



Statens vegvesen

Norwegian

Public Roads Administration

Traffic and capacity analysis for road projects in Norway

Are Sturød

Norwegian Public Roads Administration

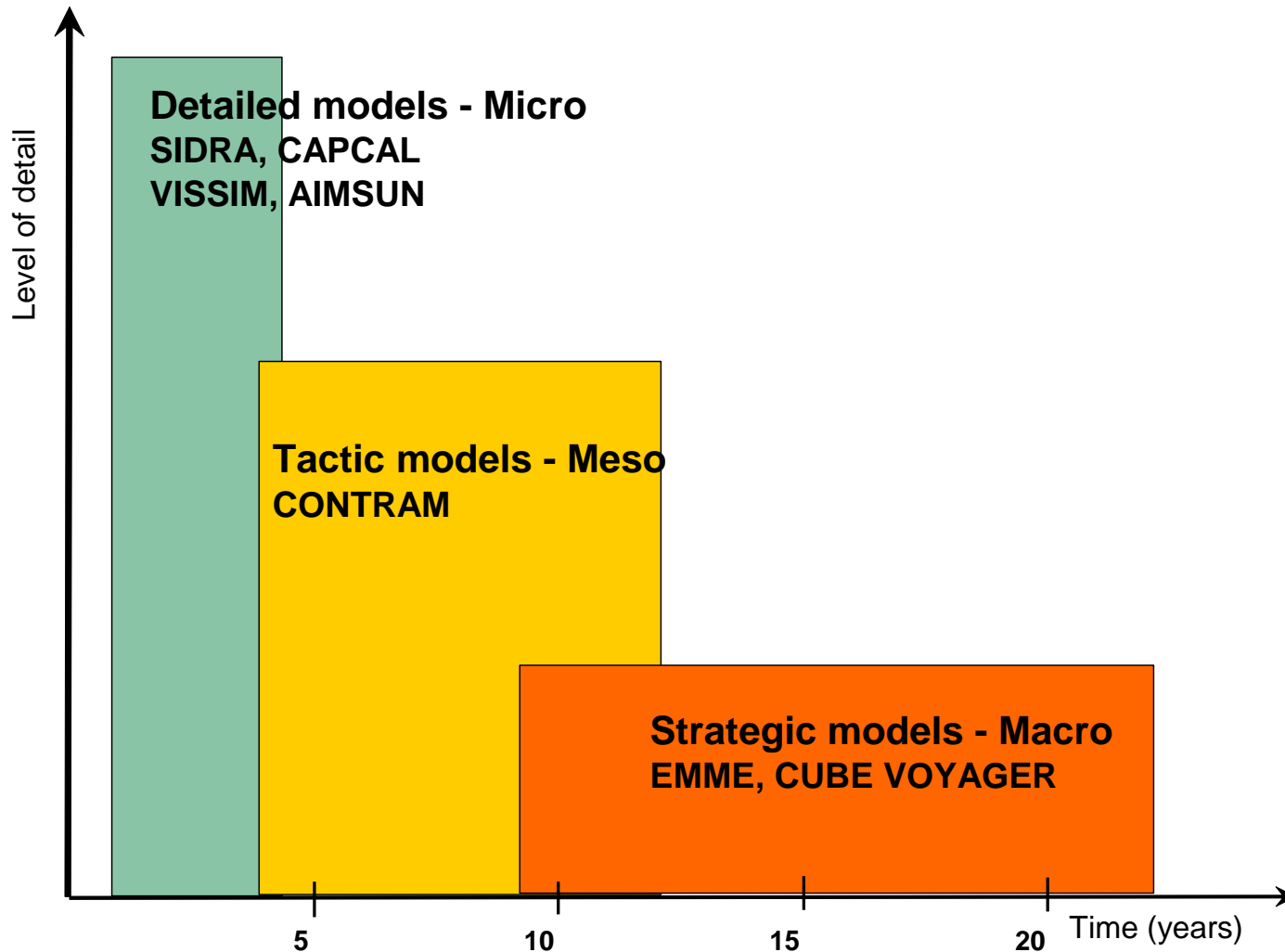
Region East, Transport Analysis

Main subjects

- Different models for different levels. A Norwegian overview.
- Stages for a planning project. Use of transport models / capacity analysis in each stage



