Training resources and e-Government services for rural SMEs: the rural inclusion platform

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A B S T R A C T

Rural Inclusion, a project supported by the Information and Communication Technologies Policy Support Programme of the European Commission, aims to adopt, adapt, and deploy a Web infrastructure, in rural settings, combining semantics with a collaborative training and networking approach, offering e-Government services that will be supported by a rigorous and reusable service process analysis and modeling, and facilitating the disambiguation of the small businesses needs and requirements when trying to carry out the particular transactions. This paper, presents an overview of the architecture of RuralObservatory2.0 which will play the critical role of training content and eGovernment services repository of the overall Rural Inclusion platform.

1. Introduction

It is widely acknowledged that Small and Medium Enterprises (SMEs) constitute a critical aspect of the overall production process in liberal economies. Hence, it becomes evident that the optimization of their productive processes and the minimization of their operating costs are in the interest of the greater business ecosystem.

However, although significant provision has been taken in terms of motivating the foundation and sustainability of SME's there are yet criticalities pertaining to each enterprise's distinct idiosyncrasies that need to be addressed. One of these issues is the low degree of penetration of innovative tools and technologies by SME's residing in rural areas.

The side effects stemming from such a deficiency are more or less evident; however they become more dominant under the specific circumstances that characterize the operation of rural enterprises, i.e. the physical distance between their premises and central public authorities, which make the respective transactions cumbersome and costly.

At the same time, one of the most significant aims of the European Union (EU) is the reduction of the administrative burdens imposed to business by Public Administration. In 2007, the European Commission presented an Action Programme aimed at reducing administrative burdens in the EU by 25% by 2012.

In such a context, a major European Project, Rural Inclusion[2], supported by the Information and Communication Technologies Policy Support Programme of the European Commission, aims at adopting a state-of-art infrastructure that will facilitate the offering of innovative services by public administration in rural areas.

The Rural Inclusion platform can be perceived as an incubator of three different, independent and well-defined components, each of which serves a particular purpose:

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- Semantic eGov, which offers personalized public service information to the rural SMEs following a conversational ontology-based approach.
- RuralObservatory 2.0, which is the carrier of training content and will provide for some additional e-government services.
- eGov Tube, which focuses on the change management/innovation adoption process by providing a semantically interactive web platform for knowledge and experience exchange between users

In this paper we focus on RuralObservatory2.0[3] component which will be one of the key components in terms of training the project´s target audience (i.e. public authorities and SMEs' personnel, as well as citizens and entrepreneurs in general) in the adoption of eGovernment services.

The following figure depicts the first page a user views when visiting the RuralObservatory2.0 portal.
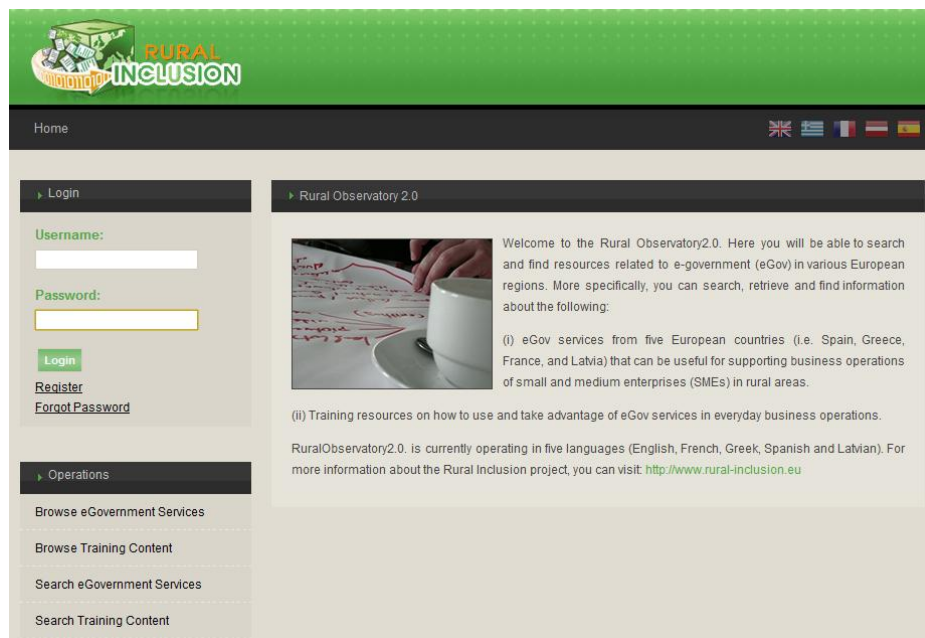

