

Forest

Knowledge

Expertise

METLA

Welfare

# The Finnish MELA System

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Olli Salminen and Markku Siitonen

# The Finnish MELA system\* is an ICT application easily adapted to different end-user/data combinations.

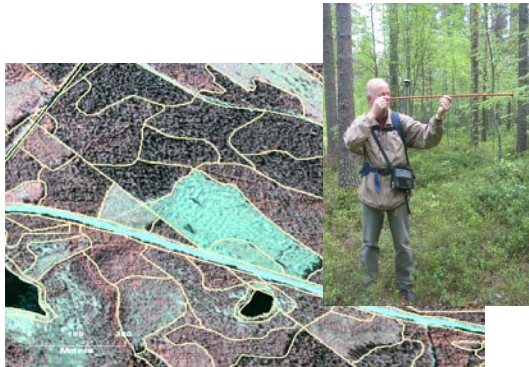
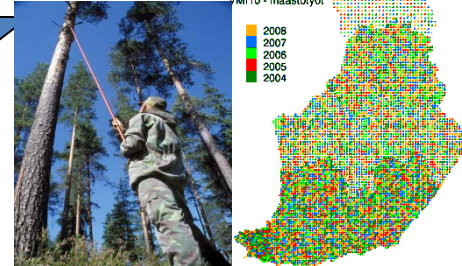


Photo: Metlia/Pekka Hyvönen

Stand/  
sample plot/tree data



**MELA Stand simulator**  
Including models for

- natural processes (Hynynen et al. 2002)
- treatments and economy
- state monitoring
- **automated** generation of alternatives
- thousands of variables

**Mgmt activities**  
**Prices, costs, etc.**

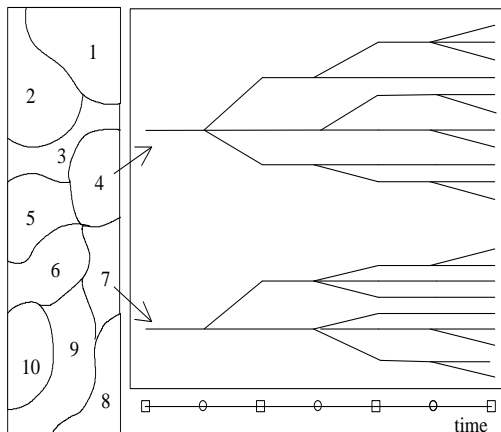
**MELA Optimisation**  
(JLP, Lappi 1992)

**Objective Constraints**



**Forest level summary report**  
**Stand level database input**

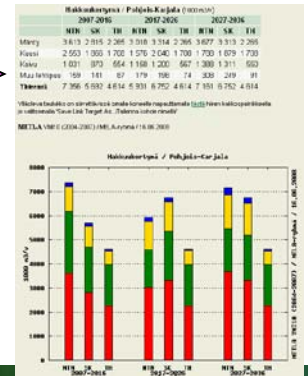
Regulation: forest level objective and constraints

