UDC 368.2

TELEMATICS SYSTEM IN USAGE BASED MOTOR INSURANCE

D. SELIAZNIOVA, I. ZIANKOVA
Polotsk State University, Belarus
A. RAHMANOV
Deputy Chairman of the Board of Directors, Baku, Azerbaijan

The purpose of this article is to demonstrate the fundamental principles of technology that contributes to the creation of new billing models in the field of auto insurance. The potential of such a system is demonstrated by the example of a real case project implemented in Eastern Europe.

The insurance industry, at least when it comes to auto insurance, has reached a mature stage in the life cycle. Fierce competition and lack of product differentiation lead to a significant decrease in revenue for the majority of existing and established insurance companies on the market. Insurance companies may suffer loss of income primarily for two reasons [1]. First, prices in these markets are likely to fall [2]. Second, pricing does not correspond to individual risk [3]. For example, there are people who drive 35,000 km a year and pay the same price as people who drive less than 10,000 km a year. This has led to a paradigm shift in traditional insurance policies, offering new ones based on the use of UBI insurance policies.

UBI is based on a variety of data, such as mileage, speed, location, time, total trip duration, G-force, etc., extrapolated from telematics devices. This data can be predictive and companies can gain a competitive advantage by analyzing driver behavior [1]. UBI products are still new in some markets, and in order to introduce them to the relevant markets, insurance companies will have to make a lot of effort to increase the acceptance of UBI [4], [5].

Importance of rich telematics data. Telematics data is used to determine the policyholder's insurance premium for the vehicle. The insurance company needs more extensive data to better quantify risk and understand driver behavior. This is very important for the insurance company to differentiate this data and for their UBI systems to collect the correct telematics parameters. In addition, it may allow insurance companies to improve their billing methods by matching individual price and risk more accurately.

Insurance telematics depends on the accuracy of the received GPS data (Global Positioning System) from the telematics device. Various environmental factors such as atmospheric effects, clogging of the sky, etc. can cause certain problems in the accuracy and reliability of GPS data. This may lead to a corresponding risk of loss of income for the insurance company.

"Context" refers to environmental factors, such as the location where certain events occurred, road conditions, weather conditions, and their overall contribution to risk. The environmental factor was identified as fundamental to the latest generation of UBI and a better understanding of driver behavior [6]. It would be fairly easy to explain why disruptive events on a crowded highway are more risky than disruptive events on some local road. But it may be more difficult to explain other types of events with different environmental characteristics. Therefore, it is necessary to implement a UBI system that could differentiate such events and provide more accurate information to insurance companies for invoicing.

To better understand driving behavior, you need to make extensive data available to the insurance company. As a result, insurance companies can't only measure traditional telematics parameters (mileage, speed, acceleration, breaking events, etc.), but also measure how people actually drive and analyze driver behavior more accurately by contextualizing the data obtained. Using more accurate data leads to an improved method of determining the cost of insurance, which reduces rating errors that occur when grouping drivers into General actuarial classes [7].

The next-generation solution for telematics-based insurance. Various UBI solutions have been implemented around the world. One of the papers on UBI provides a comparative analysis of 24 main UBI solutions [16]. The main drawback is that these solutions tend to analyze only traditional telematics parameters to assess driver behavior. Table 1 contains a summary list of UBI solutions and their key features.

In addition, UBI solutions, such as in Canada and Spain, take into account several levels of risk over a 24-hour time period [9], [13]. This approach can suffer from many pitfalls, which leads to a bias in the alignment of individual risk and price. This is because, for example, disruptive events during a rainy night may contribute to a greater overall risk than disruptive events during a sunny day. Many of UBI's current decisions can lead to inconsistencies in price and individual risk matching. The environmental factor is fundamental for the next generation of UBI.