Different models for different levels



Capacity analysis – single junction

- Roundabout, Signal junctions
- In National Road Administration we use SIDRA for both roundabout and signal junctions
- But there are also some using CAPCAL and Spreadsheet
- Also the consultancies use SIDRA, CAPCAL and spreadsheets
- Relatively easy to analyze several alternatives
- Calculating Capacity, Queue lengths, V/C factor
- But no influence between intersections

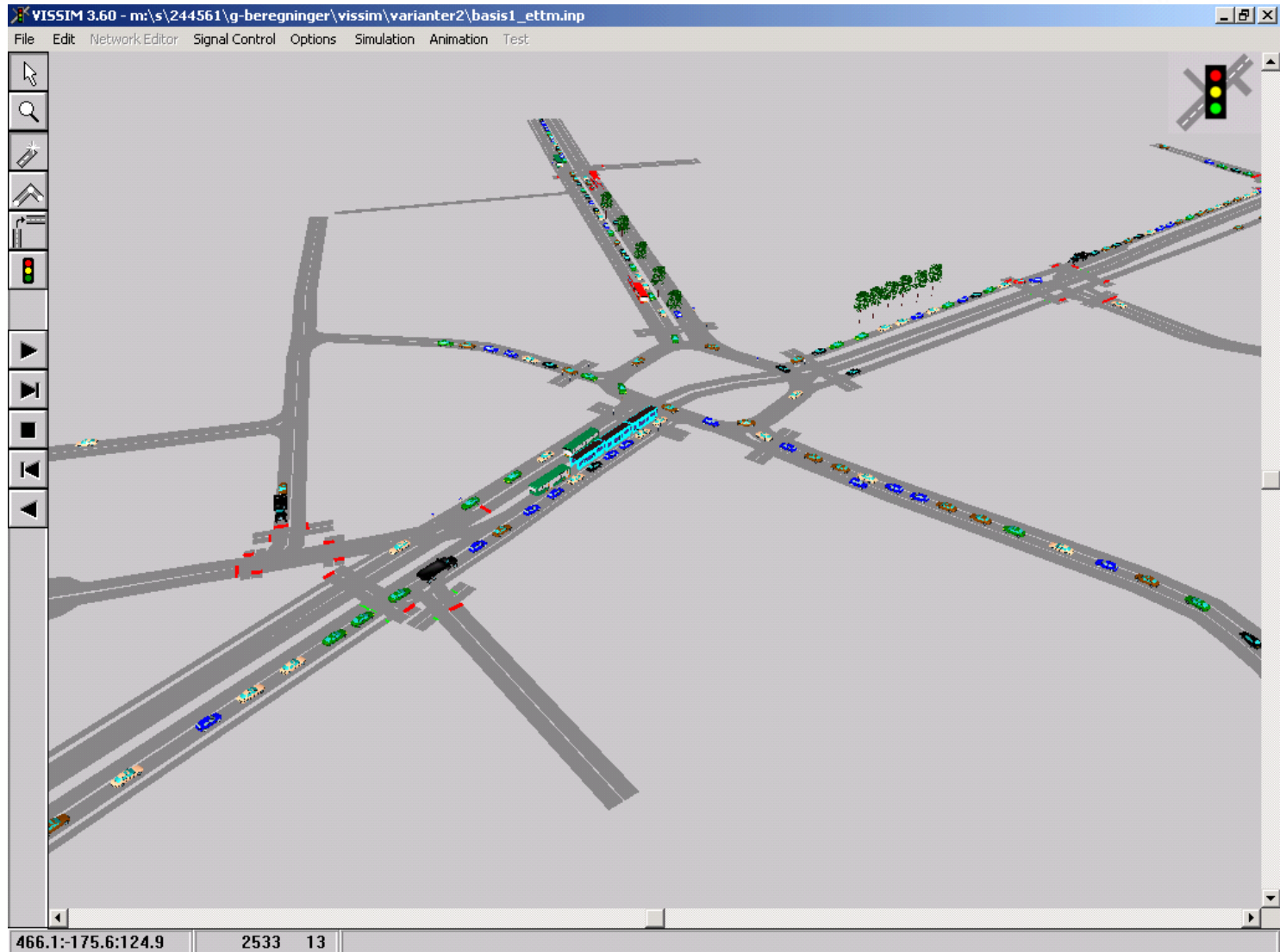


Micro simulation models

- Complex intersection areas (car, bus, tram, pedestrians)
