Telematics in Motor Insurance and AI Governance

EIOPA AI Governance Event – 15.12.2022 online

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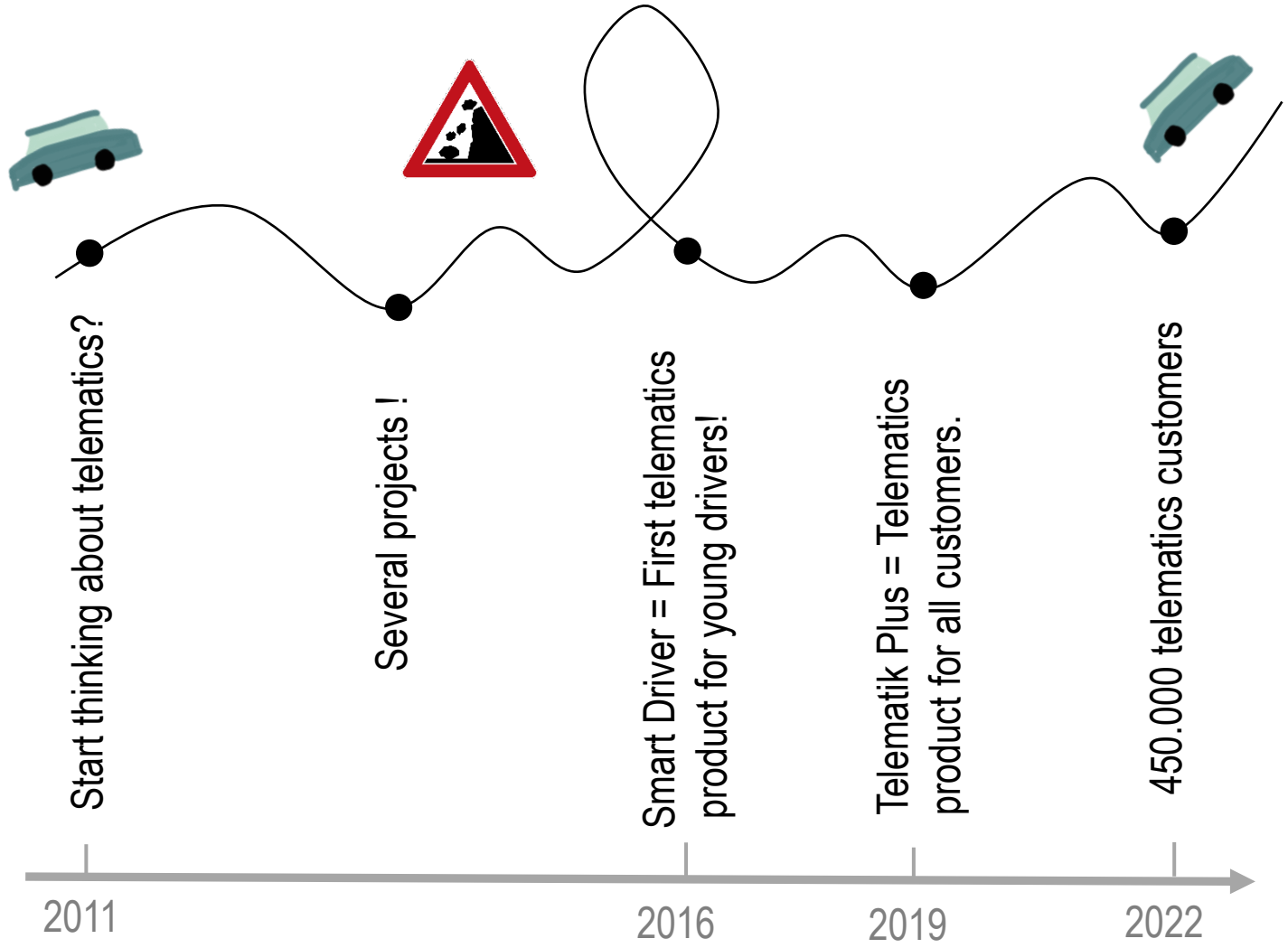
HUK-COBURG, motor insurance and telematics

HUK-COBURG is Germanys market leader in motor insurance with more than 13 million vehicles.

We started discussing and experimenting with telematics about 11 years ago.

First telematics product introduced in October 2016 (discontinued September 2019). Based on a box installed in the car. Only for young drivers. Offering discount and rescue in case of accident.