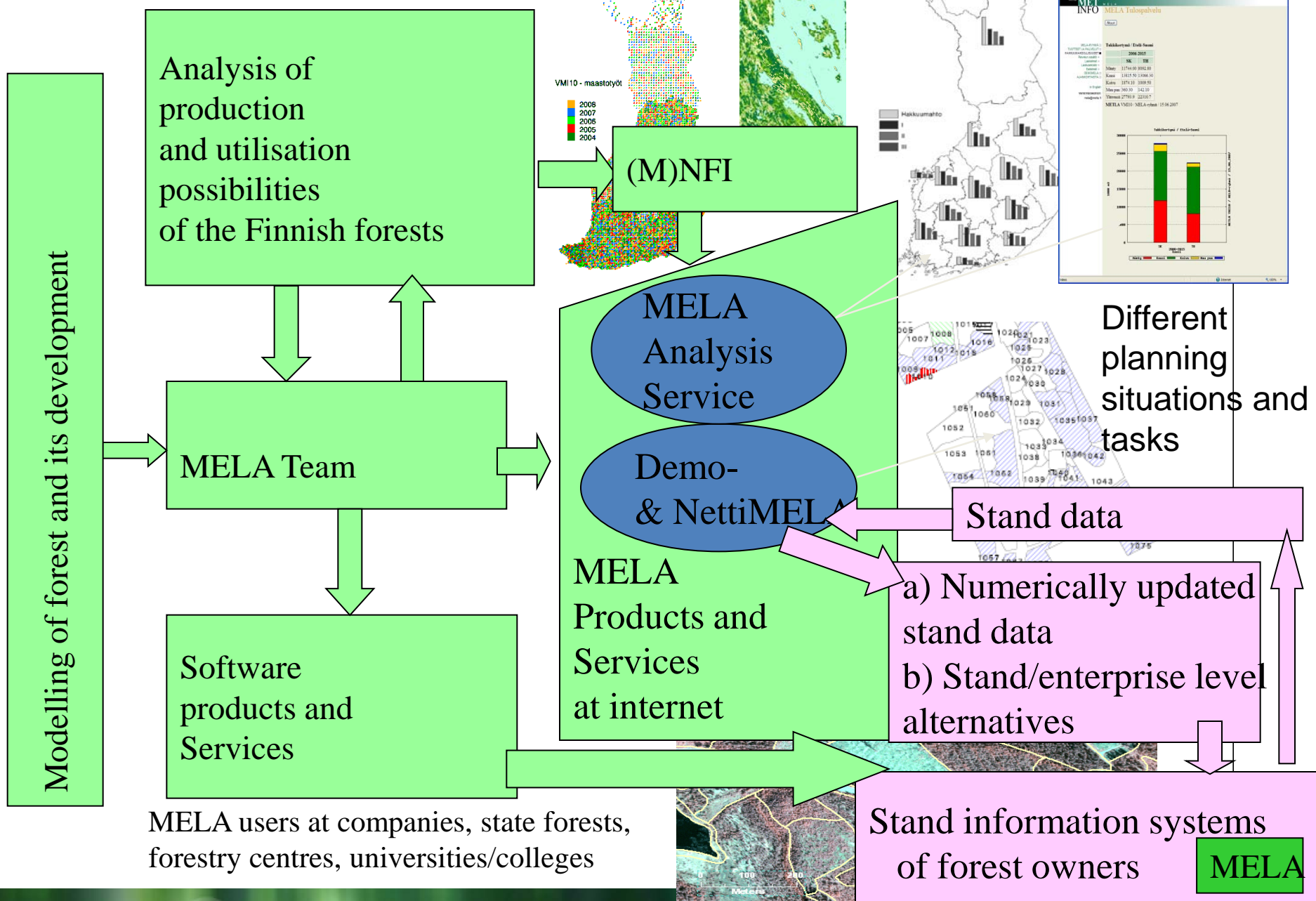


Sum of stands, full forest-stand interaction

Figure: MELA Handbook 1996 Edition

\*Siitonen et al. 1996, Forest Research Institute, Research Papers 622  
Hynynen et al. 2002, Forest Research Institute, Research Papers 835  
Lappi 1992, Forest Research Institute, Research Papers 414





# MELA software tools, IT and users

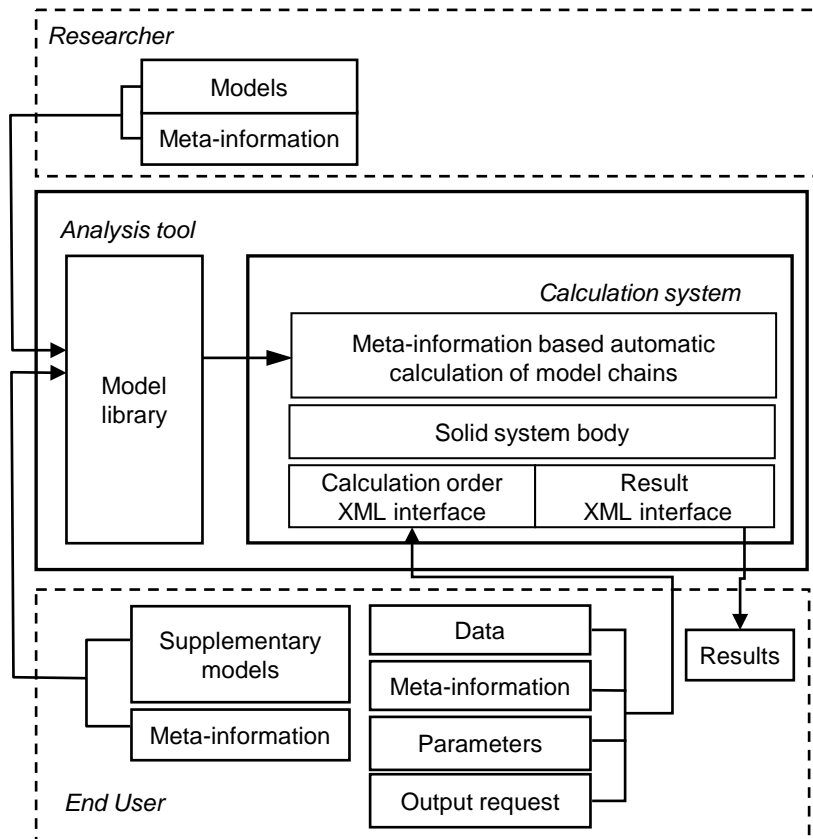
Tool	Overview	Applications	Users	The role in DSS
J/JLP*	A FORTRAN stand-alone program containing e.g. an LP module and simulator language for defining forest simulators.	Different forest modeling and analysis purposes	Currently 37 licenses in 14 countries: modelers and system architects since 1990s	A platform for DSS (in different OS)
MELA**	A FORTRAN software package containing a stand simulator, an optimisation tool (sitting on J/JLP) and interfacing routines	a) National and sub-national forestry modeling and analysis; b) A component in organisational information systems/DSS	a) Researchers in Metla, since 1970s b) Foresters, forestry students in companies, state forests, forestry centres, universities, colleges since 1980s	A component for DSS (in different OS)
DemoMELA***	A browser interface for MELA, output file interface Excel, ArcGIS	Demonstration of MELA functionalities	Universities and colleges since 2005	A browser interface for DSS
NettiMELA***	A web client-server interface for MELA	Forest accounting	MTT Agrifood Research Centre since 2005	A web-service for DSS
MELA Analysis Service***	A browser interface for MELA analysis results stored in an SQL database	Policy processes Industry decisions	Policy-makers Stakeholders	A browser-based GUI for reporting in DSS
LocalMELA****	Extranet service proto for automatically adaptable forest data enhancement	Automating and optimising data and model integration	Currently researchers	Add-on or embedded tool for inventory and

