Solving problems and making decisions

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Theoretical analysis

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- Not possible to evaluate systems in real life
- System studies often expensive
- To get representative results for complex systems
- Possibility to replicate and isolate noise and dependent factors

Simulations or deterministic analysis

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- Small – if the activities in the system are independent from each other
- Major – if the activities are dependent on each other

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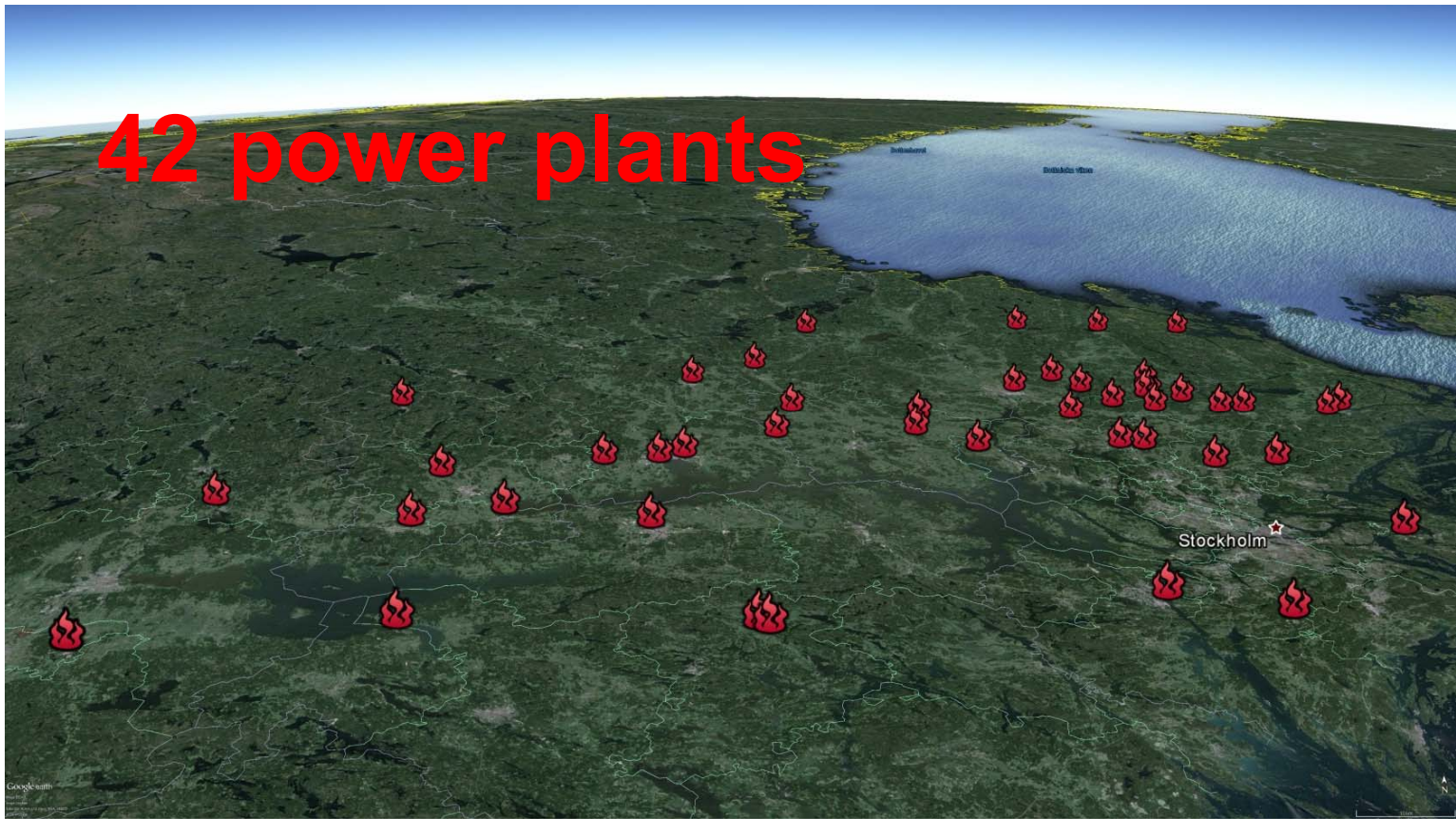
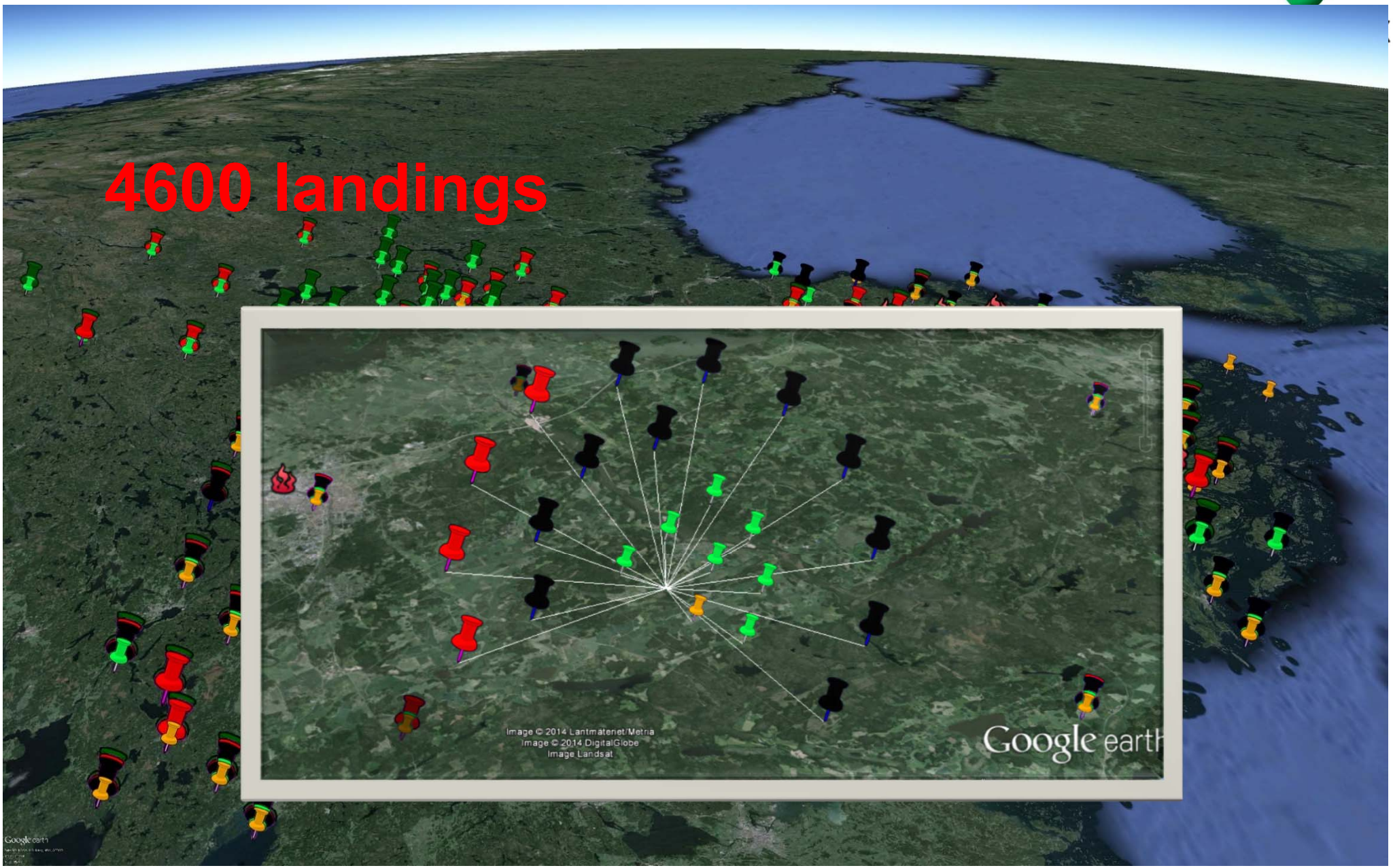
Example of projects

