

In this workshop participants will learn about causal knowledge mapping and how it could be well suited for risk analyses of emerging applications of genetically modified organisms through short expository lectures and hands-on exercises featuring qualitative (signed digraphs), semi-quantitative (fuzzy cognitive maps) and quantitative (Bayesian networks) approaches. This workshop is intended for those with little or no familiarity or experience with these approaches.

Advances in genome editing and modification, transgenic technologies and synthetic biology are enabling the creation genetically modified organisms intended to persist in environments, complicating risk analyses and decision-making. While commonly used risk matrices have proven utility as a decision-support tools for the analyses of risks presented by genetically engineered organisms, various causal knowledge mapping approaches (e.g. signed digraphs, fuzzy cognitive maps, and Bayesian networks) used in many domains to support risk assessment and management decisions could help to better organize thought processes during problem formulation and other phases of risk assessment, enable broad stakeholder input to be incorporated into risk analyses, capture uncertainty and promote transparency. These tools have much in common with the "pathways to harm" methodology that is familiar to those assessing risks of genetically engineered crops and draw upon graphical representation of cause-and-effect relationships that can either be characterized qualitatively or with varying degrees of quantitative representation, leading to more probabilistic expression of risk scenarios. These tools enhance risk assessors' abilities to systematically map risk scenarios, thereby improving not only the quality of their risk analyses, but also their ability to transparently communicate those analyses to decisionmakers and other stakeholders. These improvements will be especially useful when dealing with genetically engineered organisms that are less familiar to regulators, and where decisions based on limited data might be required.