing can be achieved by using the test cases that are available on [PHLOC]. This type of testing follows the “up part” of the V-Model of [CTPATF].

Test Case Criteria	Conformance
The receiver should validate the XML instance if it is conformant to UBL, CORE, and the PEPPOL BIS.	recommended
The receiver must be able to process an XML instance that fulfils all PEPPOL BIS requirements and agreed (national) extensions.	mandatory
The receiver must be able to process invalid XML instances, i.e., react correctly according to its role in this PEPPOL transaction.	mandatory

Clarification: “to process” an XML instance means that the receiver must react correctly according to its role in this PEPPOL transaction even if the provided artefact is not valid technically. This, for example, implies sending an order response depending on the context, i.e. according to the relevant BIS specifications that apply in that situation.

4.3 Validation

The exact steps how to create and validate an XML instance are available in [BISSWG]. The validation follows the pyramid scheme that is outlined in the European Interoperability Framework 2.0 [EIF]

In order to test your document validators please use the PEPPOL Test Management and Development tool on [PHLOC].

5 Test Environment and Execution

5.1 Test planning and controlling

Follow the guidelines in [CTPATF] and align the planning with the overall project plan, possibly by executing a series of workshops in order to verify that the all entities of your solution are covered by the test plan. It is also important to identify and include indirectly related systems into the test plan.

Define the test context, i.e., which profile you want to test and who is responsible for what parts. Design a draft of the test plan.

5.2 Test preparation

- ▶ Kick-off workshop for the test team
- ▶ Setup the test environment and infrastructure
- ▶ Create a test plan
- ▶ Define test data and test scripts

5.3 Test case design

PEPPOL uses the Test Management Tool on [PHLOC] to provide tools, documents, documents, and test cases. A standardized test case template makes sure that the relevant information will be contained in all test cases and will make the test cases reusable.

- ▶ Review the test cases on the Test Bed
 - ▶▶ Navigate to the appropriate folder on [PHLOC] and review the test cases that are marked as mandatory, i.e., have the priority “high”
 - ▶▶ The test cases describe the steps to conduct the test execution including preconditions to verify the required condition.
- ▶ Recommended: Create new test cases and upload them on the Test Bed

Every PEPPOL pilot should submit example documents as valid test cases and invalid cases (non-valid constellations), with known errors the testers are expected to find. This is to ensure that not only functional transactions but also all validation rules and error handling are working correctly.

The standardized test case template makes sure, that the relevant information will be contained in all test cases and makes test cases reusable (for different test phases, levels)

5.4 Test execution and documentation

5.4.1 Standalone Document Validation Testing

According to chapter 2.1.4 conformance is achieved when the participant is able to create documents according to one role in a PEPPOL BIS and when the documents conform to the appropriate BIS specifications and business rules.

Most CAs will only create artefacts of certain BIS specification. The assumption is also that accounting systems will create invoices with a restricted or similar set of billing information. Thus, great care must be taken on the creation of differing test cases.

The steps to run the tests are as follows:

- ▶ Log on to the [PHLOC] Test Management Tool: <http://peppol.phloc.com/config>
- ▶ Navigate to the test category “PostAward”
- ▶ Review the test cases in “Mandatory Document Validation Testing” (Figure 3)
- ▶ Create appropriate test cases according to your role in a PEPPOL BIS
- ▶ Create artefacts according to your test cases
- ▶ Validate the artefacts using the validation tool on [PHLOC]
- ▶ Execute your test cases on [PHLOC] and set the result (Figure 4)