Table 1. – Summarized list of UBI solutions implemented worldwide

Insurance company	Country	Name of the UBI program	Insurance concept	Technology platform	Data transmission
AIOI [8]	Japan	Pay as you drive	Distance-based vehicle insurance	G-book (telematics subscription service provided by Toyota Motor Corporation)	Mobile data service
Aviva [9]	Canada	Autograph	Insurance is based on traditional telematics parameters with several levels of risk within 24 hour period.	Device connected to vehicle diagnostic port	Universal serial bus
AXA [10]	Italy	Autometrica	Distance-based vehicle insurance	GPS-based	Mobile data service
Generali [11]	Italy	Protezione Satelitare	Insurance is based on traditional telematics parameters	GPS-based	Mobile data service
AXA Winterthur [12]	Switzerland	Crash Recorder	Recording events	Event-data recorder	Data retrieved from event-data recorder
MAPFRE [13]	Spain	YCAR	Insurance is based on traditional telematics parameters with several levels of risk within 24 hour period.	GPS-based	Mobile data service
RSA Insurance Group [14]	United Kingdom	More Than Green Wheels Insurance	Insurance is based on traditional telematics parameters with several levels of risk within 24 hour period.	Device connected to vehicle diagnostic port	Mobile data service
Uniqa [15]	Austria	Safeline	Insurance is based on traditional telematics parameters with several levels of risk within 24 hour period.	GPS-based	Mobile data service
WGV [16]	Germany	Young & Safe	Insurance is based on traditional telematics parameters with several levels of risk within 24 hour period.	GPS-based	Mobile data service

The new paradigm of motor insurance billing. Usage-based auto insurance policy billing appears in the literature under the following abbreviations: UBI (Usage Based Insurance), PAYD (Pay As You Drive), PHYD (Pay How You Drive), MHYD (Manage How You Drive) or PHHYD (Pay How and How much You Drive). The main characteristic of all these reductions is the billing of car insurance products basing on new sets of information, such as miles traveled, time of day, and driving behavior, among others.

Benefits of using UBI. UBI programs offer many benefits to insurers, consumers and society. More closely linking of insurance premiums to the actual characteristics of individual vehicles or fleets allows insurers to estimate premiums more accurately. This increases accessibility for lower-risk drivers, many of whom are also lower-income drivers. Fewer miles and safer driving also help reduce the number of accidents. Regardless of the UBI program, the UBI value is immanent not only for the user, but also for the entire ecosystem, as shown in table 2. The strengths of these technologies dominate their weaknesses today.

Table 2. – Categories and description of the advantages of using UBI program

Benefits	Description
Social benefits	Reduce accident frequency and severity; reduce accident response time; track and recover stolen vehicles; establish fault to improve equity in settling claims; reduce driving, pollution, traffic congestion and energy consumption
Economic benefits	Reduce chance of accidents; enhance efficiency of claims processing ; enable early detection and prevention of frauds; enable pricing based on risk profiles
Environmental benefits	Increase use of congestion-free routes and limit vehicle usage; reduce fuel consumption; improve vehicle maintenance; reduce CO2 emissions
Benefits for insurance providers	Correct risk misclassifications; enhance pricing accuracy; retain profitable accounts; fight fraudulent claims; enable lower premiums; reduce claim costs; differentiate brand
Benefits for users	Reduce premiums; demonstrate safe driving habits following an accident; value-added services (vehicle diagnostics, stolen vehicle recovery, emergency services, teen driver monitoring etc.)

Real life telematics systems implementation. Vehicle telematics is a technology for transmitting, receiving and storing information about vehicles using information and communication technologies [17]. Vehicle's telematics is based on M2M (inter-vehicle) communication and is the exchange of data between remote devices using a wired and / or wireless communication network for telemetry and remote control [18]. The availability of computing power and network connectivity in cars and mobile terminal devices has led to an explosion of available applications and services for users [19].

Data collection process. Data is recorded by a special telematics device. Most of the data used by the driver, the policyholder, or any other interested person is extrapolated from the basic set of raw data received by the telematics device.

