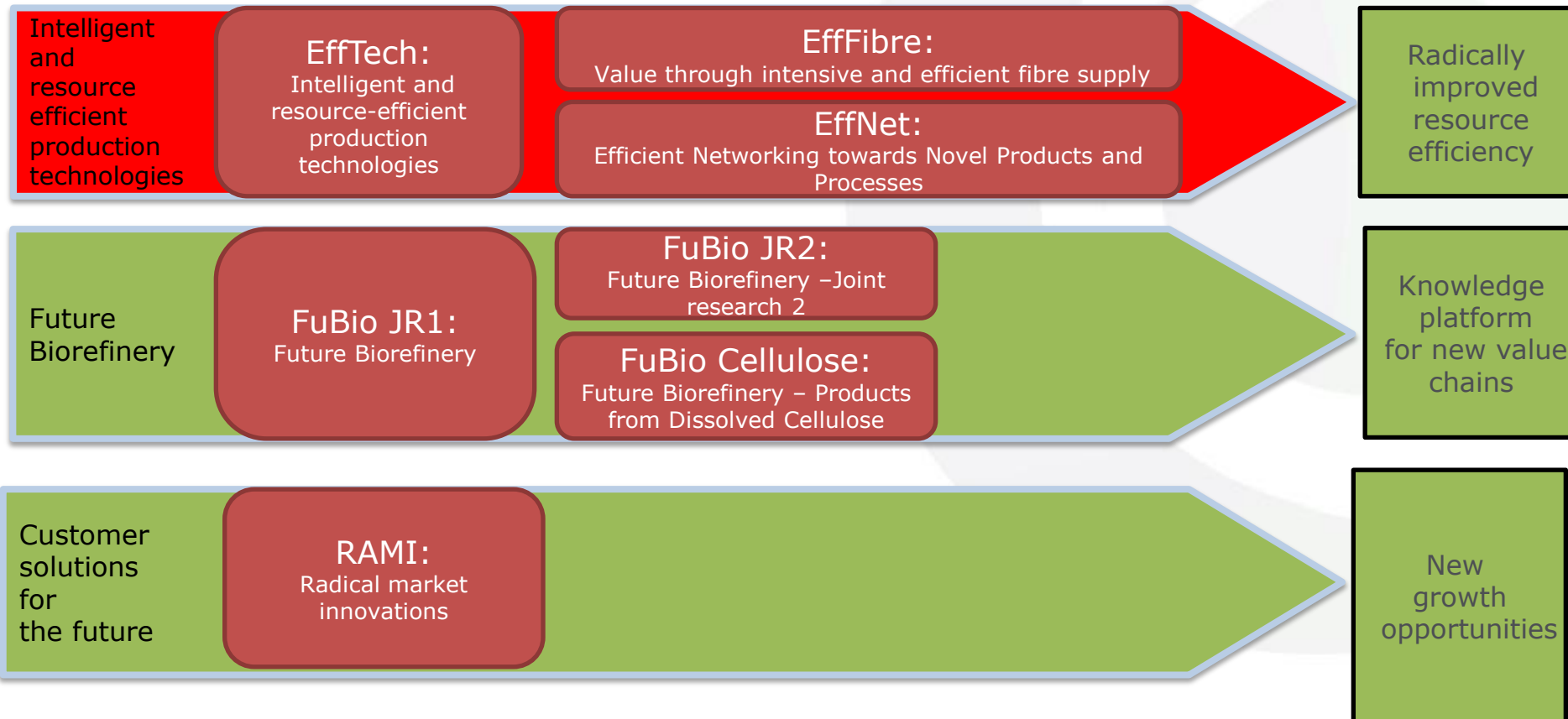


Overview of the Intelligent and resource efficient production technologies programmes

20.11.2012
Pauliina Tukiainen

Strategic research themes & program coverage



Targets

- “The target is to double the value of forest cluster products and services from the 2006 levels by 2030. At least half of the value will come from products and services that were not yet in production in 2006.”
- The goal of Intelligent and Resource efficient production technologies programmes is to develop radically new production systems that make the best use of resources and are energy-efficient so as to reduce capital intensiveness and improve the entire cluster's efficiency, flexibility and sustainability.

