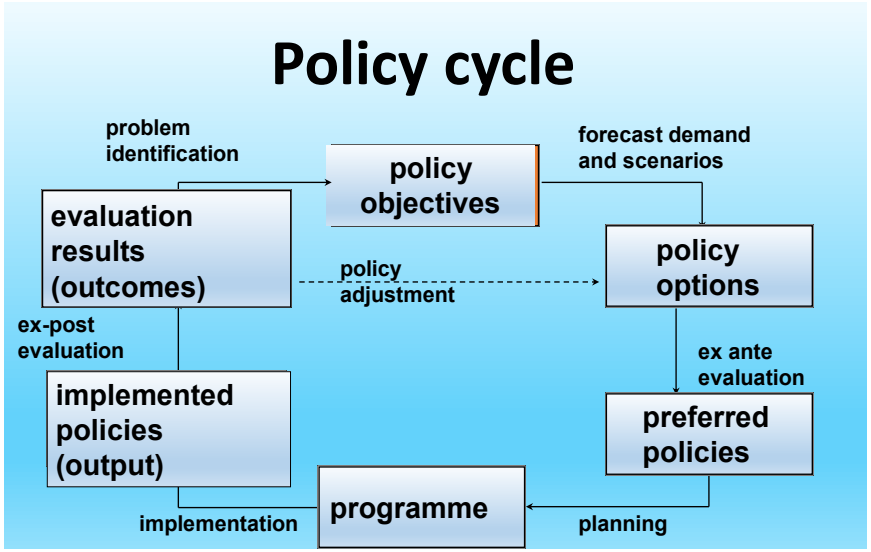


Ministry of Infrastructure and the Environment

Validation FCD for transport policy analysis and transport models

KiM Netherlands Institute for Transport Policy Analysis

KiM: Han, Peter, Jan, Saeda

DGB: strategie, WV, BB

WVL, NDW

Transpute, MuConsult, Significance

10 April 2018

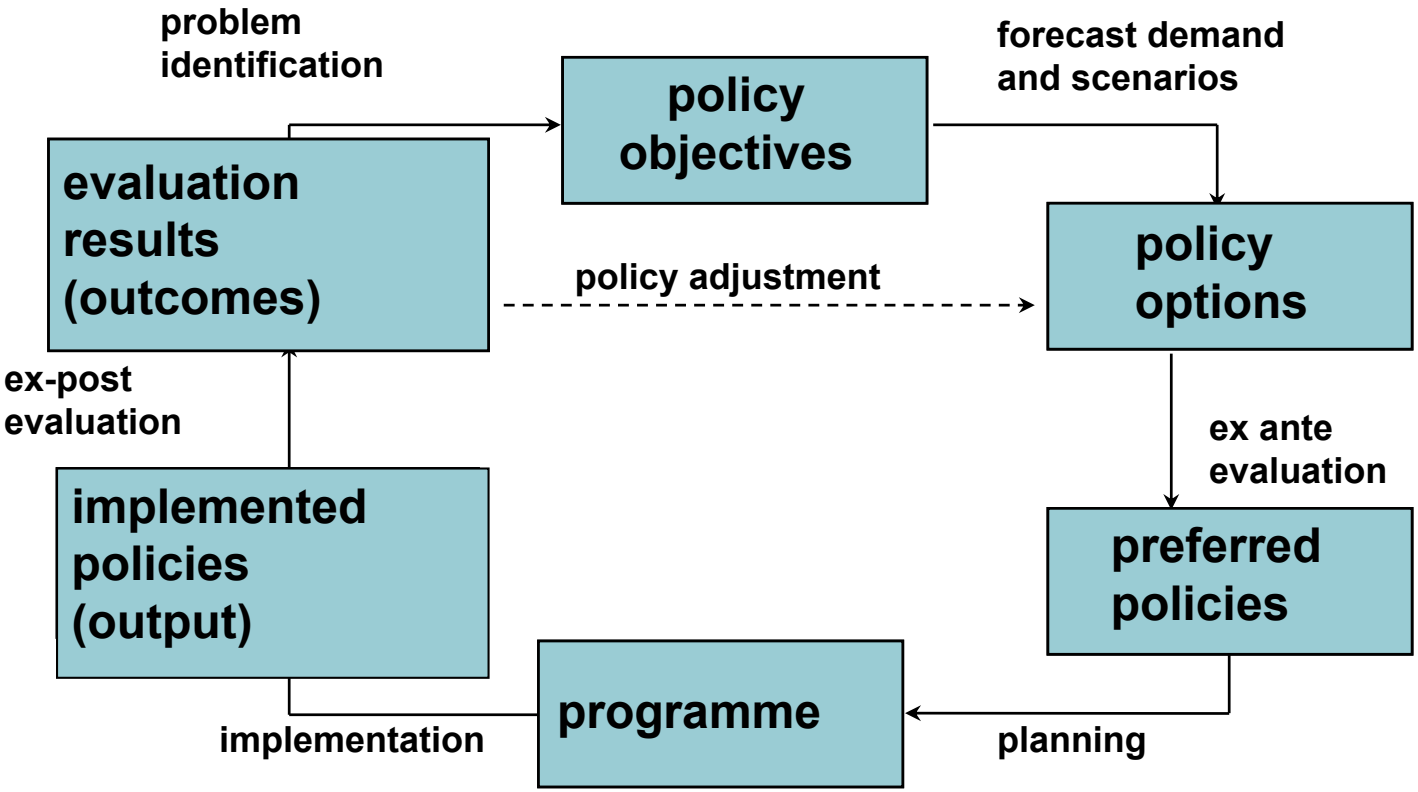
Research questions: can FCD be applied for policy research focusing on accessibility by car?

