EDUCATION COMMITTEE

OF THE

SOCIETY OF ACTUARIES

STUDY NOTE

USAGE-BASED INSURANCE AND TELEMATICS

Revised May 2025

***Author**: Anthony Cappelletti, FSA, FCAS, FCIA*

USAGE-BASED INSURANCE AND TELEMATICS

SOA Study Note
Revised May 2025

(*Only the formatting has changed from the October 2016 revision of this article.*)

1 BACKGROUND

Usage-based insurance (UBI) is a method of automobile insurance pricing whereby an individual policyholder's premium is dependent upon the individual policyholder's usage of the automobile. UBI is not a new concept for automobile insurance. Rating factors such as distance driven in a year, the policyholder's driving record[1] and vehicle use (i.e., personal use vs. business use) have historically been used in rate setting for automobile policies for many years. UBI rating factors represent factors that are in the control of the policyholder and are directly related to the loss exposure (i.e., causal). This is in contrast to some traditional rating factors that are not necessarily in the control of the policyholder, are correlated to loss exposure and are a proxy for driving behavior (e.g., age, gender).

The concept of UBI rating factors has the acceptance of both consumers and regulators because there is a direct (and usually unambiguous) link between the rating factor and loss exposure that is in the control of the policyholder. UBI rating factors also have the potential benefit of reducing loss frequency. Because drivers are aware of the factors that will increase their rates and those factors are in their control, they will tend to modify their usage to minimize their insurance costs (i.e., lower their exposure to loss).

While distance driven has a long history of use as a rating factor for automobile insurance, it was (and still is) often applied in a very basic system of classification (e.g., low distance vs. high distance). It is normally based upon the policyholder's estimate of distance to be driven in the upcoming policy period. This is of limited use in rating and has not had much of an impact on driver behavior modification. The introduction of telematics has changed the potential for UBI.

[1] Driving record can take into account the number of automobile accident claims in a defined period, the number of motor vehicle convictions in a defined period and/or the number of years without an at-fault automobile accident. Note that driving record is not a true UBI rating factor because it is looking at past experience as a measure of current exposure. True UBI rating is directly linked to the current exposure being rated.

2 TELEMATICS

Telematics is the use of technology that directly measures factors associated with driving behavior and transmits this information to the insurer. Telematics involves precise measurement of the rating factor in question. For example, precise distance measurement provided by telematics allows the policyholder's premium to be linked to actual distance driven during the policy period using a more refined rating classification system.

Telematics is not limited to the measurement of distance; systems have been developed that monitor driving conditions and driver behavior.

Information Collected	
Driving Conditions	***Driver Behavior***
• time of day • day of week • location • type of road • road conditions • parking location at residence	• distance traveled • amount of time driving • excessive speed • aggressive cornering • hard braking • rapid acceleration

Telematics in automobile insurance has been around since the early 2000s but it has been limited in its usage by the insurance industry for the following reasons:

- High cost of the telematics device in the early stages of telematics development (including reliability issues);
- Research and development to implement its use in automobile rating takes a significant investment of resources;
- Regulatory issues (e.g., rate regulations not set up to handle rating with telematics); and
- Consumer concerns (e.g., privacy issues).

With technology advances over the years, the cost of telematics devices has decreased and their reliability and effectiveness has increased. Substantial growth is expected in the number of insurers offering telematics UBI policies over the next 5 years.

Telematics devices can be in the form of: a professionally installed device, a user installed dongle[2] plugged into a vehicle's on-board diagnostics (OBD) port[3] or an application on the policyholder's smartphone.

[2] A dongle is a small technical device that plugs into a data port that serves as an adapter.
[3] Modern implementations of standardized OBD ports were made mandatory for all new vehicles starting in 1996 in the U.S. (OBD-II) and 2001 in the E.U. (EOBD).

Telematics Device	*Pros*	*Cons*
Professionally installed device	• Least susceptible to tampering • Most reliable data • Captures data from vehicle's OBD port	• Most expensive
Policyholder installed dongle	• Low cost • Captures data from vehicle's OBD port	• Device can be manipulated (e.g., unplugged by policyholder)
Smartphone application	• Least expensive method • Can be used on a trial basis before implementation of a more costly device	• Easiest for the policyholder to manipulate (e.g., phone is turned off) • Quickly drains smartphone battery • Charges for data transmission could be an issue for policyholders • Does not capture data from automobile's OBD port unless there is Bluetooth connectivity between the OBD port and the smartphone • Accelerometer not as accurate as one included in a fixed device as it must constantly make adjustments for changing positions.