Facts & Figures

~450.000
Vehicles

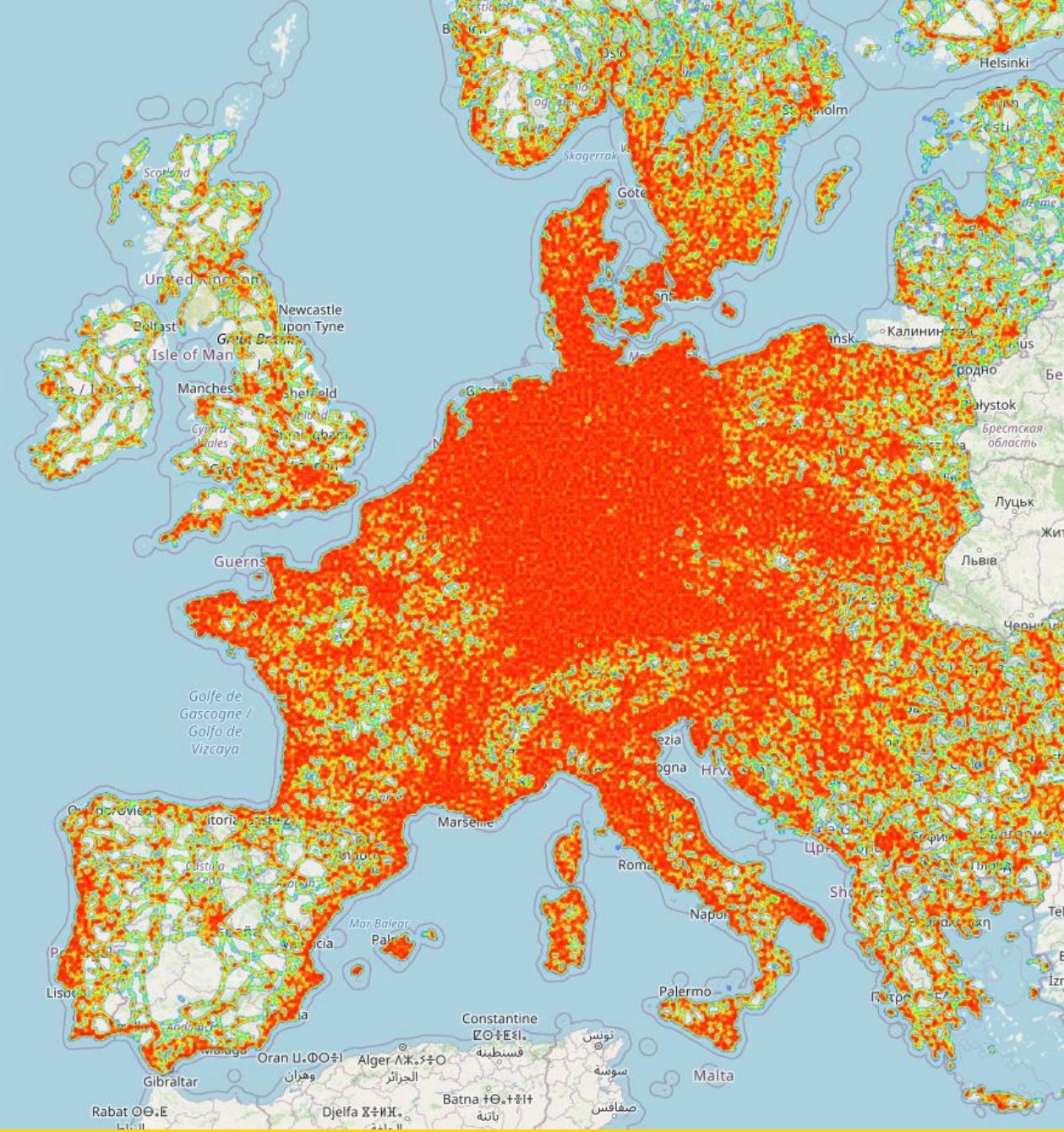
>777 M
Trips

>211 M
Hours of driving

>10,38 B
Km of driving

>478 B
Positions-/Velocity-Data Points

>7,1 T
Acceleration Data Points



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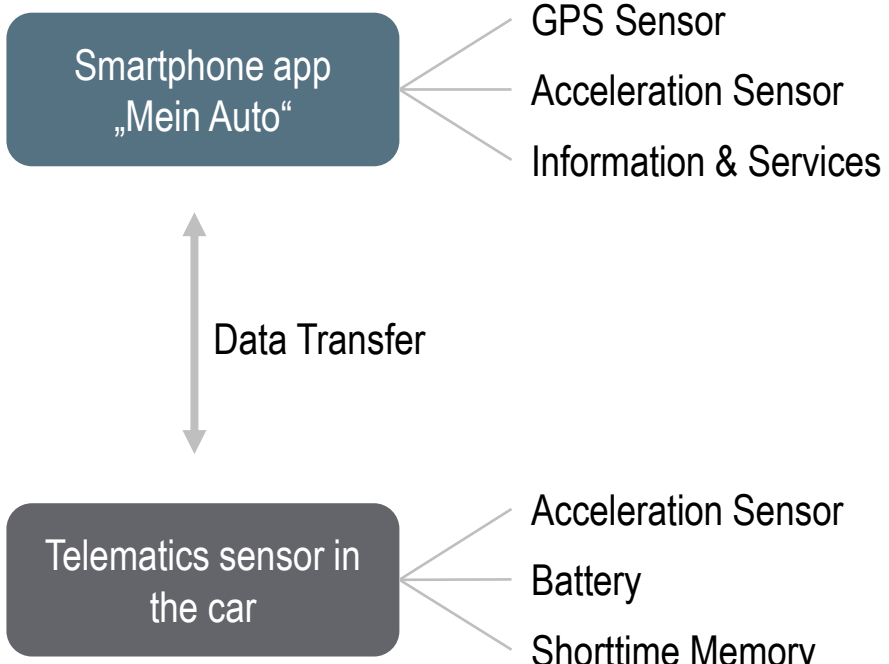
Telematics tariff – based on driving behaviour

Since April 2019
HUK-COBURG offers **“Telematik Plus”** = telematics for all customers in car insurance

Advantage for customers
initial discount of 5% for first year

By driving carefully and risk averse you can get a discount of up to 30% on the next years premium

The app offers feedback on driving behavior and for sustainable driving.



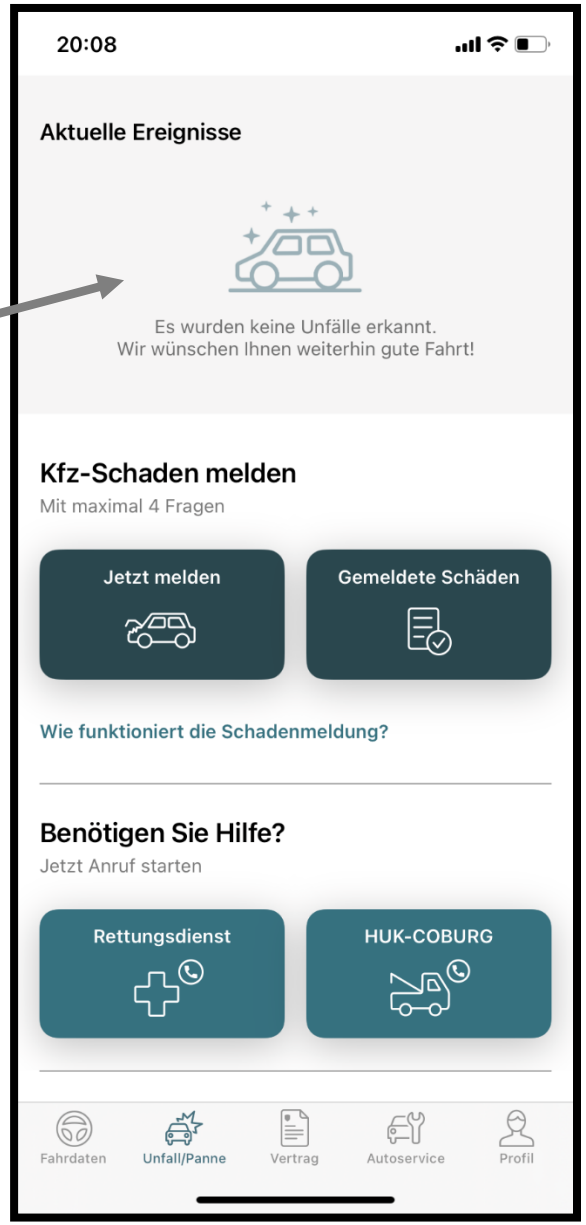
Additional

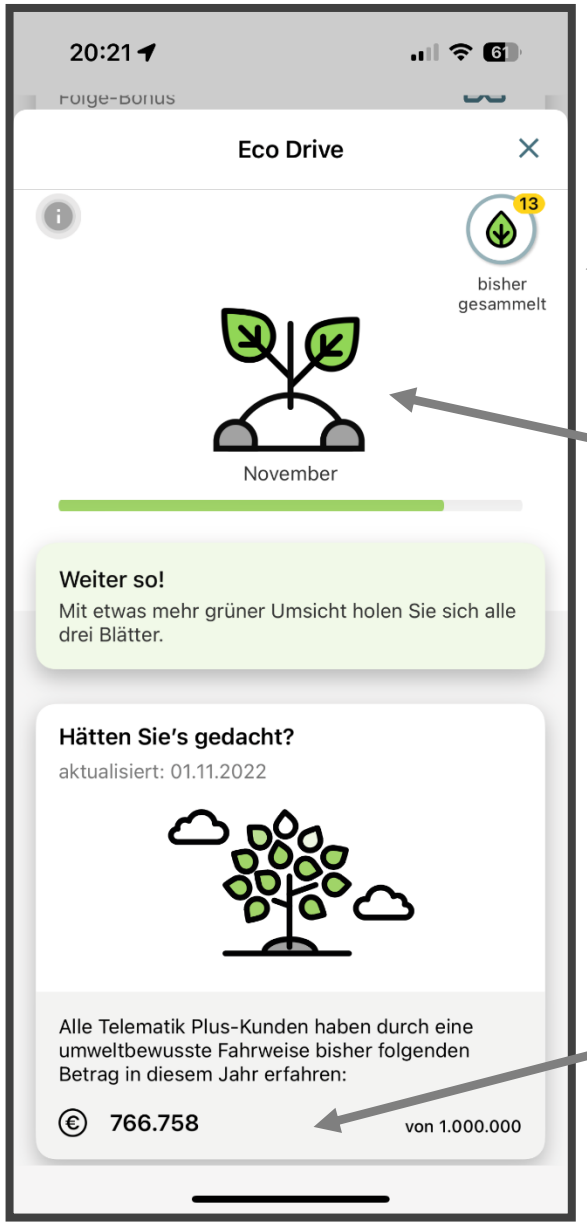
Services

Crash detection

Reporting of claims

Rescue service
Claims service

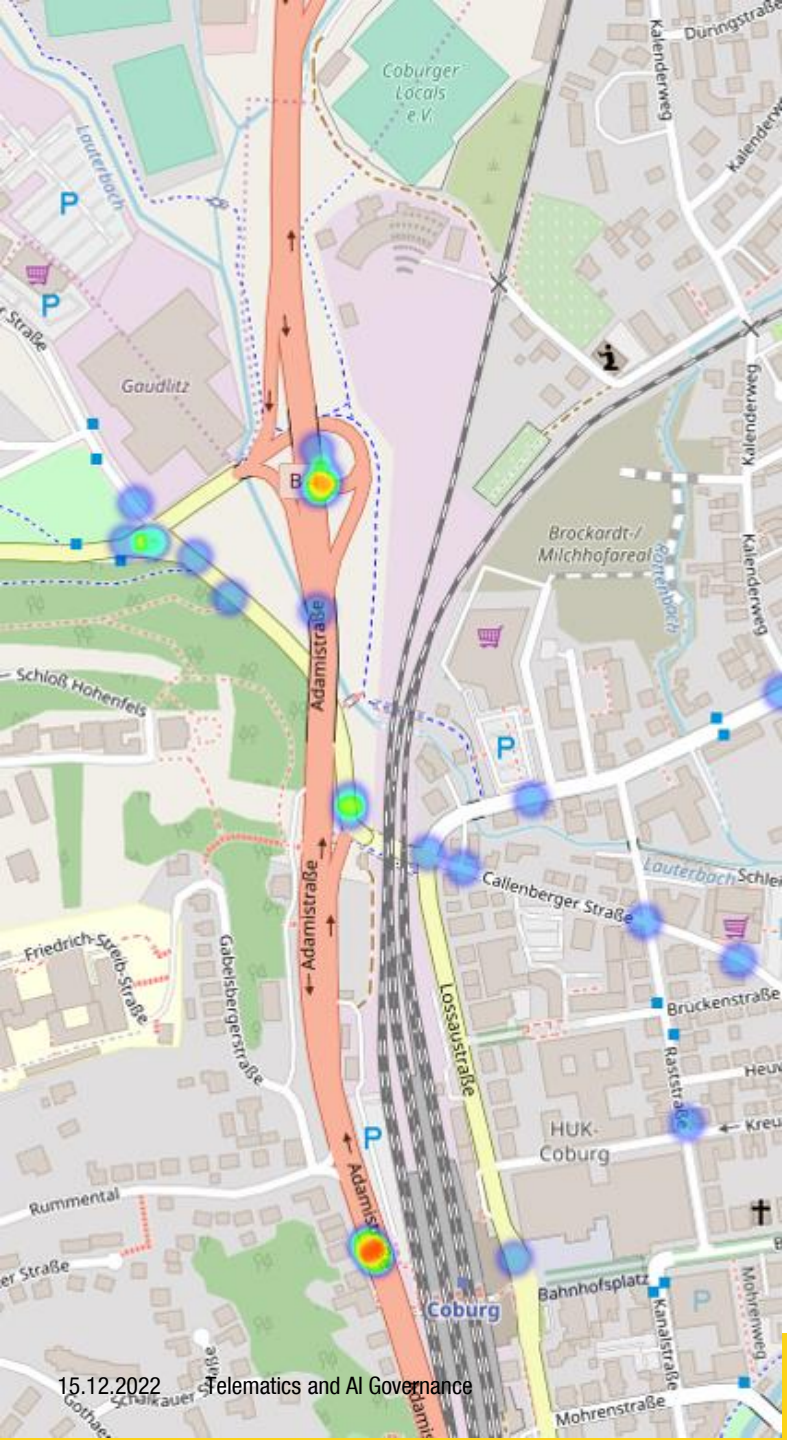




Eco Drive

Earn leaves for driving fuel-saving

The community of all drivers can collect up to 1.000.000 € which is donated to charity by the end of the year