1) Problem identification: signalize and analyze bottlenecks in traffic flow
2) Monitoring: determine trends or developments in accessibility
3) Ex-ante and ex- post evaluation: determine effects of policy measures

FCD: now applications for traffic information, traffic management, automated vehicle control

NOT PURPOSE OF THIS STUDY

Applications of FCD for policy research process



Indicators of accessibility needed in policy research

- Reistijd van herkomst naar bestemming
- Reistijdverlies
- Onbetrouwbaarheid van de reistijd
- Extreme reistijden en robuustheid
- Bereikbaarheidsindicator
- Nabijheid

Validatiecriteria

- Beschikbaarheid van data en metadata op detailniveau
- Betrouwbaarheid en validiteit
- Snelheid, continuiteit en consistentie in levering, kosten

1. Signalize + analyze bottlenecks in traffic flows ("photo")

1) Speeds can be measured at very detailed levels
2) Only appr. 5% of vehicles: no intensities
3) Combined with intensities form "fixed" data: hours of delay can be estimated

With FCD:

- Bottlenecks can be signalized and analyzed (during the day, local shifts) on smaller roads
- "Fixed data" still necessary to determine hours of delay.

2. FCD to monitor trends in accessibility

a) Can the lists of TomTom and INRIX be used?
b) Can FCD (data) be used to monitor trends

2a. Can rankings of TomTom and INRIX be used to monitor trends in congestion?

TomTom	City	Delay (compared with 2015)	INRIX	City	Delay
1	Haarlem	27% (+3%)	1	Maastricht	14%
2	Den Haag	24% (+1%)	2	Amsterdam	9%
3	Leiden	23% (+2%)	3	Utrecht	8%
4	Groningen	23% (+1%)	4	Dordrecht	8%
5	Amsterdam	22% (+2%)	5	Haarlem	8%
6	Nijmegen	21% (+3%)	6	Rotterdam	8%
7	Arnhem	20% (+3%)	7	Arnhem	8%
8	Tilburg	19% (+2%)	8	Den Haag	7%
9	Breda	19% (+2%)	9	Amersfoort	7%
10	Eindhoven	19% (+3%)	10	Groningen	7%