Some vehicles are being manufactured to include an OEM[4] device that captures much of the real-time data that UBI devices capture. In the U.S., around 38% of 2013 model-year cars included an OEM a telematics device. This is projected to increase to around 80% for 2018 model-year cars.[5] The EU has recently made it a requirement for vehicle manufacturers to equip new vehicles with an OEM telematics device (effective 2014).

As the number of cars on the road with OEM telematics devices increase, it will likely be further utilized by insurers for UBI policies. Insurers cannot solely rely on this as a platform for telematics since many vehicles on the roads today do not include this capability. There is also the issue that OEM devices from different manufacturers may not capture exactly the same information or if they do it may not be calibrated the same way. OEM telematics could be expensive for the consumer if the vehicle manufacturer requires a paid subscription through monthly fees to maintain device functionality.

The costs of UBI technology are coming down over time. Some insurers are implementing hybrid systems in which an OBD device, an OEM device and a smartphone application communicate with each other and the combined information is used.

[4] OEM is the abbreviation for Original Equipment Manufacturer.
[5] National Association of Insurance Commissioners (NAIC) CIPR Study, *Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications,* March 2015, Forward http://www.naic.org/documents/cipr_study_150324_usage_based_insurance_and_vehicle_telematics_study_series.pdf

The data being captured is also advanced to the point where software and machine learning can infer whether or not an operator of the vehicle was driving while under fatigue or driving while distracted.

The term Pay-As-You-Drive (PAYD) is a commonly used term for automobile insurance in which the insurance premium is directly based upon the distance a vehicle is driven during the policy term by means of a telematics device.[6] Note that distance does not replace other automobile rating factors in a PAYD system; distance driven is an additional factor that enhances the actuarial accuracy of the premium charged to a policyholder because, all other factors being equal, there is a direct relationship between distance driven in a year and accident frequency in a year. Benefits of a PAYD system include: increased actuarial accuracy, potential for policyholder to control costs, increased affordability for high risk drivers who drive less, and reduction of the overall level of driving as policyholders seek to reduce their premiums (which in turn can reduce traffic congestion, decrease the number of accidents, and lower vehicle emissions).

When more factors than just distance are monitored by telematics for rating purposes, the term Pay-How-You-Drive (PHYD) has been used. In a PHYD system, the telematics device normally combines information from the vehicle's OBD port with internal measurement systems on the device (e.g., GPS, directional g-forces, time of day) to capture information on driver behavior and external driving conditions.

PHYD telematics UBI programs are not limited to providing more refined insurance pricing. They can also be used to: provide drivers with feedback on how they can drive more safely and reduce their insurance premiums, assist a driver immediately after an accident (e.g., airbag deployment information is transmitted to the insurer, the insurer can then send assistance and begin the claims handling process), track a vehicle after it has been reported stolen, and provide information that could identify fraudulent claims (e.g., speed and g-forces at impact may not support the claim being made).

Telematics UBI has the potential to provide benefits to insurers, consumers and society.

Stakeholder	***Potential Benefits of Telematics UBI***
Insurers	• Opportunity for more accurate policy pricing which can improve expected profitability. • Provision of data that can assist in claims handling and the reduction of fraudulent claims. • Increasing relationship with policyholder by providing advice on how to lower premiums.
Consumers	• Lowering of premiums through discounts from safe driving. • Tracking and recovery of stolen vehicles. • Provision of accident assistance. • Reducing correlational factors in rating that are not directly related to driving (e.g., age, gender, marital status). • Allowing the consumer to control premium by reducing their exposure to accidents (e.g., drive less, drive safely).

[6] Other terms include Pay-As-You-Go and Distance-Based Insurance.

Society	• Encouraging safer driving should create safer roads. • Encouraging lower mileage driving should reduce traffic congestion and help the environment through a reduction of vehicle emissions. • Reducing insurance premiums may reduce the number of uninsured drivers on the roads.

Telematics devices log the information and transmit it directly to the insurer.[7] The amount of information captured is substantial. Information can be filtered by the telematics device to transmit only relevant data or all the data can be transmitted and then filtered by the insurer when analyzing the data. Filtering at the device saves on data transmission costs but risks losing some potentially relevant data. The data is then analyzed and used to refine the policyholder's premium and to provide feedback to the policyholder so that driving behavior can be modified.

