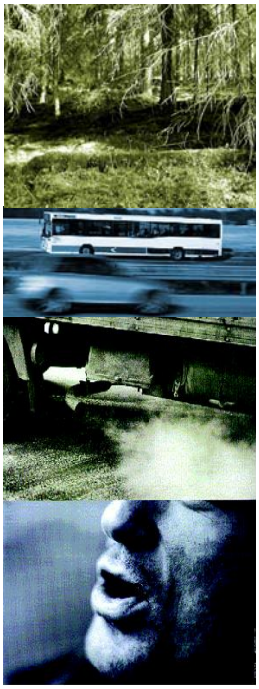
SINTEF

Applied Mathematics
Optimisation



Enhancing Business

Improving Society

Resources Time Decisions

Profit
Decision Support
Customer Service
Environmental Impact

Both industry and the public sector face numerous challenges in today's competitive environment. The open access to information in our networked society has expanded companies' markets to a global scale. Customers expect services to be cheaper and more efficient. Organisational flexibility is vital to accommodate further growth. Efficient use of time and resources is a key to success in any organisation.

Applying optimisation and planning technologies enable businesses to better allocate resources, including people, equipment, vehicles, materials, time, and facilities. The result is substantial improvements to critical parameters such as customer service, resource utilisation, operational costs, and environmental impact.

Co-ordinating all activities within an organisation is a time consuming process, where even small, relative improvements in the use of costly resources would result in large savings. Industrial experience shows that more than 10% cost reduction may be achieved by use of modern optimisation technology in transportation planning, with 75% saving in planning time.

The cost of goods transportation in the US exceeds $400 billion annually, comprising up to 30% of the price of a product. The amount of excess travel is estimated to be in the range of $45 billion per year, the loss of more than 900.000 man-years. [G.F.King & C.F. Mast, Transport Research Record, 1111, 126-134]

The Optimisation Group has an excellent record of delivering tailored, high performance solutions to the industry and public sector. Our customers cover a broad range of application areas, all having optimal utilisation of resources as a key to enhance business and improve quality.

Efficiency

Co-ordination

Sustainability

Road Transportation
Optimisation technology offers a huge potential for savings in transportation management. Planning tasks include strategic, tactical and operational planning, such as transportation network design, fleet dimensioning, dynamic fleet management, and dynamic cheapest path calculations.

A long-term research and development strategy has enabled us to establish a name in the transportation planning industry. For road transportation planning, our software package *Spider* may be purchased off-the-shelf from the tool vendor GreenTrip AS. For customers with special challenges, we develop high quality, tailor-made solutions in a cost-effective way.

"Our state-of-the-art fleet management product SPIDER Designer has won several contracts in competition with large, international vendors. The key to our success is a strategic alliance with SINTEF, including access to the best software components available, and world-class competence in applied optimisation that enables us to react to new requirements very rapidly." [Torjus Sandåker, Managing Director, GreenTrip AS]

Shipping
To maintain a competitive edge in the global marketplace of shipping, intelligent and dynamic decision support systems are necessary to reduce costs and increase fleet utilisation. We have developed software solutions that create optimised vessel routing plans for large shipping companies. All relevant aspects of the problem are modelled, including port-specific fixed and variable costs, draft constraints, and stowage logistics. The planning process is dynamically synchronised with real-world events.

Manufacturing
Large improvements in operational cost, time to market, and customer service are achievable if intelligent planning systems are utilised in dynamic production environments. Our solution approach creates production schedules based on real-time exchange of scheduling decisions among supply chain partners and information from the shop floor.

"Using software developed by SINTEF for combined shift and vehicle route planning resulted in savings in the form of reduced number of shifts, paid working hours and distance driven. The operational plans are robust and adhere to the drivers' preferences. We have seen that neither manual planning nor any other commercial system on the market are capable of creating such solutions." [Dag Kjenstad, Project Manager, Concordia]

Oil and Gas
In collaboration with industry and the public sector, we have developed a tool for strategic planning of oil and gas production in the North Sea. This involves deciding which fields to develop, which pipes to build, and when to do it. The result is better utilisation of oil and gas resources.

"I am convinced, based on years of experience in health care, that if I had an army of OR/MS professionals at my disposal, we could easily cut the cost of health care by 10 to 20 percent." [Prof. Michael Carter, University of Toronto]

Natural Resources Management

Long-term planning of natural resources involves a set of economical and ecological goals that often are in conflict. Simultaneous optimisation of all criteria is a complex task that benefits from use of advanced software tools. One such tool for forestry is *Ecoplan*, a system developed by us in collaboration with industry and the public sector. The system creates sustainable forest treatment plans that are optimised to strike a balance between increased profit, prevention of erosion, and preservation of biodiversity.

Crew Scheduling and Timetabling

Optimal utilisation of available resources is essential to improve quality and reduce cost. Scheduling and timetabling are optimisation challenges that are common to a wide range of application areas. Examples include public transportation, crew scheduling, and allocation of rooms and equipment. Our experience in managing human and material resources can benefit all applications in which a set of tasks must be performed with limited resources.

Operations Research
Artificial Intelligence
Management Science
Software Engineering

Applied Mathematics :: Optimisation

The Optimisation group develops realistic models, algorithms, and software tools that solve complex co-ordination tasks for our customers. Our *Scoop* optimisation software library is a comprehensive collection of advanced components for optimisation and constraint satisfaction. Flexibility and reuse is facilitated by object-oriented methods, allowing us to adapt and extend the generic software library to a large number of successful applications within industry.

The department co-ordinates large, international research projects, including projects funded by the European Commission, and strategic programmes for basic research funded by the Research Council of Norway.

SINTEF is the largest independent research organisation in Scandinavia, with NOK 1.7 billion in annual turnover and more than 1.700 employees. SINTEF performs research within applied mathematics, computing science, management science, civil and environmental engineering, materials technology, electronics, chemistry, energy and petroleum research, fisheries, marine technology, and disciplines related to the medical sector.

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