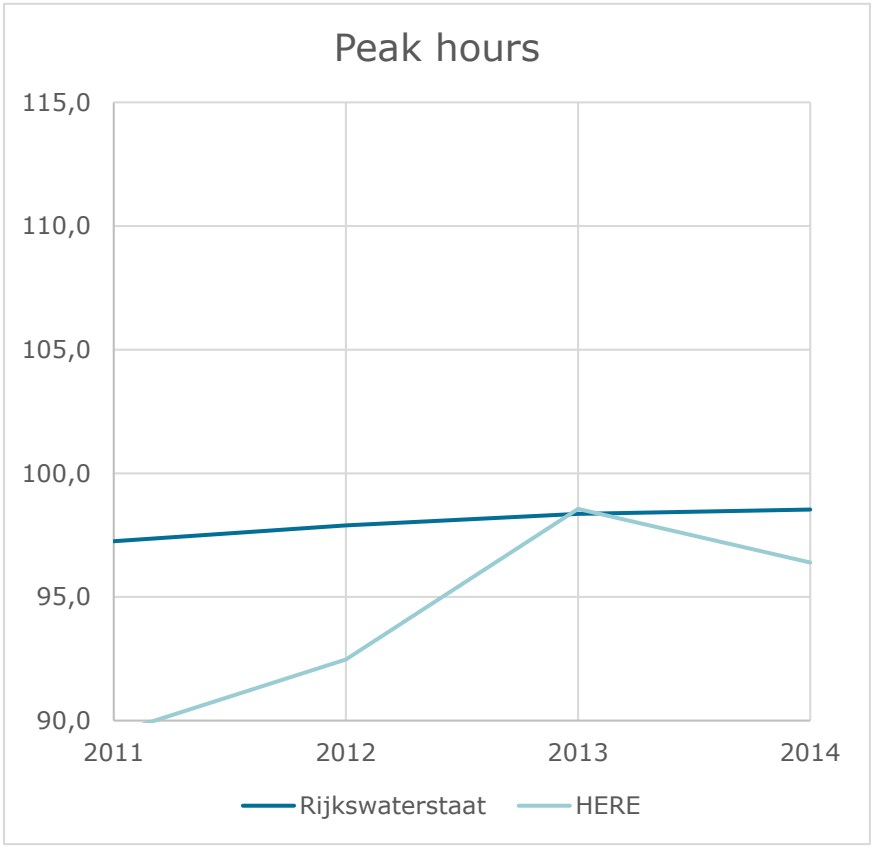
Speeds/delays during the day/peak are compared with free-flow

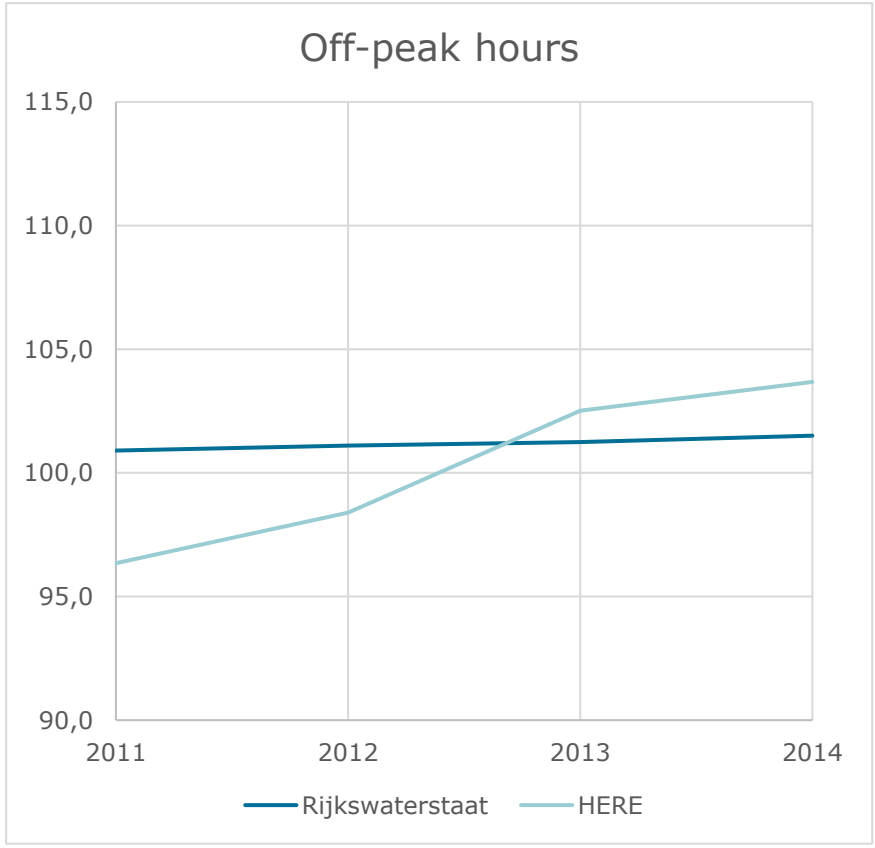
2a. Can lists of TomTom and INRIX be used to monitor trends in accessibility?

