



# Impact Evaluation of a Pilot Project on Evening Distribution in Stockholm

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## Framtida Handel (1)

- An entirely new kind of alliance promoting a dialogue between companies, local authorities, regions and the government
- Designed to achieve sustainable development of trade in and production of everyday commodity goods
- The participants have decided jointly on long term goals and have agreed on a number of specific measures to be implemented



## Framtida Handel (2)

- An agreement in the form of a policy document has been signed by all participants
- Attached to the Agreement are 10 visions and goals on which all participants have agreed.
- They are supposed to guide the participants in their efforts to help achieve the environmental quality objectives laid down by the Swedish Parliament.



## Framtida Handel (3)

- For example, the participants undertake to
  - Work together to promote sustainable distribution of everyday commodity goods
  - Use their efforts to implement the specific measures as set out in the policy document
  - Develop the sector and monitor the progress achieved
  - Evaluate the dialogue project
  - ...

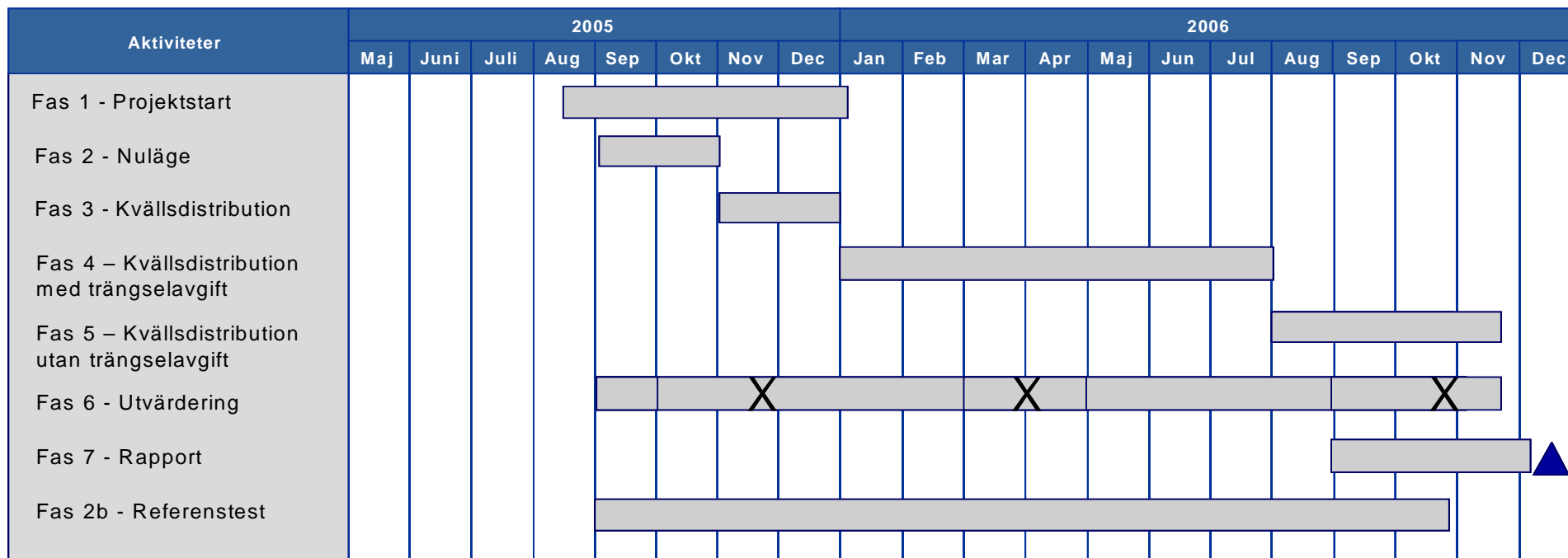
# Pilot Project – Objectives and goals (1)

- The main objective with the pilot study was to investigate the effects of evening distribution in a city centre
- Is it possible to change the distribution system and
  - The impacts on the environment are reduced
  - The time used for a delivery route is reduced
  - The flow of goods is more evenly spread out over 24 hrs
  - The use of “invested capital” is increased (especially with respect to vehicles)