- Influence between intersections (blocking back)
- VISSIM, AIMSUN
- Private consultancies operate these models
- Relatively time consuming to build the model
- Very popular for presentation



VISSIM – Carl Berners Place (Oslo)



Meso level: CONTRAM models

- Intensively used in Norway since the 1980's, for analysis in city areas
- Assignment model (car driver). Peak hour traffic. Traffic demand from registration or from Strategic model
- Some very large models. Oslo model have more than 500 zones.
- **BUT: The owner of CONTRAM has stopped further developing.**



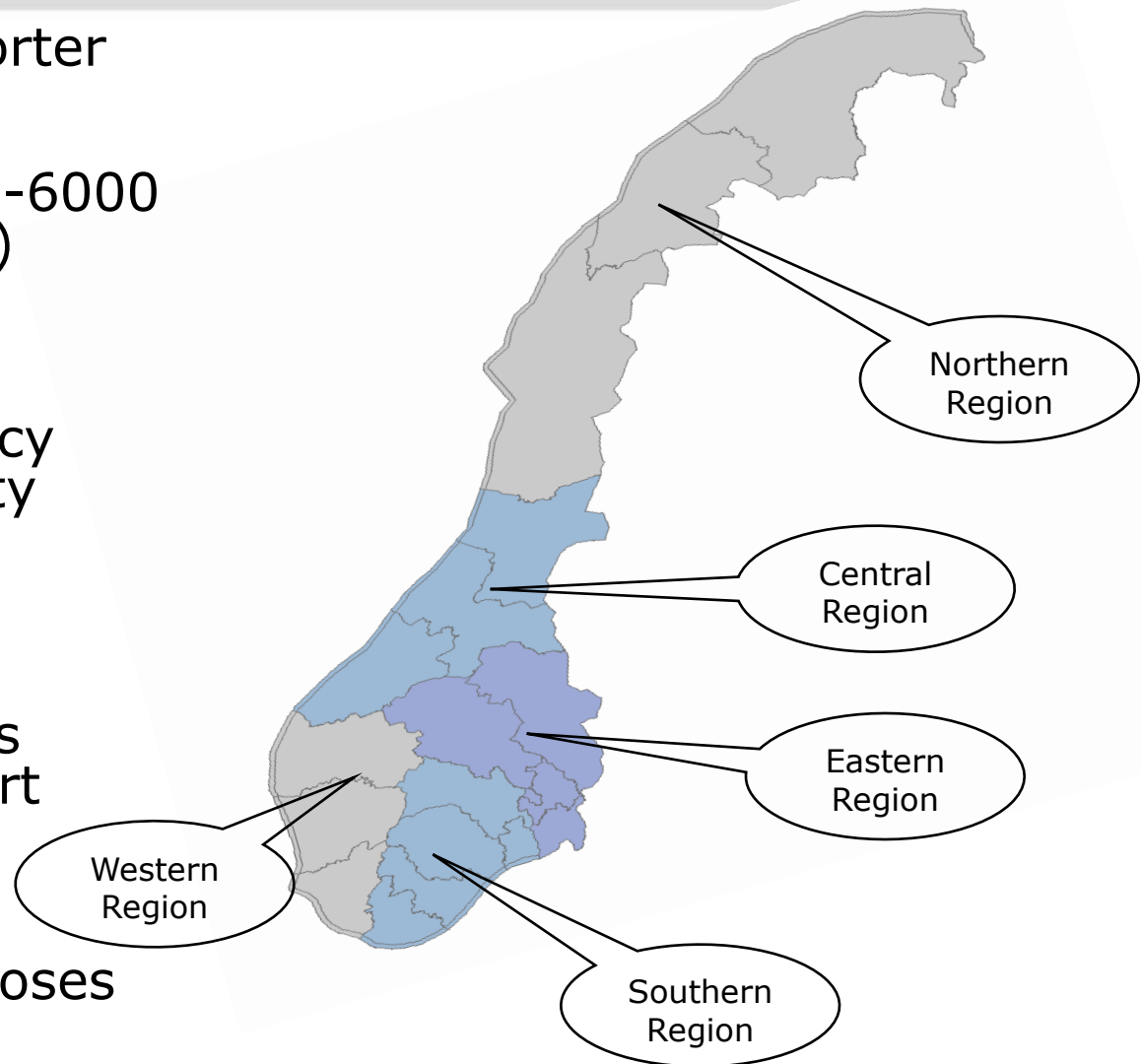
After CONTRAM??