- Although TomTom and INRIX publish broad definitions, it remains unclear how the indexes exactly are defined and measured. Algorithms are secret.
- The lists weren't validated with other data.
- The sources of the underlying FCD are selective and change in time (next slide).
- Findings and differences with other sources cannot be understood by published figures and definitions.

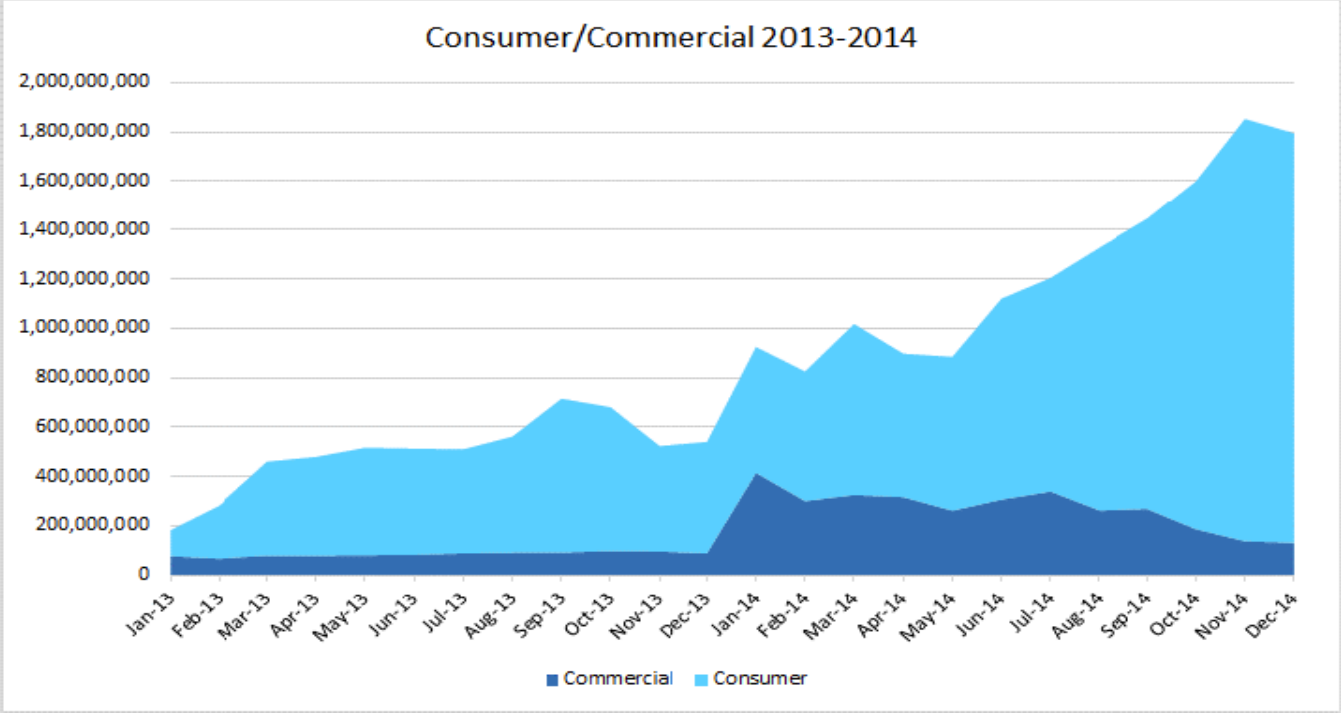
Congestion indices cannot be assumed to adequately reflect trends and differences in congestion. They may seem promising, but cannot be used for policy.

