Conflicting Goals enabled by Digitalisation

Digitalisation and the Rebound Effect – Seminar HS2020

Lukas Käppeli
Conflicting Goals

Social goal
Enable driving for everyone

Environmental goal
Reduce car traffic
Reduce CO$_2$ Emissions with Data

Reduce CO$_2$ Emissions with Data

Overview

• Reduce car traffic
  – Road Pricing
  – Smart Tachograph
• Reduce electricity usage
  – Shower Meters
  – Feedback
• Conclusion
London Congestion Charge

https://www.driving.co.uk/news/london-introduces-ulez-daily-12-50-charge-older-polluting-vehicles/
Car Insurance

\[ f(\text{Age, Gender, Driving experience, Car model, ...}) = \text{Risk category} \]

- Driver has “no” motivation to drive carefully
- Correlation between VMT and accident risk
“The best way to help Humans improve their performance is to provide feedback.”

Digitalisation

Enables gathering of data...

... and giving the driver a direct feedback
Smart Tachograph

\[ f(\text{Speed, Acceleration, Time, Temperature, ...}) = \text{Accident Risk} \]

- Insurance rate inferred from accident risk
- Insurance tax = insurance rate * VMT
Smart Tachograph

- Feedback to driver
- Show current:
  - Speed
  - Accident risk
  - Insurance rate
  - Road tax

Moral Hazard
Smart Tachograph

• Enabled by digitalisation
• Gives a monetary motivation
  - To drive less
  - To drive more carefully
Conflicting Goals

Social goals

- Pay-per-use insurance
- Reduce cost of public security
• Pay-per-use insurance
  - No cross financing of aggressive drivers
  - Less accidents

• Reduce cost of public security
  - Send traffic offenses directly to police
• Where is the data stored?
  – Local or at the insurance

• How can the data be used?
  – Accidents
  – Law suites

• How can I validate data protection?
Conflicting Goals

Social goals
- Pay-per-use insurance
- Reduce cost of public security

Data protection goals
- Let customer verify how data is used
- Do not disclose collected data
For how much money...

... do you share the location of your car?
Existing offers

• CleverDrive:
  - 15% - 25% discount
  - Data saved according to Swiss data protection law

• DrivePartner
  - 15% discount + vouchers based on driving style
  - “always know and let others know where you are located and where the car is parked”
Let us assume that...

Social goals
- Pay-per-use insurance
- Reduce cost of public security

Data protection goals
- Let customer verify how data is used
- Do not disclose collected data
Punishing Smartless Cars

• Can everybody pay less?
• What if 80% have a Smart Tachograph?
• Is no reduction already a punishment?
Possible Consequence

![Graph showing possible consequence]

**Figure 1.** —Average number of late-coming parents, per week

Another Approach

“... the underlying problem is that energy is invisible, so people do not know when they are using a lot of it.”
Do you remember this image?

Social Norms

Savings/Year:

- 215 kWh
- 3,500 liters
- 47 kg CO₂

Shower Meter

https://smart-home-geraete.de/2015/02/amphiro-a1-der-smarte-warmwasserzaehler/
Impact of Real-Time Feedback

Conflicting Goals

Environmental goals

• Reduce electricity usage
• Reduce hot water usage
Data Protection

• Measure water and energy consumption

• Collect this data from:
  – Households of 2 – 5 persons
  – Company showers with 3 – 5 users
Data Protection

S. Günther et al., Empowering personalized feedback on hot water usage: a field study with shower meters
Realtime Feedback

https://greatestideaever.wordpress.com/2017/01/24/1023-ambient-orb/
“We think it might work even better if, when energy use went over a certain threshold, the device made annoying sounds, such as cuts from ABBA’s Gold: Greatest Hits”
Summary

Smart Heating
Shower Meter
Smart Tachograph
Ambient Orb
Usage Feedback

Location Data
Tax Rate
Electricity Usage
More examples

https://bag-coronavirus.ch/swisscovid-app/
https://google.com/
Conclusion

Digitalisation as enabler for new solutions...
... if used in the right way