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MILITARY E-LEARNING PLATFORM

Abstract. A modern IT tool is presented: an e-learning platform used in military training. The objectives and tasks of the Polish military platform of the national defence sector (RON) are described. Administrator requirements and the security and protection measures applied with regard to the information available on the platform are discussed. The method of installing training aids, including virtual trainers developed at OBRUM available on the RON platform, is given.

Keywords: distance learning, e-learning, military training platform, SCORM standard, virtual trainer.

1. INTRODUCTION

In 1999, an idea was born in the United States to use the Internet to teach the army. The organization of traditional, stationary training for the US troops deployed in various parts of the world was highly impractical. General William H. Campbell, Retired, the chief information officer (CIO), set the goal of maximizing the availability of courses, thus recommending the creation of an IT system that would allow training of military personnel.   "Distance learning" has enabled thousands of soldiers and workers to run courses using significantly less funding and infrastructure. In one of its audits the Army Audit Agency stated that e-learning helped the US Army save about 86 million dollars during three tax years (2004 to 2007). During that time 159 thousand soldiers and other people related to defence activities benefited from the training [1]. The benefits of introducing e-learning in the US Army have drawn the attention of leaders of armed forces of other countries. After a few years they have also inspired the Polish Armed Forces to make similar implementations. This way the e-learning platform of the Ministry of National Defence was created. The development of the Internet and multimedia has led to a growing interest in distance learning. It should be remembered that when the DLS (Distributed Learning System) program was launched in the USA, bandwidth was a problem. SkillSoft company, responsible for the implementation, was forced to distribute a large part of training materials on CDs by traditional mail and outside of the main distribution channel, the Website. High-speed network links now allow real-time bi-directional information exchange (audio and video) between the student and the teacher and provide the system with additional functionalities, such as virtual trainers, which since 2015 are being developed by the Simulator Department at OBRUM [2].

2. OBJECTIVES AND TASKS OF THE MOD E-LEARNING PLATFORM

Due to the increasing use of new information and communications technologies in distance learning and the prospect of their application in military training, the ICT Support

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Management Team in Kraków, with support and under the supervision of the Department of Information Technology and Telecommunications of the Ministry of Defence (now the Inspectorate for Information Systems of the Ministry of Defence), was entrusted with the task of launching the first publicly available e-learning platform for the Ministry and the entire defence sector. This decision was made with account taken of the Team's modern network infrastructure based on high-performance servers and the ability to provide backups. The platform was implemented using the latest IT technologies and solutions, ensuring thereby very high efficiency and availability. In July 2012 the platform was launched in the classified MIL-WAN ITC system (now MILNET-Z), and in 2013 in the INTER-MON ITC system (now MILNET-I). Currently both platforms have more than 20,000 users. The legal basis that defines the rules of functioning of the platforms was included in the "National Plan of Information Technology Implementation in the National Defence Sector in the years 2013 - 2022" [3].

The RON e-learning platform is an IT system of the LMS (Learning Management System) type which is accessible at elearning.mil.wp.pl. It is based on MOODLE (Modular Object-Oriented Dynamic Learning Environment), a free, community-supported and widely used LMS under the GNU GPL licence [4]. It becomes available after logging in by the user and is designed for online learning.

The purpose of the platform is to support educational, scientific and research processes in the Polish Armed Forces and to acquire, share and transfer knowledge, competencies and skills [5]. The platform assumes a better use of the research and technological potential of military units, universities and scientific institutes. The system enables exchange of knowledge (e.g. forums and chats) and offers a wide range of tools, allowing the e-teacher to run the course and maintain full control over the progress, the amount of material covered, and the verification of the material assimilated through various tests. The data may include information about the number of attempts made, as well as time spent on the entire training or individual lessons. These data enable assessing the trainee's learning rate and his/her level of knowledge. Another purpose of the platform is to support educational, scientific and research processes in the Polish Armed Forces. Use of the platform is free. In order to access its resources, a request should be drawn up, a form for creating an email account should be filled in, and the tutor should be contacted by sending a message via the e-learning platform. Every registered user has permanent access to the complete course database at any time and from any location where internet is accessible, while the user's knowledge can be verified by means of tests at any stage of the training. Successful completion of the e-learning courses may in many cases entitle to commence practical training in Military Training Units.

Teaching materials on the RON e-learning platform are updated on a regular basis. Given the frequency with which new military equipment is being deployed, this has a significant impact on keeping the troops updated on the use, operation or repair of that equipment. It should be noted that the system has functions for informing students about the changes introduced. By adapting the manner of providing information to the user's individual needs and preferences, and by making it efficient, the user does not waste time looking for available professionals. Every user chooses the time and the form of learning, and there are dozens of available options. This is one of the many advantages of this solution. Only part of the necessary knowledge is acquired in a formal way, that is during courses, trainings, etc. Most of the intellectual resources are attained casually, for instance when enquiring co-workers, but we must arrive at new solutions by ourselves. Over the years, this knowledge has faded away along with the instructors, specialists, and soldiers who had the unique skills [6]. E-learning has the potential to prevent this, by gathering everything that previous generations have developed.

