Chapter 12

PERE (REAIMS)

PERE (Process Evaluation in Requirements Engineering) is a structured method for analysing processes for weaknesses and proposing process improvements against them. PERE combines two complementary viewpoints within its process evaluation approach. Firstly, a classical engineering analysis is used for process modelling and generic process weakness identification. This initial analysis is fed into the second analysis phase, in which those process components that are primarily composed of human activity, their interconnections and organisational context are subject to a systematic human factors analysis.

PERE is an integrated process improvement method that combines two complementary viewpoints onto the process under analysis:

1. Mechanistic viewpoint–an analysis of the process in mechanistic terms, as a number of interconnected process components. This analysis uses techniques adopted from classical safety analysis, adapted for a consideration of the RE process.

2. Human factors viewpoint–an analysis based on the application of human factors and social scientific principles to assess weaknesses and protections at an individual, group and organisational level using the results of the mechanistic viewpoint to scope the analysis

This dual viewpoint approach has been adopted since it has the following advantages:

1. Structured, usable approach–PERE enables human factors considerations to be presented in a usable manner, through the application of a structured grounded checklist. This checklist is grounded in that each item contains

references to human factors review documents and structured since the user is guided through the checklist by means of navigational questions. This navigation is guided and scoped by the results of the mechanistic viewpoint analysis. As a result, a manageable subset of the checklist is used, preventing the combinatorial explosion of having to consider each checklist item for each component.

2. Sensitive to actual RE process improvement needs–since RE processes in practice combine human and automated processes, it is appropriate to combine two complementary viewpoints within the method, each concentrating on different aspects of the process. PERE exists within the process improvement paradigm and combines both âĂIJhardâĂİ and âĂIJsoftâĂİ process improvement approaches.

3. Knowledge dissemination–PERE integrates classical engineering analysis and human factors analysis. This structured, usable, yet technically defensible approach means that engineers in the process and safety domains will have access to the relevant social scientific research and broader human aspects that determine process dependability and which would not typically be within their domain.

4. Enhanced coverage–since each viewpoint comes from a different research tradition, there is a certain amount of redundancy in the PERE process, resulting in increased coverage of the process under analysis as process weaknesses are trapped under different guises. This redundancy further improves the dependability of the PERE process itself.

Mechanistic viewpoint

PERE's mechanistic viewpoint has its origins in the classical safety analysis technique, Hazops, and Object-Oriented inspired analysis.

For this viewpoint it is assumed that both human and machine activity in the process are analysable into components. The model we describe is based on the principles of using modularity and abstraction to describe systems, considering generic component classes (process, transduce, channel, store and control) as subject to generic component weaknesses, and explicitly considering the "working material".

Once the process structure and working material is described, the PERE analyst completes a PERE component table to describe the process model. This process model is then reviewed for weaknesses by considering the generic

weaknesses associated with each component and also the specific weaknesses associated with the components attributes.

In documenting this analysis a PERE Weakness Table is completed. The weaknesses identification and review steps are iterated until no more weaknesses are identified. The results of the mechanistic analysis are then passed on to the human factors viewpoint, although provisional results may be fed forward if, say, one component is considered to be particularly vulnerable to human error.

Human factors viewpoint

In this phase we consider those components that are composed primarily of human activity, their interconnections and working material, and organisational context. The analysis proceeds by means of a series of structured questions, which enables the analyst to search for only those human factor weaknesses that are relevant for the particular process under consideration (e.g. it is not generally necessary to consider knowledge-based component weaknesses for a skill-based component such as typing).

The application of the human factors viewpoint concludes with a completed PERE human factors table, which includes suggested protections against the identified weaknesses. Of course whether they should be actually implemented for a particular application depends on factors such as the reason for investigation, an assessment of the risk associated with the weakness, and considerations of prioritisation and financial cost of the protections.

Retrospective

A simplified form of PERE has been used by Adelard, a safety consultancy, but it has not been further developed or evaluated. We believe that the principles are still sound but the number of organisations that consider the safety aspects of their processes is so small that it is unlikely to be further developed.