Figure 1. Main page of RuralObservatory2.0

2. RuralObservatory Content Objects

The RuralObservatory2.0 is an evolution of the Rural e-Gov Observatory, an online digital content and eGovernment services repository that was developed in the context of the Rural-eGov Leonardo da Vinci (LdV) initiative[4], and which monitors and assesses the e-Government services that are being deployed in a number of rural areas around Europe.

The RuralObservatory 2.0 aims to list the digital training content that will be developed to support the vocational training curriculum on how to prepare rural SMEs to use and exploit e-government services. In addition, the Observatory 2.0 will list collect, describe and categorize e-government services that can prove useful to SMEs in the rural areas to be considered.

Both the training content and the eGovernment services or RuralObservatory, in the scope of Rural Inclusion project is called Rural Inclusion Content Objects (ReCOs). Consequently, in the context of

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[3] www.rural-observatory.eu

[4] http://rural-egov.eu

Rural Inclusion, the two main categories of content objects will be Rural Inclusion Digital Training Objects (DTOs) and e-Government Resource Objects (eGROs).

2.1. Digital Training Objects (DTOs)

A number of DTOs has been developed to support the scenarios of the project, including different types of educational material. These are stored as electronic files in the form of PowerPoint presentations, Word documents, PDF documents and others. These digital resources can be uploaded in the database of the Observatory 2.0 Portal, and will be made available to all interested users.

To facilitate searching, locating and downloading appropriate resources, the characteristics of the DTOs have to be briefly reflected in their descriptions. In this way, users can simply go through the various descriptions, and select the most appropriate resources for their needs, instead of downloading each file and checking for their appropriateness. Apart from reflecting the most important characteristics, descriptions have to also be available in the language of the users (that is, multilingual descriptions will be necessary). In the context of Rural Inclusion project, the RuralObservatory2.0 is available in all languages of the project, namely English, Spanish, French, Greek and Latvian.

2.2. e-Government Resource Objects (eGROs)

Apart from the training resources, the Rural-Inclusion Observatory 2.0 aims to list a number of e-government services for each participating country that are useful for the SMEs in the corresponding rural areas. The eGROs that are listed are mainly the ones to be examined in the context of the project (i.e. the case studies to be used in the training scenarios). Descriptions of the e-government services are also included in the RuralObservatory2.0 Portal, in order to allow users search through the listings of services and identify ones that may be useful for their needs. For this reason, these descriptions are structured in such a way that allows searching and browsing according to various properties such as their geographical coverage, their business sectors, and others. Again, apart from reflecting the most important characteristics, descriptions are available in the language of the users.

3. Users

There are three kinds of users, each one accessing the portal in a different fashion:
- Visitors, who can use the Public Services of the Portal such as browsing or searching for DTOs and / or eGROs. Visitors can be either registered or unregistered, with the registered ones having access to a wider set of the portal's functionalities such as adding annotations or rating to DTOs and evaluating eGROs.
- Content Providers (CPs), who can upload DTOs or reference to eGROs and their corresponding Metadata.
- Administrators, who perform all the administrative functions related to Visitors, Content Providers, DTOs and eGROs. Those include Viewing/Deleting/Deactivating DTOs/eGROs and the corresponding Metadata, Accepting or Declining Requests for Registration from CPs, Viewing/Activating/Deactivating Registered Visitors or CPs etc.