Data precision and reliability. The billing process is one of the key processes in insurance telematics products. The billing process for insurance telematics depends to a large extent on the accuracy of the GPS data received from the telematics device. However, the quality of GPS data depends on environmental conditions. In fact, this may lead to a corresponding risk of income loss for the insurance company or even for the holder of such insurance. For this reason, contextualizing data received from a telematics device is the second most important aspect of ensuring accurate and reliable data for use by the system. Data is contextual with the help of improvement of algorithms of GPS data and matching map. Throughout this process, many deviations caused by environmental factors that affect the accuracy of GPS data can be eliminated, which significantly improves the overall reliability of the data. As it follows from the above, choosing the right data processing solution in insurance telematics is of paramount importance for the insurance company.

Results and discussions. The main purpose of the study was to provide an overview of the technical solution and basic data model for the billing process. The presented technical solution includes an environmental factor for better contextualization of the collected data. Collected, extrapolated, and processed data allows you to more accurately quantify the risk and understand the driver's behavior. This allows for a more consistent assessment of individual risk, thereby improving the billing process.

Conclusion. Research suggests potential for both insurance companies and drivers. UBI policies can be useful, especially in emerging markets. In addition, emerging markets have great potential, and insurance companies will have to actively implement new business models. The most important part for insurance companies is to recognize the importance of the environmental factor in reconciling individual risk and price. The presented telematics solution, although implemented in Eastern Europe, should be easily adapted in other countries.

REFERNCES

1. R. Harbage, Usage-based auto insurance, Tower Watson, 2011, http://www.casact.org/community/affiliates/sccac/1211/Harbage.pdf
2. Amodo Ltd., Technological revolution in the motor insurance market, 2014, http://www.amodo.eu/wp-content/uploads/2014/01/interview.eng.pdf
3. SAS, Telematics: How Big Data Is Transforming the Auto Insurance Industry, SAS Institute Inc., 2013, http://www.sas.com/resources/whitepaper/wp_56343.pdf
4. C. A. Dobocan, I. Blebea, Application of the optimal control problem in new product launching process, Procedia Engineering, 24th DAAAM International Symposium on Intelligent Manufacturing and Automation, Zadar, 2013
5. P. Chwastyk, M. Kołosowski, Estimating the cost of the new product in development process, Procedia Engineering, 24th DAAAM International Symposium on Intelligent Manufacturing and Automation, 2013
6. A. Tamir, Driving for change, 2014, http://www.verisk.com/Visualize/q2-2014-driving-for-change-telematics-data-offers-big-challenges-and-big-opportunities.html
7. P. Desyllas, M. Sako, Profiting from business model innovation: Evidence from Pay-As-You-Drive auto insurance, 2013
8. Aioi, Pay-as-you-drive, 2014, http://www.ioi-sonpo.co.jp
9. AVIVA, Autograph, 2014, http://www.avivatraders.com
10. AXA, Autometrica, 2014, http://www.axa.it/
11. Generali, Protezione Satelitare, 2014, http://www.generali.it
12. AXA Winterthur, Crash Recorder, 2014, https://www.axa-winterthur.ch/fr/particuliers/campagnes/Pages/crash-recorder.aspx
13. MAPFRE, YCAR, 2014, http://www.mapfre.com/portal/YCAR2-html/html/index.html
14. RSA Insurance Group, More Than Green Wheels Insurance, 2014, http://www.morethan.com
15. Uniqa, Safeline, 2014, http://www.uniqa.at
16. WGV, Young and Safe, 2014, http://www.wgv.de
17. A. Laurie, Telematics – The New Auto Insurance, Towers Watson, St. Louis, USA, 2011
18. D. Peraković, S. Husnjak, I. Forenbacher, The Market Potential of M2M Communications for Telecommunications Operators, International Conference on Traffic and Transport Engineering, Belgrade, 2012, pp. 211-218.
19. S. Husnjak, D. Perakovic, I. Jovovic, Possibilities of using speech recognition systems of smart terminal devices in traffic environment, Procedia Engineering, 24th DAAAM International Symposium on Intelligent Manufacturing and Automation, 2013, pp. 778-787