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Opportunities

Important contribution to society

- Reduction of claims (Vision Zero)
  - By improvement of driving behaviour (telematics has more impact than driving assistance systems)
  - Possible improvement of traffic infrastructure (see map: telematics recognizes dangerous locations in Coburg)
- Sustainability: energy efficient driving / saving fuel

Maintain competitiveness of insurance companies

- Tariff sovereignity is under acute threat (activities of OEM)
- Direct contact with customers is lost (aggregators, Big Techs)
- Steering of claims is under acute threat (OEM)
- Telematics is a very important use case for representing the interests of insurance industry (data act, access to vehicle data, mobility dataspaces)

Transparency by Product Design

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#1 – Data Privacy

Important aspects of our privacy policy:

- To ensure privacy: Driving data is hosted in a separate company. In order to have “chinese walls” between the very personal driving data and the traditional insurance data.
- Data is used for the telematics tariff and for corresponding statistical purposes: That is, data is used for risk assessment.
- No cuts/disadvantages in the event of a claim
- No sale of data to third parties – contractually excluded
- Data security is taken very seriously!
- Access to driving data can be requested – but this option is hardly ever used
- Right to have the data erased

The data privacy statement is an important aspect of our data governance.

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#2 – Terms & Conditions

Essential aspects from our policy conditions:

- Premium discount for risk averse driving – assessment based on driving data. No penalties!
- List of features which are fed into the algorithm
- Fair assessment of driving style – score reflects expected claims amount
- Examples of good/bad driving behaviour
- Information about “limits of technology” and required cooperation (such as installing updates)
- Errors are possible. But: There are tolerance ranges in favour of the customers!
- Voluntary participation with daily cancellation option for customers

Policy conditions lead to as much transparency as possible.

But the best way to get a feeling for how telematics works is to experience it for yourself - on the road and using the telematics app.

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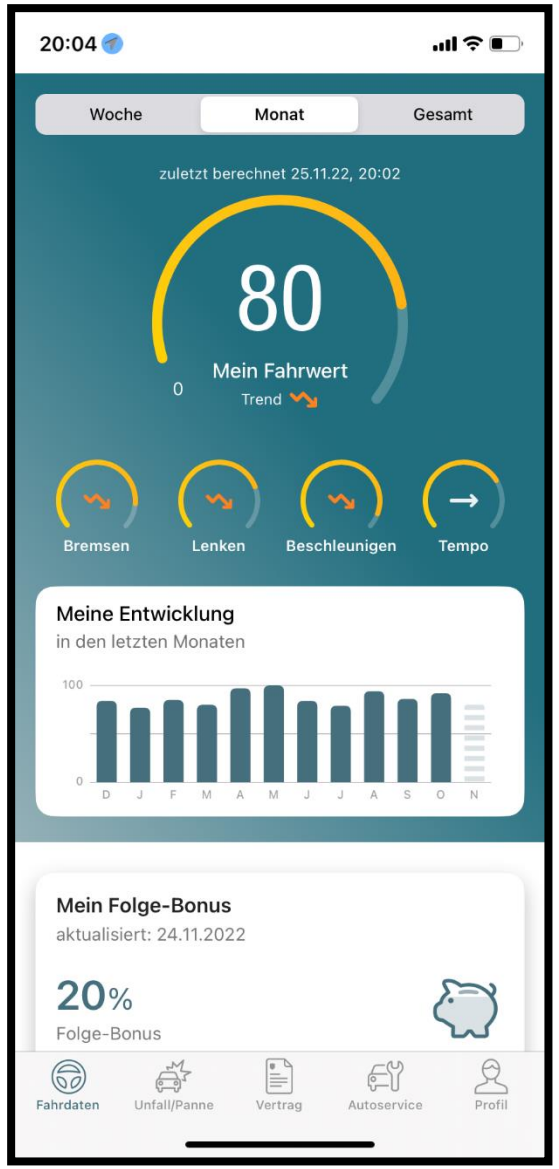
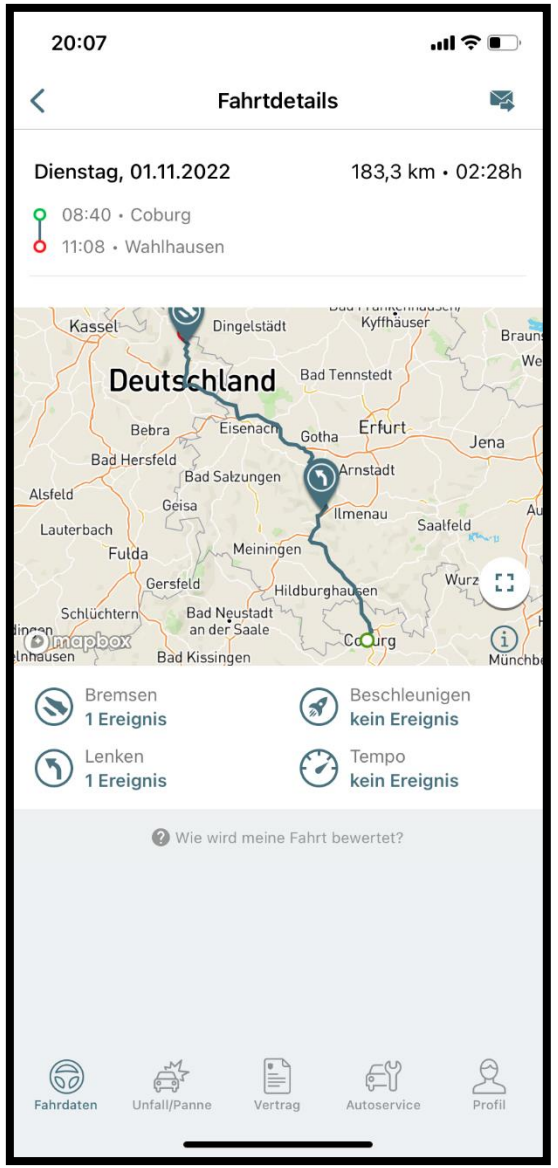
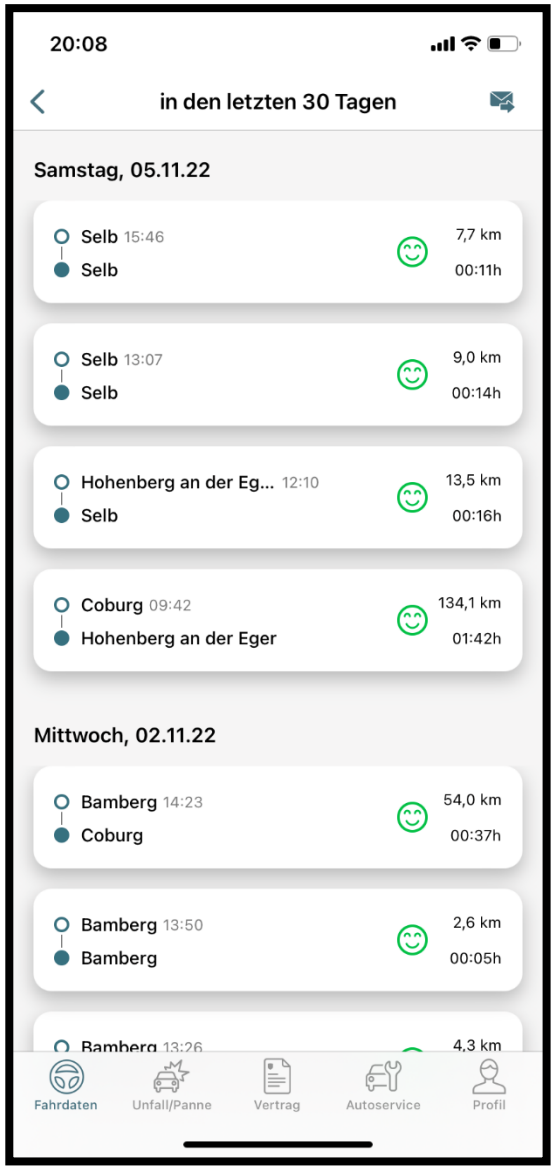
#3 – Feedback for drivers on driving behaviour is part of the app