- Initiated a project with the aim to find a replacement for CONTRAM
- Considering three different software
 - AIMSUN
 - VISSIM/VISUM
 - CUBE AVENUE
- All three firms have converted a CONTRAM-model for Trondheim city centre
- SINTEF is responsible for the evaluation



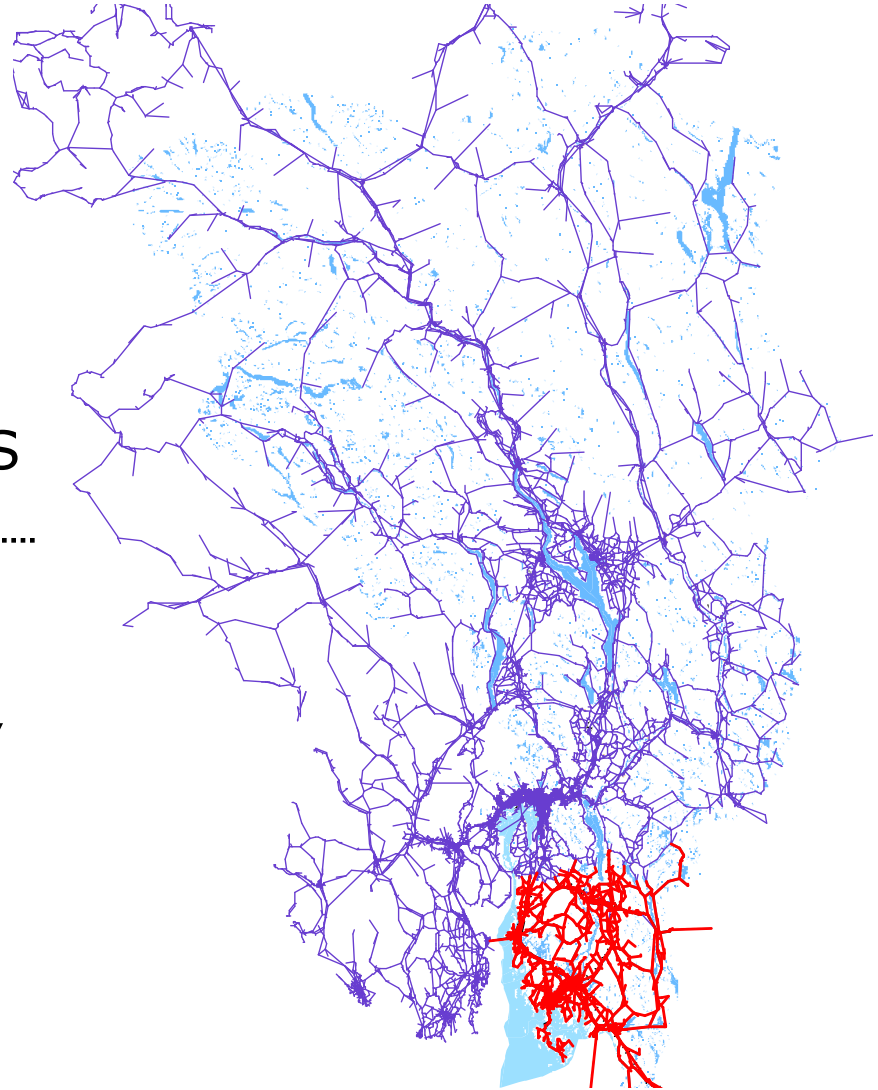
The Regional Transport Models (RTM)

