



# USING FLOATING CAR DATA FOR SPEED ANALYSES – CZECH EXPERIENCE

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11th  
International  
Road Safety  
Seminar  
GAMBIT  
2016

# Introduction

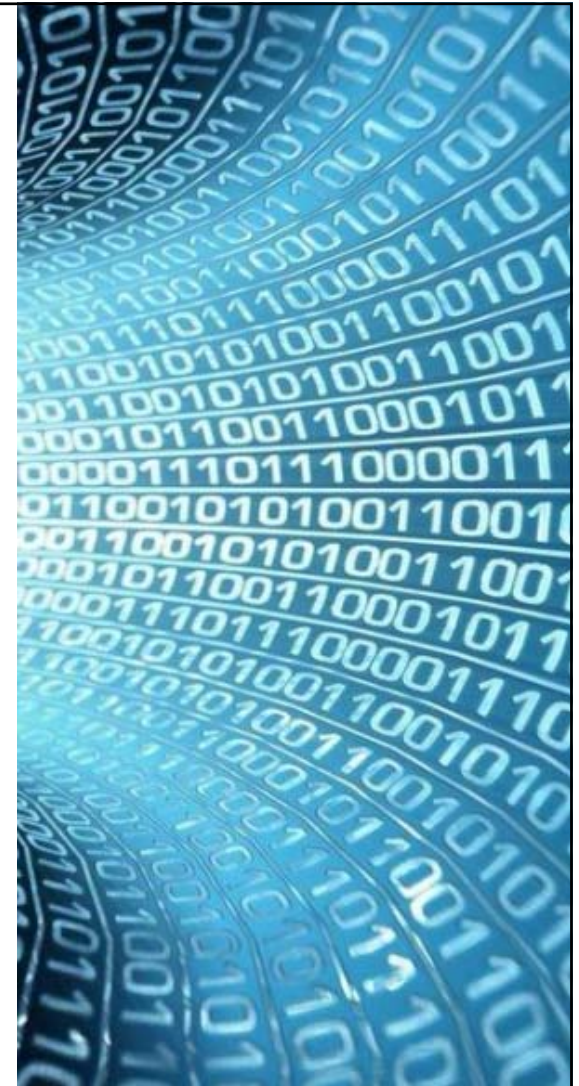
- Speed is an important risk factor
- Need for investigation and proposal of measures
- Traditional speed data collection – stationary (speed guns, traffic counters, loops or tubes)
- Focus on free-flow speed



- Limited in time and space
- **Floating car data (FCD) – continual records of GPS positions**

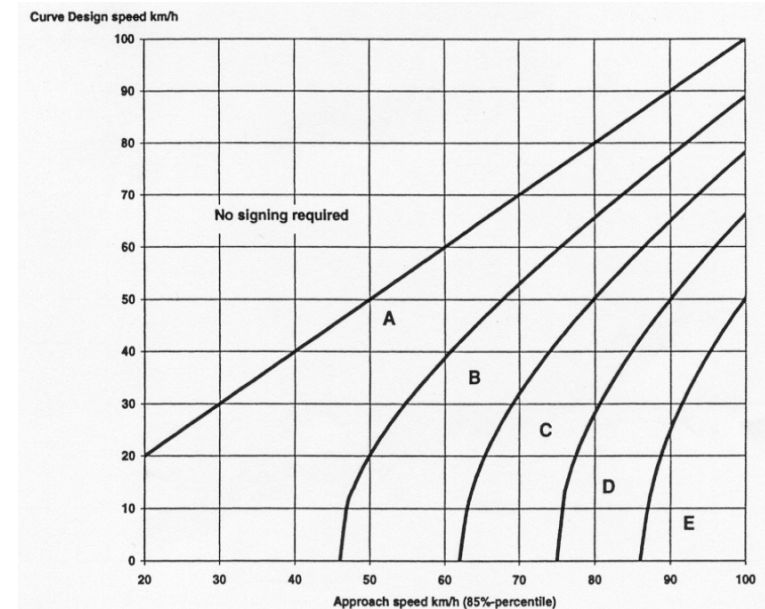
## Floating car data (FCD)

- Often for analyses of traffic operation (detection of congestions, estimation of travel times...)
- Less often for safety-oriented analyses
- Positions in time → speed



