"SERIOUS GAMES" SERVING THE PROFESSIONALISATION OF ELECTRICITY TECHNICIANS

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INTRODUCTION

At a time when the rate of skills renewal is high, linked to the large numbers of technicians retiring, it is necessary to find training methods that can meet this challenge.
Recently hired people are young and attuned to new technologies and for this reason the use of modern and innovative tools are appropriate.
Professional training games, of the simulator type, offer technicians the possibility of performing various electrical operations in an augmented-reality environment at several levels of difficulty. Others propose the possibility of performing an analysis of accidents using eye-witness accounts to reconstruct the tree of causes. These new tools facilitate the training of young recruits, allowing them to self-assess or check out their knowledge as a group. They contribute to the mastering of practical professional skills, in addition to traditional training and to improving safety

WATTOU

Placed midway between e-learning and a video game, a serious game is a way of strengthening knowledge and working on behaviour.
The training strategy is based on an inductive and interactive teaching scenario: the learner is encouraged to think before acting, to understand and learn the rules and procedures, to react appropriately to unforeseen events and to analyse his own behaviour in response to situations and to correct it.
The goal is to gain knowledge of the basic principles of "non-live" work and to become proficient in the various stages of network access procedures
- identify the appropriate tools for the different types of operations, the electrical hazards related to accessing non-live facilities and the means to protect oneself from them,
- communicate with network supervisor in accordance with the rules defined by the general codes of operations on electrical networks,
- help learners to test their skills and become aware of their behaviour in the field during technical interventions. They can thus understand the mistakes made or bad habits acquired over time. They realise that a build-up of mistakes leads to an accident, here game over.

This Serious Game is aimed at all 8,000 ERDF technicians who perform operations on electrical facilities.

Simulated Actions

To perform non-live work on the electrical network, it is first necessary to secure it. These operations are implemented by the lock-out operator whose role will be to identify the facility concerned, and to shut off power to it. He must also prevent any inadvertent operation re-energising the network thereby guaranteeing to the works supervisor that work on the facility may be performed in total safety. The game simulates all the actions that the lock-out operator will need to perform to successfully carry out his mission

The Game

You do not have to be a video game champion to be able to use WATTOU. Detailed explanations are provided at the start of the game about the rules and practicalities. WATTOU is accessible from a standard computer workstation which facilitates its use by everyone.

The Avatar

To take on the role of lock-out operator, the player must first build his character as an avatar. He can choose his gender, his appearance (glasses, beard,) and clothing (sportswear, classic,). The avatar interacts throughout the game with other characters (the works supervisor, the operations manager,).

The Missions

Two missions are currently available:
An underground lock-out.
An underground cable has been damaged by a construction machine without triggering a shut-down. The task involves

shutting off and locking out the damaged cable to allow it to be repaired.

An aerial-underground lock-out

A broken insulator on the aerial part of the network causes brownouts on customers' premises. The task involves shutting off and locking out the aerial line to allow the works supervisor to change the insulator.

A mission lasts about half an hour, but with variations corresponding to the learner's level and the difficulty level chosen. Virtual sets have been modelled from actual views of sites and facilities (ERDF sites, transformer stations, switches ...)

The Game

Finding Out About the Assignment

This involves the player discovering the lock-out assignment entrusted to him. He himself chooses the documents regarding the mission that he must become aware of. He can exchange various items of additional information with, in particular, the network supervisor.

Personal Protective Equipment

The player must go to the locker room to collect the personal protective equipment that seems most relevant to him

Actions

Once he believes he has what he needs to successfully carry out his mission, the lock-out operator goes to the different parts of the network that he determines to perform additional procedures and actions.

The Score

All the choices he has made to prepare his assignment and every action he decides to take, impact on the score he will get at the end of his lock-out.

Three gauges will allow him to monitor the quality of his actions. One represents his health capital which is dependent on the risks he takes in his choices or in his assignments on the field and which accounts for 50% of the final score. One validates compliance with the procedures accounting for 30% of the score and the third and last accounts for 20% of the score and reflects his performance, i.e. the relevance of his choices in avoiding unnecessary work.

