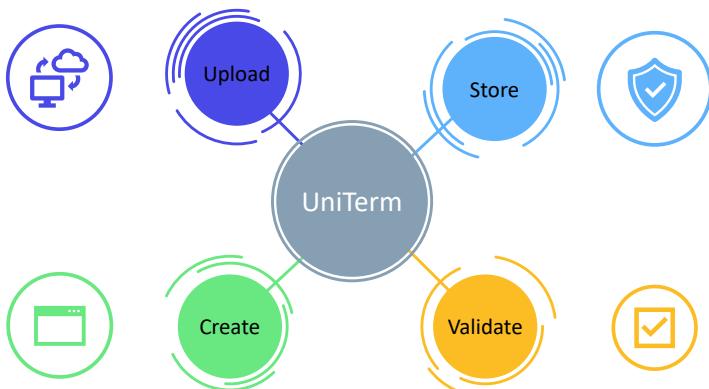


## Report on the validation of a demonstrator for the use of UniTerm in the legal weighing industry

EN

### UniTerm



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The title figure uses mind maps from Slidesgo



# Report on the validation of a demonstrator for the use of UniTerm in the legal weighing industry

- Exchange of a machine-readable EU  
Declaration of Conformity -

Version 1.0

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Comprising the results from our research and the fruitful and intensive discussions with all our other project partners worldwide.

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## 1 Introduction

The purpose of this document is to report on the use of a demonstrator application built to show how, in principle, legal metrology information can be shared and processed in a local, or wide area network type environment. Typically, the network type will be either an intranet or more commonly an internet. This work was performed for work package 5, task 5.2 of the SmartCom project plan. This document forms the D8 deliverable to the SmartCom project “Report on the validation of a demonstrator for the use of UniTerm in the legal weighing industry”.

Further details of the requirements and system design for the demonstrator for the legal metrology information sharing process can be found in the SmartCom deliverable document D6 “Guideline describing the concept of UniTerm (Unified user interface) and how to establish secure communication interfaces in legal metrology” [1].

## 2 Background

### 2.1 Paper EU DoC

During the production phase of an instrument lifecycle in legal metrology a conformity assessment is performed. This procedure is followed by drawing up and exchange of an EU Declaration of Conformity (EU DoC). Within the “New Legislative Framework” of the European Union [2], the main purpose of the EU DoC is to document which Union harmonisation legislation applies to a particular instrument and who is responsible for compliance with the EU legislation requirements.

The EU DoC must be drawn up and signed by the manufacturer (or his authorised representative). Once the EU DoC has been created, the manufacturer must take over responsibility for the compliance of the object of the declaration (the instrument), with the requirements that are given within the EU harmonisation. The requirements and usage of an EU DoC are discussed in [1] in details. The creation and exchange of so-called paper EU DoC's is time consuming and an error-prone process, since it often requires manual data exchange between different stakeholders.

### 2.2 Digital EU DoC

The Digital EU DoC provides a machine-readable version of the EU DoC in XML format that can be exchanged by digital means such as online interfaces from a cloud platform. It consists of unified data elements that are

helping to reduce errors and improve the interoperability of the EU DoC with machines and automated processes.

In the user interface of UniTerm, various functions are realised to create and manage the Digital EU DoC in a way that is suitable for human users. It includes easy to use mechanisms to establish the exchange and validation of the declaration with cloud platforms.

### 2.3 Use Case Diagram

Figure 1 shows a top level Use Case Diagram for the web-based process whereby an instrument manufacturer is requesting the validation of an EU Declaration of Conformity for a new instrument to put onto the market.

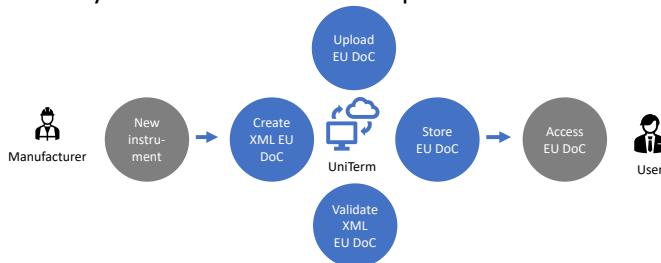


Figure 1 UniTerm Use Case Diagram

It will be the actual Manufacturer Actor who will instigate the process for the creation of the EU DoC to be validated by: creating an EU DoC, uploading the EU DoC to an EU DoC Service. From the other side user can access in secure way the EU DoC document, by its ID. Note that beyond these automated interactions there will be other systems and actors but they do not form part of the system being described here and so are not shown.