The following figure illustrates the users of the Rural-Inclusion Observatory 2.0 Portal and their categorization.
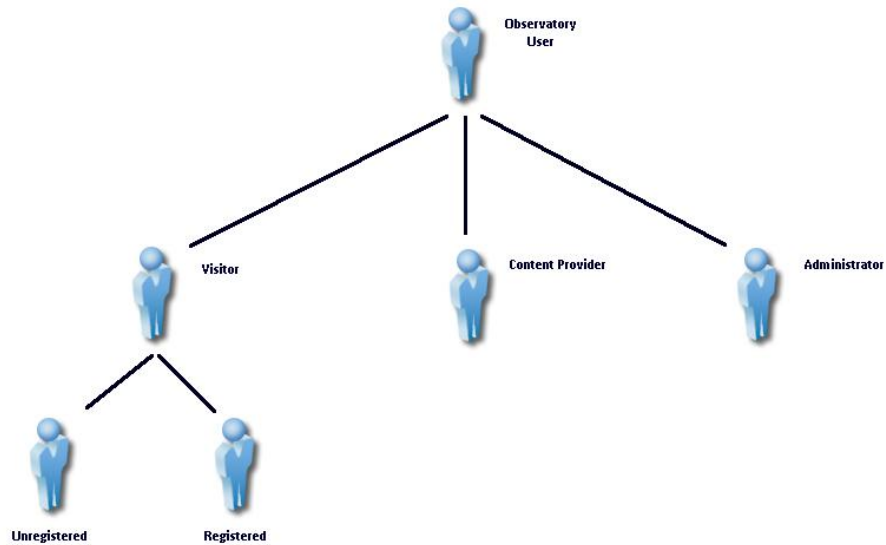
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Figure 2. Users of RuralObservatory2.0

4. Architecture and Software Technologies

The next figure illustrates the main architecture of the RuralObservatory2.0. The users accessing the portal, the corresponding services as well as the repositories involved are depicted
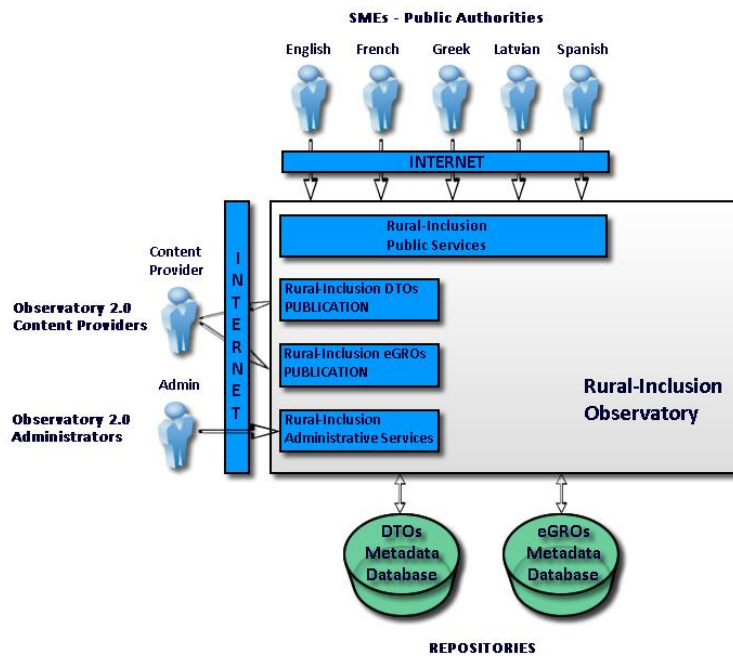

Figure 3. Overall architecture of RuralObservatory2.0

The RuralObservatory2.0 Portal requires transaction and state management services, resource pooling and multithreading. The J2EE architecture[5] that has been used in this project separates those low level services from the application logic. Since those services are implemented by application servers, this saves development overhead of reinventing the wheel. Furthermore, changes in the underlying database, or even the application server would require only a few changes in the deployment scheme and none at all in the source code. Thus, it simplifies the development of multi-tier enterprise applications. Lastly, using standardized and reliable software architecture when developing a system, will most likely decrease any future costs and ensure longevity of the application.

Most J2EE applications follow the 3-tier architecture. The RuralObservatory2.0 Portal has been based on J2EE technologies, thus it has also followed the most commonly used architecture:

- Presentation layer: The presentation tier mainly deals with presentation logic, generally implemented by servlets[6] and jsps[7] . Tomcat will be used as the Web container.
- Business layer: The business layer contains business components such as Spring Controllers and Services encapsulating the business logic.
- Database layer: The database layer contains persistent data generally stored in a RDBMS Observatory 2.0 uses MySQL for storing information.

