

IT SYSTEM FOR THE ASSESSMENT OF INTERVENTION AND RESCUE STAFF IN TOXIC / EXPLOSIVE / FLAMMABLE ATMOSPHERES FROM THE EXTRACTIVE INDUSTRY

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Abstract: It assessment systems can be defined as being computer programs that make use of the experience and knowledge of experts in order to solve complex problems in a restricted field and they are based on the research results of the artificial intelligence in the fields of knowledge representation, inference methods and natural languages.

It assessment systems represent an essential component part of artificial intelligence that covers the expert knowledge for a specific domain; subsequently, this knowledge shall be dynamically capitalized by a reasoning mechanism.

The IT application is achieved according to a linear diagram and it presents graphically the logical processing sequence, combining in a vertical order the types of structures of the algorithm.

Key words: extractive industry, IT assessment system, human expert, intervention and rescue staff.

1. Introduction

The development of artificial intelligence has led to diversification of the fields in which information (IT) systems have a direct and efficient applicability.

IT assessment systems can be defined as being computer programs that make use of the experience and knowledge of experts in order to solve complex problems in a restricted field and they are based on the research results of the artificial intelligence in the fields of knowledge representation, inference methods and natural languages.

In this regard, choosing a particular system involves accurate information based on predetermined criteria for achieving a purpose. The retrieved and processed information are chosen according to the systems' field of applicability.

Developing an IT system requires interaction between an expert, who is a person specialized in the knowledge area for which the expertise is desired, and a knowledge engineer.¹

The IT assessment systems are an essential part of the artificial intelligence, by which the knowledge of experts in a specific activity field are stored, and later can be dynamically exploited by a reasoning mechanism through a declarative approach.

The use of IT assessment systems within the instruction / reinstruction process of the intervention and rescue staff, brings several advantages:

- performance – IT systems maintain their knowledge in time, being able to work continuously (they don't forget and don't get tired);

- reproduction – there can be easily made several copies of an IT system while creating new human experts is often a long and very expensive process;

- efficiency – they lead to low cost expertise, being able to easily multiply; the development costs can be covered by several users;

- consistency – similar actions are handled in the same way; it cannot be influenced to draw conclusions, being very objective unlike the human experts that can be subjective;

- documentation – an IT system can provide continuous documentation regarding the decision process;

- completeness – an IT system is able to review the entire reasoning, unlike the human expert who retains only the main steps in case of complex expertise;

- operating speed – a conclusion can be drawn shortly due to the power offered by the computer systems;

- multilateral approach – the knowledge of several human experts can be comprised into an IT system so that the solutions can be much better than the ones of a single expert;

2. Experimental

The program is installed on a server and is designed so that it can be run on an unlimited number of computers.

After the IT system is installed on a computer, the use of it by the users involves the following steps:

2.1. The IT assessment system displays at start-up the window from Fig. 1.

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Fig. 1 Start-up window

2.2. The program starts with registering the tested person into the program database.

The program displays the window from Fig. 2.

Fig. 2 Registering the tested person

The database of the program will be built so as to allow the input of the following information:

- name and surname of the tested person;
- personal identification number of the tested person;
- the number of the rescuer authorization.
- name of the company where the person carries out its' activity;
- occupation of the tested person.

2.3. We don't have to register as a new user if we are already a registered user that had been registered before into the database. We have to login using the name, surname and the number of the rescuer authorization.

In this case the program displays the window shown in Fig. 3.

Fig. 3 Login window

2.4. After we have registered as a new user or after we have logged in as an existent user, the program displays the window from Fig. 4.

Fig. 4 Account administration

2.5. The assessment systems allows viewing the chapters of the course: "Rescuing in toxic environments". There can be viewed the following chapters.

- definition and principles of the intervention and rescue activities in toxic / explosive / flammable environments;
- normative regarding intervention and rescue activities at industrial facilities with toxic and/or explosive gas emission hazard;
- insulant respiratory protective equipment based on compressed-oxygen;
- insulant respiratory protective equipment based on compressed-air;
- resuscitation equipment;
- first aid providing;
- mine air;

- mining breakdowns and methods to combat them;
- the entry of rescuers into action;
- procedures to be followed by rescuers;
- regulation of rescuers interventions for the extractive industry.

In this case, the assessment systems displays the window illustrated in Fig. 5.



Fig. 5 Chapters of the course

2.6. After viewing the chapters from the course the assessment systems allows browsing through the history of previous viewed courses. In this case, the program displays the window shown in Fig. 6.



Fig. 6 History of previous viewed courses

2.7. We must choose the person that will assess the test and then the „Generate Test” button must be pressed. In this case, the program displays the window in Fig. 7.



Fig. 7 Choosing the assessor

The test has 30 minutes assigned for work during which the tested person has to answer a 30 questions set, questions that are randomly generated from the complex database of the assessment system.

2.8. At the end of the 30 minutes allocated time or at the end of the 30 questions, there will be generated an examination report for the tested person.

The tested person passes the test if it responds correctly to at least 24 questions.

In this case, the program displays the window illustrated in Fig. 8.

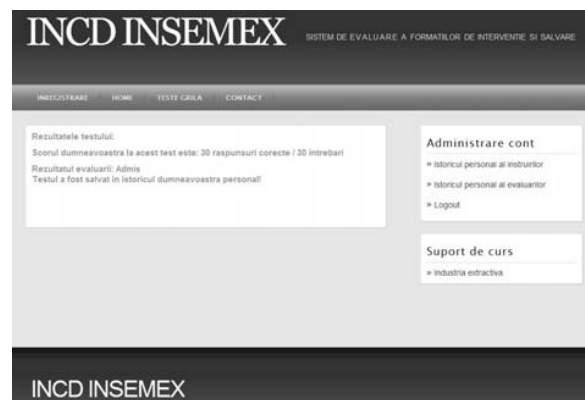


Fig. 8 The results of the test

2.9. The examination report will comprise:

- name of the tested person,
- domain of activity,
- the unit where it carries out its activity,
- date of the test, total number of questions,
- number of correct answers,
- number of wrong answers,
- option for viewing the wrong answers and the correct variants of the questions,
- time used for test completion,
- result of the test (passed/failed),
- name of the assessor.

In this case, the program displays the window from Fig. 9.

Informatii personale:

Nume si prenume cursant:	ILIE COSMIN
Funcția:	INGINER
Unitatea angajatoare:	INSEMEX

Informatii referitoare la testul selectat:

Domeniul de activitate:	Industria extractiva
Data testării:	29 May 2011
Numar total de intrebari:	30
Numar raspunsuri corecte:	30
Numar raspunsuri gresite:	0
Rezultat:	Admis
Evaluator:	Gaman Artur

Tipareste raport

Inchide raport

Fig. 9 The examination report

3. Conclusions

The IT assessment system allows knowledge testing by completing a set of questions randomly chosen from several chapters, specific for the chosen field

It allows the creation of a database with the recordings of the names of tested persons, of the testing field, of the date and of the test results.

The IT assessment system can be used in the instruction / reinstruction process from within GAS (Rescue Group Authorization) INSEMEX as well as in the process for theoretical reinstruction of personnel for intervention and rescue in toxic / explosive / flammable environments from within the rescue stations.

The operating system is built so that it allows modifying the course, respectively the configuration of questions depending on the specific field of activity.

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