The predictive ability of the models used to analyze the data is enhanced the more detailed the data that is captured by the device and input into the model. The volume of detailed data captured from telematics UBI is significantly greater than the volume of data insurers have historically dealt with for rating analyses. This has required an investment from insurers in computer systems, software, and analysts; it has also increased the need for partnerships with third-party vendors for the necessary technology for data capture and models. As the telematics UBI market matures, insurers will likely reduce reliance on third-part vendors and rely on in-house solutions.

There are many different approaches currently being used by insurers as to how the telematics data is used to modify the premium charged to a policyholder. Note that most programs provide a small discount (e.g., 5%) just for enrolling in the program. Some of the more popular approaches include:

- Discount is based on telematics data over a thirty day period, which then applies to the premium over the six month policy term;[8]
- Discount is based on twelve months of telematics data on a rolling basis, calculated every six months, which then applies to the premium over the following six month policy term;[9]
- Discount is based on telematics data over a thirty day period, which then applies to premiums at renewal every six months;[10]
- Discount is based on telematics data over the six month policy term, which then applies to premiums at renewal;[11]

[7] Or a third party under contract to the insurer.
[8] Progressive Snapshot
[9] Allstate Drivewise
[10] State Farm Drive Safe & Save
[11] The Hartford TrueLane, Nationwide SmartRide

3 ISSUES

Consumers, insurers and regulators have their own perspectives regarding issues with UBI and telematics. Consumers and regulators often share the same concerns because regulators focus on consumer protection.

Consumers and regulators like rate reductions, not increases. Regulators are more likely to accept programs that can reduce rates. To gain wider initial acceptance, most new telematics UBI programs are limited to providing premium discounts for reductions to loss exposure. Another issue for consumers and regulators concerns data use and privacy protection. Telematics UBI programs will likely face less resistance from consumers and regulators if the use of data collected is clearly defined and includes methods for ensuring that a policyholder's privacy is protected. Consumers will want access to telematics information with unambiguous feedback regarding their driving behavior so they have an opportunity to modify their behavior to reduce their insurance costs.

Issues for insurers looking to use a telematics UBI program for automobile insurance rating include:

- Regulatory and consumer acceptance;
- Technical considerations;
- Protection of proprietary information; and
- Potential legal concerns.

As noted previously, regulator and consumer acceptance can be improved by limiting the program to the application of premium discounts, including sufficient transparency in the type of data collected and how it is to be used, and including procedures to safeguard policyholder privacy.

Because the cost of telematics devices has come down, technical concerns now focus on the amount of data to collect, methods of analysis to be performed on the vast amount of data collected, and interpretation/application of the results. Insurers make a big investment to implement a telematics UBI program; they need regulators to recognize this investment by protecting an insurer's proprietary information (i.e., excluding proprietary information from publicly available rate filings).

Potential legal concerns for insurers regarding telematics UBI programs include:

- Ensuring regulatory compliance (given that regulations may not be clear);
- Patent infringement (and licensing of patented ideas);
- Trademarks;
- Data ownership (who owns the individual policyholder's data?); and
- Partnership agreements with third parties and the risk that third parties may use the data in prohibited ways.

It should be noted that in the introduction of a telematics UBI program in a jurisdiction, anti-selection is expected to occur; the lower risk drivers will be most likely to sign up for a telematics UBI policy because they perceive that savings will result. Aggressive drivers and high

distance drivers will likely not select telematics UBI policies. Inevitably, as the volume of telematics UBI policies grows within a jurisdiction, upward pressure will be applied to the non-telematics policies of the insurer (due to this anti-selection). Insurers without telematics UBI will lose their lowest risk policies and see their average loss cost per policy increase.

Regulators reviewing insurance rates are tasked with ensuring that rates charged are not excessive, inadequate or unfairly discriminatory. A properly designed telematics UBI program bases rates on causal factors (fair discrimination). However, this is not sufficient from a regulatory standpoint. Even if the program is properly designed and implemented, regulators generally require that the program includes transparency and public disclosure.

- Regulators need to fully understand the program, so that they can ensure that unfair discrimination is not included within it.
- Regulators want consumers to fully understand the program so that they know what modifications are required to their driving behavior in order to reduce their premiums.