The design and specification of the RuralObservatory2.0 also called for the design of the system's repositories: that is, of the databases that store information about DTOs and eGROs and the relevant metadata. In the case of RuralObservatory2.0 the stored metadata about the resources has been represented according to two selected metadata standards.

More specifically, for the description and classification of the eGROs for rural SMEs, the RuralObservatory2.0 used a specialization of the e-Government Metadata Standard (e-GMS). In addition, for the description and classification of the DTOs, a specialization of the IEEE Learning Object Metadata (IEEE LOM, ISO/IEC JTC1 SC36) standard has been developed. The metadata (and therefore access to the training resources) are made available to other repositories and federations of repositories, through their exposal using the OAI-PMH[8] protocol. This allows for the potential federation of the RuralObservatory2.0 with federations of repositories such as ARIADNE[9] and GLOBE[10].

5. UML Analysis of System's Behavior

To further analyze the system and its expected operations, we have engaged the Unified Modeling Language[11] which is the de-facto software industry standard modeling language for visualizing, specifying, constructing and documenting the elements of systems in general, and software systems in particular. UML provides a rich set of graphical artifacts to help in the elicitation and top-down refinement of software systems from requirements capture to the deployment of software components (Boggs, 2002).

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[5] Java™ 2 Platform, Enterprise Edition (J2EE), http://java.sun.com/j2ee/overview.html
[6] Java™ Servlet Technology, http://java.sun.com/products/servlet/
[7] JavaServer Pages Technology, http://java.sun.com/products/jsp/
[8] www.openarchives.org
[9] http://www.ariadne-eu.org/
[10] http://www.globe-info.org/en/aboutglobe
[11] http://www.uml.org
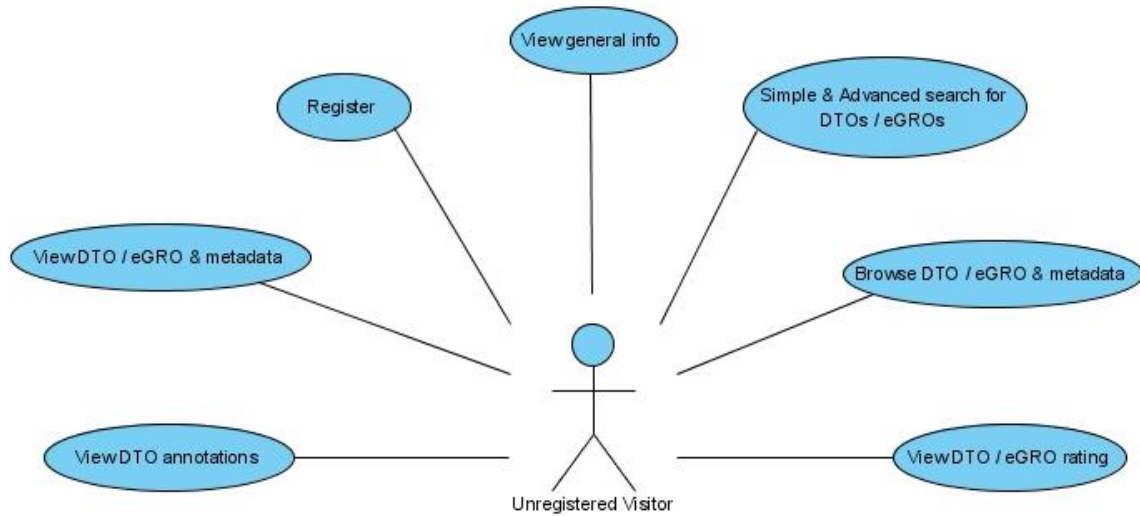
Figure 4. Part 1 of the overall Use Case Diagram
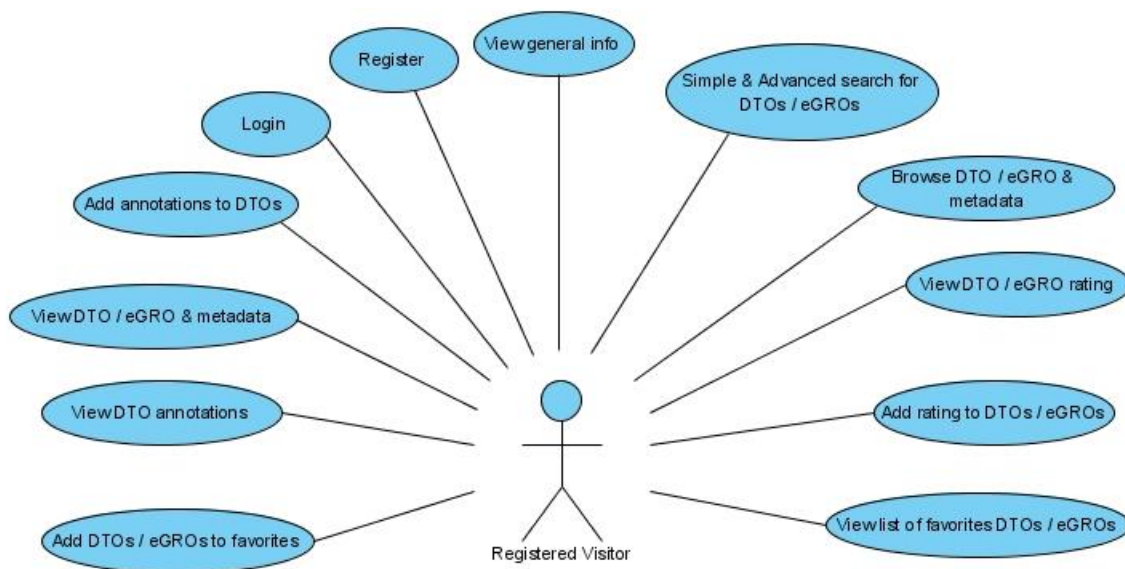
Figure 5. Part 2 of the overall Use Case Diagram