Game Over

A dangerous action, or the accumulation of successive errors can lead to a game over, fortunately without consequences for the player which would probably not be the same in real life.

Debriefing

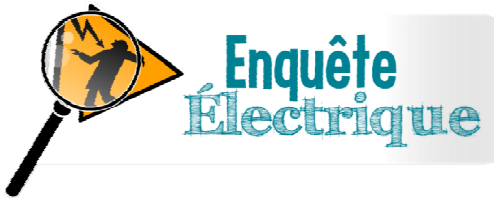
A printable version of the results enables the WATTOU user to identify his knowledge and any gaps in it. In memory mode, it can be used for a debriefing interview with his supervisor.

ELECTRICAL INVESTIGATIONS

Electrical investigations are an addition to the WATTOU module in the form of a role play which provides individual learning.

The Electrical Investigation game is an educational tool that helps prevent electrical hazards. It is intended to be played as a group and refers to knowledge acquired or refreshed thanks to WATTOU. It includes several scenarios for ERDF technicians.

It is based on a joint analysis of known facts that have occurred before an accident. This analysis should lead to identifying why an accident has occurred and what actions must be taken to prevent it from happening again.



Aim of the Game

Each scenario gets players to take on the role of an investigator who has been assigned to look into an electrical accident. Players collect evidences by interviewing “witnesses” or consulting documents to compile a list of facts relating to the accident.

They must also answer a list of specific questions for each scenario. From the information collected, the players, guided by the trainer, analyse the accident using the tree of causes method and answer the following questions:

- What happened?
- What are the causes of the accident?
- What lessons can be learned to prevent the repetition of such an event?

They then discuss risk situations or similar events they have encountered locally:
-Has this already happened to us?
-Could it happen?
Finally, they collectively determine the actions to be implemented in the work team to avoid the occurrence of an accident of the same type.

The Game's Principles

The scenarios offered are fictional but based on real causes of electrical accidents.

- Investigation No. 1 - Maintenance and repair of a meter
- Investigation No. 2 - Repair of a medium voltage overhead network
- Investigation No. 3 - Repair of a low voltage underground cable
- Investigation No. 4 - Lock-out in a MV/LV sub-station

At the beginning of his investigation, the investigator may ask questions to a limited number of "witnesses" (short video sequences). As the questioning progresses, witnesses introduce other people and the witness list gets longer. To gather information, the investigator can also view documents that are provided by the witnesses as well as photos of the place of the accident.

Choice of Action to be Taken

Players discuss matters among themselves in order to choose what action will be taken:
-View and listen to a witness statement,
-View a photo,
-Read a document from among those available.

Collection of Information

While viewing a witness statement or when consulting a document, players take note of any information they believe to be relevant to the investigation.
The witness statements, photos and documents can be viewed several times.
After having viewed the witness statement or consulting the document, the trainer invites the players to review collectively the information gathered.

This information is recorded in a table and will be used to compile a list of facts to build the tree of causes of the accident.
The trainer also highlights any new statements and documents available (shown in the application by fluorescent highlighting).
When a document is supplied by a witness, it appears in a list and the trainer distributes a hard copy of it to the players.
This process is repeated until all the information needed to compile the tree of causes has been collected. At the end, a message appears on the screen to indicate that all the witness statements, documents and photos have been consulted: "Ah, now of course I understand! "

Conclusion of the Investigation

The trainer gives an overview of the information collected. He then asks the players to answer the questions presented in the Questions form.
Using the list of facts now compiled, the trainer guides the analysis of the accident using the tree of causes method. It is very important to note that the proposed tree of causes is not THE solution but A solution. What matters is the collective construction.
The trainer then asks the players if they have experienced similar events or observed situations that could have resulted in the same consequences. He invites them to talk about local habits and practices: do they guarantee the safety of the personnel?
He may use accidents or near-accidents that have occurred within the Unit, Dangerous Situations detected by staff, site visit reports, etc.
This is the most important part: the trainer elicits discussions between players and ensures that everyone contributes.

Finally, the players together seek actions needing to be implemented locally to prevent the occurrence of another accident with similar causes. These actions will be included in the team's H&S action plan.