2b. Use of FCD to monitor trends: Step 1: speeds Here 2011-2014 on Dutch national roads (detector loop data show realistic patterns)





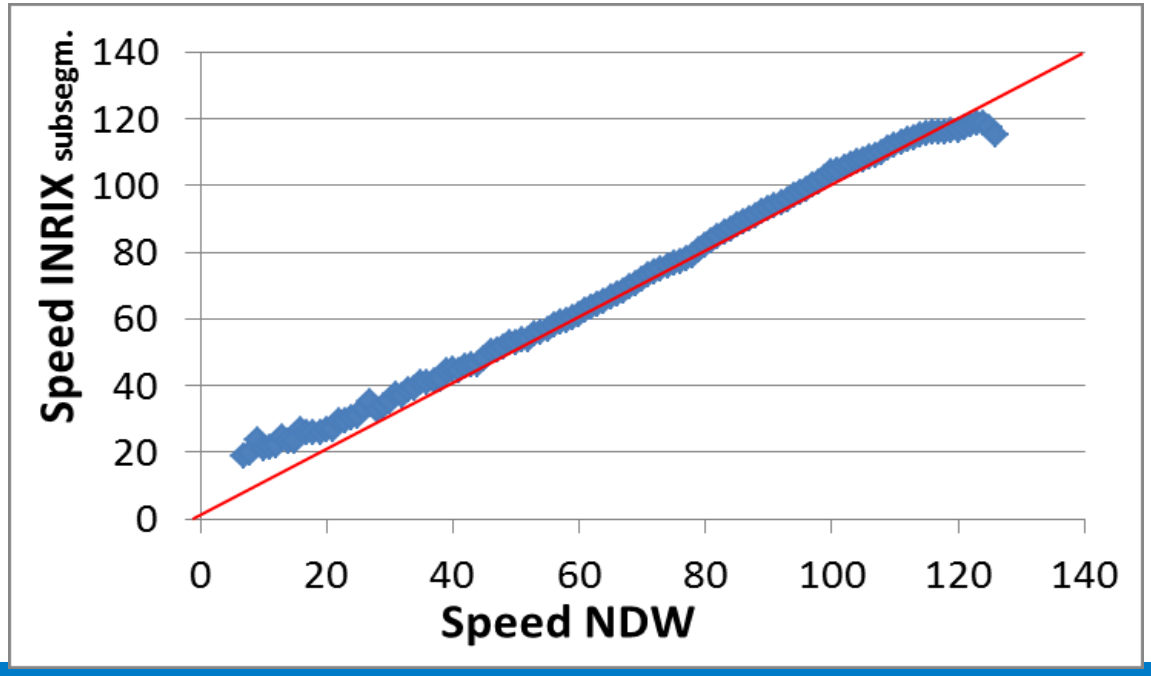
2b. Use of FCD to monitor trends:
Step 1: composition of the fleet changes over time (Here data)



2b. Use of FCD to monitor trends:

Step 2: INRIX speeds correspond to detection loop speeds between 30 and 100 km/h

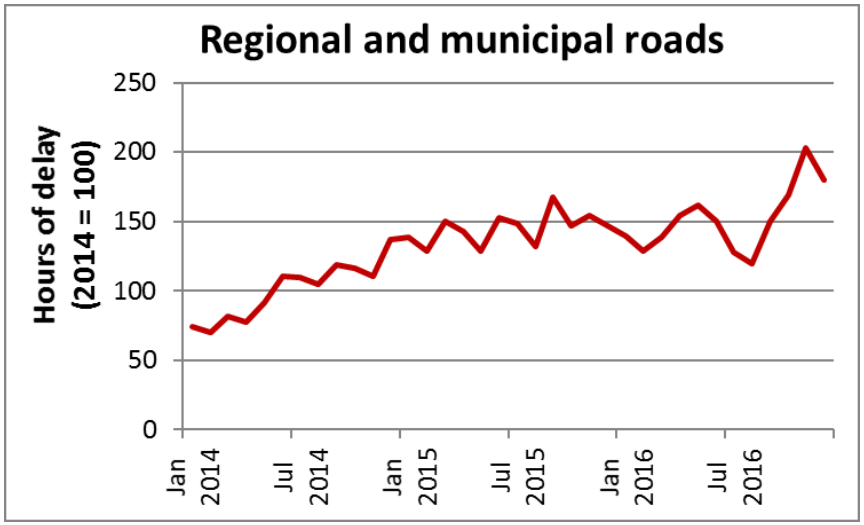
(at 22 municipal, 162 regional, > 3000 national locations) per location per 15 minutes 2014-2016