## 2.4 Process Map

The process for applying UniTerm with the Digital EU DoC use case is visualised in Figure 2. It schematically represents the sequence of events, required to create and validate an EU DoC by the manufacturer as well as access to the existing documents by the user. Process map components presented in blue denote the implemented functionality of UniTerm. Orange-coloured fields refer to EU DoC and archive services, realised on the basis of AnGeWaNT's platform [3]. The grey-coloured fields describe functionalities, which were conceived, but not implemented in the current version of UniTerm. The last refer to the security concept, described in details in [1].

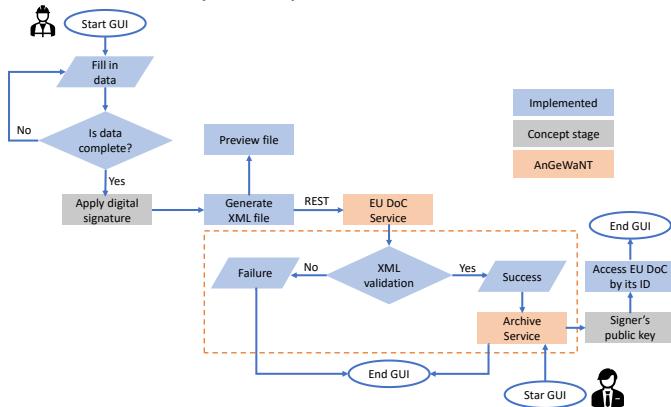


Figure 2 Process map of the UniTerm

The detailed description of UniTerm functionality is provided in section 3 of this document

### 3 Demonstration SmartCom UniTerm functionality

The UniTerm application demonstrates a graphical user interface (GUI) providing different functionality that helps instrument manufacturers and their users to work with the digital EU DoC. The demonstrator software can be run locally on a computer (see Annex on the IT infrastructure requirements). The GUI is executed within a web-browser. The following sections 3.1 to 3.4 give a brief description of the implemented functions. Section 3.5 provides feedback and further recommendations of industry users of the EU DoC for the UniTerm application.

#### 3.1 Creation of EU DoC

The first function of the UniTerm application allows a user to create a Digital EU DoC by filling in a simple form which is shown in Figure 1. The content, that is filled in by the human user into the form will automatically be converted into the machine-readable XML document for the EU DoC. The button “New EU-DoC” in the UniTerm application will open the form for creating the document.

The form is a web-based input field for a manufacturer's declaration. It includes the following fields:

- Name:** A text input field.
- Street:** A text input field.
- Zip Code:** A text input field.
- City:** A text input field.
- Country:** A text input field.
- Telephone No.:** A text input field.
- Product:** A dropdown menu.
- Description:** A text input field.

A "Back" button is located at the top left of the form area.

Figure 3 Form to fill in the information on the object of declaration

Filling in the form is supported by automatic notifications (error messages) in the case that content is either incomplete or wrong. In addition, some blocks of content for the digital EU DoC are predefined within the UniTerm demonstrator such as common statements on the conformity with regulations and standards [4], see Figure 4. These can simply be included in EU DoC by ticking a checkbox for a statement.

The screenshot shows a web-based form titled "Conformity Directive". It has two columns: "Number" and "Description". Under "Number", there is a row with the value "1". Under "Description", there is a row with the value "Example". Below this table is a plus sign (+). At the bottom of the form, there are two checkboxes, both of which are checked:

- This declaration of conformity is issued under the sole responsibility of the manufacturer.
- The object of the declaration described above is in conformity with the relevant Union harmonisation legislation.

Figure 4 UniTerm predefined blocks of content, defining mandatory statements for EU DoC

Existing digital EU DoC documents can also be loaded into this form via simple Drag-and-Drop of XML files to the UniTerm web-browser window.

### 3.2 EU DoC exchange

Manufacturers of measuring instruments and their users have the possibility to exchange and easily access the digital EU DoC via the UniTerm application. This exchange consists of two parts. In the first part, the provider (manufacturer) can upload the digital EU DoC to the cloud platform (AnGeWaNt service used within the demonstrator [3]), where it is archived with a unique Identification number (ID). The upload is activated by pressing “Send XML” button, see Figure 5, after filling the form, described in section 3.1.

The screenshot shows a web-based form titled "EU Declaration of Conformity". At the top left, there are fields for "Location" (Braunschweig) and "Document No." (123321). Below this is a section for "Manufacturer" with details: Name (Sarimax Lab Instruments GmbH & Co. KG), Address (Otha-Brenner-Strasse 20), City (37077 Goettingen DE), and Phone (123). Under "Product", it specifies "Non-electronic electromedical weighing instrument without limit system". The "Type" is listed as "Model xyz". At the bottom right of the form are two buttons: "Generate Preview" and "Send XML".

Figure 5 UniTerm interface to upload EU DoC and generate preview

In the second part of the exchange, the user and manufacturer retrieve the digital EU DoC documents from the documents that are archived in the cloud platform by entering the ID of the relevant document, see Figure 6.