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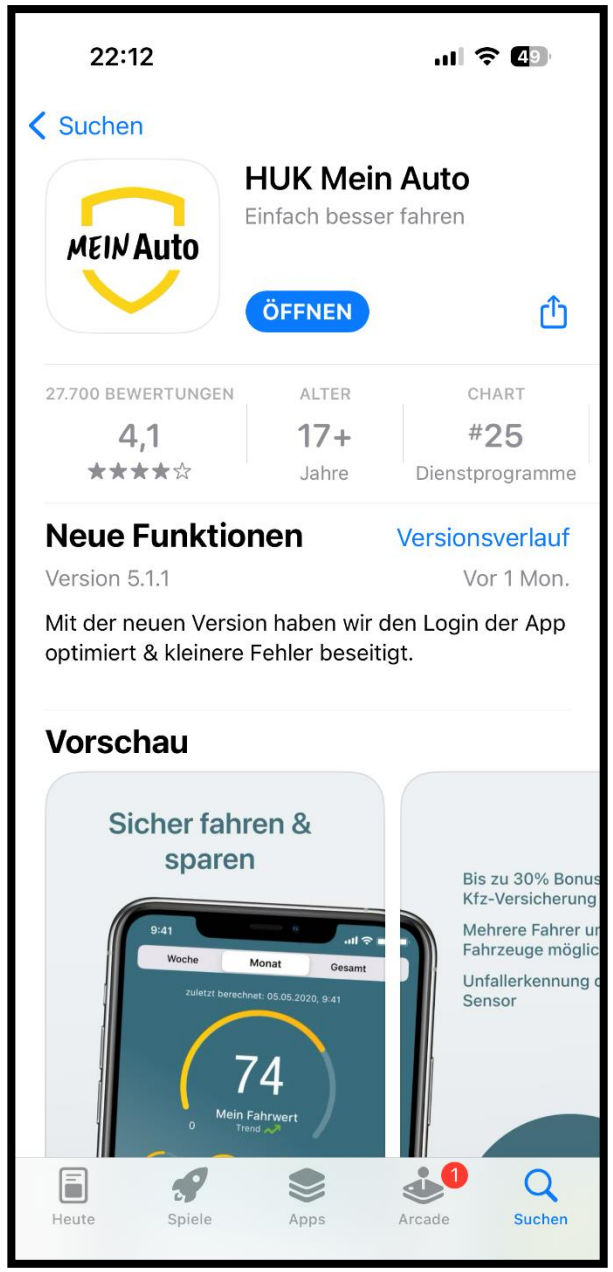
We take feedback and complaints seriously



- We have **20 people in customer support** for telematics which answer lots of support requests and handle customer complaints.
- We **permanently analyze feedback in App/Play-Stores**.
- We **do market research surveys** to learn about customers views.
- We have a **permanent test fleet of about 500 cars to get feedback** from test drivers.
- Feedback and problems are:
  often about GPS or Bluetooth, some people ask „what is an App-Store“, about missing trips, that is trips that have not been recorded (for example due to low phone battery …), seldom about wrong speed limits, about driving events (breaking, cornering) which customers claim they didn‘t do or didn‘t feel to be bad, sometimes about the score, because people think they are better drivers.
- We make a lot of effort to collect important knowledge for further development of our solution which we take very seriously.
- Overall, we are currently happy with the customer feedback.

Data – Quality Management

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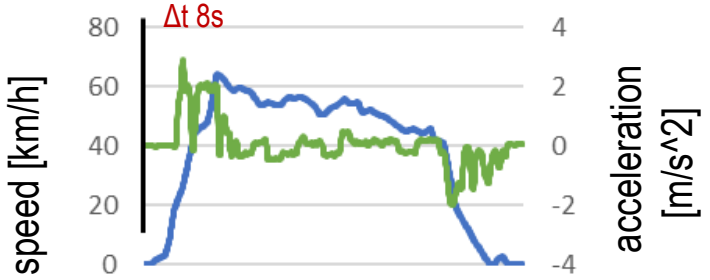
Errors can‘t be fully avoided

- We use a good and low-priced combination of technologies: smartphone + tag, which are able to deliver very good data for the evaluation of driving behaviour.
- But our system is highly complex:
  - Smartphones: many different models, many special features, many changes
  - Settings are extremely important: GPS, Bluetooth, power saving mode, ...
- Thus: Errors are part of our lifes. For example:
  - Pairing is not working, trips are missing, mapping on the map is wrong, time series don’t match, …
- In order to guarantee a high quality, we need to:
  - provide extensive quality filters and permanent quality control using many data quality indicators
  - always listen to customer feedback and actively inform customers about issues
  - have our own test fleet – for developing and testing new releases
  - predict changes in technology and react quickly
  - test, test, test
  - have a very robust algorithm which can deal with many problematic situations
  - permanently strive for improvement
- We have reached a very good level of quality.
  But: 100% perfection can never be achieved.

Ghost loops – driver took a straight way but map matching generated loops



Time series of different sensors don‘t match.
These errors have to be corrected.

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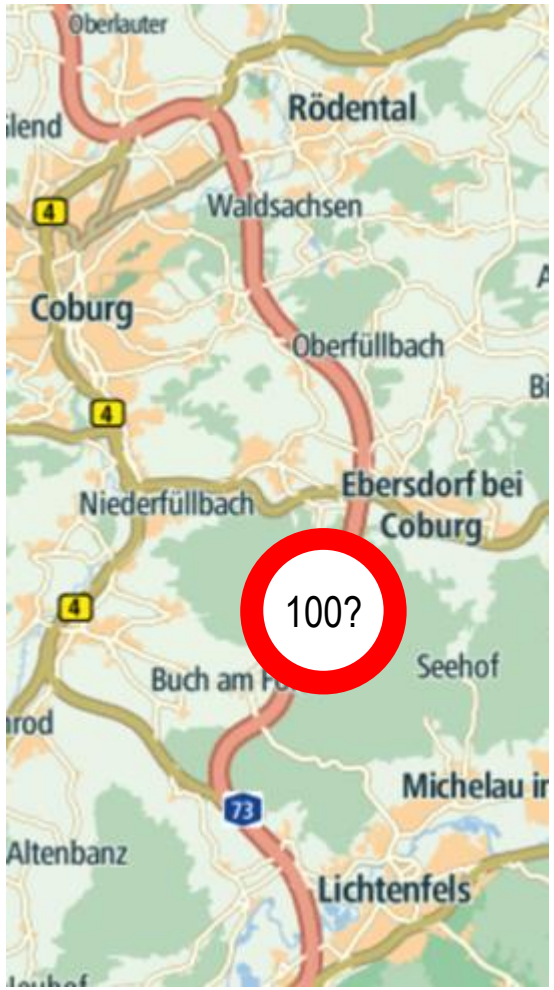
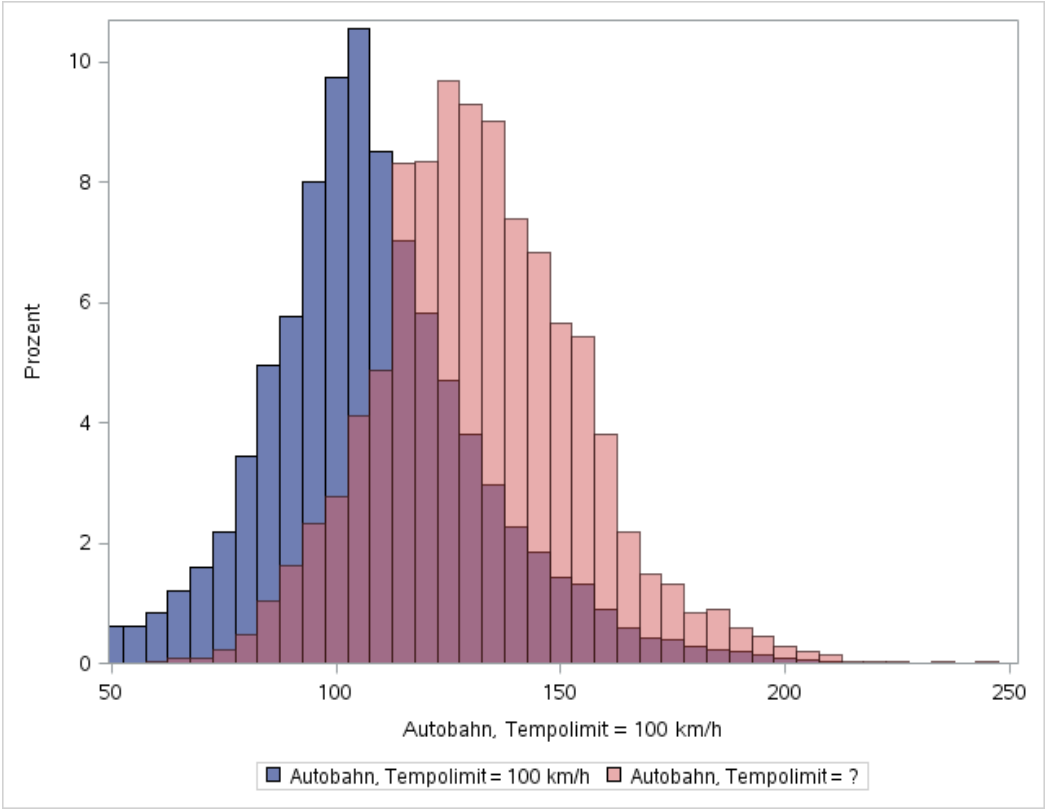
Map data can be erroneous and may require correction





blue: velocity driven when real speed limit of 100 km/h
red: velocity driven on suspicious part of street