# Pilot Project – Objectives and goals (1)

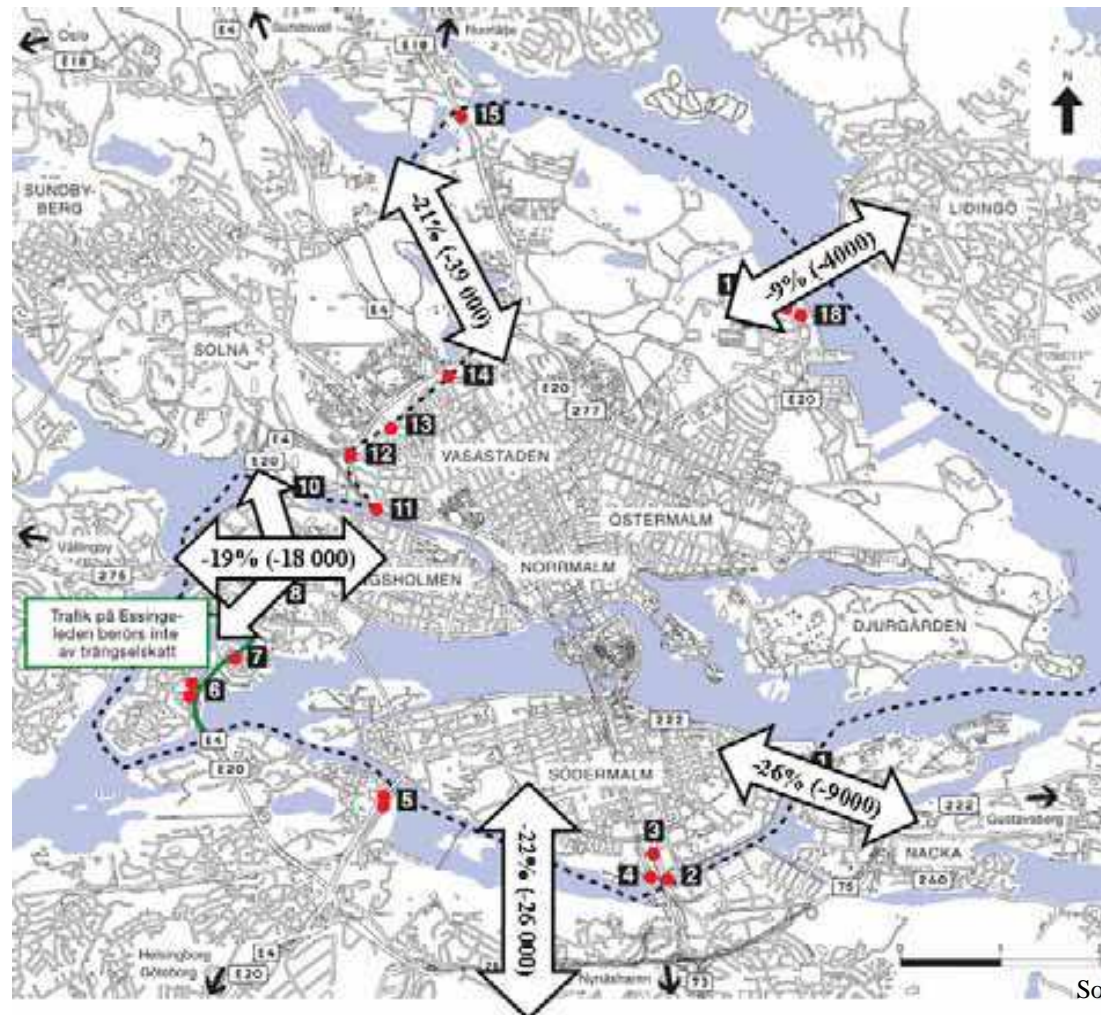
- If possible also indirect effects should be addressed
  - Can retailers in the city centre be stronger by means of more efficient distribution and less lead times (for orders)
  - Can the manning and the security during evenings be solved in a satisfactory way
  - Can the noise problem be addressed and other disturbances when loading/unloading be avoided
  - Can other business sectors learn from the experiences

# Pilot Project – Project time plan



X - indicates test periods planned

# The Stockholm Trial



Source: Stockholm Trial – Final Report



# Test area and distribution routes



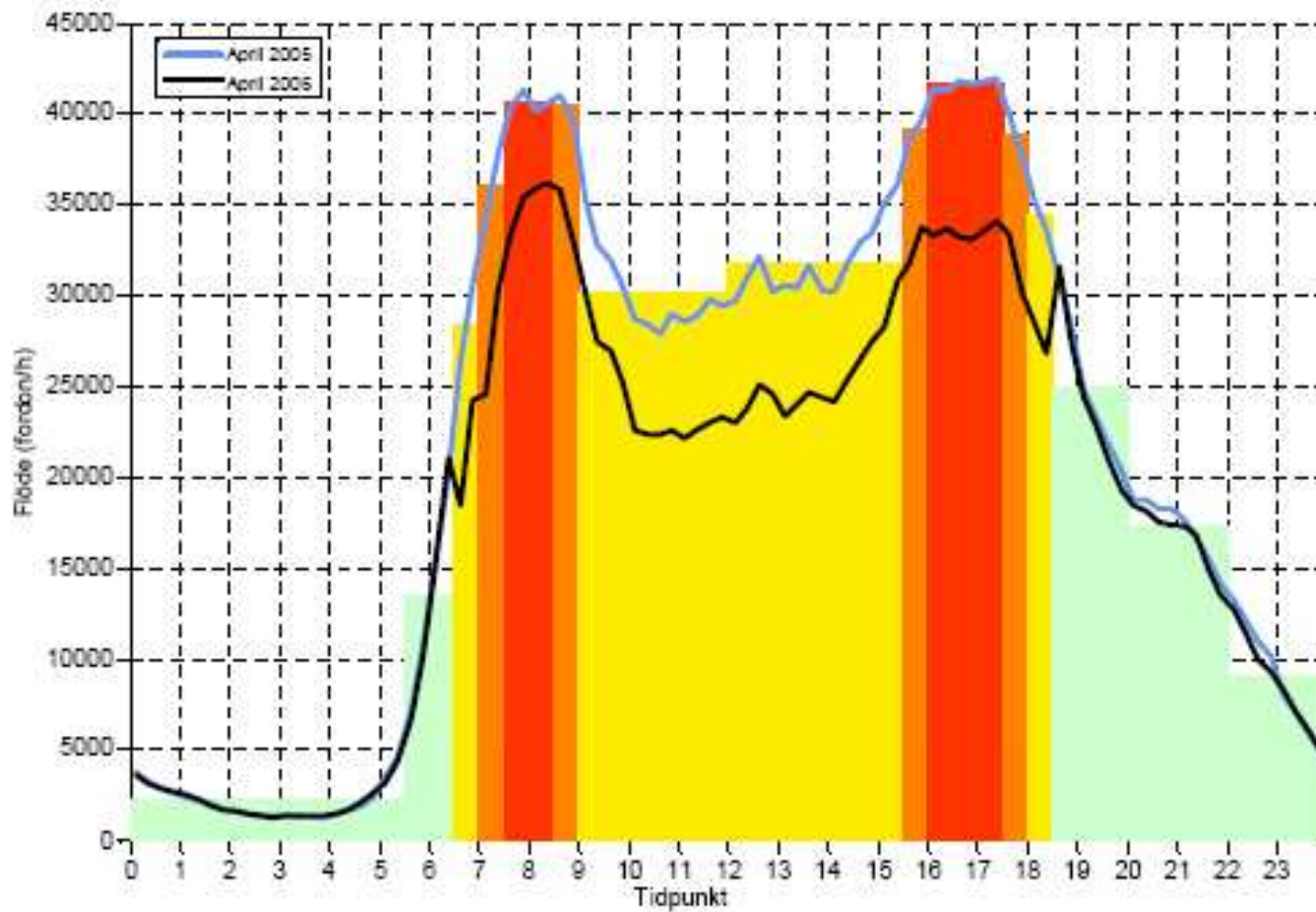
# The Project Plan – and what happened in practice (1)

