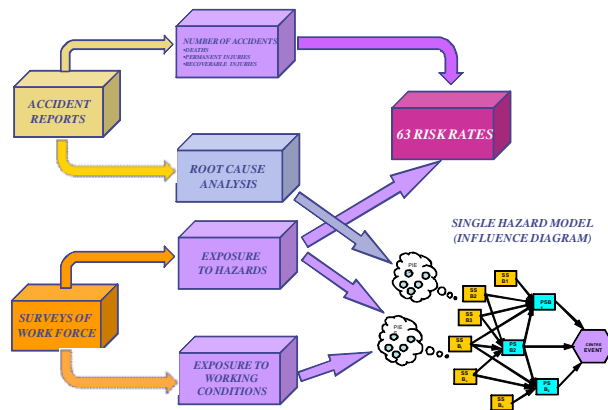


Occupational Risk Management

For the last six years SRISL has been involved in a large research program commissioned by the Dutch Ministry of Social Affairs and Employment aiming at developing a decision support system concerning a choice among various measures or combinations of measures aimed at reducing the risk of employees suffering injury or death as a consequence of job-related incidents. Two major phases of this project can be distinguished: a) the development of a *single hazard model*: and b) the development of a *multiple-hazard model* and an *optimization tool*.

Single hazard model

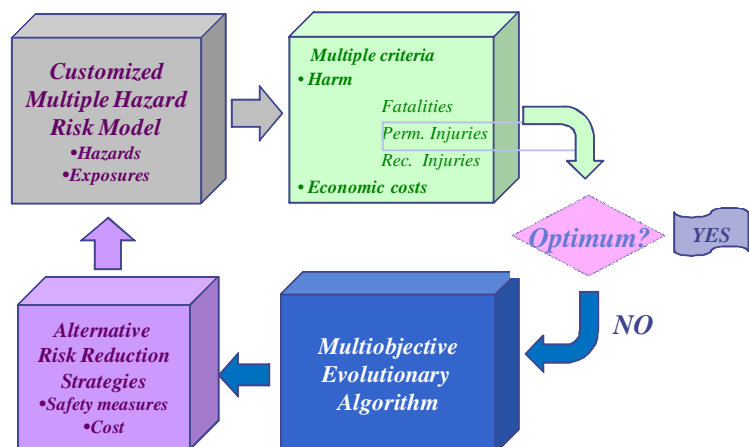


Sixty three specific hazards (like fall from a scaffold, struck by a moving vehicle, contact with moving parts of a machine) present at various phases of different types of jobs have been identified and a single hazard model has been developed for each one of them. The single-hazard model logically connects the working conditions and the various safety barriers with the occurrence of an accident resulting in death or an injury requiring hospitalization of at least three days. SRISL was responsible for the mathematical aspects of this model and it has put it in the form

of an *influence diagram*. SRISL has also developed a software tool that facilitates the development and the quantification of such models in general. The logical structure of the sixty three models has been based on the analysis of more than 10000 accident reports filled by labour inspectors investigating the causes of the accidents. Furthermore, exposure of the workers in the various hazards through the exposure to conditions/activities while performing their jobs has been assessed through extended surveys of the Dutch working population. As a result, the quantification of the sixty three single hazard models (performed by SRISL) provide one of more extensively supported quantification of the corresponding risk rates on a worldwide scale.

Multiple-hazard model and Decision Support tool

The multiple-hazard model quantifies occupational risk of a worker or a multiple of workers, by taking into account their various tasks, activities and the associated hazards and the corresponding single hazard models. A company, consisting of several workers with different jobs may be also modelled. Various risk measures are then calculated. Risks can be affected through specific measures than can alter working conditions and through them the risk. Each measure is associated



with a specific cost. Given a specific “company” and a basket of possible risk reducing measures the question that must be addressed is which is the optimum combination of measures that provides the maximum risk reduction at a given cost, or the a given risk reduction at minimum cost. SRISL has provided the mathematical basis and the software implementation of the multiple-hazard model and an associated multi-attribute optimisation module based on evolutionary algorithm. A single optimisation calculation involves thousands of single-hazard model calculations. In 2009 SRISL developed an algorithm that substantially speeds up the single –hazard model (influence diagram) calculations.