- Geographical exchange of biofuel
- Simulation of a small-tree processor-bundler prototype
- Variation in supply chain to paper mill

Exchange of biofuel

- Potential of exchanges
- reduced transport distance




4600 landings
Image © 2014 Lantmäteriet/Metria
Image © 2014 DigitalGlobe
Image Landsat
Google earth

The potential in exchange

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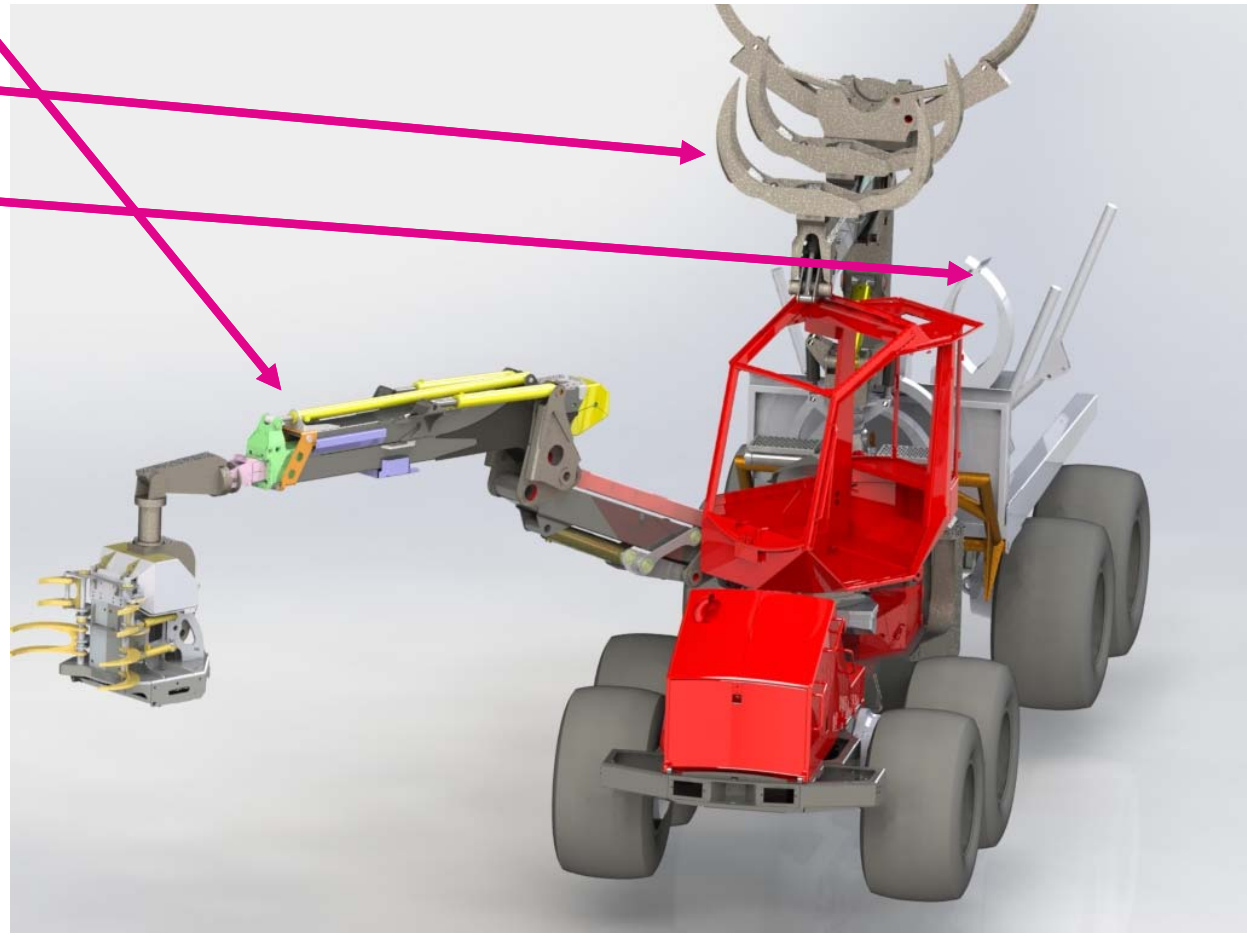
Barter within and between company's			
Company	Share of exchanges	Reduction, %	Total transports
A	21	12	7500
B	14	13	3400
C	19	15	7700
D	9	12	8900
E	9	3	700