- At the end one test area and two wholesale companies were involved
- Delivery times between 17 and 20 in the evening were planned
  - In most cases the delivery times were 16-18
    - The main reason being that the possibilities for the retailers to receive the goods were limited
- A workshop and in-depth interviews with relevant stakeholders were performed

# The Project Plan – and what happened in practice (2)

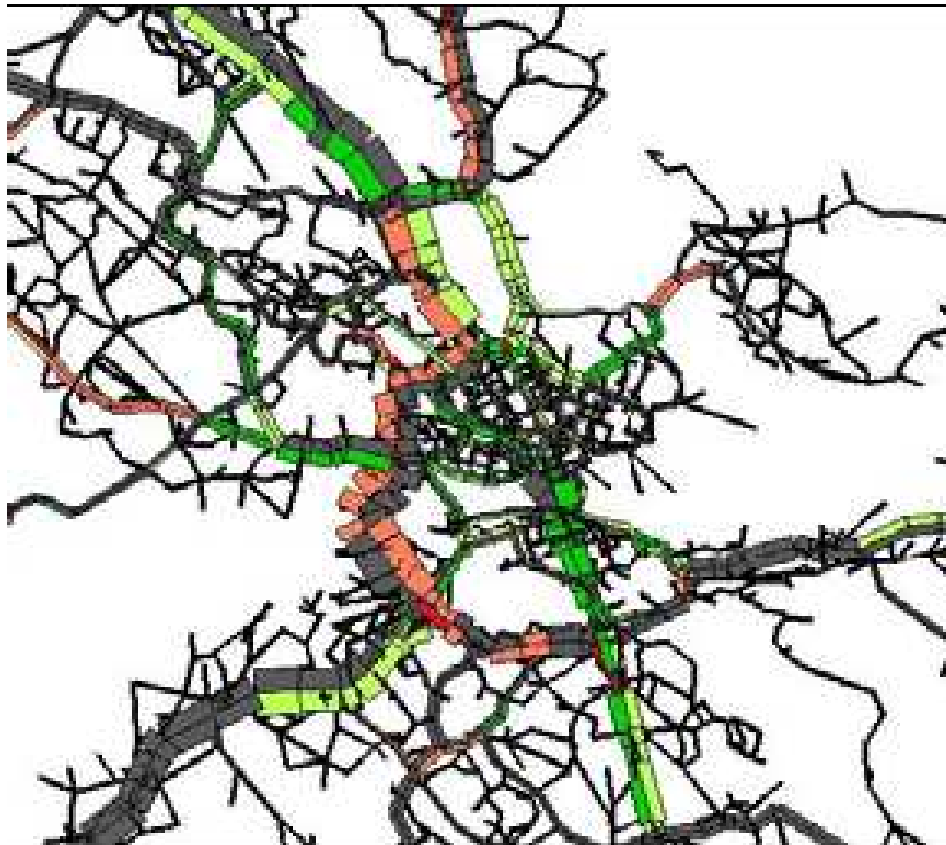
- Measurement of driving times, stop times, etc. before, during and after the Stockholm Trial
  - Before the Stockholm Trial
    - The evening distribution was delayed by one month (started in November 2005)
      - As a consequence less reliable measurements before the congestion charges were introduced
  - During the Stockholm Trial
    - One wholesale company faced problems with working hours (union protests) and too low load factors
      - Measurements planned for the Spring 2006 had to be performed in June-July 2006 (out of the original test period)
- Fuel consumption was calculated from driving logs, not measured

