Risk analysis (in practice)

In order to analyze the risks related to the distribution of the new soft application on the market of Helsinki the system dynamics (SD) approach has been used. The term of SD was originally rooted in the management and engineering sciences, and was created during the mid-1950s by Professor Jay Forrester of the Massachusetts Institute of Technology. The first published work was 'Industrial Dynamics' (Forrester, 1958). SD is part of a larger school of thought, systems thinking, which studies dynamic complexity through systems (Systemdynamics.org, 2014).

System dynamics first was developed to understand how the policies of corporations produce successes and failures. What is it in decision-making policies that produce growth or decay; what policies make huge fluctuations of employment, etc. Nowadays, according to the system dynamics society, SD refers to a computer-aided approach to policy analysis and design.

The computer-aid approach implies the utilization of the information technologies. That is why the research resorted to the Vensim computer simulation program, which provides a framework and an easy-to-understand graphical interface for observing the quantitative interaction of variables within a system. The graphical interface was used to describe, analyze complex system, and to perform the Monte-Carlo test (Fig.1).

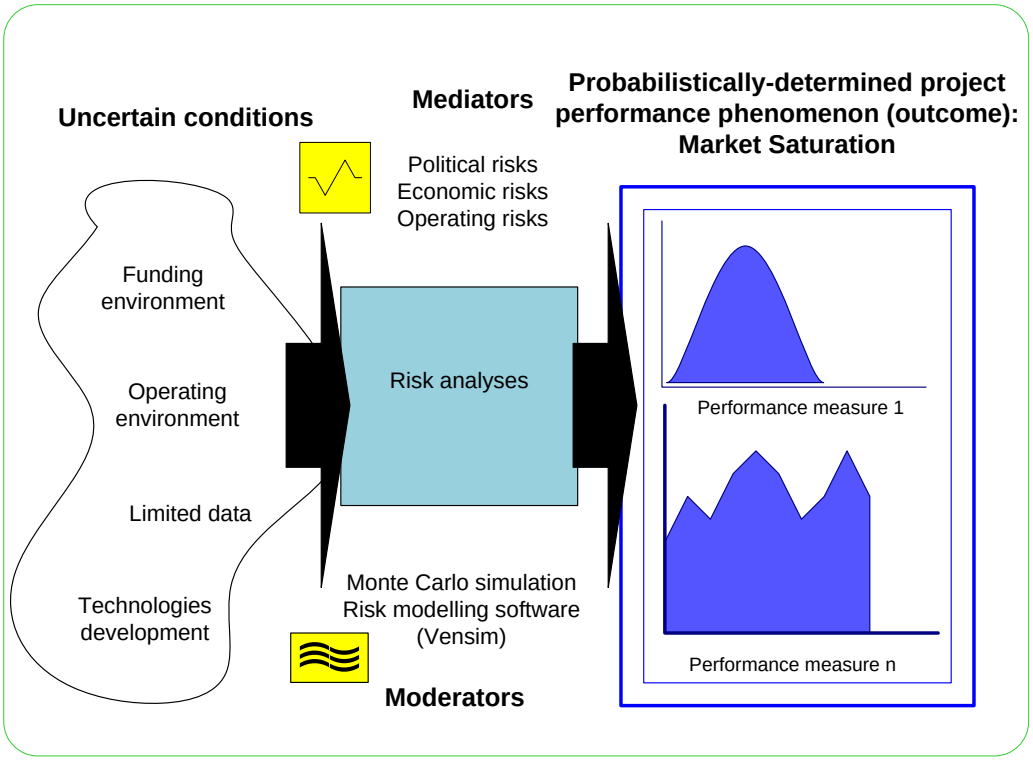

Fig.1. Uncertainty of the forecasted outcomes due to probabilistic surrounding conditions

Within the created model one of the most probable risks has been analyzed (the development of other competing technologies). The influence of risk was modeled with the use of special blocks: variables/parameters and feedbacks (Fig.2).