- Speed limits are never fully accurate (for example in case of construction works, …).
  We make extensive effort to correct the data by generating our own “speed-limit-maps” using a ML-algorithm.
- 100% accuracy is not possible. However, this is not necessary for an adequate score.
- Speed limits are corrected in favor of the customers.

Explainability by Design

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Our scoring is designed to guarantee explainability

Instead of applying any method on any data …
„hoping for a good result“ …

Data → **Model** → Driving Score

Calculation of score

… we use several explainable steps to build a

- transparent & explainable,
- fair,
- robust
- and high performant

system for driving behaviour assessment and feedback.

Data → **Aggregated KPIs** → **Features** → **Model** → Driving Score

Aggregated raw data (frequency of certain events such as speed limit exceedings)

Features characterising driving style which are directly linked to risk

Assessment of claims-risk related to driving style

?!

Define events which are perceptible while driving
and for which the link to claims risk is comprehensible.

Count these events.

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Generating KPIs by aggregating raw data

→ **Aggregated KPI's** → **Features** → **Model** → Driving Score

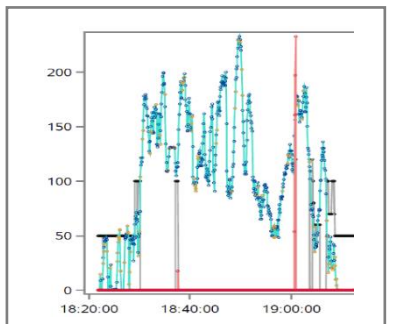
speeding > 10 km/h
braking acc. > 4 m/s²
lateral acc. > 4 m/s²

Input Time series of positions, velocity and acceleration data

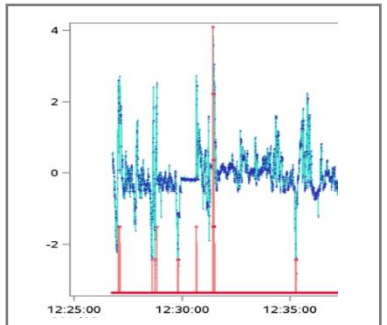
Output Explainable KPIs: Counting number of events of a certain class (for example number of speed excesses above a certain threshold)

Advantages

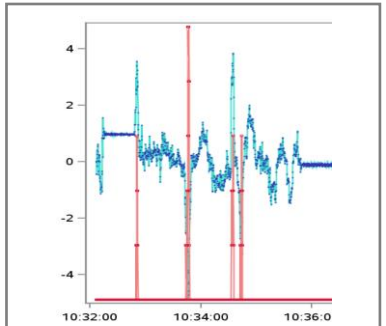
- Robust and easy control of data quality
- Individual handling of special situations is possible (driving in highway entry, roundabouts, …)



Speed Excess
- Class 1: > 10 km/h
- Class 2: > 11 km/h
- Class 3: > 12 km/h
- …



Forward/Backward Accel.:
- Class 1: > 0,1 g
- Class 2: > 0,2 g
- Class 3: > 0,3 g
- …



Lateral Acceleration
- **Class 1:** > 0,1 g
- **Class 2:** > 0,2 g
- **Class 3:** > 0,3 g
- …

Data Processing

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Feature engineering

?!

Engineer features with a clear link to claim frequency and claim amount.

These features are the input for the model.

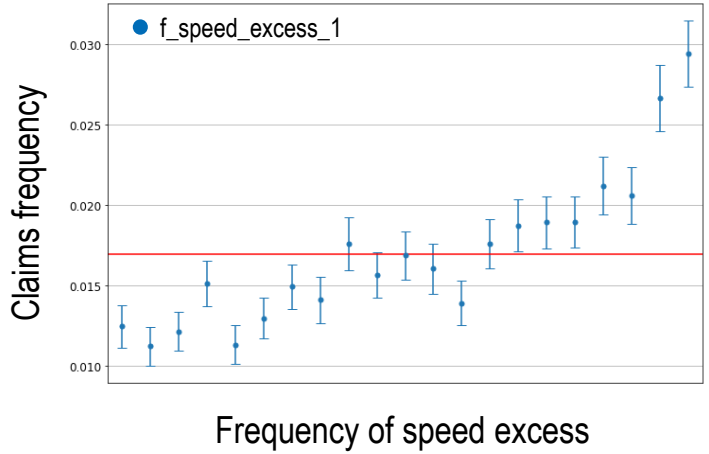
Aggregated KPI‘s → **Features** → Model → Driving Score

For example:

$$\frac{Time(speed\ excess)}{Time(valid\ speed\ limit)}$$

Principles for feature engineering

- Optimise the differentiating impact of the features while keeping causality, explainability and fairness
- Systematically validated by experts, for example
  - Do the features correlate with claim frequency and claim amount?
  - Exclude special situations such as roundabouts, winding roads, highway entries, …
  - Use features that can be influenced by driver.
    For example: Use „speeding while night“ but not just „driving while night“



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Generating KPIs by aggregating raw data

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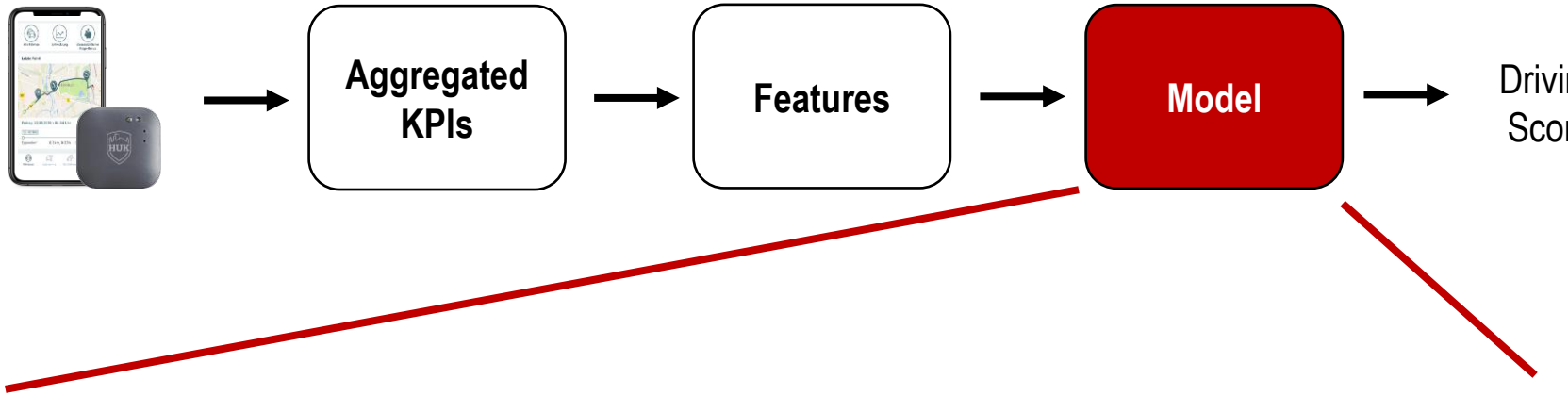
Build a robust model such that the score has high correlation with claim frequency and claim amount.

The discount directly relates to the score.



Choose an explainable model such as

- GLM, Logistic Regression
- Tree based models

The model is fitted by experts

- Target variable is claim frequency or claim amount,
- but also take the driving experience into account (how does the driving event feel compared to its impact in the model)

Fairness and Non-Discrimination

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The telematics score is the most non-discriminatory motor ratemaking factor imaginable.