\*Lappi 1992, Forest Research Institute, Research Papers 414; \*\*Siitonen et al. 1996, Forest Research Institute, Research Papers 622 analysis systems

\*\*\*Nuutinen et al. 2011, J. For. Plann.; \*\*\*\*Nuutinen et al. 2011 Scand. J. For. Research

# LocalMELA:

## The components of the autonomous analysis tool



*System specialist is responsible for the platforms (model library and calculation system) and interfaces.*

*There is no need for programming the calculation chains since they are automatically generated based on output requests and supplied data and models.*

Nuutinen et al. 2011 Scand. J. For. Research

# The MELA team

Forestry Modelling and Analyses Project\* 1985-  
A part of Forest Planning in Metla

Name	Education	Responsibility for
Aimo Anola-Pukkila	M.Sc. (For.)	Web services
Hannu Hirvelä	M.Sc. (For.)	Data interface
Kari Härkönen	M.Sc. (For.)	Interface with G&Y models
Juha Lappi	Ph.D.	J program
Reetta Lempinen	M.Sc. (math.)	Software design
Visa Redsven	M.Sc. (computer science)	Software project and version management, documentation, IT-environment and -components
Olli Salminen	M.Sc. (For.)	Team leader Interface with economic models
Markku Siitonen	Forester	Original design, prototyping

\*<http://www.metla.fi/hanke/3002/index-en.htm>

# MELA maintenance, development and technology transfer

- MELA Users Group since 1980s
- MELA web-site since 1990s
- Continuous
  - collection of user feedback (e.g. MELA Users Days)
  - scientific collaboration for new knowledge (e.g. models)
  - prototyping of new features
- Organized and systematic
  - software project management (Sirid)
  - large-scale testing (NFI-based analysis as testbed)
  - version management
  - software release: 8 releases since MELA96, most recent MELA2009
  - documentation (release-specific reference manuals)

# For the Guidelines

- MELA is used, for example
  - by Metla to support MAF and RFCs (13) to derive forest programs for SFM
  - by companies and state forests to derive management plans for SFM
- Based on our experience the key factors for success include USERS and
  - the original design
    - a stand simulator and forest-level optimization tool under the same interface routines/parameter control
    - facilitating evolving SFM through
      - the flexible (user-guided and adjustable according to forest management) stand simulator and
      - open (user) definition of optimization problem
  - the powerful optimization tool, J/JLP for large LP-problems (> 1 mill. stands)
  - the use of standard and supported IT-solutions for long life cycle
  - the principle of minimizing built-in code and maximizing user control and automation
  - collaboration with different disciplines for the models (knowledge) and with users for the feedback
  - motivation for the development, testing and maintenance due to sectoral responsibilities of the team.



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KNOWLEDGE

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***Thank you!***

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