3. ORGANIZATION

The growing popularity of e-learning and related management have necessitated the introduction of certain rules. In order to create a common content, knowledge base and tests and other training materials, in a concerted, uniform and orderly manner on a single e-learning platform, it is necessary to apply certain defined standards. One of them is SCORM (Sharable Content Object Reference Model). Its history dates back to the 1990s, when it was created for US military training by ADL (Advanced Distributed Learning). In those days it was difficult and costly to create a course that could run not only on one learning platform. Moreover, it was not certain whether a platform other than the native one would support such a course, as it could have had, for instance, a different computer infrastructure, so it would be necessary to adapt the underlying content. SCORM was intended to provide a solution to such problems. It was based on existing specifications and standards developed by other organizations with which ADL had collaborated. The first widely used version of the standard was published in 2001 with the designation 1.2. After a few years a decision was made to use it in the RON e-learning platform.

SCORM defines, in the first place, the manner of:

- setting up of files containing training objects (for instance animations, text fields, audio files);

- transferring statuses that describe progress made, test results, time spent on training (entire course and individual lessons);

- completion of parts of the training and moving between the parts.

The above information is stored in the files and directories database. In addition the files contain metadata, i.e. course information, title, level, author, language, etc. Metadata are recorded using the XML language, communications with the platform is defined using JavaScript. The main benefit of using SCORM is the unification, interoperability and compatibility of the content included.

4. SECURITY AND THE ROLE OF PLATFORM ADMINISTRATOR

An important part of all IT systems, especially those with network connectivity, is security. Due to the sensitivity of the content posted on the RON e-learning platform, special security considerations are all the more important. The platform administrator is obliged to constantly monitor network traffic. In case of violation by the e-student or e-teacher of the rules of classified information protection, the administrator must immediately inform the Classified Information Protection Officer. The administrator is also obliged to collaborate with Information Technology and Telecommunications Inspector [5].

Those who seek access to the Platform are verified with the database of the Polish Armed Forces. Only after the appropriate declarations and positive verification have been made, does the user gain access to system resources. The scope of that access depends on the user's rights. "In the event of expiration, termination of employment contract or termination of service in the Polish Armed Forces, the right to use the Platform also expires" states art. 3, item 4 of the document: "Framework for using the e-learning platform of the Ministry of National Defence available through the INTER-MON system".

"Each prepared training material, prior to being posted on the Platform by an authorized person, must be accepted by an authorized person in the military unit / institution. The Military Institution or Unit, or the e-teacher is responsible for the observance of copyright of the materials and content used in the creation of lessons." [5]

If training courses based on the application of virtual 3D training simulators are placed on the Platform, some additional requirements arising from the need to ensure protection of intellectual property and classified information must be met. The main elements of this type of applications are three-dimensional models of machines and devices the spatial geometry of the which is reproduced at such level of detail that it enables study of the structure and functions of equipment. The record format of the model should prevent its duplication or transfer of the geometry of the visualized object. In order to meet this criterion, the geometry must be represented in a discrete form, i.e. a spatial raster consisting of volumetric elements (voxels). This technique, unlike surface (polygon mesh) or edge modelling (segments and curves), provides a secure geometry representation that precludes extraction of any structural data of subassemblies below the user-defined level of detail [2].

5. IMPLEMENTATION

In order to facilitate quick understanding and consolidation of the information provided, training materials placed on the MOODLE Platform of the National Defence sector must be prepared in accordance with good instructional design practices (e.g. IMI - Interactive Multimedia Instruction) [4]. All 3D models and other audiovisual content included in the course must be verified by authorized persons during the course. Moreover, they must be designed in a way enabling smooth running of the training on the e-learning platform.

As mentioned, the materials must comply with SCORM 1.2. In this form, they are run and verified by the LMS system implemented in the National Defence sector. The verification data must include at least the following information on: launching, stopping the training, time spent between tasks, conducting incorrect and correct task steps and results of performed tests. The training material must provide: monitoring of the student's progress, provision and tracking of content in accordance with the guidelines of the LMS implemented at the Ministry of National Defence.

The Military Units or Institutions that wish to place training materials on the Platform appoint two persons for this purpose. One of them approves the prepared training material before its publication and, together with its author, is responsible for the content, security classification and up-to-dateness of that material. The other is authorized to place the material mentioned above on the Platform and collaborates with the Platform Administrator (e-teacher). Before a course is placed on the Platform, the application form on the Platform must be filled in correctly and sent to the ICT Support Management Team (ZZWT) in Kraków [5]. When placing training materials, the user group (institution, type of Polish Armed Forces, etc.) should be specified and a list of persons for whom the material will be made available must be provided[5].

The SCORM-compliant training material must by prepared in the form of a compressed archive file (ZIP). When placing the material on the Platform, the period for which the material will be available and after which it will be archived must be specified. If this period is not specified, the material will be archived after one year. When the period of validity is extended, a new expiry date must be specified. It is also necessary to indicate an approximate time for completing the course, provide a description of the course and define the group of e-students to which the course is addressed.