# Stockholm Trial Results – Traffic flows



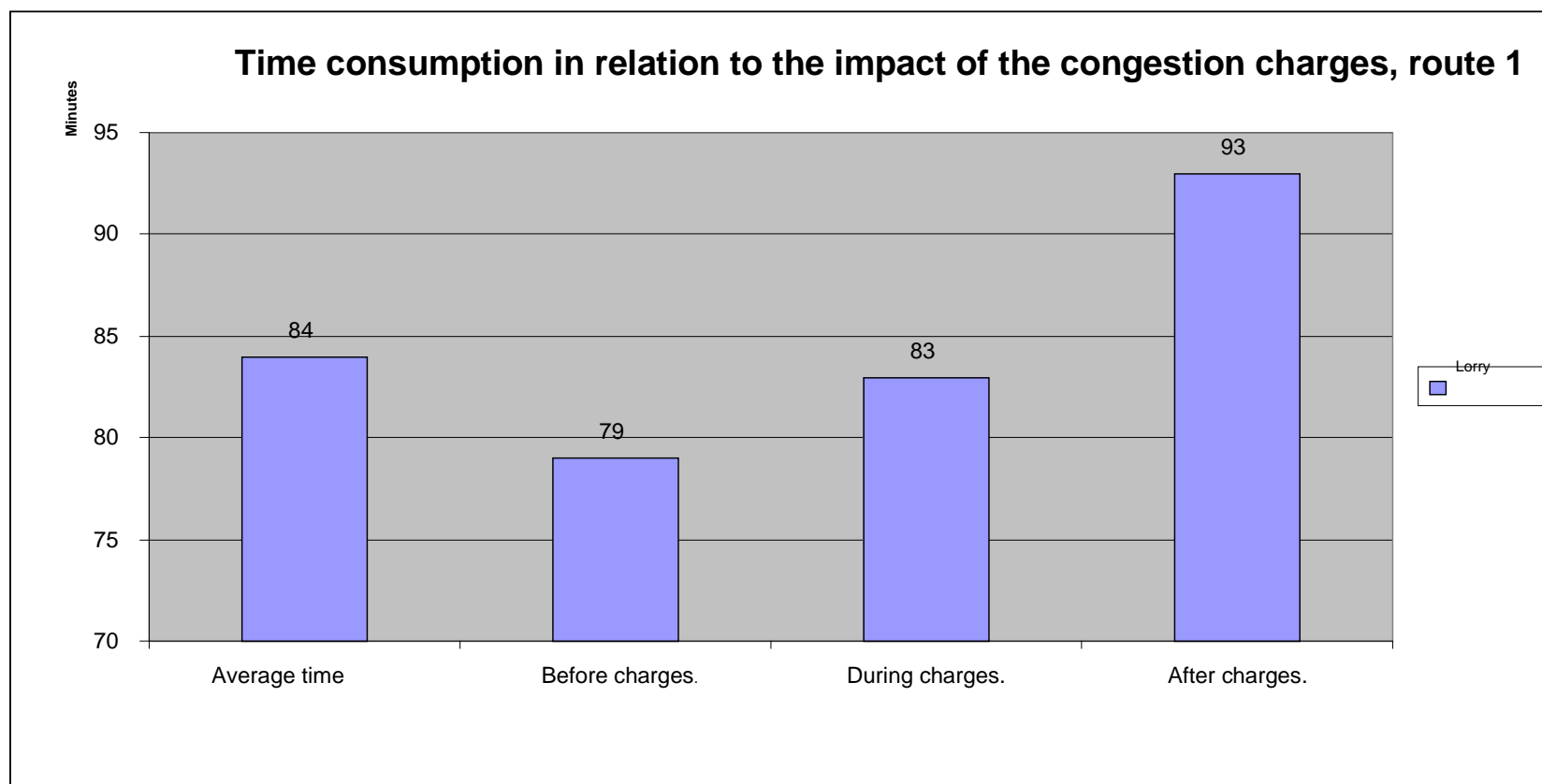
Source: Stockholm Trial – Final Report

# Stockholm Trial Results – Changes in travel