Design of a new machine concept

- Critical times:
  - a, Harvesting crane
  - b, Delivery crane
  - c, Bundling



Design of a new machine concept

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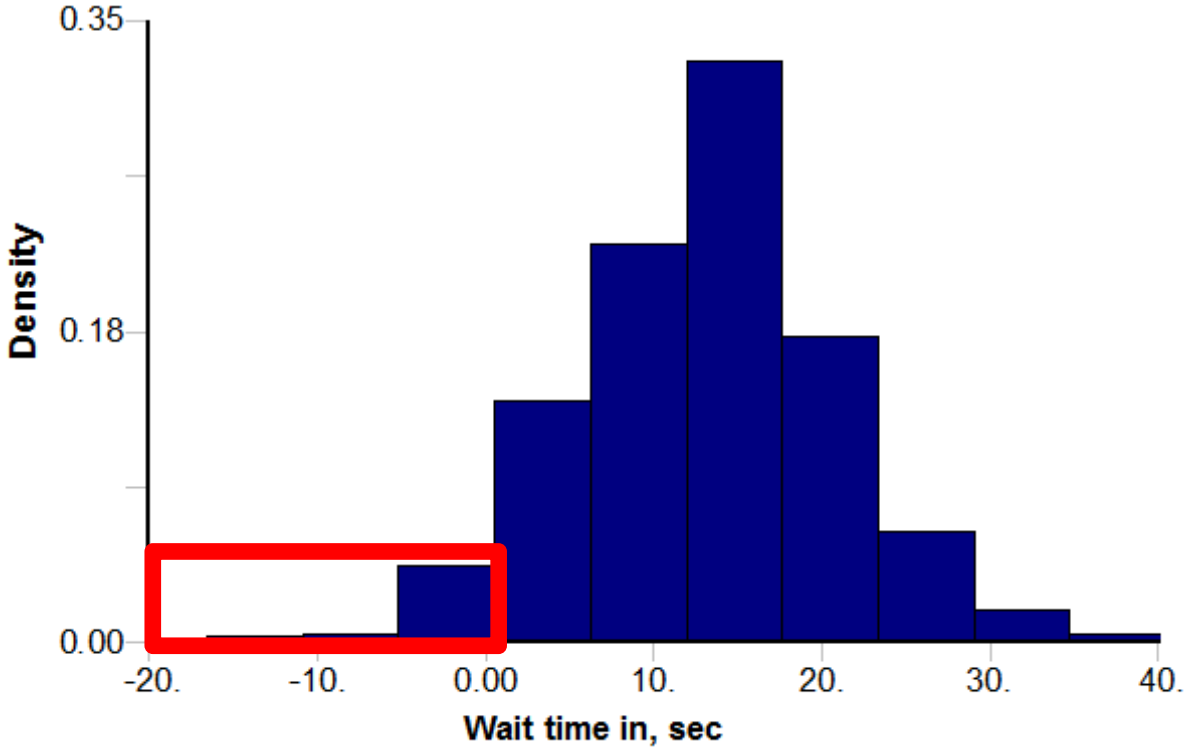
- Harvest crane and head implemented in simulator.