- Covers trips shorter than 100 km.
- 5 regions (2500-6000 zones pr region)
- Sub models for:
 - mode/choice
 - travel frequency
 - car accessibility
 - route choice
- Trip matrix for:
 - car drivers
 - car passengers
 - public transport
 - cycle
 - pedestrians
- Five travel purposes



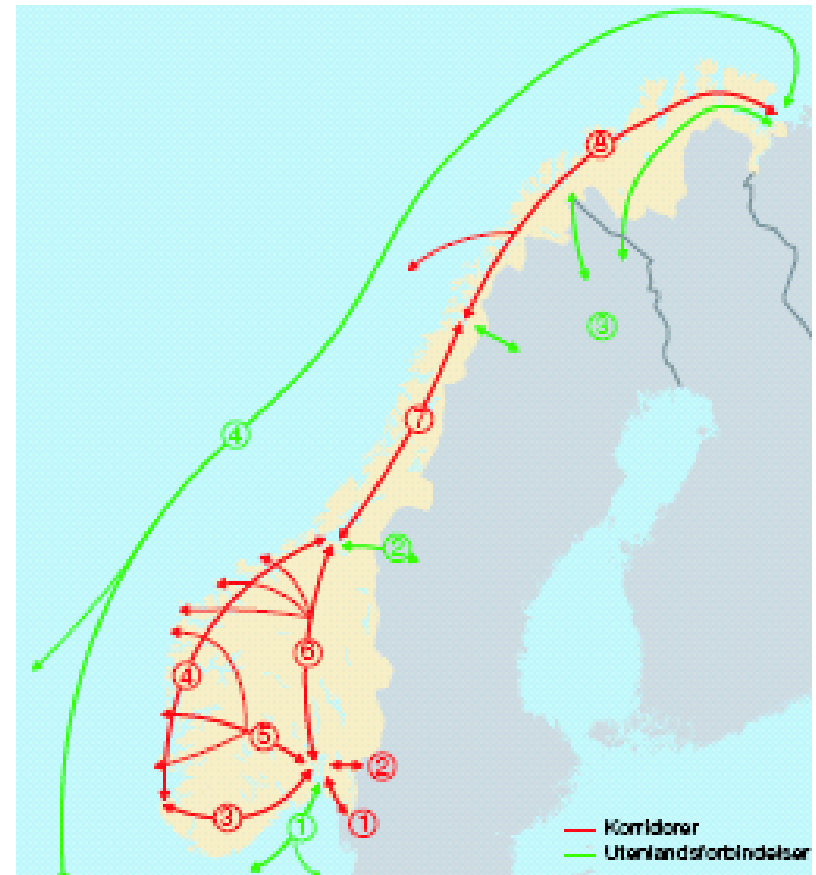
Part Area Models (RTM)

- Methods developed to select an analysis area from larger transport model
 - Region East model has 12 hour runtime. Part Area model "Østfold", has 25 min
 - Extensive use of ArcView GIS
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- Further developing on the RTM system is aimed to achieve better "City-models"



The National Transport Model (NTM)

- Long distance trips, >100 km
- 1428 zones
- Trip matrix for:
 - car drivers = number of cars
 - train passengers
 - bus passengers
 - boat passengers
 - airplane passengers
- Matrix from the National model is input to the Regional model



Stepwise planning process for road projects

- Feasibility study. All projects with an estimated cost over 500 mill NOK
- National Transport Plan. Every 4. year
- Consequence Analysis / Impact assessment
- Development plan / Detail plan
- Building plan