time

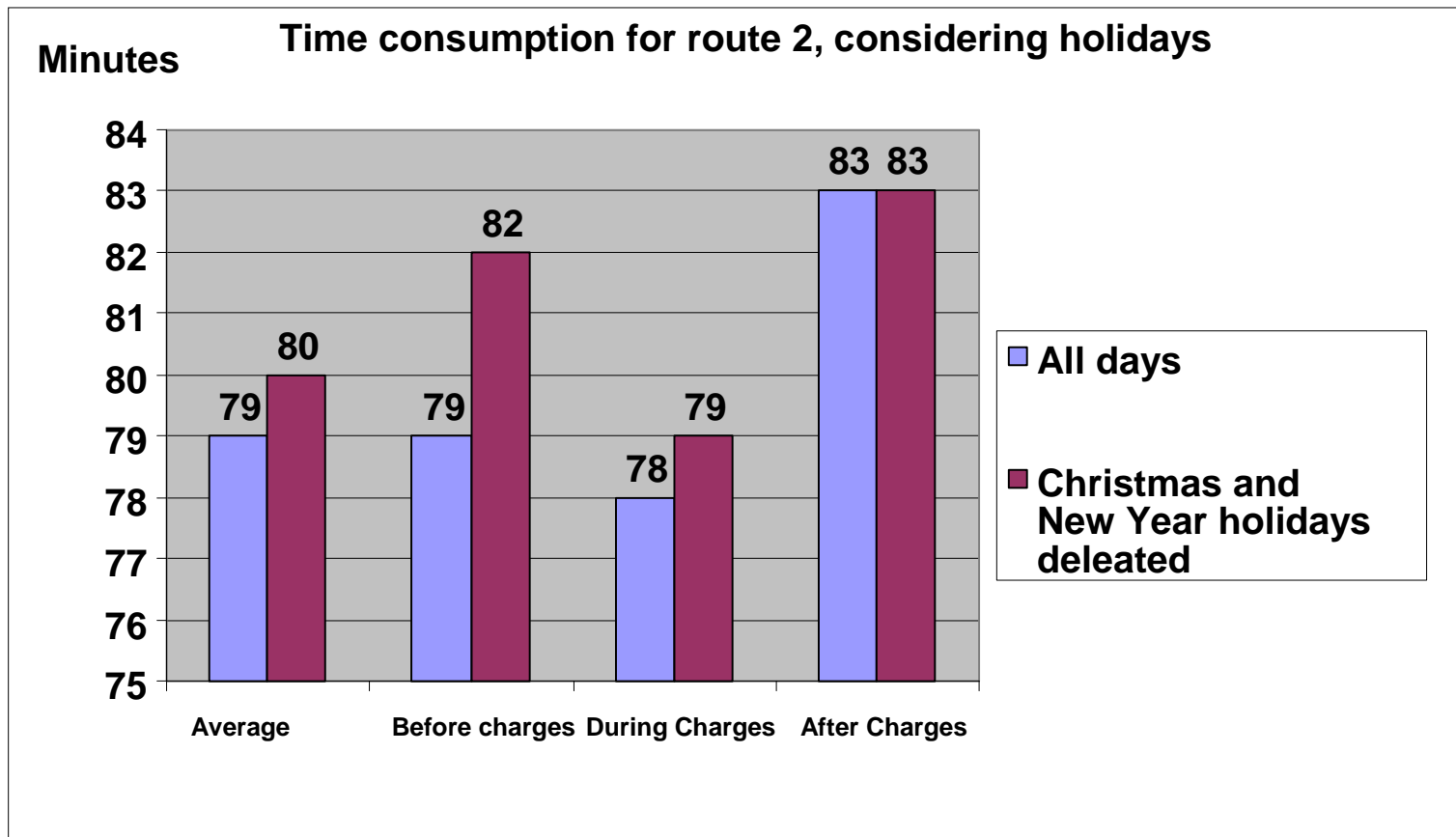


Source: Stockholm Trial – Final Report

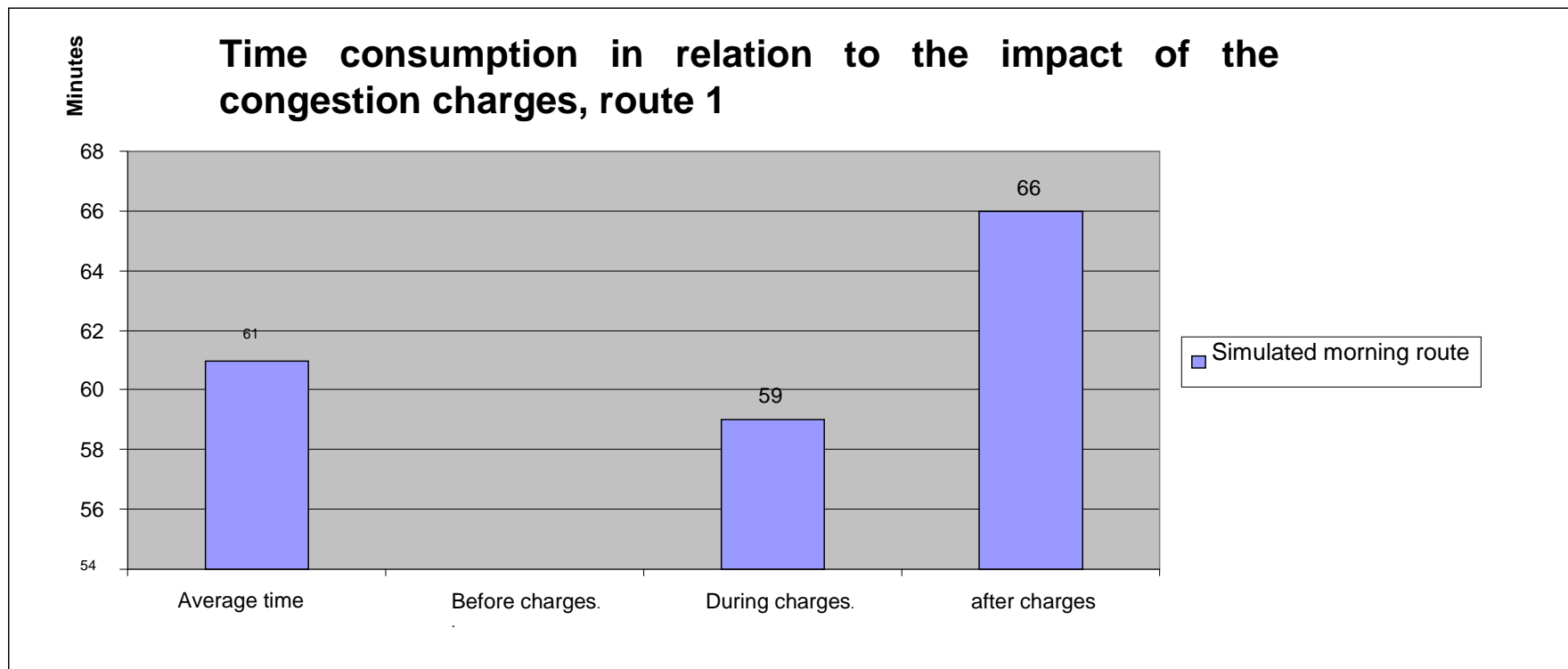
# Results from Pilot Project – Example 1