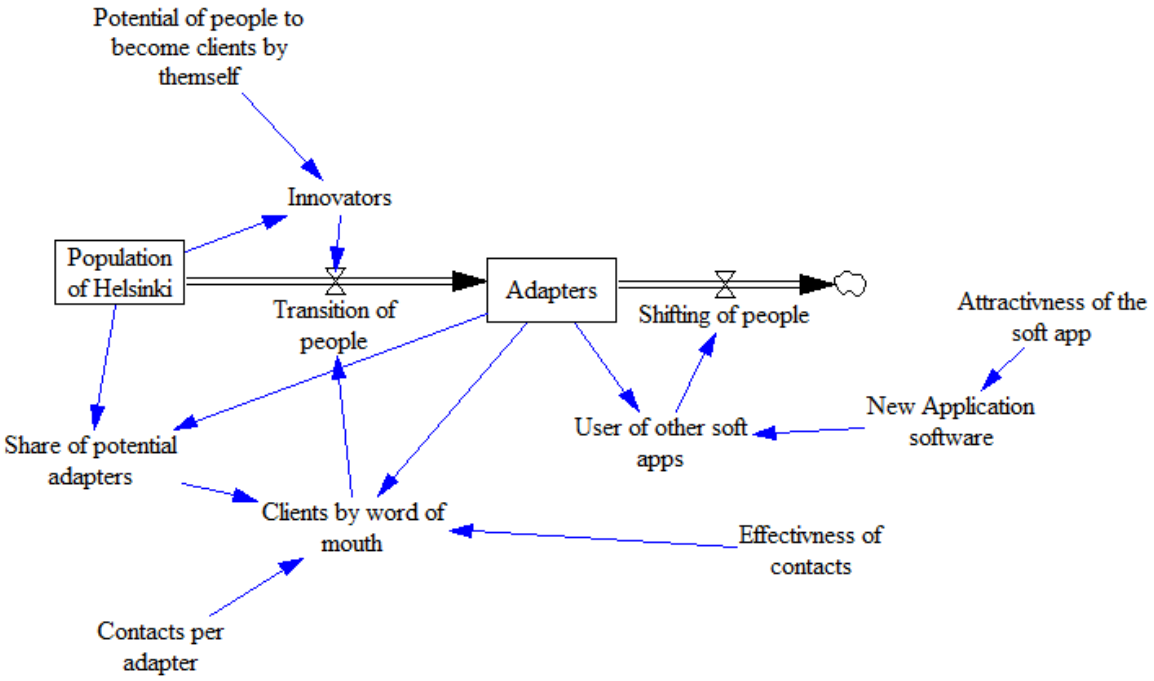

Fig. 2. Model of the market (Helsinki) where the new software application can be distributed

Variables simply store information and/or conduct different calculations during the simulation. The model is mainly constructed of exogenous and endogenous variables, and a few level and array blocks. From the exogenous point of view, the system was considered under the influence of outside events that are not part of the internal dynamics of the system. Thus, exogenous variables are an outside variable that affects but is not affected by the behavior of the system (e.g. attractiveness of the soft app, the time of the competing software application appearance, effectiveness of contacts, etc.). An endogenous view approaches a problem searching for its causes and cures within some boundary. Therefore, endogenous variables affect and are affected by the rest of the system (e.g., population of Helsinki, adapters, clients by word of mouth, etc.) As can be seen from the Figure 2, exogenous variables are those that are not part of a feedback loop, while endogenous variables are members of at least one feedback loop.

The whole structure of the model represents the market where the application software is distributed with the allowance for possible risks. In the model, the potential adapters are the population of Helsinki that becomes the adapters of the created soft app product as time goes by. The proposed parameters of the model are as follows:

- Initial population of Helsinki: 588 941 (all belong to potential adapters).
- 0.5 % of potential adapters become adapters by themselves. They can be called innovators, since they get knowledge of the new product by themselves.
- Each adapter contacts 30 people each month.
- 2 % of contacted potential adapters become adapters each month.
- Risk of appearing similar soft application may reduce the number of the contacted potential adapters by 10%.
- Depending the characteristics of the similar soft application, the effect can increase from 10% to 30%.
- The competing new soft app can be marketed, starting in 6 or 11 months from the introduction of the main software application.