Focus areas

- Ensure raw material availability in a sustainable way and improve the profitability of forestry.
- Utilization of modeling and simulation in order to be able to increase the speed of the development of new process concepts.
- Development of new resource efficient paper production processes that are profitable, sustainable and enabling a range of new products

Intelligent, resource-efficient production technologies, 2008-2013

- The duration of the programmes is five years, with a total budget of around 40 million Euros.
- Pre-competitive research, i.e. generic competences are generated in the programs
- The Intelligent, resource-efficient production technologies (EffTech) program portfolio for the first two years included ten research projects and three consortia projects (1.6.2008-30.6.2010), budget 18 M€
- Industry led work groups prepared proposal for programme continuation (1.7.2010-30.6.2013)
- The second phase of the EffTech program continues in two separate but strongly interlinked Programs
 - “Value through Intensive and Efficient Fibre Supply” (EffFibre), 11 M€
 - “Efficient Networking towards Novel Products and Processes” (EffNet), 15 M€
- Pre-competitive research, i.e. generic competences are generated in the programs

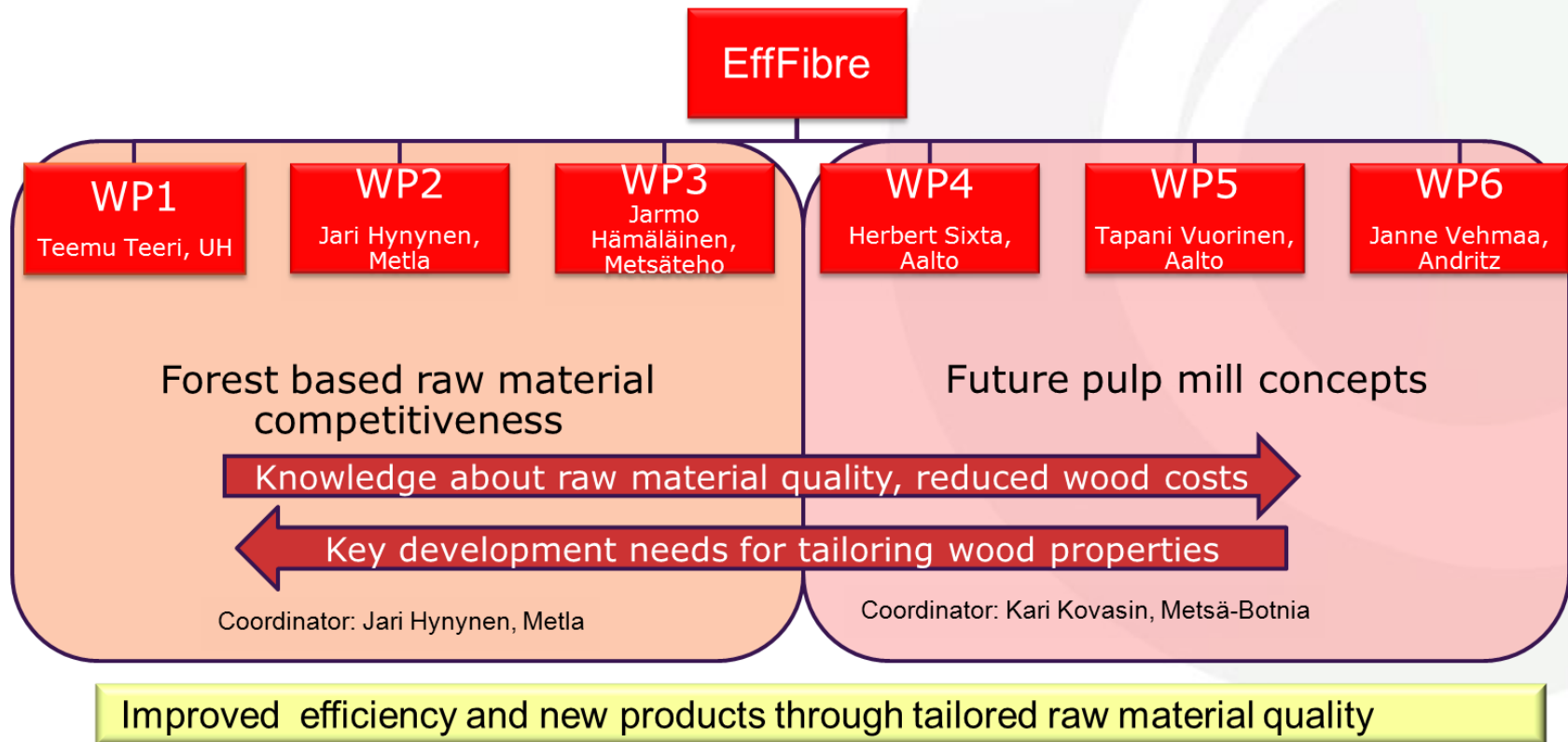
“Value through Intensive and Efficient Fibre Supply” (EffFibre)

