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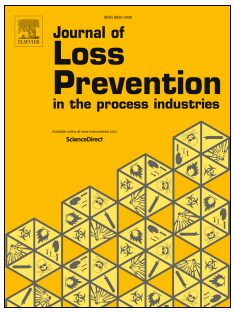

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A New Multi-objectives Approach to Implement Preventive and Protective Barriers in Bow Tie Diagram

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Abstract

Bow tie diagram has become a popular method to implement safety barriers. It defines several preventive and protective barriers to reduce respectively the frequency and severity of a given risk. These barriers are often defined by experts that ignore the real aspect of the system. However, the definition of barriers based on experts experiences limits this method because it seems unrealistic to use static recommendations in real dynamic systems. This paper proposes a new multi-objectives approach to implement preventive and protective barriers. The proposed approach is mainly based on three phases namely; a parameters learning phase, a simulation phase and a selection phase.

Keyword: Bow tie diagram, Preventive barriers, Protective barriers, Propagation algorithms, Multi-objectives influence diagrams.

1. Introduction

Since 1980, safety barriers have been used in industry process for safety management [1]. The notion of safety barriers was clearly defined by Skelet [2]: "*Safety barriers are physical and/or non-physical means planned to prevent, control, or mitigate undesired events or accidents*". From ISO 13702, prevention states the reduction of the occurrence related to undesired event, control means limiting duration of an undesired event and mitigation means the reduction of the effects of an undesired event. In addition, this standard defines the undesired events such as; technical failures, human errors, external events or a combination of these occurrences. These events may lead to major accidents such as; environmental damage, material damage and people injuries [3].