The time for placing the training on the Platform from the moment of accepting the order is at least two weeks. This time can be extended if there is an accumulation of applications. In this case, the Platform Administrator decides on the order of placing courses, taking into account the importance of the subject matter.

Apart from preparing courses for the RON Platform, the OBRUM's Simulator Department also has the right to place the same courses directly on the client's computer equipment.   If the customer does not have a platform that supports courses, the Simulator Department configures and delivers the Moodle Platoon, which is also used in the RON e-learning system. Therefore there is no need to modify the courses.

6. PROJECTS DEVELOPED AT OBRUM

Since 2015, the OBRUM's Simulator Department has been implementing innovative projects, including the development of training materials for use on the RON e-learning platform. Two training courses were developed for the Logistics Training Centre in Grudziądz. In order to find the best way of communicating with prospective students, it was necessary, in constant cooperation with the client, to refine the scope of the training program and of the way the training content is delivered.

Fig. 1 shows an example of a screen with results of a test that constitutes one of the components of a training.

Fig. 1. An example of a list of test results (MK-44 Bushmaster)

Analysis of the real-life equipment and documentation (operating instructions - IU, manual - IO) and the acquiring of references necessary to produce a 3D model were a key element of this project. The NATO standard ADDIE (Analysis Design Development Implementation Evaluation) was selected, that is a model creating learning content with the participation of the client, along with LCMS (Learning Content Management System) [9]. This resulted in the creation of two courses of equipment maintenance, repair and diagnostics:

- Virtual 3D training device MK-44 BUSHMASTER [7];
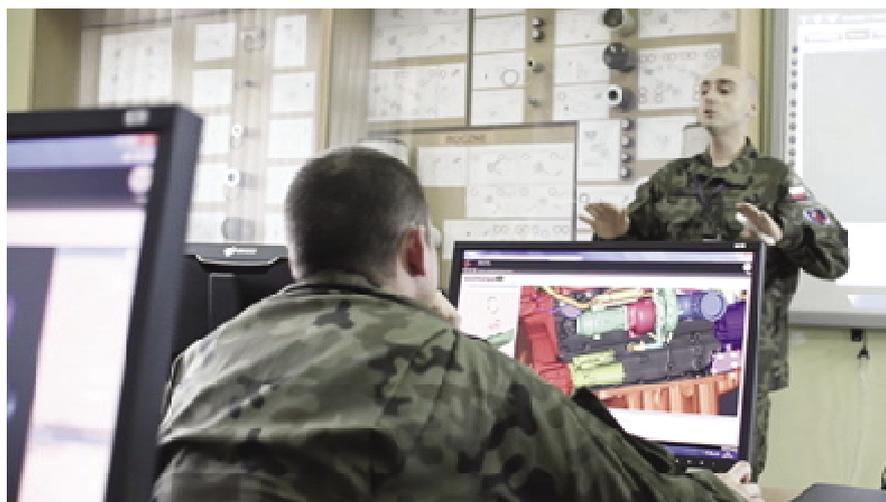- Virtual training device for the engine of JELCZ 442.32 [8].

Fig. 2. Training conducted with the use of a 3D training device

The application includes 148 procedures related to the assembly, dismantling, diagnostics of the engine of JELCZ 442.32 vehicle, the vehicle consisting of 1221 parts, and 82 procedures for the MK44 Bushmaster gun consisting of 447 parts. Each part has its identification number in the Uniform Material Index (JIM). Fig. 2 shows a fragment of a training conducted at the Logistics Training Centre in Grudziądz where materials developed at OBRUM are used.

Virtual trainers designed and manufactured by OBRUM's Simulator Department provide the ability to view contents in popular web browsers. Therefore there is no need to install third party applications. The software provided has been adapted to provide experts with the ability to modify the operating and maintenance procedures and remotely conduct training using the e-learning platform of the National Defence Sector. This enables expanding the scope of the training program and its updating by the client.

7. SUMMARY AND PROSPECTS

Internet information systems constantly require individualization of the content and adapting it to the needs of both groups of people and of individual users.

"The user's needs and intentions (plans) must be recognized in order to respond appropriately - by proper action and information provided by the system. The system must collect and analyze information obtained from the user and about the user to define the user's profile (interests, needs, abilities)" [10].

Systems such as the RON e-learning platform help satisfy such needs. Undoubtedly, the biggest advantage is that the user decides on the direction in which he/she wants to proceed and on the pace of self-education, while geographical barriers are eliminated. Prospects are that the distance learning program will grow as the number of available courses increases. The law establishing the Territorial Defence Force as one of the types of Armed Forces caused, to some extent, increased interest in the subject of e-learning in the army. Volunteer recruitment involves a number of training sessions, divided into three phases: preparatory duty, specialized training, training and duty within the army unit. The concept of the present Minister of National Defence provides that such training will be conducted for two days in a month. [11]. The number of soldiers in the planned 17 brigades, one in each

province, will reach 25 to 42 thousand. The use of the RON e-learning platform seems to be fully justified in this case. OBRUM's Simulator Department plans to develop new training materials for the Territorial Defence Force to be implemented on the military platform in the form of e-learning materials.

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