Feasibility study

- All projects with an estimated cost over 500 mill NOK
- Concept evaluation
- Ensure that the most feasible concepts are pursued in the further planning process, (and not the wrong ones).
- To minimize the use of planning resources
- Regional Transport Models are used to analyze the effect and impact. Also input to a cost benefit analysis



National Transport Plan 2010-2019

- Co-operation between the four transport administrations in Norway
 - Norwegian Public road administration
 - Norwegian National Rail administration
 - Avinor (Stated owned Aviation company)
 - Norwegian National Coastal administration
- Project program first 4 years (2010 – 2013)
- Planning program next 6 years
- Extensive use of Regional Transport Models and National Transport Model. Cost benefit analysis



Official traffic forecasts (1)

- Attachment to National Transport Plan
- Forecasts for car, bus, train, boat and air
- Annual forecast from 2006-2040
- The forecast is split in 19 counties, and light and heavy vehicles
- The forecast is based on calculations with Regional and National model system



Official traffic forecasts (2)

Trafikkarbeid. Lette kjøretøy. Nivå 2006 (i mill. kjtkm) og årlig vekst

Annual growth

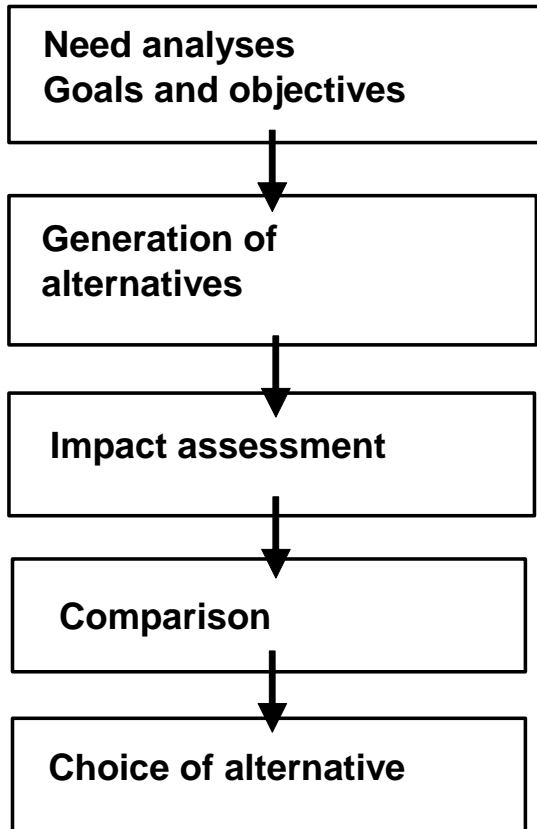
Vehicle km

Light vehicles

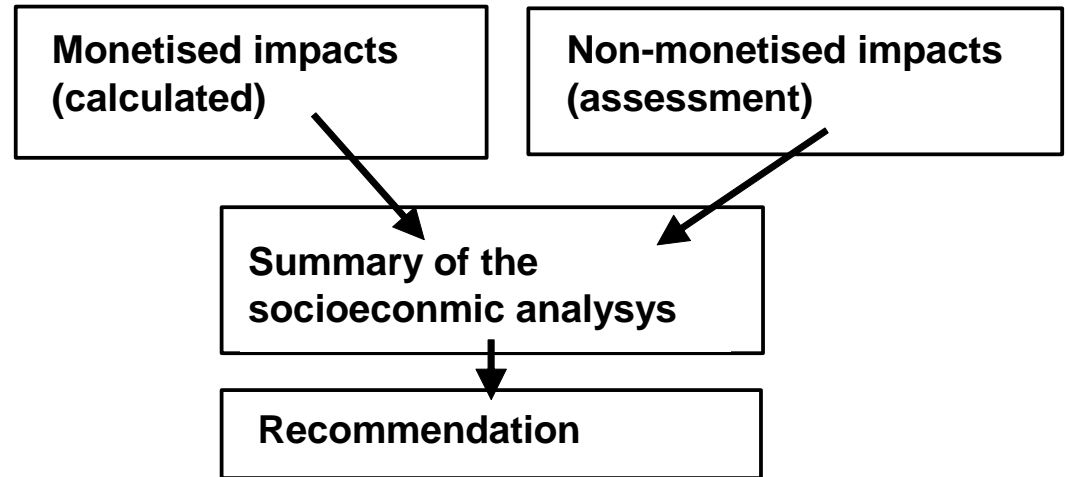
Fylke / År	2006	2006 - 10	2010 - 14	2014 - 20	2020 - 40	2006 - 40
Østfold	2.180	2,2 %	1,2 %	1,3 %	0,7 %	1,0 %
Akershus	4.332	1,4 %	1,6 %	1,3 %	0,8 %	1,0 %
Oslo	3.272	1,9 %	1,9 %	1,4 %	0,6 %	1,1 %
Hedmark	1.835	0,8 %	1,0 %	0,5 %	0,7 %	0,7 %
Oppland	1.581	1,2 %	0,9 %	0,8 %	0,8 %	0,9 %
Region Øst	13.190	1,6 %	1,4 %	1,2 %	0,7 %	1,0 %
Buskerud	2.054	1,2 %	1,7 %	1,1 %	0,8 %	1,0 %
Vestfold	1.931	1,9 %	1,1 %	1,1 %	0,7 %	1,0 %