# Results from Pilot Project – Example 2

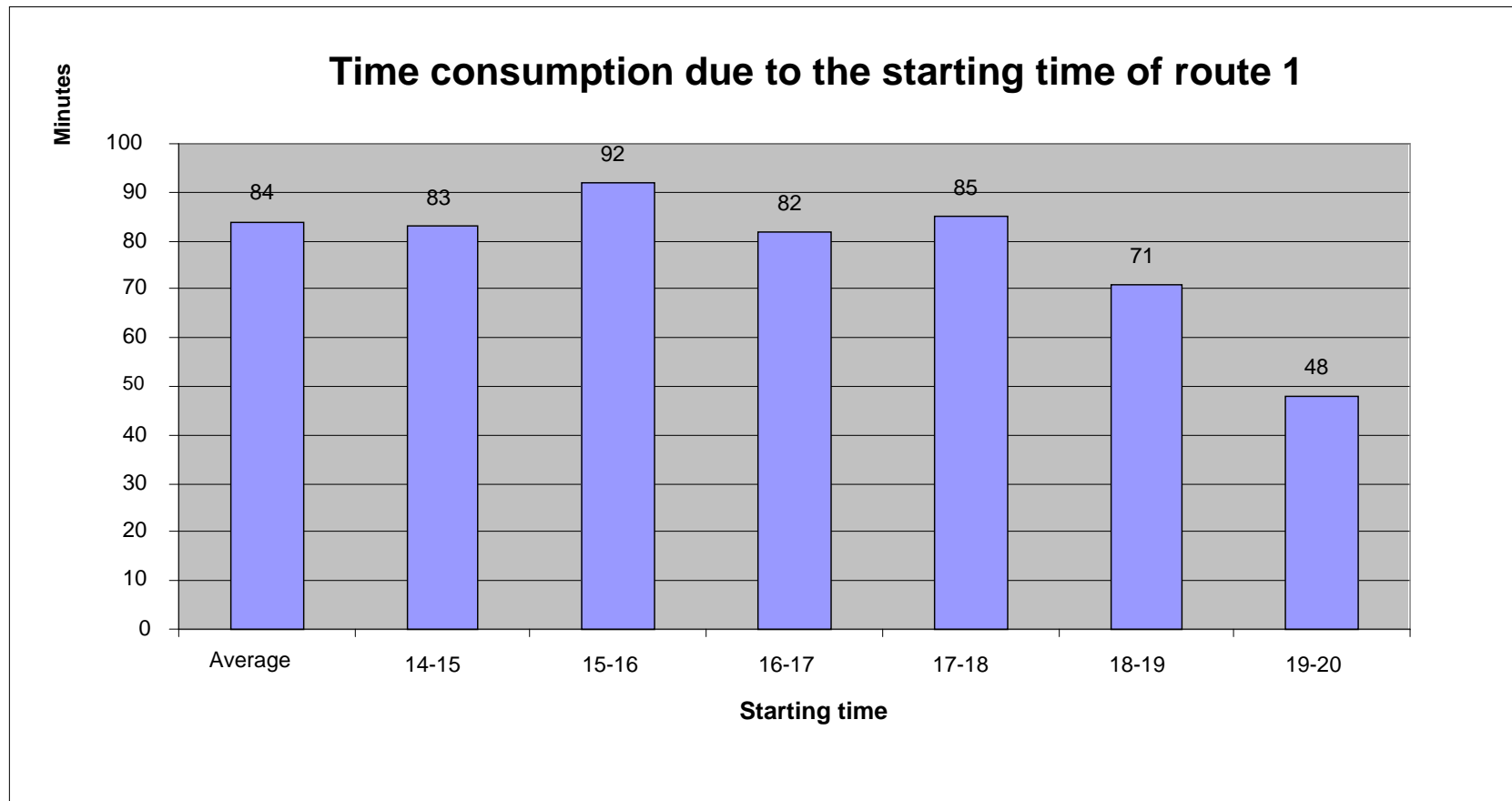


# Results from Pilot Project – Example 3

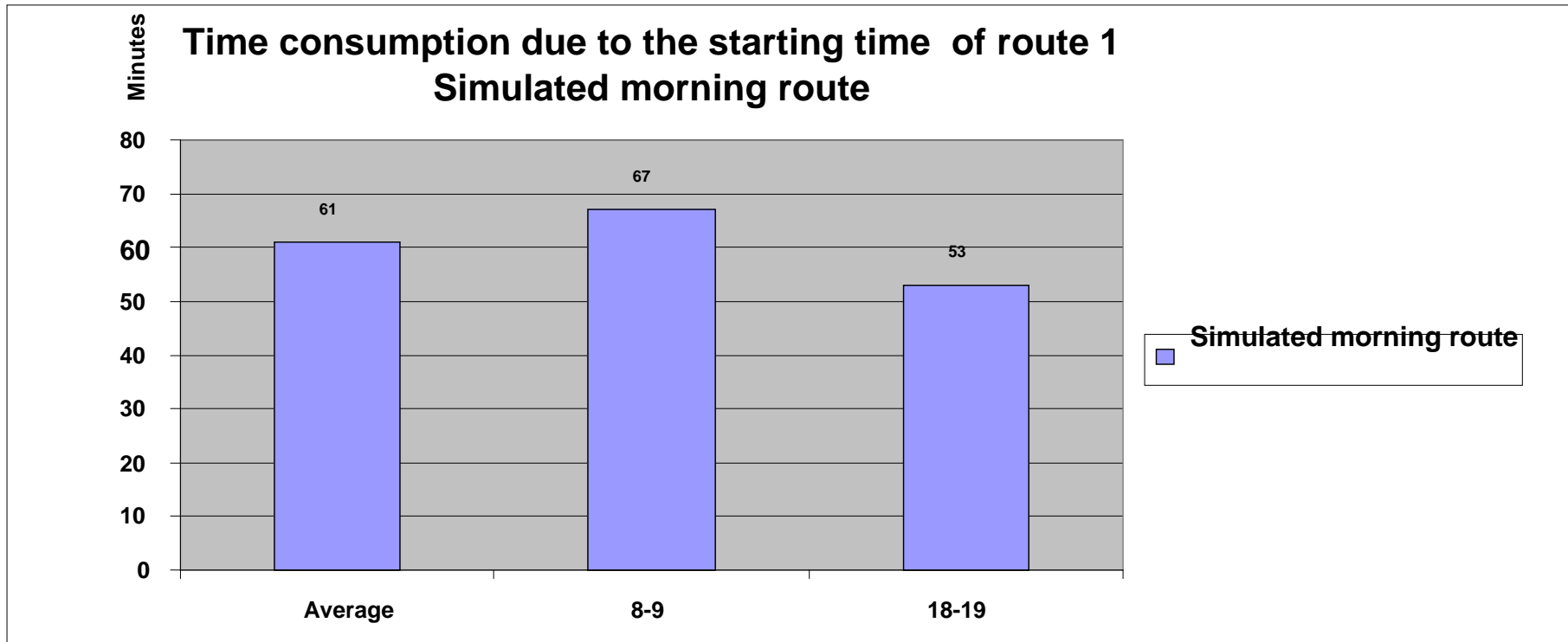