Based on the proposed parameters and the created structure of the system, it was found that the market can be fully saturated by the new product within 1 year and 8 months (Fig. 3).

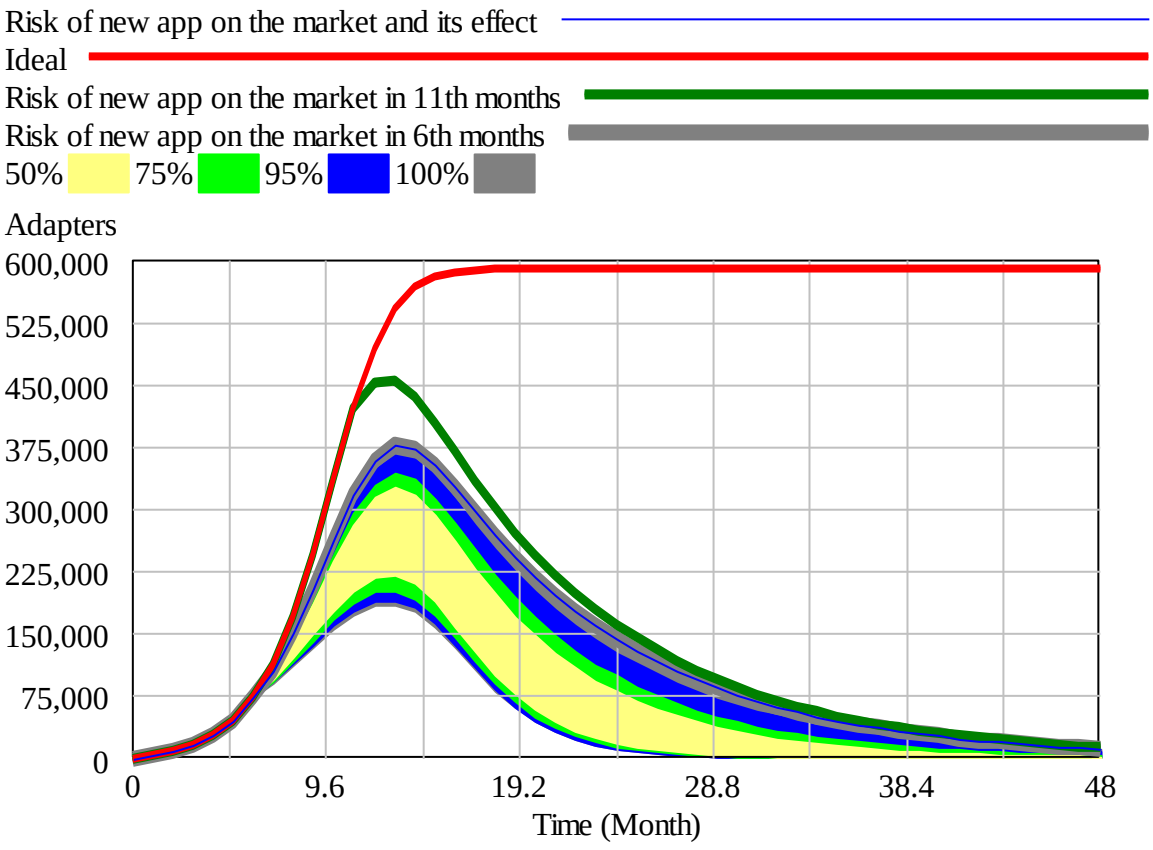

Fig. 3. Sensitivity analyses (Monte Carlo test) in Vensim

The potential risk is the appearance of competing application on the market. If the new soft app enters in the market in 6 months, then, by the time of 1year 8

months, the potential users of the main soft app decrease by 63% to 244 700 persons (Fig. 4). The risk of appearing the competing products in 11 months is less by 3%, since the number of the potentials adapters of the main soft app reduces to 218 300 persons (by 60%).