2010-2013

Value through Intensive and Efficient Fibre Supply (EffFibre)

- Value through Intensive and Efficient Fibre Supply program focuses on the competitiveness and quality aspects of forest based raw materials and on development of radically new energy – and resource efficient production technologies for chemical pulp.
- The targets of the EffFibre programme are to
 - Improve availability raw material, to improve cost-efficiency of wood supply value chain, and to increase the utility value of domestic raw material.
 - Develop radically new energy and resource efficient forest exploitation and fiber production technologies

EffFibre Structure



Forest based raw material competitiveness

- **Main target:** Intensification of wood production in order to improve competitiveness of the wood supply chain and to understand means to improve quality.
- **Tasks:**
- Research-based knowledge on possibilities to affect quantity and quality of raw material
 - tree genotypes with improved growth and quality
- Production of wood and biomass
 - Intensified forest management
- Procurement of wood and biomass
 - Cost-efficient wood supply



Future pulp mill concepts

Main target: Develop solutions to utilize the existing pulp mills more profitably and to respond to the process modification needs which arise from the new value chains

Tasks:

- Novel two-stage kraft oxygen-alkali process (KrOxy)
 - Yield saving with uniform and selective cooking and oxygen delignification
- Virtual chemical pulping model (VIC)
 - Fundamental based chemical pulping model
- Future pulp mill concepts
 - Techno-economical evaluation of pulp mill concepts

EffFibre – Partners and international networking

Partners: 5 Research Institutes and universities, 11 companies



International Networking

- Co-operation with 6 countries (Argentina, Canada, France, Germany, Sweden, U.S.A)
- The collaboration with research groups (Umeå Plant Science Centre, University of British Columbia).
- Short and long term research visits (Skogforsk, University of Maine, North Carolina State University)
- Joint M. Sc. Theses (Universidad Nacional del Litoral in Santa Fe, Argentina)
- Student exchange between Aalto and Grenoble with Professor Christine Chirat

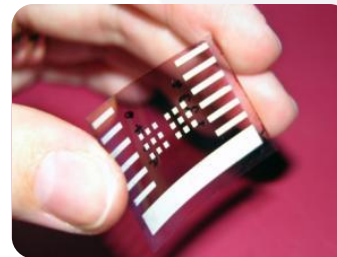
“Efficient Networking towards Novel Products and Processes” (EffNet)