A 2015 report published by the National Association of Insurance Commissioners (NAIC) in the U.S. noted that:[12]

> *Insurers may object to filing the models, asserting they represent confidential commercial information, are trade secrets or proprietary in nature and should not be made available for public inspection. However, absent a review of the models, it is difficult to determine if any rates based upon them are compliant. Insurers and rating organizations already overlay multiple models, including topography, GPS, crime, traffic and population density. When combined with driving behavior information, this could contain prohibited factors or produce rates that are unfairly discriminatory.*

Regulators are also concerned with the protection of policyholder privacy with telematics UBI data. As per the 2015 NAIC report:[13]

> *The transmission, storage and reporting of private data constitute a key concern for state regulators along with the rating factors used to determine UBI premiums.*

Patent infringement is a concern of insurers that implement telematics UBI programs. Implementing a telematics UBI program can incur significant legal expenses and/or licensing fees due to patent issues. Consider the situation with Progressive, the first company to implement telematics UBI in the United States. Progressive obtained several patents that made telematics (in general) a proprietary technology. This required other insurers to license telematics from Progressive if they wanted to implement a telematics UBI program. Progressive's patents were challenged by other insurers resulting in the U.S. Patent Trial and Appeal Board cancelling several of the patents. This ruling permits other insurers to implement telematics UBI programs without obtaining a licence from Progressive. However, insurers must be vigilant to ensure that

[12] NAIC CIPR Study, *Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications*, March 2015, Regulatory Implications of Telematics UBI
[13] NAIC CIPR Study, *Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications*, March 2015, Forward

they do not infringe upon any of Progressive's patents that survived the challenge as well as patents held by other parties.

At this time, insurers in the E.U.[14] appear to be leading the way with the implementation of telematics UBI programs. The following issues have converged in the E.U., increasing the adoption of telematics UBI programs for automobile insurance:

- Reduced costs for implementing telematics;
- Escalating automobile insurance premiums;
- Consumers more willing to share personal information; and
- European Court of Justice ruling that gender cannot be used in the E.U. for insurance rating.

Of the aforementioned reasons, the European Court of Justice ruling that prohibited the use of gender as a rating factor in insurance is likely the most important. Automobile insurance traditionally uses gender as a rating factor for young drivers.[15] Without the ability to use the loss correlated rating factor of gender (which is a proxy for driving behavior), insurers in the E.U. have chosen to invest in telematics UBI to use actual driving behavior as a rating factor.

In April 2013, the Association of British Insurers (ABI) published a good practice guide for insurers on "Selling Telematics Motor Insurance Policies" and a consumer fact sheet on PHYD policies.[16] The good practice guide focuses on transparency, data security, and individual rights.

As per the ABI guide, the overarching objectives for insurers are as follows:

- For use of data

    A. *"The insurance industry is fully compliant with its legal responsibilities in respect of the collection and use of Personal Telematics Data; and*
    B. *Consumers trust the insurance industry to use their Personal Telematics Data responsibly and to store Personal Telematics Data securely."*

- For selling and managing policies

    A. *"Consumers understand the policies they are being offered, and are able to make informed purchase decisions; and*
    B. *Customers who purchase Telematics Policies are treated fairly."*

According to the ABI guide, insurers need to ensure the data collected is accurate and secure and make sure that consumers understand:

- *"what Personal Telematics Data is being collected;*
- *who is using their Personal Telematics Data;*

[14] The U.K. and Italy are at the forefront in UBI telematics programs in the E.U. at this time.
[15] Young drivers tend to have the highest premium charges.
[16] Association of British Insurers (ABI) https://www.abi.org.uk/News/News-releases/2013/05/The-ABI-and-BIBA-publishes-consumer-guide

- *how their Personal Telematics Data is being used; and*
- *what their rights are with respect to their Personal Telematics Data."*

With respect to the selling and managing of telematics UBI policies, the ABI notes that insurers need to be transparent in their policies. That is, consumers need to have the following clearly explained to them:

- How much premium fluctuation they can expect;
- How specific driving behaviors will affect premiums; and
- How telematics will be used in the event of a claim.

If telematics data is used by an insurer for claims handling, is the information available equally to both parties. That is, will the insurer reveal data to all parties involved only if the information benefits its position in a claim settlement or will it make information available to all parties even if it benefits the claimant. Fairness would indicate that all parties involved should have access to the telematics information for an accident if it is used in claims handling.

The adoption of telematics UBI programs has been slower in North America than in the E.U., but it continues to grow significantly. SMA Research predicts that approximately 70% of all automobile insurance companies in the U.S. will use telematics UBI by 2020.[17] Growth of telematics UBI programs in Canada is expected to be slower than in the U.S.

Several states actively encourage PAYD policies by specifically allowing it (e.g., California, Oregon, Texas, and Washington). Oregon offers a tax rebate to insurers offering PAYD policies and California requires that mileage be given a significant weight in rating an automobile policy. It should be noted that California, while encouraging mileage in a PAYD program, does not support PHYD programs.