- Target figure: claim frequency or average claim amount per risk in a year
- Scientific and mathematical methods are used to calculate the score
- The score is very robust: Deleting 20-30% of the trips will not change much
- Only the (driving-) behaviour which can be directly influenced and adapted by the driver is taken into account.
- No sociodemographic factors / age / income / occupation / foreigner / m/f, ... - telematics treats every person equally.
- We don’t use unfair scoring factors such as “night trips” or “bad weather”. Only speeding at night is critical - and this can be avoided by the driver.
- The telematics tariff is way better and fairer than the traditional rating features.
- Voluntary participation. Low prices are also guaranteed for non-telematics customers.

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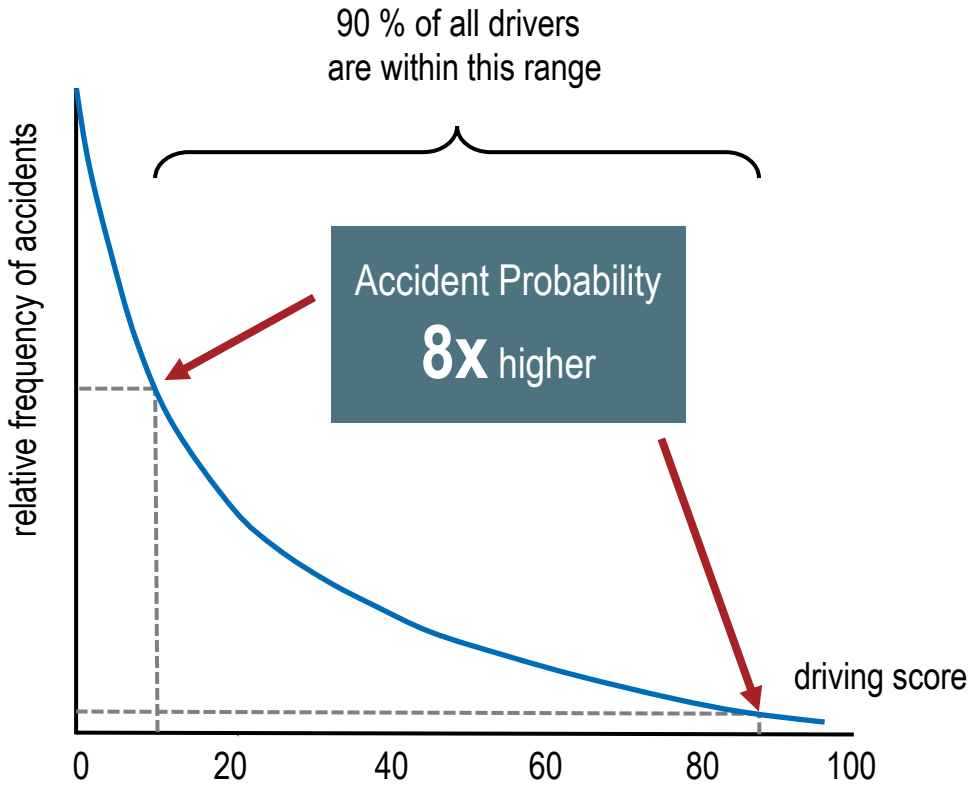
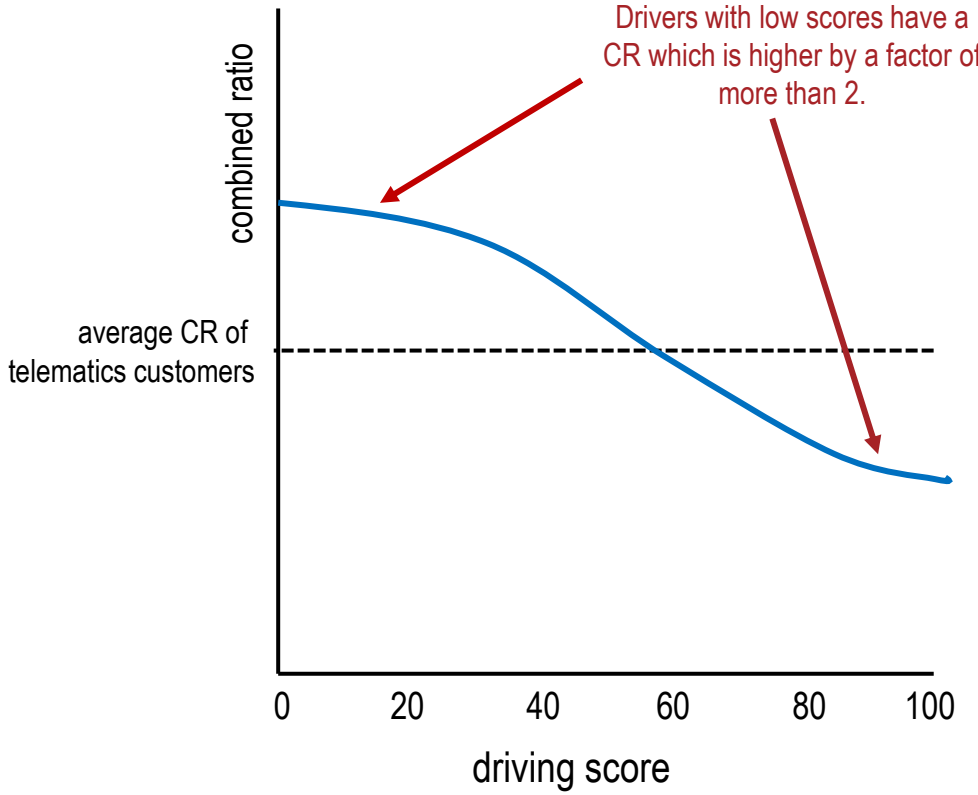
Telematics score highly correlates with claim frequency and adds real extra information

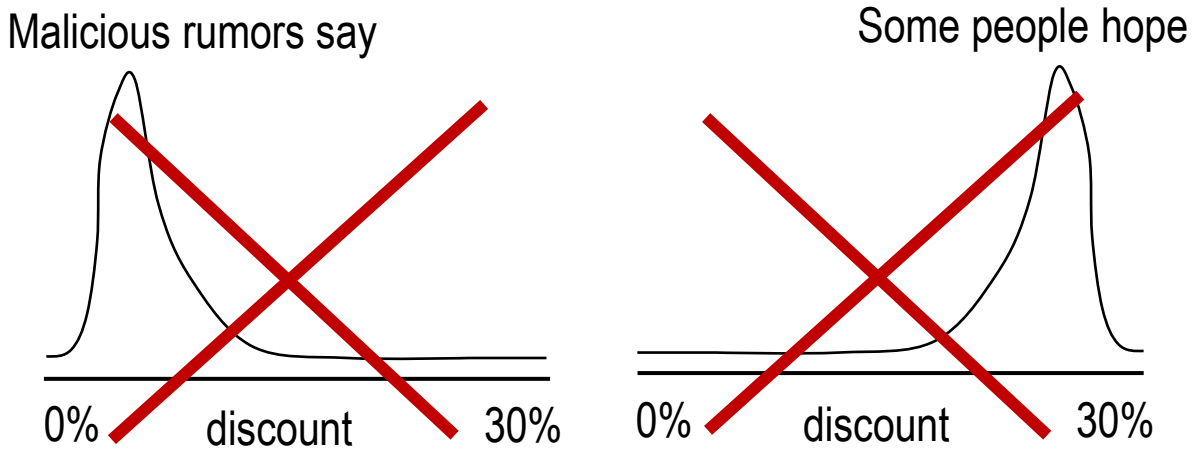


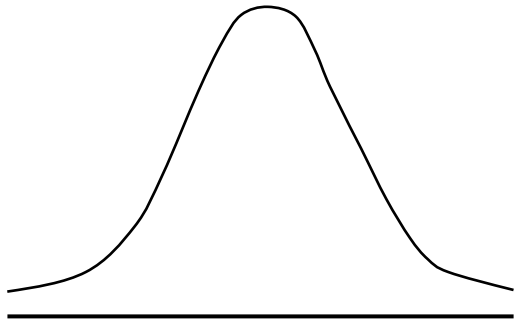


The accident probability of drivers with a lower score is 8x higher

Telematics is real additional information.
Far beyond classical tariff features.