- Time study's for further system simulations

Simulation results

- Delivery crane - safety margin
- 7% of total working time
  delivery crane is the bottleneck



Design of a new machine concept

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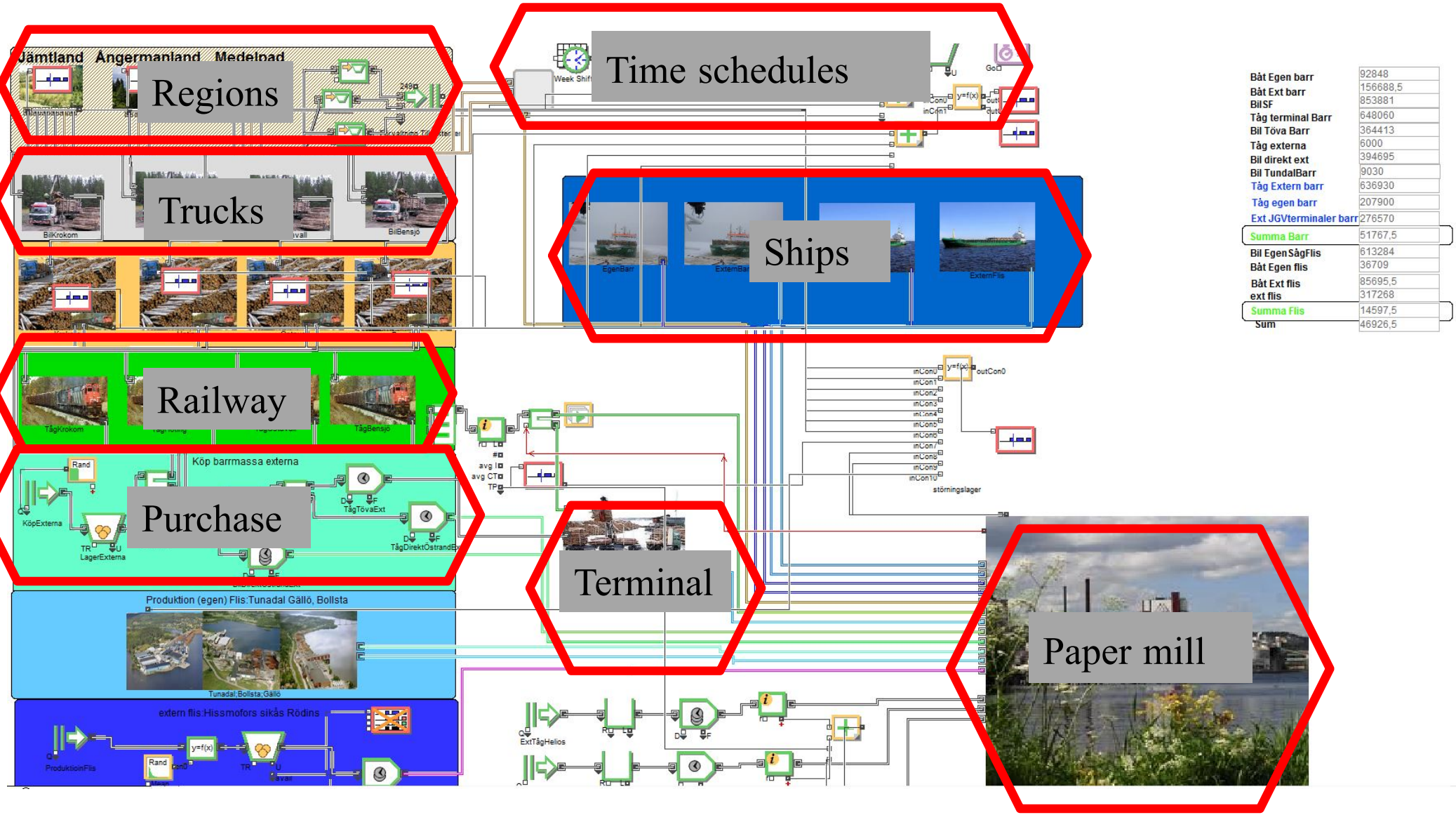
Simulation model