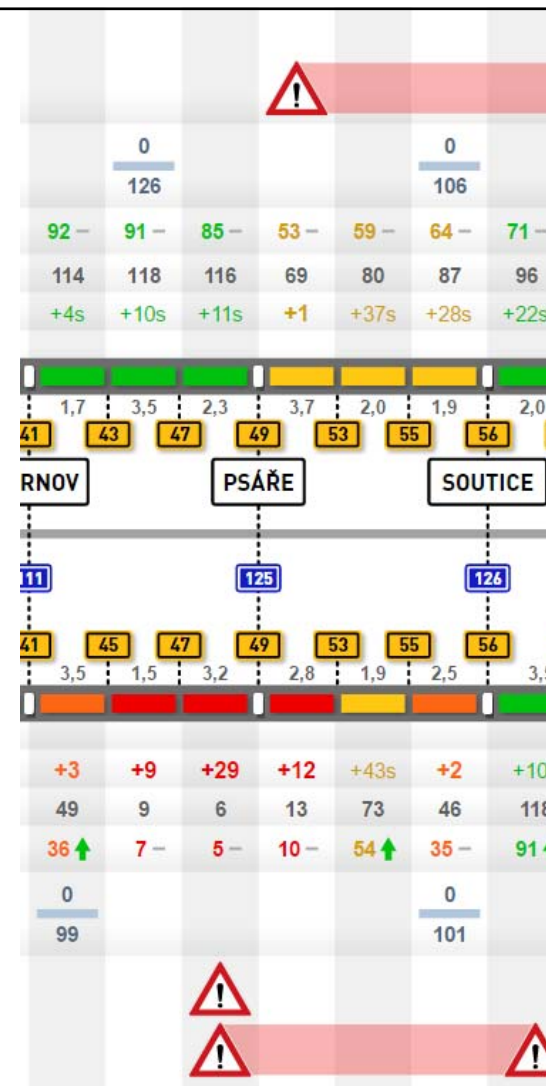
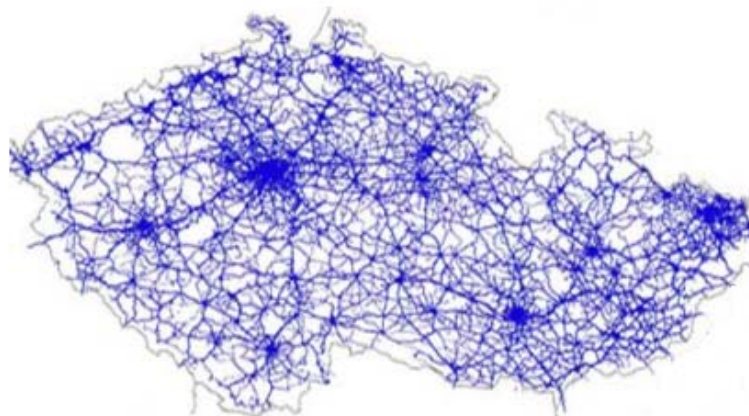
## Example projects: SAFESTAR

- „Safety Standards for Road Design and Redesign“
- EU research project (1996-2002)
- Part devoted to curves on rural roads:
  - Curves much more critical than tangents
  - Operating speed to evaluate road design
  - Speed prediction models developed
  - Signing of inconsistent curves
- Also Polish adaptation  
(*Instrukcja zróżnicowanego oznakowania łuków poziomych, 2002*)



# Czech FCD: „macro” applications

- RODOS system, managed by IT4Innovations
- Cellphone positions, once per minute
- 140 000 vehicles ~ 5% sample





## Czech FCD: „micro” applications

- Several companies provide fleet management services (monitoring of positions, journeys, etc.)
- Frequency usually 1 Hz or less
- The exception: Vetronics units by Princip (4 Hz)
- **A rich data source for local safety studies!**

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1416974591.00 49.745080 14.671908 83
1416974591.25 49.745123 14.672011 85
1416974591.50 49.745168 14.672053 85
1416974591.75 49.745214 14.672096 84
1416974592.00 49.745260 14.672139 84
1416974592.25 49.745305 14.672182 84
1416974592.50 49.745351 14.672225 84
1416974592.75 49.745396 14.672263 84
1416974593.00 49.745445 14.672300 83
1416974593.25 49.745490 14.672338 83
1416974593.50 49.745536 14.672370 83
1416974593.75 49.745584 14.672408 82
1416974594.00 49.745630 14.672440 82
    
