CEN

WORKSHOP

AGREEMENT

CWA 16200

September 2010

ICS 35.040

English version

A Guide to the Development and Use of Standards Compliant Data Formats for Engineering Materials Test Data

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Ref. No.:CWA 16200:2010 E

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Foreword

The production of this CWA (CEN Workshop Agreement), *Economics and Logistics of Standards-Compliant Schemas for Interoperability of Engineering Materials Data,* was formally accepted at the Workshop's kick-off meeting on 12th May 2009, held at CEN, Brussels.

The document was developed through the collaboration of a number of contributing partners in the CEN WS ELSSI-EMD, including universities, digital curation centres, industry, consultants, software houses. The CEN Workshop was active from May 2009 until June 2010.

A period of public comment was held during March-April 2010. The final text of the CWA was formally endorsed at the Workshop final meeting, 27th May 2010, and following an electronic round of comments in June 2010. The name of companies/organizations, which endorse the CWA, is listed hereunder.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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The CEN WS ELSSI Project Team (PT) expresses its thanks to Dr Chris Bullough for his active participation in the work and his expert guidance.

Finally, the contributions from the registered participants, experts in the domains of engineering materials, data curation, and standardization, to the work of CEN WS ELSSI are gratefully acknowledged.

NOTE While a decision on CEN hosting the data formats that CEN WS ELSSI-EMD delivers is pending, the links to the resources at HTTP URIs beginning http://www.cen.eu/cen/cwa/elssi-emd/ will be unavailable. Until such time as the data formats are published as HTTP URIs, the CWA includes an electronic copy (ZIP file) of the ontology, the schema, and the examples.

Companies supporting the current CWA

Registered participants:

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Comments or suggestions from the users of the CEN Workshop Agreement are welcome and should be addressed to the CEN-CENELEC Management Centre.

0. Introduction

0.1 Overview

The engineering community invests significantly in generating materials test data of a high inherent value. Very often, the data sets are richly structured and amenable to reuse. The materials community has however, largely failed to address the issue of data capture and preservation. Although technologies for the automated capture and preservation of test data exist, on the rare occasions that data are conserved, they are invariably inaccessible to the wider materials community. This inevitably acts as an obstacle to the research process, and hinders business activities in the engineering sector. In recognition of these issues, CEN (the European Committee for Standardization) sponsored the 12-month ELSSI-EMD Workshop to develop schemas and ontologies derived from procedural materials testing standards. With the emergence of a Semantic Web of data, the project aimed to emulate other branches of the sciences that are developing and leveraging Web technologies to their advantage, and that of associated business sectors. Beyond developing schemas and ontologies for a chosen test type that complement existing specifications, the Workshop investigated their role in promoting the capture and conservation of experimental data in the materials sector, the opportunities that may arise for new and improved business, and the viability of appending the schemas and ontologies to their corresponding materials testing standards. This CWA reports the work performed and the findings of the ELSSI-EMD Workshop.

0.2 Requirements for Engineering Materials Data

Documentary Standards are an essential tool for underpinning virtually all aspects of society. In the engineering sector, material testing standards play a vital role in ensuring that the design of structures, monitoring of safety critical components, and the certification of materials for product release are all based on an agreed and validated method for determining material properties. So far, paper-based standards have been used to control the testing procedure, and paper certificates or reports are commonly used for reporting and storing such data. Various stakeholders using the documentary Standards directly, or the data so obtained, identify the need for greater interoperability of the data, not least in consistency of testing method, storage of tests results, and usage of those results in a wide engineering context.

It is contended that there are significant benefits that may be accrued from developing documentary testing and calibration Standards used for the determination of materials properties into formats that allow direct interoperability with computers and computer-controlled facilities. This would allow such Standards to be used to set-up mechanical testing machines and allow the measured output to be transferred directly to material property databases or data processing tools, or enable the material properties to be directly uploaded to product release certificates.

To understand the full benefits that would accrue from improved interoperability, it is important to consider both the mechanics of use of the Documentary standards, and the subsequent usage of the data by key stakeholders. One of the most ubiquitous materials tests is the tensile test, typically applied using the documentary standard EN ISO 6892-1:2009. Often it is applied to qualify a particular product against a material specification. A material test certificate produced in that way can have several uses, as illustrated by a simplified ship-building example in Figure 1 ***- The use of a material test certificate in ship building and operation***

Here it is used not only to provide confidence that the ship plate has been produced to the required specification, but it may also be used to demonstrate the quality processes employed during ship building. In each of those transactions information (that is, data) is taken from the store of the sender, transmitted and re-stored by the recipient.