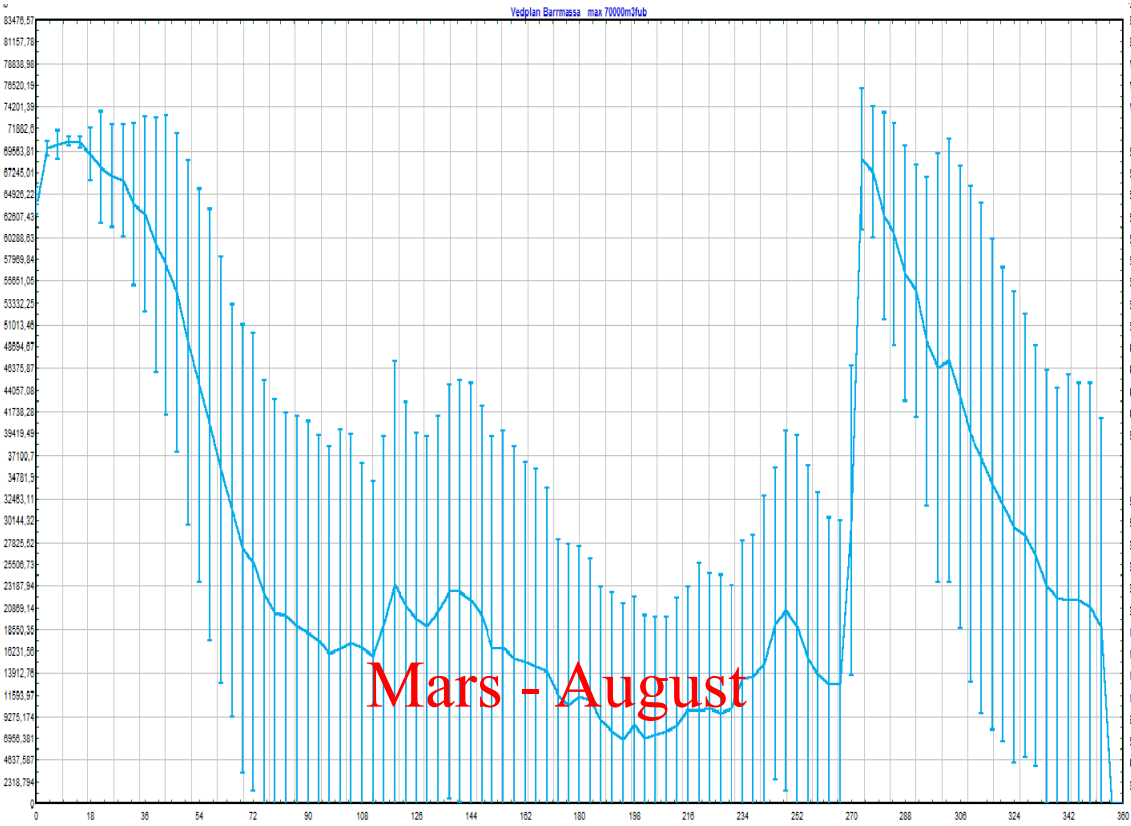


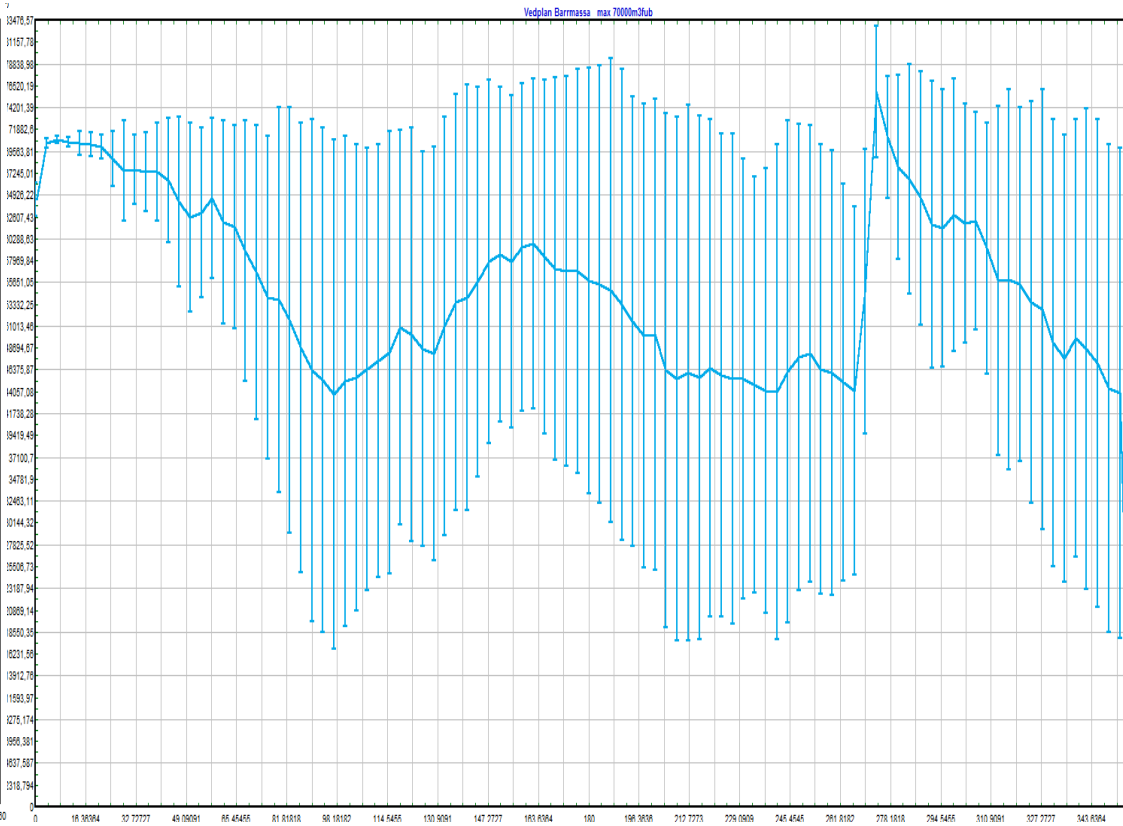
Båt Egen barr	92848
Båt Ext barr	156688,5
BilSF	853881
Tåg terminal Barr	648060
Bil Töva Barr	364413
Tåg externa	6000
Bil direkt ext	394695
Bil TundalBarr	9030
Tåg Extern barr	636930
Tåg egen barr	207900
Ext JGVterminaler barr	276570
Summa Barr	51767,5
Bil EgenSågFlis	613284
Båt Egen flis	36709
Båt Ext flis	85695,5
ext flis	317268
Summa Flis	14597,5
Sum	46926,5

Simulations results

- Increased flows
- No added terminal

- Added a extra terminal nearby paper mill





Conclusions

- Simulations helps to understand complex systems
- Evaluating decisions when knowing the risk involved for a specific decision.