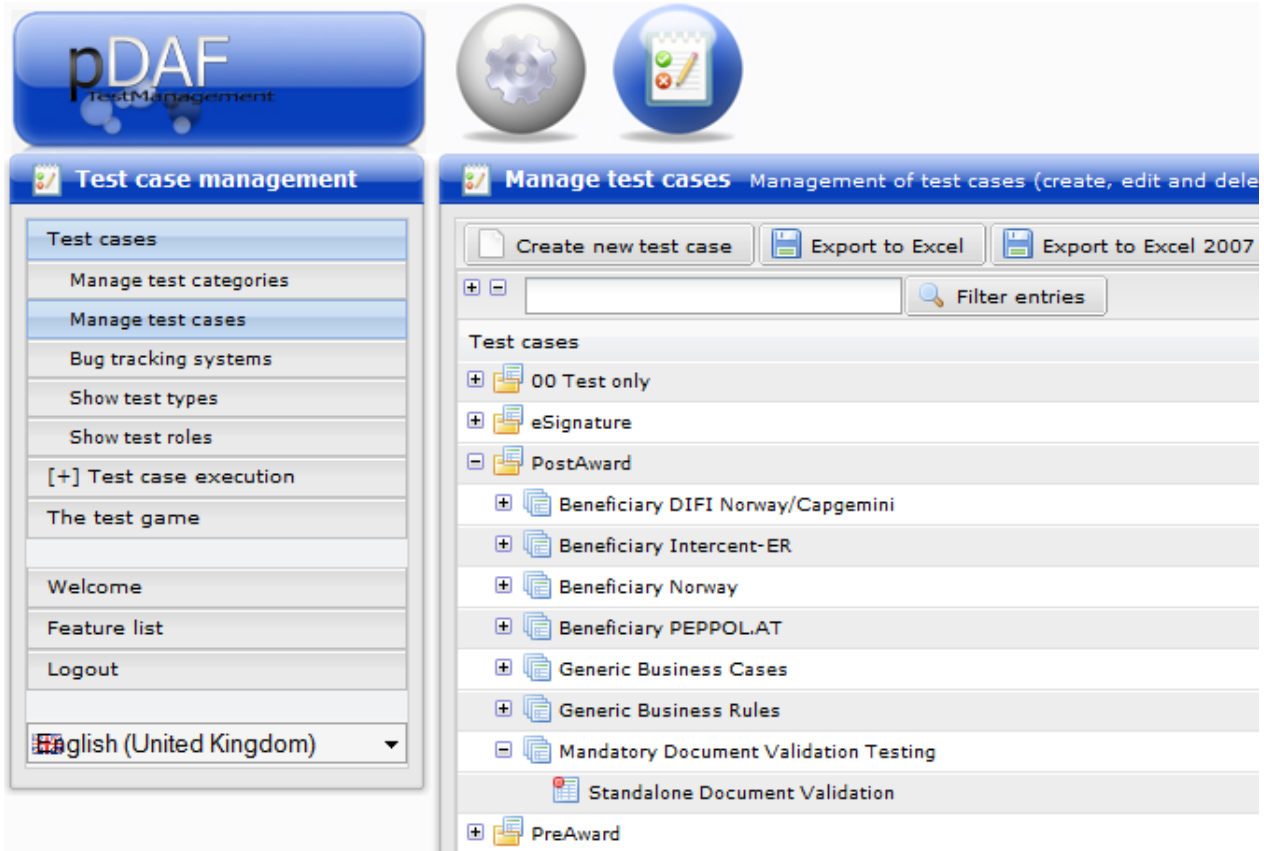


Figure 3: Test Case for Document Validation

In order to achieve conformance you should test 10-20 artefacts depending on the document type, transaction, and national rules.

5.4.2 SUT-Interactive Conformance Testing

According to chapter 2.1.4 conformance is achieved when the *Solution* is able to receive documents according to one role in a PEPPOL BIS.

The steps to run the tests are as follows:

- ▶ Log on to the [PHLOC] Test Management Tool: <http://peppol.phloc.com/config>
- ▶ Navigate to the test category “PostAward”
- ▶ Review the test cases in “Generic Business Rules” and “Mandatory SUT-Interactive Conformance Testing”
- ▶ Review the test cases that apply to your Solution
- ▶ Retrieve the XML attachments from the test cases marked as “high priority”
- ▶ Use the artefacts from the test cases in your SUT and note the results
- ▶ Execute the test cases on [PHLOC] and set the result status accordingly (Figure 4).

