# SIMO needs and idea; users' viewpoint

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Jyrki Kangas

UPM Forest Finland

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**Based on SIMO co-operation, and on an article authored by Kangas, Uuttera, Wathén, Haapasalo, Laamanen, Soimasuo, Suutarla & Ärölä**

**Time horizon = 5 years**

## Some general aims and challenges for forest planning IT development (Part 1)

- **By IT systems and their development we should**
    - be able to better answer today's forest planning challenges
    - get solid support in different kinds of forestry decision-making tasks and processes and for different kinds of people (with different background, knowledge, skills,…)
    - get forestry more efficient and profitable (better decisions with less staff, more cost-efficient forest management, etc.)
    - enhance utilisation of research results in forestry practice
    - increase the quality and reliability of forest management planning and forestry decision-making in Finland

- **For achieving these general aims, SIMO co-operation project produces modules to be widely utilised in forest IT systems**

# Some general aims and challenges for forest planning IT development (Part 2)

— **Forestry decisions are to be made more and more on grounds of forest databases and decision support provided by IT tools (and by a decreasing number of forestry staff)**

=> Reliability of numerical information is important, and efforts must be put on increasing the quality of forest information; more detailed and more accurate information on forest is needed and IT systems must enable storing and making full use of it

=> Versatile and efficient analysis tools are needed to handle the wide spectrum of decision support needs

# Some general aims and challenges for forest planning IT development (Part 3)

- **All available relevant information is worth exploiting when making decisions**
    - IT systems must enable making use of all information

- **Information is never (or seldom) perfect**
    - IT systems should manage calculations with incomplete data

# In general, forest IT system must be, e.g.,

- **Reliable**
- **Logical**
- **Robust**
- **Tolerant (for errors)**
- **Many-sided**
- **Flexible**
- **Adaptable**
- **Easy to use**
- **Pedagogical, and easy to understand**
- **Transparent**
- **Technically efficient**
- **Expandable**
- **Properly documented**

― **Simulation packages should enable/provide:**

  ― Considering large areas with different sub-area-wise parameters (ecological, economic, controlling)

  ― Scenarios for parameters (e.g. prices for timber assortments)

  ― Many-sided possibilities for adjusting models

    ― e.g., with regional/local calibration, expert judgments

  ― Simulation with incomplete information basis (even errors), and on grounds of different information sources

  ― Analyses of the reliability of simulation results, and information on deficiencies of the simulation process

    ― information on the applicability and deficiencies of models

  ― A choice of models; to choose the best for each task

    ― e.g., both tree-wise and stand-level models; regional models,…

- **Lack of models; modelling work is still needed**
  - emphasis e.g. on wood quality, energy potential, decaying wood, carbon budgets
- **Tools to fill the gaps in models are needed**
  - making use of expert knowledge
- **Free determination of simulation periods**
  - many years, one year, some months, some weeks
  - and free determination of the starting and ending moments
- **Free determination of the interest rate**
  - also possibility to change in time

# Needs concerning simulation of forest development and treatment schedules (Part 3)

- **Controlling the simulation of cuttings and management options**
  - regeneration criteria
  - thinning rules, including the choice of trees to be removed
  - rules for silvicultural treatments, drainage, fertilisation, etc.
- **All simulated alternative treatments must be logical**
  - rules also on grounds of the treatment history
  - expert system –ideology in controlling simulation of treatment schedules
- **Controlling must be easy to apply, and different controlling rules possible in different sub-areas within one simulation process**

- **Large-scale hierarchical optimisation consisting of sub-areas with different parameters (control/rules, economic, ecological, calibrations,…)**
- **Tools to formulate and modify optimisation problems**
  - easily, and in line with decision objectives and preferences
- **Methods to solve different kinds of optimisation tasks**
  - spatial constraints, nonlinear utility, multiple objectives
  - alternative quick-and-dirty methods; good solutions rapidly for large/difficult problems
- **Robustness; optimisation must not stop because of minor deficiencies or errors**
  - illustrative reporting, warnings, etc. for users

## Other calculation tasks and requirements

- **Biodiversity, multiple-use considerations**
- **Participatory planning, group decision-making**
- **Financial calculations; accounting, book values of biological assets**
- **Land-use planning; forestry in zoning**
- **Considering special financial values in forestry decision support and calculations**
  - plots to be sold, soil resources, peat, carbon storage, emission trade, "nature protection value trade"
- **Multicriteria decision analyses**
- **Illustrating calculation results and alternative plans**

# Some final remarks

— **Needs and requirements is an never-ending story**

— **New needs and requirements evolve continuously**

— **We need models, methods, IT systems NOW**

   — and improvements or new modules soon after a new need is met

   — SIMO helps us now when we build new systems for today's needs and for those of the near future

— **In 2010, we'll have more needs**

   — what needs; we are not sure

   — but IT development work will continue