Distribution of discounts

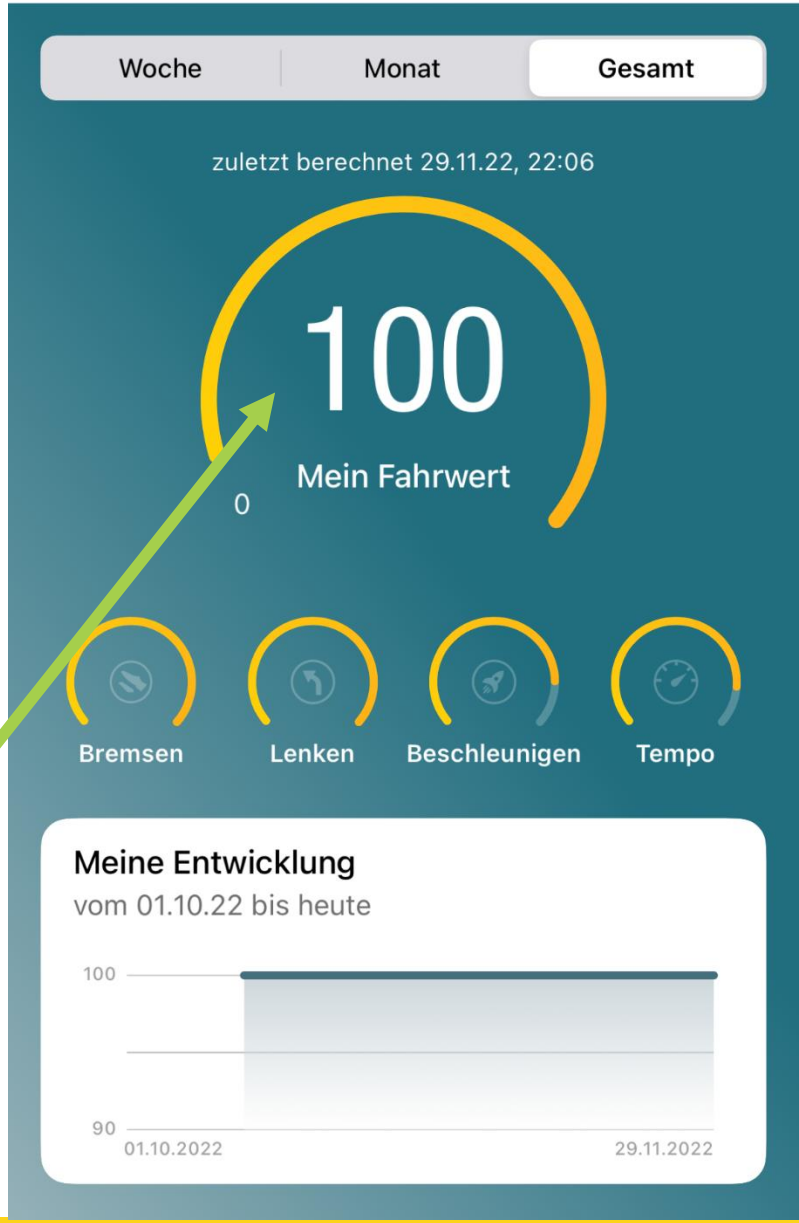




Reality is more or less normally distributed …

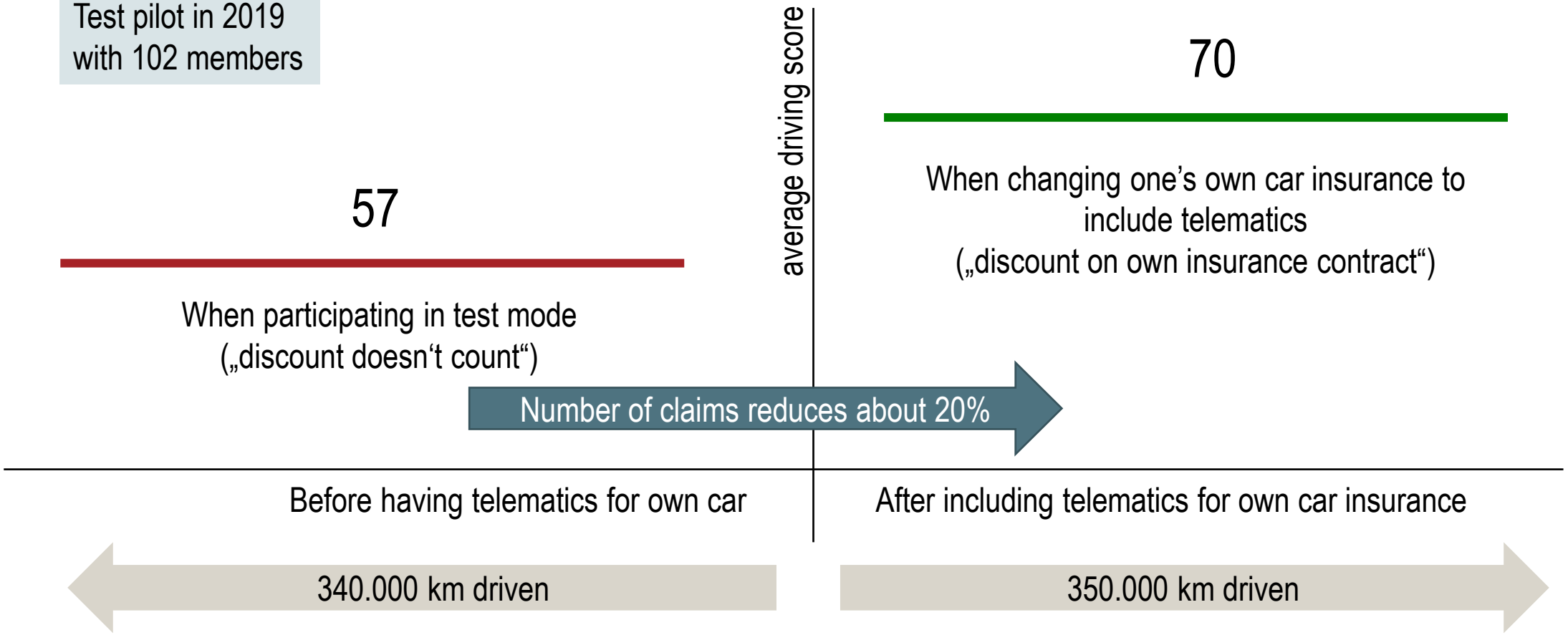
…

… and a score of 100 is possible … it only depends on you!



Telematics really works

Test pilot in 2019
with 102 members



Telematics is a clear motivation to change driving behaviour.

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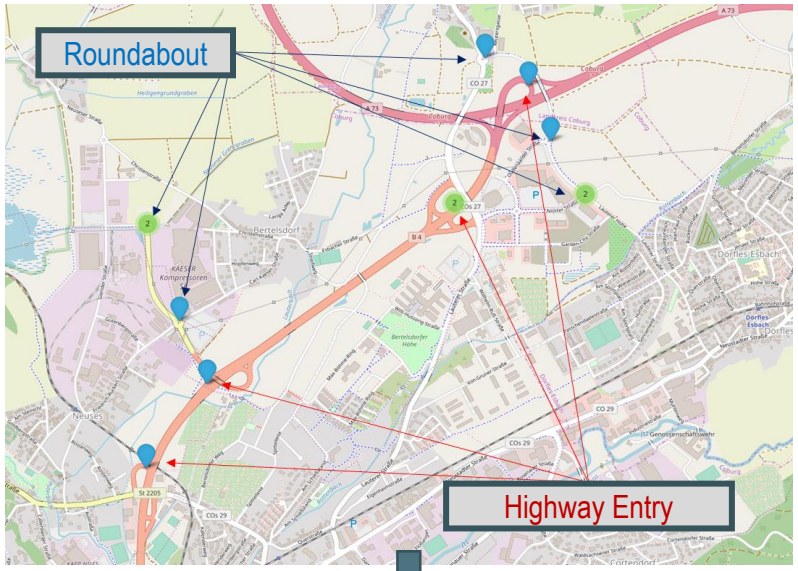
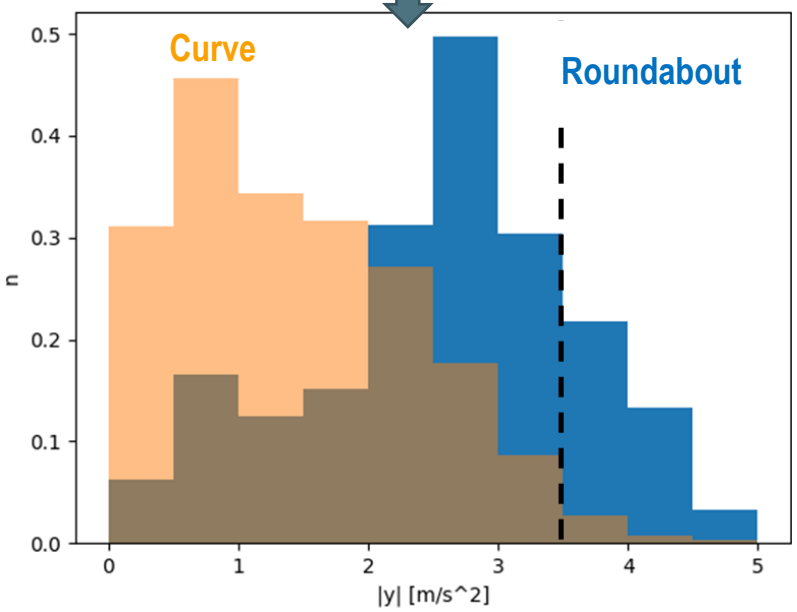
Fair & correct handling of special situations





Examples

- **Braking for a child:** If your general braking behaviour is smooth, then a single hard braking event will not be classified as negative – because it could have been an emergency braking for a child.
- **Driving by night:** Driving by night is more dangerous. Nevertheless, driving by night has no negative impact on the driving score – unless we see risky driving behaviour by night. Because we don‘t want to discriminate people who have to drive at night (night nurses & others).
- **Roundabouts:** Lateral acceleration in roundabouts is higher than in other curves. Therefore thresholds for lateral acceleration are adjusted in roundabouts.
- **Highway entries:** High acceleration in a highway entry is normal and necessary. Therefore thresholds are adjusted.