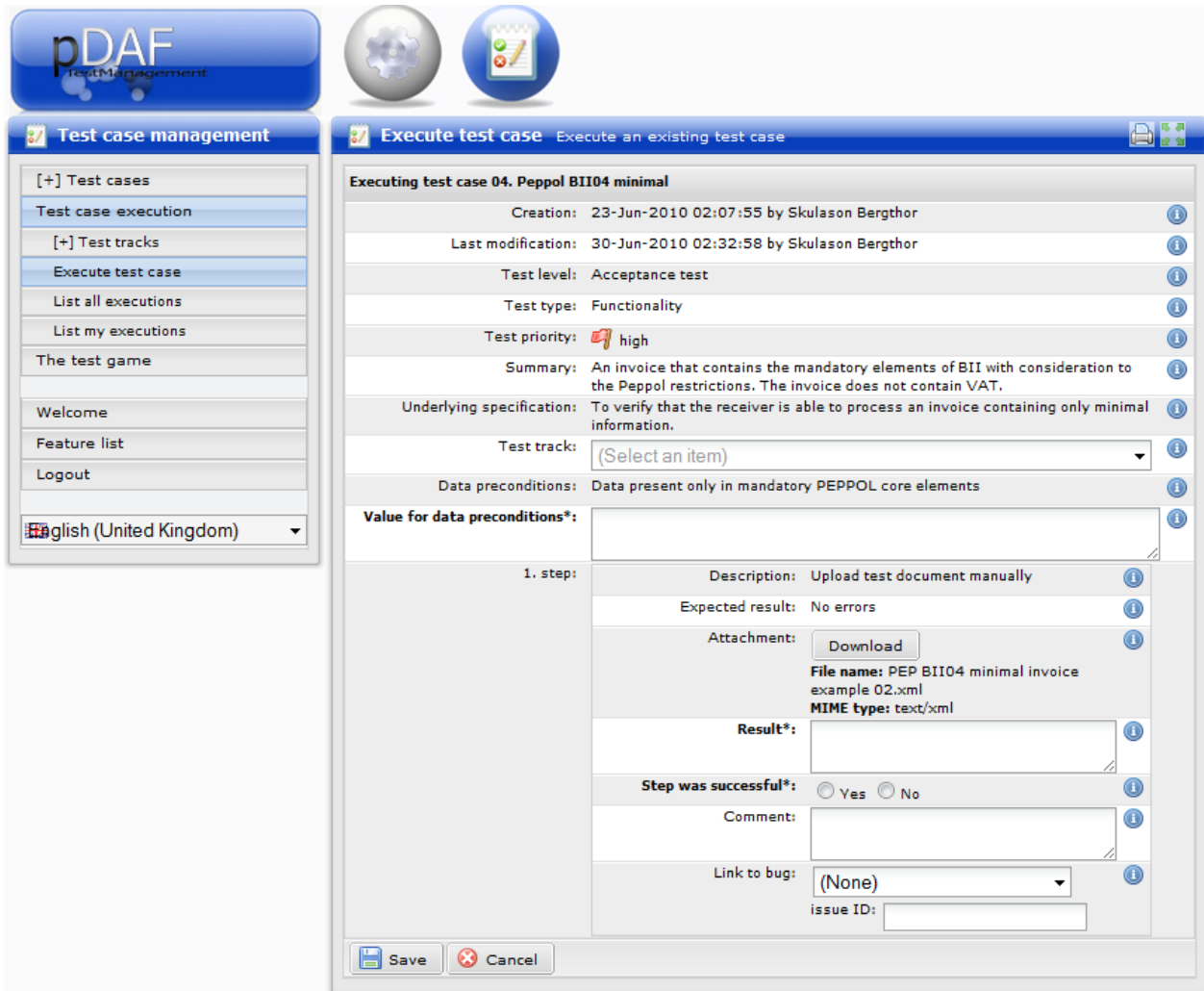


Figure 4: Execute a Test Case

5.5 Defect Management

It is important to track the status of tests during the execution of test runs. The status of tests can also be documented and tracked on [PHLOC] if necessary. There is a list of test cases available that were executed by a user (Figure 5). This list can be sorted by the success status.

Test cases will also be organized in Test tracks that make it easy to get an overview about test executions that were successful or failed (Figure 6).