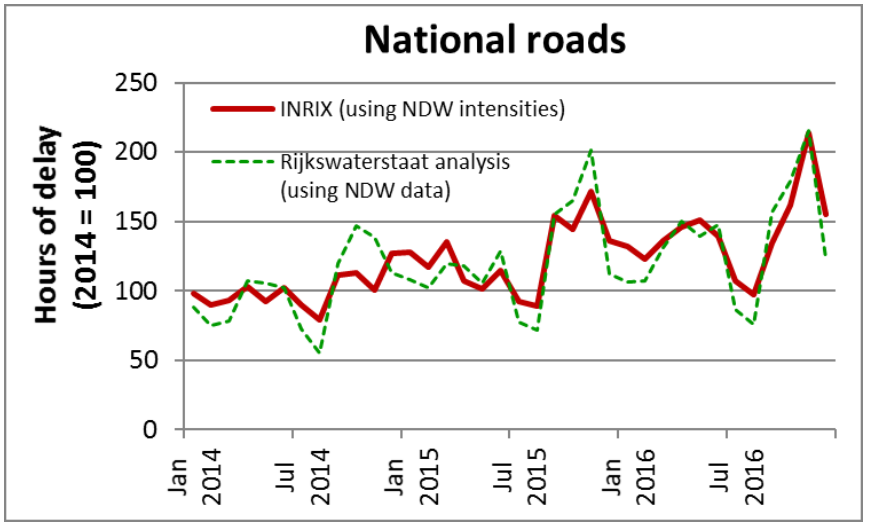


2b. Use of FCD to monitor trends: Step 2: INRIX

Findings	Approach
Changes in speed INRIX occur 3-7 minutes later	Accelerating
INRIX speeds strongly correlated between consecutive minutes	Analyse per 15 minutes
Every appr. 6 months segments definitions can change, few stable	Exclude segments with large changes
At the same time the algorithme to derive speeds also seems to change (causing changes in speed of several kms/h)	Speed corrections
Irregular data structures, e.g. blocks of missing data	Exclude irregular data

2b. Use of FCD to monitor trends:
Step 2: **trends in hours of delay** based on loop data alone (NDW) correspond with INRIX speeds and NDW intensities on Dutch national roads





2b. Use of FCD to monitor trends: Step 2: hours of delay based on INRIX speeds and NDW intensities

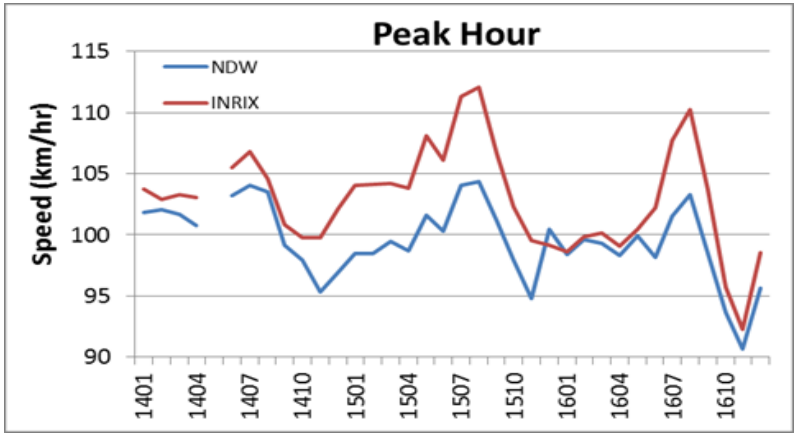
Calculation:

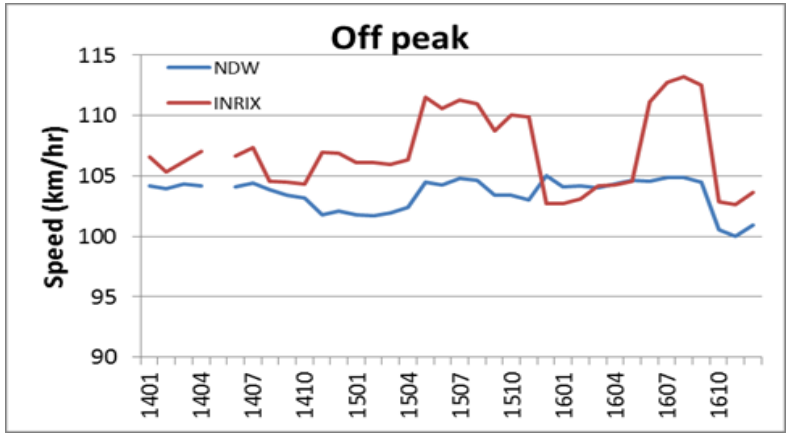
- Per road type: local/regional (50, 60, 70, 70 k/u) national (70, 80, 100+)
- Fixed reference speed based on average speed off-peak 10-15 h

