## Systemic Approach to Estimation of Operational Risks

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The problems of financial and other risks estimation and management are highly urgent as of today due to substantial losses that emerge as a result of underestimation of the risks or inappropriate countermeasures. The systemic approach to modeling and estimation of operational risks is based on system analysis ideas that refer to hierarchical data processing, modern techniques for estimation of model structure and parameters and taking into consideration possible uncertainties related to data and estimation techniques. The approach also includes the possibilities for control of relevant computational processes by appropriate sets of quality criteria so that to provide high quality of final result. It supposes performing of analysis of internal and external influence factors to various sides of financial company activities including stochastic disturbances of different nature and types, application of statistical simulation techniques in the frames of decision support systems (DSS) constructed on the purpose.

An operational risk is the risk of loss due to inadequate or failed (partially or completely) internal processes, people and information processing systems inside of financial organization or from external events. The frequency of OR losses are modeled using counting processes. The severity of OR losses are generally estimated with fat-tailed distributions. The empirical distributions used include Poisson and negative binomial distribution (for frequency); lognormal, gamma and Weibull distributions (for severity). Also popular are generalized extreme value (describes maxima and minima) and generalized Pareto distribution (for peaks-over-threshold description). Neural networks are useful for description of complex relationships between variables that cannot be modeled with linear models. The promising approach used in our study is based on Bayesian networks that allow expert and data inputs, i. e. combinations of subjective inputs and empirical observations.