The screenshot shows a search interface for EU DoC documents. The search bar contains "0". On the right, there are dropdown menus for "Search mode" (set to "Mandant Id") and "Actions". The main table lists two documents:

Mandant Id	Document Id	File name	Actions
0	1	DOC_1.xml	Load
0	2	DOC_2.xml	Load

Figure 6 Interface to access EU DoC by its ID

The UniTerm demonstrator establishes this exchange in a very basic way. Future interfaces for practical use would include additional security mechanisms such as access control (visibility of documents only for users with permission given by EU DoC provider) and further integrity and authenticity checks (e.g., digital signature for trusted verification of source of EU DoC and its correctness).

### 3.3 Validation against XSD schema

An XML-based schema is stored in AnGeWaNt's Archive Service and is used for validation of an EU DoC XML file,

created by a manufacturer. After the data has been entered, the manufacturer can send the XML file for validation by pressing the “Send XML” button, see Figure 7. After a validation process, a success or failure statement is communicated back to the user.

The screenshot shows a web-based form titled "EU Declaration of Conformity". At the top, there is a section for "Instrument" with fields for "Location" (Braunschweig) and "Document No." (123321). Below this, the form is divided into two main sections: "Manufacturer" and "Product". Under "Manufacturer", there is a field for "Name" (Sachsen-Lahn-Instrumente GmbH & Co. KG), address (Otro-Brausestrasse 20, 37070 Goettingen DE), and phone number (123). Under "Product", there is a field for "Name" (Non-electric electrochemical weighing instrument without force system), type (scale-type), and model (model-type). A green banner at the bottom left of the form area displays the message "Successfully sent XML." with a checkmark icon. At the bottom right, there are two buttons: "Generate Preview" and "Send XML".

Figure 7 Send XML file for validation in EU DoC Service

### 3.4 EU DoC preview

After filling the corresponding form with the instrument information or retrieving the digital EU DoC document from archive, the user has the possibility to preview data, by pressing the “Generate Preview” button, see Figure 7. In the current version of the UniTerm application, the preview options are limited to an HTML browser preview. In future versions of UniTerm, the option to generate a human-readable file, for example in PDF format, must be added.

### 3.5 Adaption for industrial use

To adapt the existing prototype version of the UniTerm application for industrial use, firstly, improvements in terms of input automatisation are required. In the real case, manufacturers frequently issue large numbers of EU DoC

documents on a daily basis, which makes manual input, see section 3.1 ineffective. To make a real step towards process digitisation, the UniTerm validation system would need to be integrated with the instrument manufacturing system. Direct information transfer from the manufacturing system, containing all the required instrument information, will allow for the automatic generation of the EU DoC XML file.

Several steps regarding user-friendly UniTerm interoperability would need to be performed. This includes more informative error messages and better UniTerm field names, etc. The human-readable version of the EU DoC file must be available for download in order to facilitate the transfer with the national authorities, which, currently do not support a digitalised conformity assessment process. Finally, a future version of UniTerm would much benefit from an extension with the option to update or correct existing EU DoC.

## 4 Summary

The demonstrator application as described above has clearly shown how information relating to legal metrology can, in principle, be shared and processed in a computing network environment. Although the demonstrator takes a specific information example from the field of legal metrology i.e. the XML-validation (information completeness check) of an EU DoC for a new instrument, the principle would be the same for all legal metrology information whether administrative or technical data was involved.

Although beyond the scope of the current project definition, the demonstrator application provides a simple foundation implementation that can be further modified/adapted to produce a version that could form the template applicable to most legal metrology information and/or data sharing activities.

## 5 References

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- [2] European Commission, *New legislative framework*. [Online]. Available: [https://ec.europa.eu/growth/single-market/goods/new-legislative-framework\\_en](https://ec.europa.eu/growth/single-market/goods/new-legislative-framework_en) (accessed: Jun. 17 2021).
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## 6 Annex: IT requirements for UniTerm run

The UniTerm demonstrator works on a standard office PC or any device that is supporting Java applications and Java Script applications (Node.js). To run UniTerm, it is required to have an installation of Node.js (version 14 or higher). The source files of UniTerm are compiled to an executable service with Node.js. The service itself is run through Node.js and the frontend with the user interface of UniTerm is accessed via a web browser.

The functions for archiving EU DoC documents, validation and creation of human-readable outputs are established through two JAVA services that are under development in project AnGeWaNt [3]. These services are provided by executable JAR (JAVA ARchive) files that run with a JAVA Runtime Environment (JRE) 11 or higher (e.g., Installation of Open JDK 11).

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<https://www.ptb.de/empir2018/smartcom>  
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