## Results from Pilot Project – Example 4



# Results from Pilot Project – Example 5



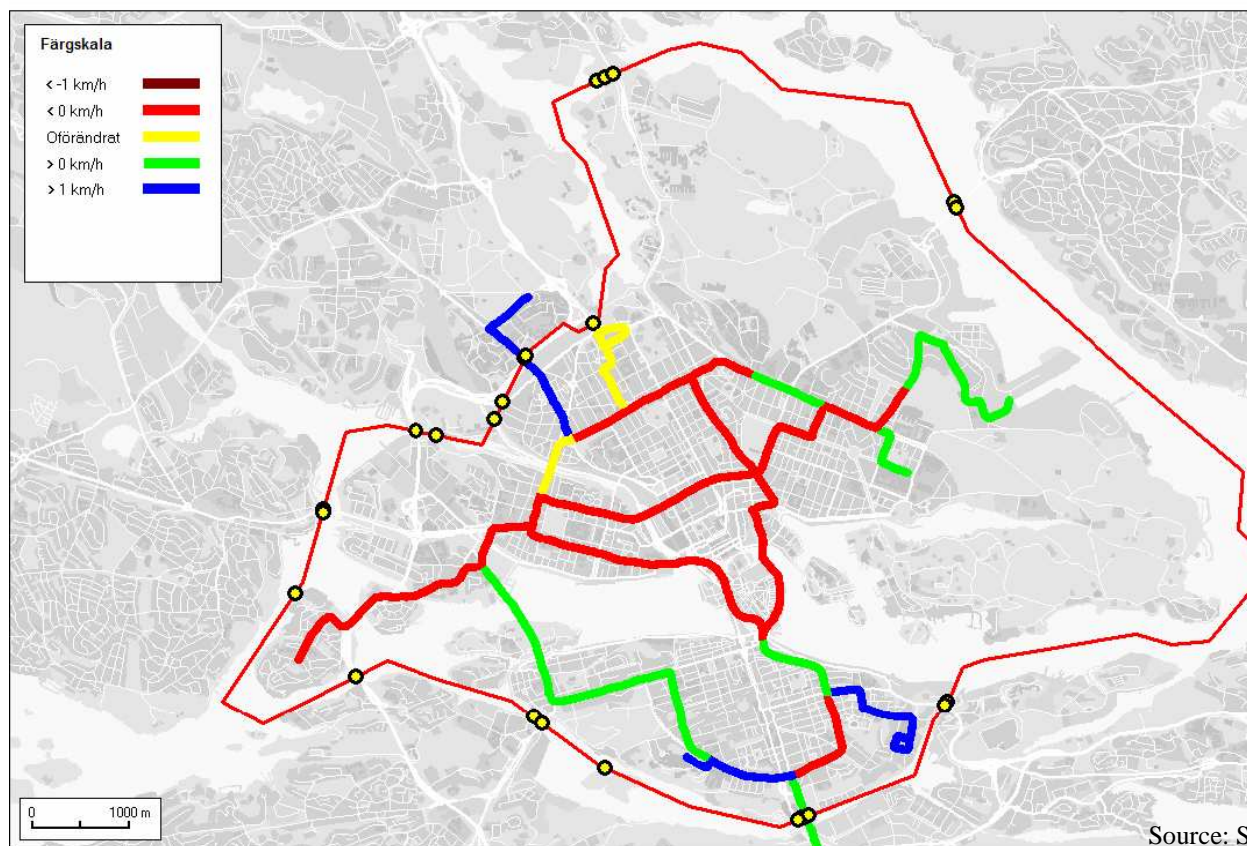
## Summary – Quantitative results (1)