Telemark	1.429	1,3 %	1,0 %	0,8 %	0,7 %	0,9 %
Aust-Agder	731	2,0 %	1,2 %	1,0 %	0,7 %	1,0 %
Vest-Agder	1.255	1,8 %	1,6 %	1,1 %	0,8 %	1,0 %
Region Sør	7.399	1,6 %	1,3 %	1,0 %	0,8 %	1,0 %
Rogaland	2.747	1,9 %	2,8 %	1,1 %	0,6 %	1,1 %
Hordaland	2.824	1,8 %	1,8 %	1,2 %	0,7 %	1,1 %
Sogn- og Fj.	711	0,9 %	1,4 %	0,4 %	0,6 %	0,7 %
Region Vest	6.282	1,8 %	2,2 %	1,1 %	0,7 %	1,0 %
Møre og R.	1.717	0,8 %	1,2 %	0,6 %	0,5 %	0,6 %
Sør-Tr-lag	2.218	1,0 %	2,0 %	1,1 %	0,7 %	0,9 %
Nord-Tr-lag	1.082	1,3 %	1,0 %	0,6 %	0,6 %	0,7 %
Region Midt	5.027	1,0 %	1,5 %	0,8 %	0,6 %	0,8 %
Nordland	1.482	1,3 %	-0,3 %	0,1 %	0,6 %	0,5 %
Troms	1.154	-0,4 %	2,1 %	-0,8 %	0,5 %	0,4 %
Finnmark	488	-0,1 %	1,7 %	-0,6 %	0,5 %	0,4 %
Region Nord	3.102	0,5 %	0,9 %	-0,3 %	0,5 %	0,4 %
Hele landet	35.001	1,4 %	1,5 %	1,0 %	0,7 %	0,9 %



Consequence Analysis / Impact assessment



- Method described in "Handbook 140 - Impact assessments"



- Use of Transport model required when project can give change in route choice



Development plan – detail plan

- Choice of junction type and design
- No formal requirements for capacity and level-of-service estimates
- Old and outdated capacity manuals
- Seldom level-of-service estimates for stretch of highway in rural areas. Uses instead “highway standards”, for example at the choice between 2 or 4 lanes, dependent of the level of traffic
- Traffic demand estimates are based on either transport models, or traffic counts and traffic forecasting, or a mix



Capacity analysis – junction / network

- Simple situation with one junction and no influence from other junctions => SIDRA, CAPCAL
- More complex situation. Influence between several junctions => VISSIM / AIMSUN
- Complex/widespread changes in route choice => CONTRAM (up till now)