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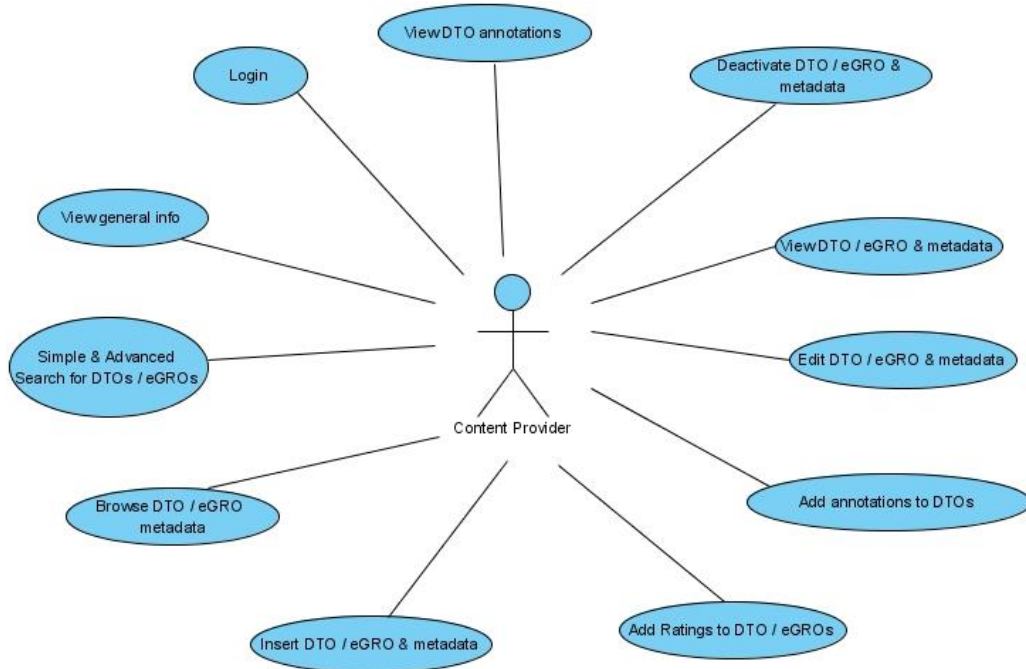
Figure 6. Part 3 of the overall Use Case Diagram
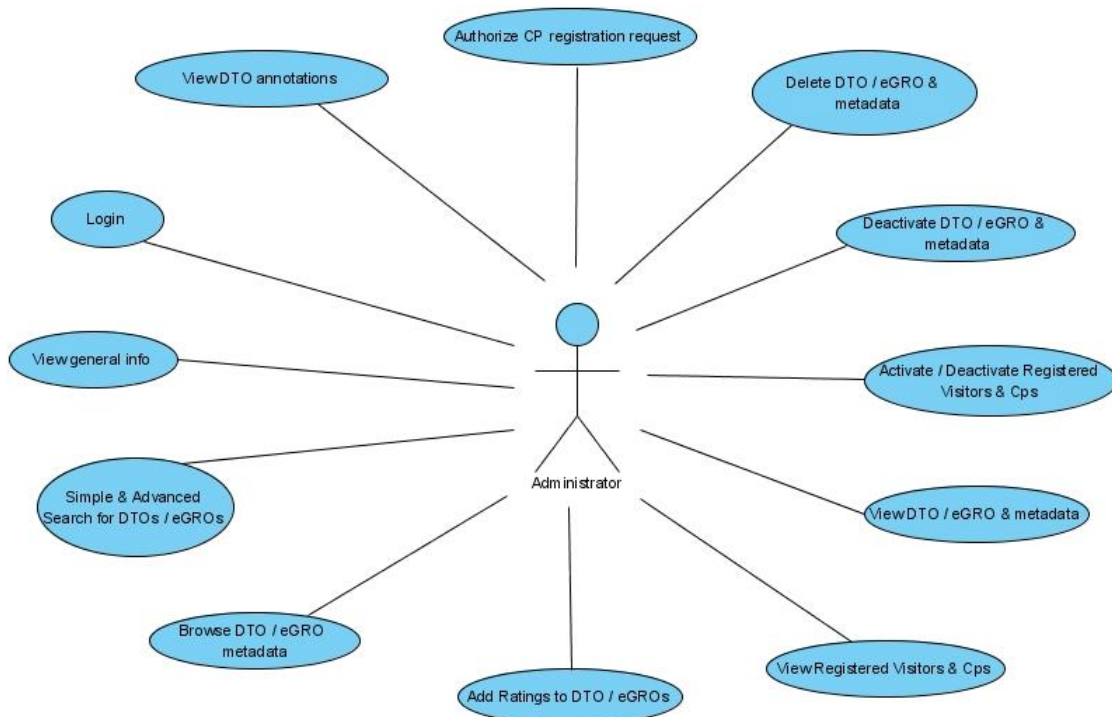
Figure 7. Part 4 of the overall Use Case Diagram