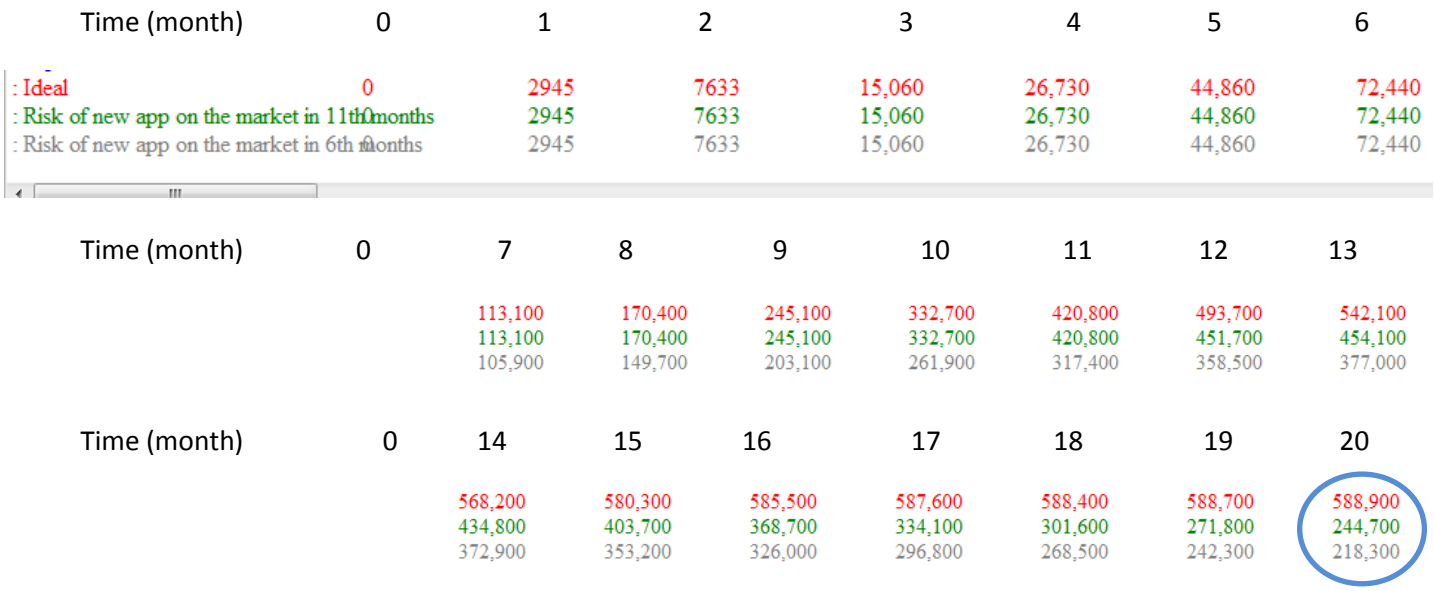

Fig. 4 The screenshot of the outcome of the model of the market for the new app

The Monte Carlo simulation allowed to find the risk of losing the clients for the main soft app, depending on the quality of the new competing product. In particular, the attractiveness of new soft app can reduce the number of the contacted potential adapters by 10% -30%. The simulation of the model was provided with the use of the uniform distribution for the one parameter (attractiveness of the soft app), keeping the other parameters of the system constant (including the time for the appearance of the new soft - in 6 months).

The statistics showed that by 1 year 8 months, the loss of the potential uses of the soft app can be on average 76%, reducing the number of adapters to 143 700 persons with the standard deviation of 37 760 persons (Fig. 5).

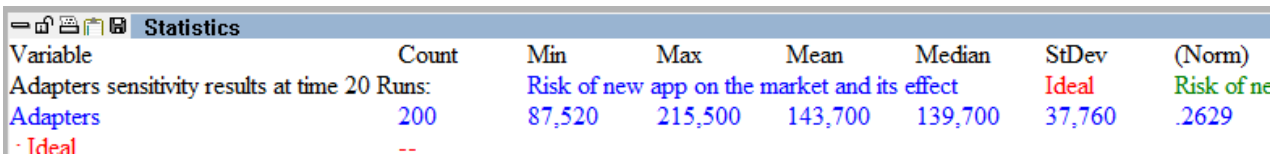

Fig. 5 Statistics of probabilistically-determined marker saturation with the new software application in Helsinki