2010-2013

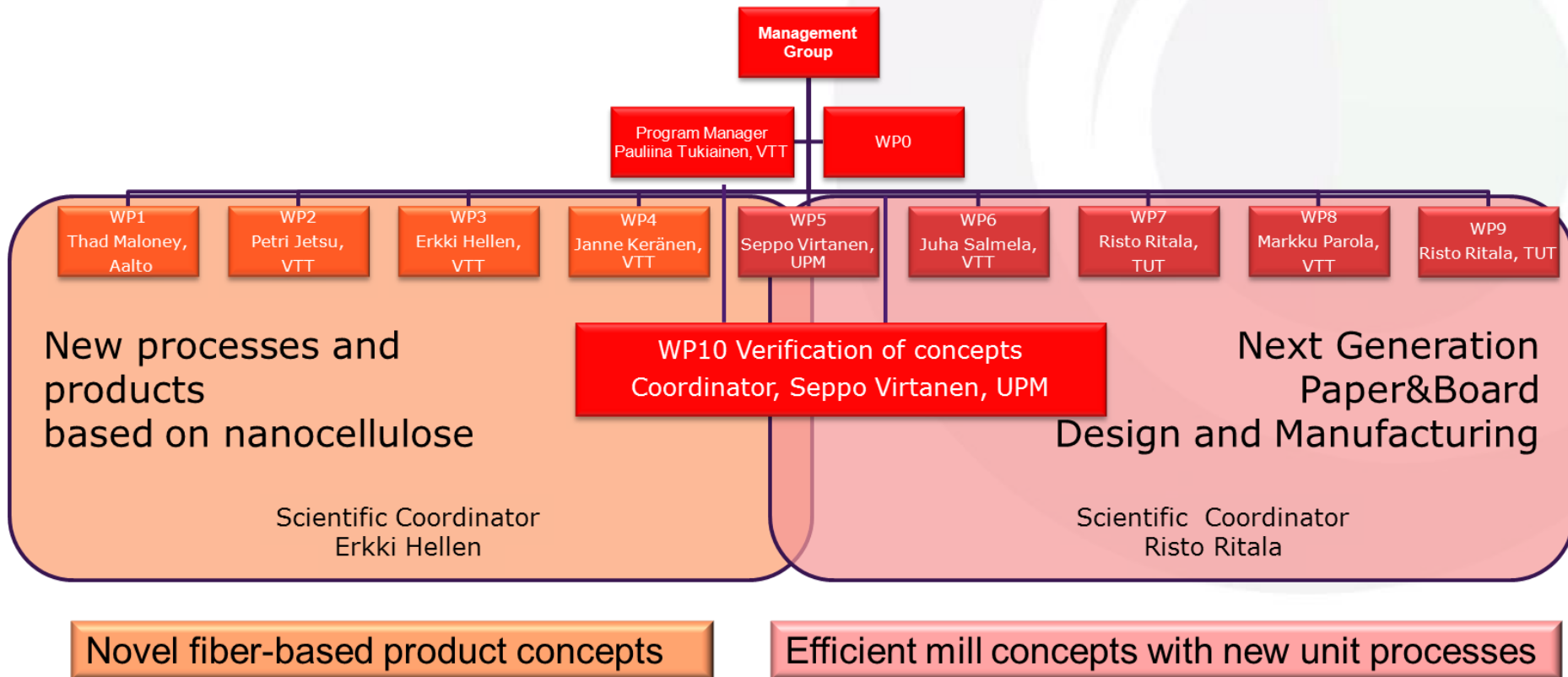


Efficient Networking towards Novel Products and Processes(EffNet)

- The EffNet (Efficient Networking Towards Novel Products and Processes) program focuses on a completely new type of energy- and resource-efficient production technology for web products and designing nanocellulose-based production concepts and new products.
- The target is to develop and demonstrate new types of fibre-based products to expand the range of products offered by the existing forest cluster companies. Special efforts will be made to minimise the energy consumption of new products and processes and develop resource-efficient processes.



EffNet Structure



New processes and products based on nanocellulose

Main target: Develop sustainable web product concepts including cellulose nanofibers and their resource- and energy-efficient production technology.

Tasks:

- Efficient production technologies for new furnishes
 - Ultra low water content forming, foam forming, NFC processing and dewatering
- Expanded properties for paper and board products
 - Low density structures, engineered multilayered light-weight board
- Fiber-based products to new value chains
 - 2-4 new product concepts outside existing business
 - Modelling of new structures
- Sustainability and feasibility assessment
 - Safety & characterization



Substrate
for printed
electronics



nanocellulose

Sustainable and resource efficient design and manufacturing (paper and board)

Main target: Develop lean and environmentally sound production concepts = current combination of functional product properties with less capital, raw material, energy, and water

Tasks:

- Lean concepts and unit processes
 - Radically reengineered production line based on reduced water concepts
 - Retrofittable technology for present production systems
- Efficiency of operation through improved decision making, control, and measurements
 - Image-based measurements and control
- Expanded operating window for printing process enabling efficient use of newly engineered fiber-web substrates
- Optimized structures and operation of entire lines
 - Methods of optimal design of concept structures and dynamics

EffNet - Partners and international networking

Partners: 8 Research Institutes and universities, 8 companies



Sanomapaino

International Networking

- Co-operation with 10 countries (Canada, Denmark, France, Germany, Ireland, Israel, Sweden, U.K, Uruguay, U.S.A)
- The collaboration with research groups (FPInnovations, KHT, Sweden).
- Long term research visits (Imperial College, UK, Trinity College Dublin, Ireland and the University of Texas at Austin, USA)
- Co-operation with Yttkemiska Institutet (YKI), Sweden, on foam chemistry
- Joint M. Sc. Theses (University of Uruguay)

Dissemination of results & Publications

- 10 Thematic workshops and seminars organized
 - Seminar materials are available at FIBIC research portal
- International Conference presentations and posters
- 50 scientific publications (peer reviewed)
- 6 Doctoral Thesis

Thank you for your interest