- 10 minutes shorter trip time during the Stockholm Trial period compared to the period after the trials (total trip 84 minutes)
- Time used for delivery is 15 minutes less during the evening (18-20) compared to the afternoon (14-18)
  - Confirmed by "simulated" trips using a passenger car and comparing morning trips (8-9) with evening trips (18-19)

# Stockholm Trial Results – Changes in average speed

## Medelhastighet på innerstadens stomlinjer 07:30-08:30

Differens mellan våren 2006 och våren 2005



Source: Stockholm Trial – Final Report

# Calculation of Emissions (1)

| Fuel          | SK             | VS   | Größenklasse         | Konzept          |
|---------------|----------------|--|----------------------|------------------|
| <b>Diesel</b> | <b>Highway</b> | <b>Highway_Stop+Go</b><br>(Speed 6 km/h)   | <b>MEDEL (14-26)</b> | <b>HDV/Euro3</b> |
| NOx           | <b>17</b>      | [g/fkm]  |                      |                  |
| PM            | <b>1</b>       | [g/fkm]  |                      |                  |
| CO2           | <b>1653</b>    | [g/fkm]  |                      |                  |
| Fuel          | <b>521</b>     | [g/fkm]  |                      |                  |
| <b>Diesel</b> | <b>Urban</b>   | <b>Urban_Main road4</b><br>Main road / right of way /<br>major hold ups<br>(Speed 18 km/h) | <b>MEDEL (14-26)</b> | <b>HDV/Euro3</b> |
| NOx           | <b>10</b>      | [g/fkm]  |                      |                  |
| PM            | <b>0,35</b>    | [g/fkm]  |                      |                  |
| CO2           | <b>1040</b>    | [g/fkm]  |                      |                  |
| Fuel          | <b>328</b>     | [g/fkm]  |                      |                  |
| <b>Diesel</b> | <b>Urban</b>   | <b>Urban_Main road3</b><br>Main road / right of way /<br>medium hold ups<br>(Speed 33km/h) | <b>MEDEL (14-26)</b> | <b>HDV/Euro3</b> |
| NOx           | <b>8</b>       | [g/fkm]  |                      |                  |
| PM            | <b>0,26</b>    | [g/fkm]  |                      |                  |
| CO2           | <b>825</b>     | [g/fkm]  |                      |                  |
| Fuel          | <b>260</b>     | [g/fkm]  |                      |                  |

Source: HBEFA (2004)

## Calculation of Emissions (2)

| Type of emission | Reduction: Evening vs. Afternoon | Type of emission | Reduction: Evening vs. Rush hours |
|------------------|----------------------------------|------------------|-----------------------------------|
| NOx              | 20%                              | NOx              | 53%                               |
| PM               | 26%                              | PM               | 74%                               |
| CO2              | 21%                              | CO2              | 50%                               |

## Summary – Quantitative results (2)

- The environmental load is calculated to be reduced at least in the order of 20% per vehicle when involved in evening distribution
- Potential possible positive side effects of less congestion due to changes in delivery times has not been possible to address

## Qualitative results (1)

- The willingness of shop owners to change and adapt their business for evening distribution is a key issue
- The ability of the transport company to effectively plan new routes during evening hours is another key issue
- It is easier to load/unload in the loading bays due to fewer lorries queuing in line for delivery
- More passenger cars are blocking the loading/unloading zones during evening hours
- Overall there is less stress experienced by the drivers



## Qualitative results (2)

- The following advantages can be reported
  - Better reliability in the deliveries
  - Deliveries are made with leeway for the shops
  - The shops are less restricted in time use
  - Better use of the personnel in the shops
  - Better use of the vehicle fleet

## Qualitative results (3)

- The following drawbacks can be reported
  - Changed working hours for both drivers and shop personnel
  - Difficulties to correct errors in orders made
  - Less help from shop personnel when drivers are unloading in the evening
  - There is a risk for higher costs (both for retailers and wholesalers)
  - The power of tradition is strong

# Evaluation Experiences (1)

- At the end we got enough quantitative data to say something about the trip times
  - As an “added value” from how the pilot project was finally implemented and conducted we could also say something about afternoon vs. evening distribution
- We have collected interesting qualitative data and got experiences from distribution in the evening that could not have been foreseen
  - These findings would not have been gathered if the pilot project had not been “adapted to the real life situation”

## Evaluation Experiences (2)

- Our laboratory is the "real life" and it cannot be controlled or corrected afterwards
  - Unforeseen incidents happen
  - Negative experiences are as important as positive
- Problems in "real life" have to be faced and solved
  - We learn more from the implementation of ideas than from what simulation models can provide
  - The principle of "learning by doing" is applied
- The inductive evaluation approach used was a success

## Concluding remarks (1)

- It is important to evaluate the effects with enough strength and competence
  - The evaluation budget must be of a reasonable size
  - Reporting both positive and negative results must be made with transparency (for future use)
    - All “facts” are needed for a transferability analysis to be performed

## Concluding remarks (2)

- The project budget must include a buffer to cope with the necessary changes in the project plan
  - Relevant for all parties involved (especially for the project management)
  - A pilot project where stakeholders are involved must be given enough calendar time (for agreements, acceptance and for the promotion of active participation)