C. ARGIOLAS, A. CARBONARI, F. MELIS, E. QUAQUERO. ***A Bayesian model for real-time safety management in construction sites.*** *Gerontechnology 2012;11(2):149;* doi:10.4017/gt.2012.11.02.355.00

Purpose This article reports on an ongoing research project, which is aimed at implementing advanced probabilistic models for real-time identification of hazardous events at construction sites. The model has intelligent capabilities for near real-time automated recognition of hazardous events during the execution phase. To achieve this, features of Bayesian Networks[1] have been exploited. In addition, inputs to the model are assumed to be provided by a pervasive monitoring system deployed on the site. The need for this kind of intelligent tool is determined by the complexity inherent in construction sites, due to a variety of reasons, such as heterogeneity of the actors, the simultaneous nature of operations, harsh contextual conditions, and the only partially efficient current approach based on health and safety plans. Hence, this model is proposed as a support tool for health and safety coordinators for supervision of sites as they cannot guarantee a continuous physical presence. **Method** Given that there are no long-time series on past occurrences of hazardous events in all the potential contextual combinations presently available, the probabilistic models cannot be learned just through datasets. For that reason, the available data have been integrated with expert opinions. In particular, the conditional probabilities of the Bayesian networks are estimated by an elicitation process of subjective knowledge from the opinions of experts[2]. The complexity of the phenomena under analysis are modelled as a tree structure with several levels (corresponding to the work-breakdown structure hierarchy), which itself is based on the top-down technique; it provides therefore a clear view of the global picture. The built-hierarchical tree allows the expert to weigh more easily causal relationships involved and also to define the qualitative structure of the net. Furthermore, the article describes and tests how conditional probabilities of the variables in the networks can be estimated, through gathering and interviewing groups of stakeholders and experts. **Results & Discussion** Our research has led to the definition of a probabilistic model using elicitation techniques for subjective knowledge. Furthermore, the development of such a model is part of a wider system relying on the implementation of a real-time monitoring network.

References

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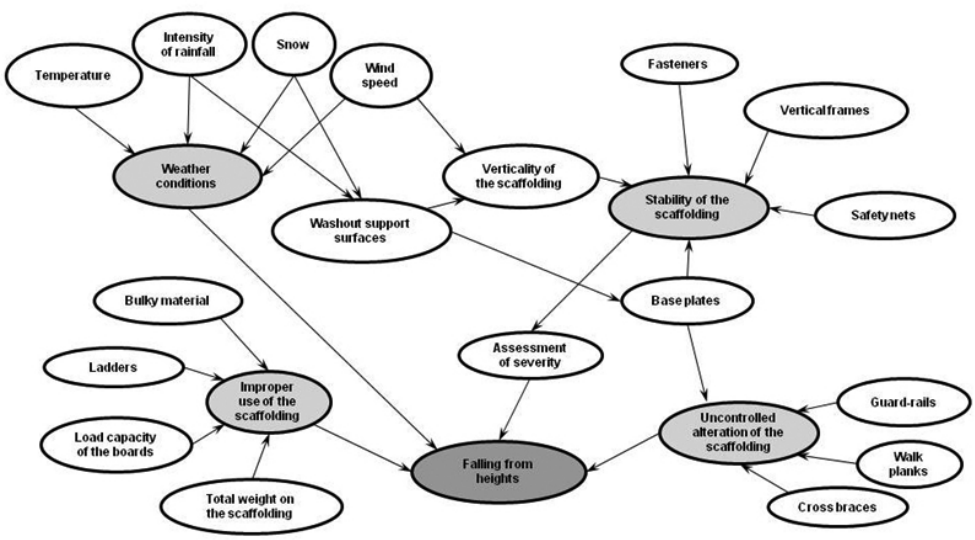

Figure 1. Qualitative structure of the elementary network relative to falling from heights.