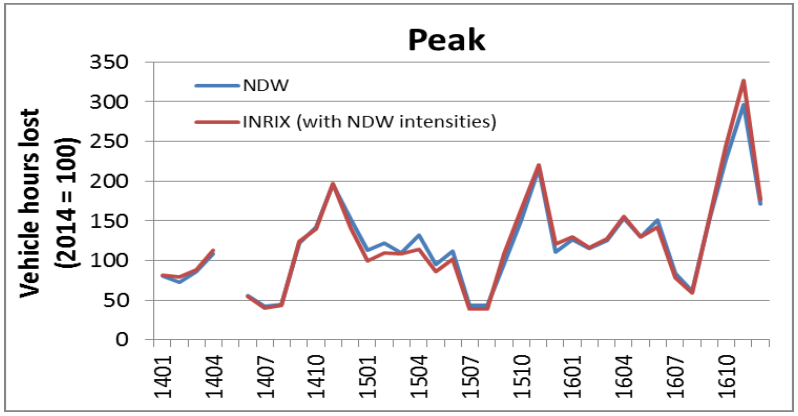
Conclusion:

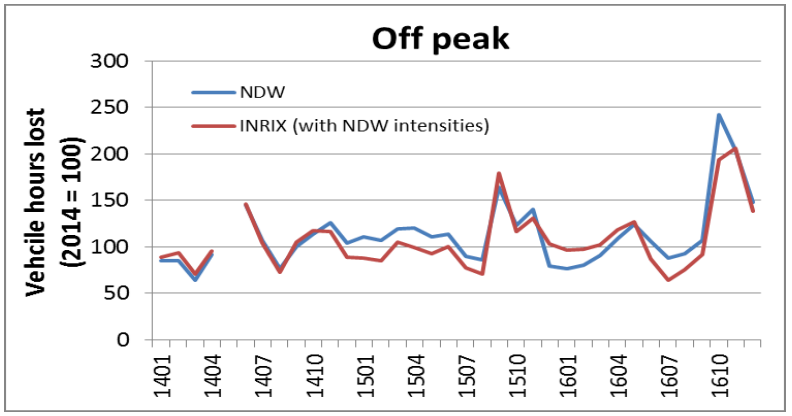
- Hours of delay based on INRIX/NDW and NDW alone correspond closely
- Caution INRIX/NDW to measure hours of delay because of extrapolation of intensities (INRIX covers whole network, but lacks intensities)
- Caution: > 100 km/h, representativeness

2b. FCD monitor trends: NDW alone <> INRIX/NDW









3a. Use FCD for ex ante-evaluation

- Few published studies.
- Netherlands National Model System (LMS, RWS): requires a detailed description of travel behaviour in the base year: travel times and hours of delay from origin zone to destination zone (O D matrix): FCD can improve these.
- Pilots to use FCD at O-D: an intersection, a junction.
- Study: Can O-D matrix be improved with GSM? Yes, at some points.

  E.g. around airports, traffic to/from abroad, car trips > 10 km.

Future:

- Further attemps to use FCD door-to-door travel times this information in particular for municipal and regional roads.
- Problems: selectivity of FCD data, how representative for the total? How to correct for misrepresentations? Distinct verhicle types, motives.

3b. Use FCD for ex post-evaluation

- No examples of application FCD for ex post evaluation found

- Same **problems** with FCD as for monitoring trends:
  - inconsistencies in the data,
  - not clear whether representative
  - how to check and correct
  - intensities from other sources are required

Conclusions

- Recent year's **first applications** of FCD for policy research:
  - Signalize and analyse bottlenecks
  - Improvements of monitoring and ex ante evaluation are possible by combining FCD with other data (detection loops, surveys, etc)
  - Rankings TomTom and INRIX cannot be used for policy research
- **Problems** with FCD for policy research:
  - inconsistencies in the data,
  - not clear whether representative, how to check and correct
  - intensities from other sources are required

Future:

- Improvements FCD by more and better data and more transparancy
- Further research for validation, corrections, and combinations with other data