```



# Czech research application: SAMO

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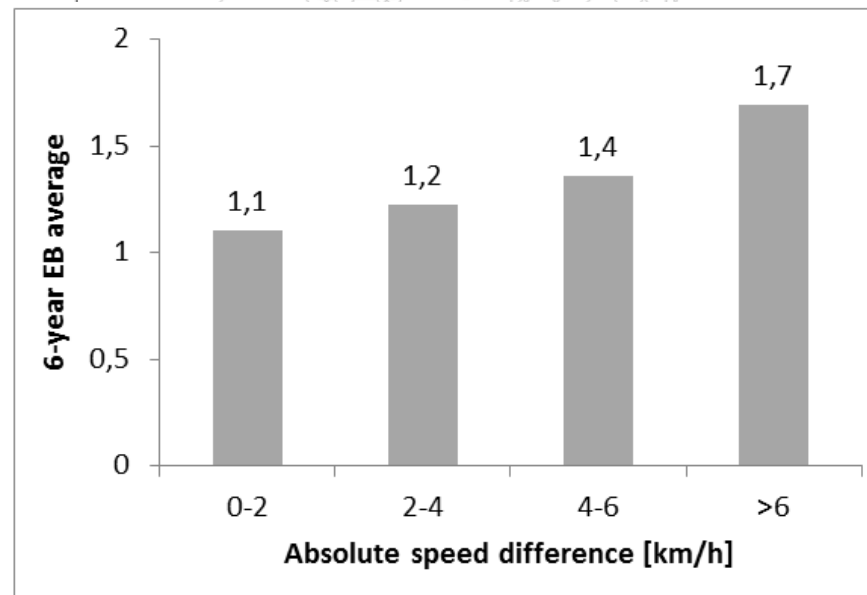
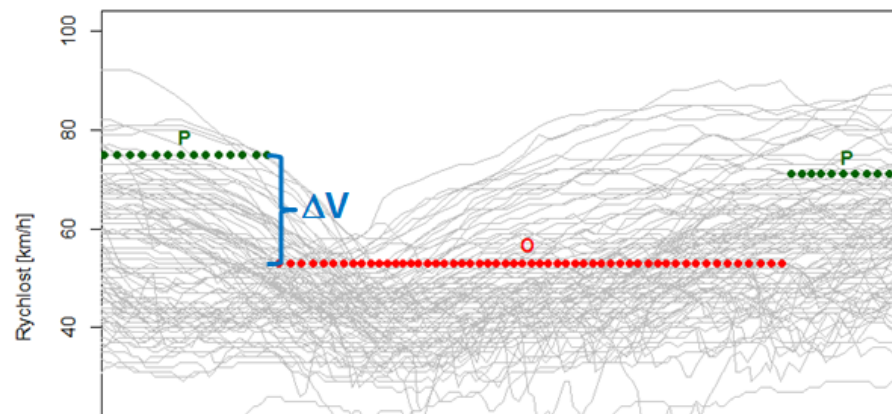
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- Czech research project (2014-2016)
- Conducted by CDV, using data from Princip
- Safety assessment of curves on national roads → improvement of self-explaining performance
  1. automated segmentation into tangents and horizontal curves (min. 200 m)
  2. **collection of FCD and calculation of speed** (min. 100 drives per segment)
  3. development of models for estimation of speed also on non-FCD segments
  4. network-wide application of the models and evaluation of speed consistency (differences of speed on tangents and following curves)
  5. identification of sub-standard curves

# SAMO: FCD validation

- Tangent-curve pairs
- About 1000 pairs (600 km)
- Comparison of FCD speed consistency with accident data
- Clear rising trend!
- Minimal differences = safest





# SAMO: outputs

- Risk classification based on speed consistency and length of preceding tangent
- On-line map of sub-standard curves

<http://samo.cdvinfo.cz/vystupy/>

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Kat.	Návrh	Popis
A		Směrové sloupky podle TP 58 (Tab. 9a). VDZ: • podélná čára přerušovaná • vodící proužky
B		Směrové sloupky podle TP 58 (Tab. 9a). VDZ: • podélná čára souvislá ve zvukové úpravě • dopravní knoflíky vedle podélné čáry souvislé • vodící proužky ve zvukové úpravě SDZ: • výstražná značka • vodící tabule po celé délce oblouku (Tab. 9b)
C		Směrové sloupky podle TP 58 (Tab. 9a). VDZ: • dvojitá podélná čára souvislá ve zvukové úpravě (přip. dopravní stín nebo barevná výplň) • vodící proužky ve zvukové úpravě • dopravní knoflíky vložené mezi dvojitou podélnou čárou souvislou SDZ: • retroreflexní výstražná značka s doporučenou rychlostí (Tab. 9c) • retroreflexní zvláštní vodící tabule po celé délce oblouku (Tab. 9b)
D		Úprava směrových návrhových prvků, úprava klopení, smykových vlastností... [více viz [29], kap. 5.3.1]

**Kategorie**

- A: 18
- B: 40
- C: 35
- D: 24

Zobrazeno 117 oblouků.

**Tab. 9a** Rozestup směrových sloupků na vnější straně podle poloměru oblouku

R [m]	Rozestup v oblouku a 1–3 sloupků před/za obloukem [m]			
	5*	10	20	30
< 50	5*	10	20	30
50 – 250	10*	20	30	–
250 – 450	20*	30	–	–
450 – 850	30	–	–	–
850 – 1250	40	–	–	–
> 1250	50	–	–	–

\* na vnitřní straně poloviční rozestup sloupků

**Tab. 9b** Rozestup vodících tabulí podle poloměru

R [m]	Rozestup [m]
50	5
100	10
200	15
300	20
400	25
500	30

**Tab. 9c** Doporučená rychlost podle poloměru a příčného sklonu

R [m]	Příčný sklon [%]			
	0–3	3–5	5–7	–
50	40	45	45	–
60	45	50	50	–
80	50	50	60	–
100	60	60	60	–
150	70	80	80	–
200	80	90	90	–

# Open questions

## *Sample size*

- where to collect FCD data? (data availability)
- for how long? (day/night, seasons...)

## *Definition of free-flow speed*

- off-peak hours?
- comparable with stationary radars?

## *Representativeness*

- vs driver population? (individuals/professionals, vehicle types...)
- data privacy? (age, gender...)

# Outlook

- FCD: interesting alternative to stationary data collection for safety applications
- Various universities/institutes involved
- Studies of speed limits, effect of traffic calming...
- Methodologies of collection and processing still under development
- A field for CZ+PL cooperation?



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# THANK YOU FOR YOUR ATTENTION

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