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In UML, a system is described using different levels of abstraction and considering various views (i.e. Business view, Use Case view, Design and Process view, Implementation view). Each view is realized using different UML modelling tools (diagrams), such as Use Case Diagrams, Activity Diagrams, Sequence Diagrams, Collaboration Diagrams, Statechart Diagrams, Class Diagrams, Component Diagrams, and Deployment Diagrams. UML is largely process-independent, meaning that it can be used with a number of software development processes. Due to space restrictions, we only present the Use Cases in which the identified users are engaged (Figures 4-7). The detailed analysis is included in the technical documentation of the project.

Conclusions

The RuralObserbatory2.0 platform, comes to bridge a significant gap that currently characterizes the adoption of innovative technologies in rural areas, especially in relation to the e-government paradigm. However, apart from the apparent advantages and opportunities that, technologically-wise, offers to rural SMEs, RuralObservatory2.0 offers a series of other advantages, mainly pertaining to SME's sustainable economic growth. Among others, it fosters the growth of rural SMEs facilitating the access to better knowledge using new semantic technologies and it encourages and increases the usage of ITC by SME in rural areas. Promoting cooperation and innovation can play an essential role in connecting people to new ideas and approaches, encouraging innovation and entrepreneurship and promote inclusiveness and the provision of local services.

Acknowledgments

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IEEE LOM: Draft Standard for Learning Object Metadata, IEEE Learning Technology Standards Committee, IEEE 1484.12.1-2002 (2002)

ISO/IEC JTC1 SC36: Working Draft for ISO/IEC 19788-2 – Metadata for Learning Resources – Part 2: Data Elements (2005)

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