Study on the man - machine – organization system interfaces in nuclear facility operation

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Man – Machine – Organization System

The nuclear installations are complex socio-technical systems whose reliable operation is based on the success both of the technical equipment and of the human and organizational factors. In this paper a theoretical study of the interfaces in Man – Machine - Organization System (MMOS) was performed. So,in this phase were performed the following:

- The identification of the characteristics of each element (man. machine, organization)
- The identification and the analyzing of the man-machine, the man-organization and machine -organization interfaces (figure 1)

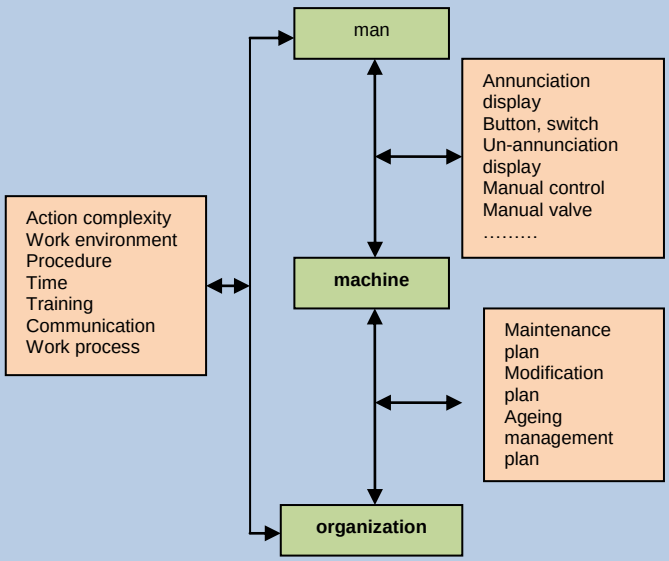

Figure 1 - The main factors which can influence MMOS

So that for each interface was developed a circumstances module which can influence positive or negative the MMOS performance in accident conditions.

Database

All interfaces identified in MMOS and the conditions which could be at any given time are in the database records (HUFAD_E – Human Factor Analysis Database _English). This database was developed in Microsoft Visual Basic 6.0 environment using SQL language query relational database. A schematic presentation can be viewed as in Visual Basic in figure 2.

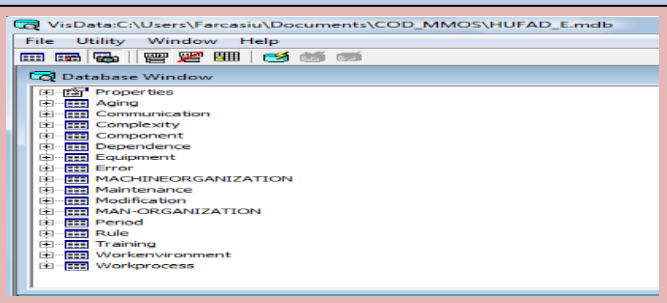

Figure 2 – Schematic presentation of HUFAD_E

MMOSA approach

Using the results of the studies, developed database and a software application (it was developed in Microsoft Visual Basic 6.0) a new approach (MMOSA) was developed (figure 3)

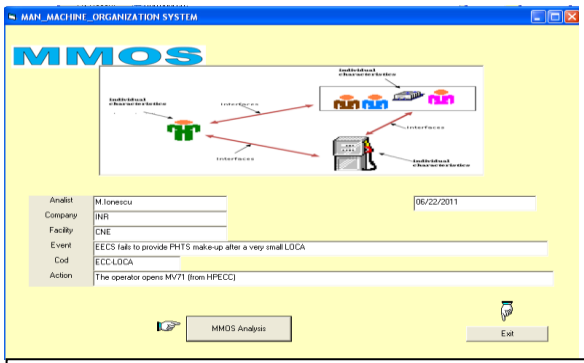

Figure 3 - Main form for beginning of MMOSA

This method contents the following phases: the investigation process of the human actions; the appraisal of the possible human errors; the estimation of Basic Human Error Probabilities (BHEP) from generic or/and specific database; the estimation of Conditional Human Error Probabilities (CHEP) by the determination of the dependence level between actions using a positive dependence model; the comprehension of the human actions in MMOS to identify the MMOS interfaces using our qualitative analysis model and the database (the positive or negative conditions which can influence the human action at the analysis moment are identified for each interface); the estimation of the human error probabilities (HEP); the documentation (it is a report which will contain all elements considered in analysis and all results to be incorporated both in PSA study and design process)(figure 4).

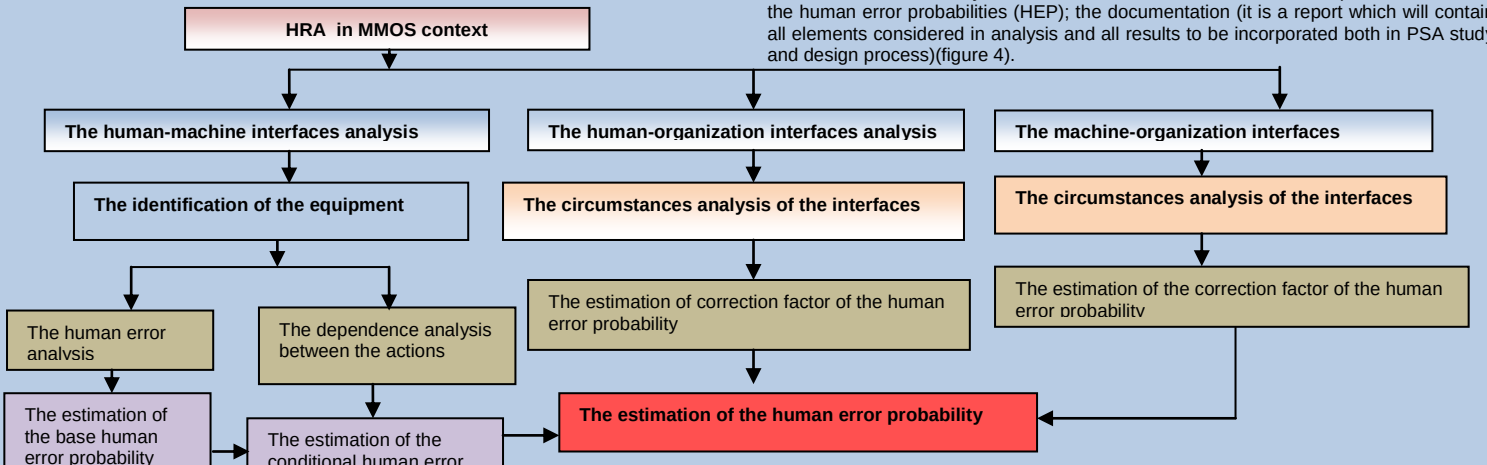

Figure 4 – The HPA diagram in MMOS context

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