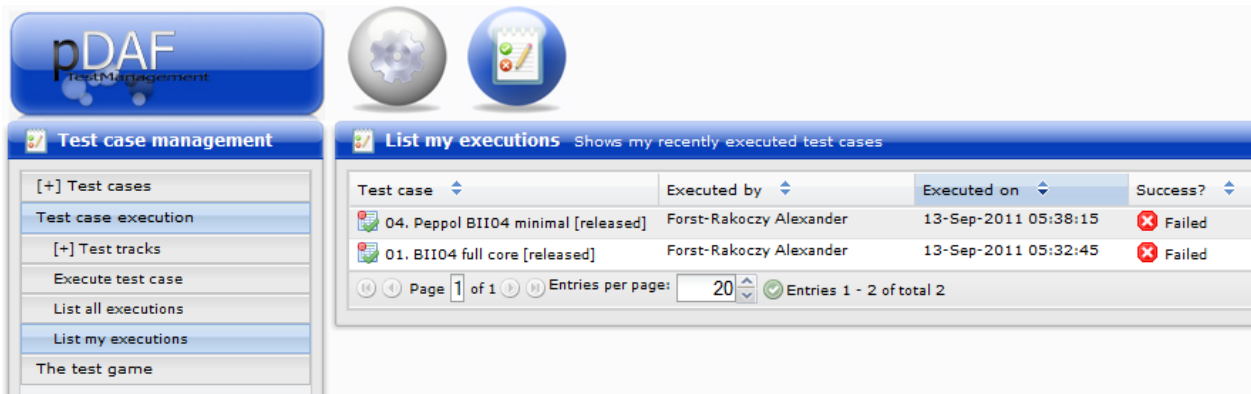


Figure 5: List my executions

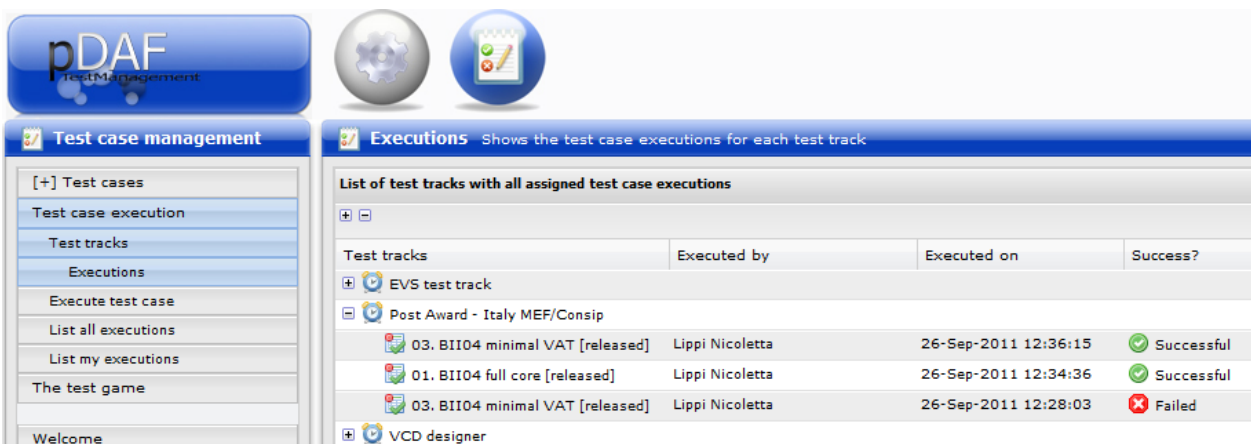


Figure 6: Test track executions

5.6 Reporting

Process of testing and testing results has to be documented as part of the process for reporting and for verification purposes. PEPPOL will report to project beneficiaries and the EU on results of interoperability testing and hindrances to cross border trade identified. To support these objectives the participants have developed templates and reporting tools [CTPATF, PHLOC].

Participants are encouraged to input test cases by using provided templates and tools to report the outcome of the execution – you can save a lot of work!

A report of the executed test cases and results can be automatically generated by the PEPPOL Test Management and Development tool [PHLOC].

Appendix – Abbreviations

Abbreviation	Meaning
AP	Access Point
ASAP	As soon as possible
BIS	Business Interoperability Specification (former: PEPPOL profile)
CA	Contracting authority (e.g. buyer)
EO	Economic operator
EUGEN	European Union Generic
OSOR	Open Source Observatory and Repository
OSS	Open Source Software
PEPPOL	Pan-European Public Procurement On-Line
SML	Service Metadata Locator
SMP	Service Metadata Publisher
SVN	Subversion
WPM	Work Package Manager
SUT	System Under Test
CEN	Comité Européen de Normalisation European Committee for Standardization
BII	Business Interoperability Interface
CENBII	CEN/ISSS Business Interoperability Interfaces for Public procurement in Europe
EIF	European Interoperability Framework 2.0