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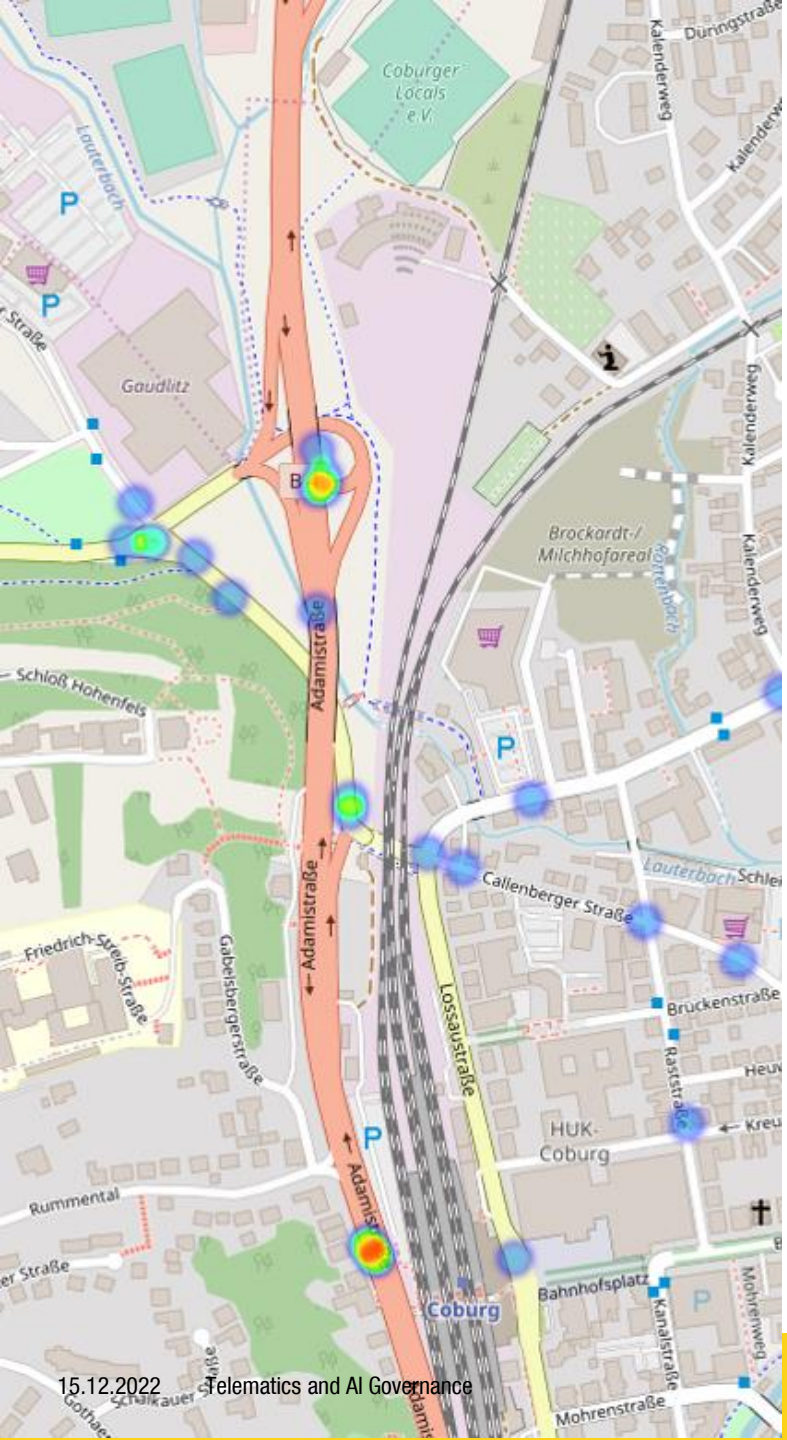
Possible future development of features – based on AI: Deep Learning / Neural Networks



- Generation of features based on properties of roads, which are are learned by AI (for example accident hotspots)
- Detection and / or classification of driving manoeuvers (for example overtaking)
- Usage of data from vehicles which is generated by ML-based driving assistance systems (for example emergency braking assistance, detection of tiredness)

Using such features will still result in a transparent, explainable and fair scoring of driving behaviour.
Although these features may be generated by using black box methods.

Other Governance Aspects

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Clear Guidelines and Procedure for Development, Testing, Approval and Deployment

Starting Point

New Insights
New features or new potential for differentiation is found based on our permanently ongoing research

Incidents
Feedback from customers, abnormalities detected by our monitoring or unexpected impact of changes of smartphones, OS, etc.

Regular Updates & Re-Training
Regular adjustments due to re-training, Updates of system (hardware & software changes)

Development

Human oversight

Human oversight
No automatic training
Four-eyes principle
Scientific standards
Transparent documentation

1. Definition of new feature set
2. Data extraction, selection, cleaning – from driving data
3. Selection of claims data and merging with driving features
4. Detailed analysis of features: Correlation with claims, interactions, ... → when necessary: loop back to 1.
5. Calibration: Training of the model
6. Validation and manual adjustments based on clear criteria → when necessary: loop back to 1

Testing

1. Transfer update into test system (Pilot)
2. Evaluate driving score etc. of test drivers (Pilot) → when necessary: loop back to development
3. Evaluate feedback of test drivers (Pilot) → when necessary: loop back to development
4. Simulate impact of change for productive system

Approval

Clear process of approval: Several departments up to board – transparently documented decision

Deployment

Clear process for deployment to productive system … extensive monitoring in operation

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Governance for classical risk assessment also works for AI – with minor adjustments

- Pricing using AI (such as here with telematics) is very similar to classical pricing.
- Therefore: Similar governance measures also work for AI:
  - Telematics is an organic part of our usual pricing process, which incorporates: Product oversight and governance (POG), internal control system, data protection, development guidelines, decisioning process, …
  - We added several governance aspects, such as:
    - Separated company to host the driving data (for data protection / data governance reasons)
    - Approach and guidelines designed to guarantee fairness, transparency, explainability, non-discrimination
    - Adapted process for development and modeling
    - Test fleet of 500 cars
    - Support team (to guarantee human oversight)

→ AI governance for telematics-pricing is seamlessly integrated into existing elements of our governance.

→ **The existing regulatory / legal framework is big enough to also handle regulation of AI: It just has to be used. Regulation of AI in insurance should use existing structures. It should be designed very carefully to not become a high burden and destroy the chances of AI. Some minor changes in regulation at the right points should be enough for „usual AI“.**

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AI in telematics for motor insurance is not almighty. It is not high risk. But a real chance.

- We did an impact assessment, whether telematics pricing has aspects of high risk AI – as described in the list of criteria used in the draft of the EC directive for AI. For this we assumed that telematics is AI.
- Result: Critical impact on customers is low (at most). Especially:
  - Purpose of telematics is not to decide whether or not you get an insurance contract. It is just for getting a fair price. In case of telematics, this depends on driving behaviour which can easily be influenced by the driver.
  - The extent of AI use is low. It is just used for generating new features and pricing. Which is very similar to classical pricing, especially the impact on customers.
  - There is no risk for damage or for health, security or other fundamental rights.
  - Telematics is a voluntary option. This option can be cancelled by customers on a daily basis – in this case the insurance contract is simply continued without telematics.
  - There is no need for special protection (because of vulnerability) of customers due to telematics AI.
- **Summary: Telematics for motor insurance is not a high risk AI system.**

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Please clear the fog.

- Unfortunately, „risk assessment and pricing in relation to natural persons in the case of life and health insurance" is still on the list of high risk AI in the final position of the EU council. But:
  - An impact assessment similar to the one above would show: „Risk assessment and pricing in life and health insurance" covers a broad range of use cases that are no high risk at all.
  - Therefore the list of high risk AI should be changed in the upcoming EU negotiations on AI regulation. Especially:
  - No insurance use case should be put on the list of high risk AI without prior and detailed impact assessment.

- AI needs fast and frequent development cycles. Too much regulation would be the end of AI in insurance and a great disadvantage compared to competitors, such as big techs, start ups, OEM, aggregators. This would destroy many big chances achievable by using AI in insurance for customers and for society.
  What we need is a level playing field.

- **A very personal remark at the end:**

  Treating our customers fair is first of all a core business decision. Which is then supported by AI. The other way round: Companies who try to get out most of the customers, also do this first of all by business decision. And then in a second step maybe they use AI to do it.

  So: The problem is not AI. The problem is the human being and its ethics.

Thank you.

And please make the world a little bit more colorful.