Some regulatory responses have not encouraged or have specifically limited UBI:

- A regulatory requirement of an upfront statement of premiums could be used to deny PAYD/PHYD premium adjustments;
- PAYD/PHYD rating structures may not be allowed in jurisdictions with strict rate regulation that includes rules that require credible historical data within a jurisdiction;
    - Rate filings usually must include statistical data that supports a proposed rating structure. It will take time to build up credible data in a jurisdiction; insurers need to be able to use other sources of data.
- Making an insurer's proprietary UBI telematics information publicly available in rate filings;
- Prohibiting time of day from being used for a PHYD system;[18]
- Prohibiting GPS tracking as a violation of privacy; and
- Limiting the introduction of PAYD/PHYD to rate reductions only (i.e., for discount purposes only).

[17] NAIC http://www.naic.org/cipr_topics/topic_usage_based_insurance.htm accessed Oct. 6, 2016

[18] This is based on the belief that it would discriminate against low income earners because they are more likely to have shift work at night.

In Canada, the province of Ontario's regulator, The Financial Services Commission of Ontario (FSCO) has recently made public statements regarding its views on telematics UBI.[19] FSCO made it clear that any proposed system must adhere to its current regulatory criteria for rates and rate classification systems, including that rates be:

- Reasonable;
- Predictive of risk;
- Fair in their discrimination of risk;
- Adequate; and
- Not excessive.

FSCO will consider granting conditional approval for an insurer's UBI program in principle before full approval for any rates in a UBI program. FSCO requires that any UBI program be voluntary, be used for discount purposes only, not be used for claims purposes, and that the costs of any device be entirely borne by the insurer. FSCO also requires clear contract language when the policyholder decides to participate in a UBI program. FSCO has noted that telematics UBI information is to be considered "personal information" as defined by Canada's Personal Information Protection and Electronic Documents Act (PIPEDA).

FSCO's guidance to insurers on telematics UBI programs covers the following issues:[20]

1. *Personal Information and Privacy Requirements*
2. *Personal Telematics Data: Insurer Transparency and Consumer Consent*
3. *Complaints, Inquiries and Customer Support*
4. *Driver Education and Transparency in Rating and Risk Classification Systems*
5. *Changes in Rating*
6. *Limitations on Collection and Use of UBIP[21] Data for Insurance Purposes*
7. *General Rate-Filing Information*
8. *UBIP Program Costs and the Impact on Insurer Expenses*
9. *Reasonability of UBIP assumptions and the provision of adequate support*
10. *Compliance with the Unfair or Deceptive Acts or Practices (UDAP) regulation*
11. *General Data Considerations: accuracy, security, storage, at termination*
12. *Roles and Responsibilities: Insurers and Third Party Providers*

Insurers face numerous hurdles in implementing telematics UBI programs, not the least of which is dealing with different regulatory requirements in each jurisdiction in which they operate.

Currently, policyholder data from telematics UBI is owned by the insurer. However, there is a view from consumer groups that policyholders should own their driving behavior data from

[19] FSCO http://www.fsco.gov.on.ca/en/auto/autobulletins/2013/Pages/a-05-13.aspx and Canadian Underwriter article "FSCO lays out how insurers should take on usage based insurance programs," February 13, 2013 http://www.canadianunderwriter.ca/news/fsco-lays-out-how-insurers-should-take-on-usage-based-insurance-telematics-programs/1002069441/?&er=NA

[20] FSCO http://www.fsco.gov.on.ca/en/auto/autobulletins/2013/Pages/a-05-13.aspx

[21] UBIP is the acronym used by FSCO for usage-based insurance pricing.

telematics or at least have the rights to use the data to market themselves to other insurers. This could be an issue for the growth of the telematics UBI market.

As noted in an NAIC report:[22]

> *A further hindrance to the growth of the market is if a driver leaves an insurer with which he or she had a telematics device installed, the driving behavior data is property of the insurer and cannot be transferred to a new carrier to help price a new policy. One idea floating through the industry is the creation of a statistical agent to collect centralized telematics data, similar to what exists with credit scores for insurance. This would allow customers to shop around. A centralized agent would allow insurers to have additional amounts of information about a driver's driving behavior prior to becoming insured. The logistics behind this idea are not developed, but portability could dramatically change telematics.*

There are several concerns over telematics UBI from a consumers' standpoint. Consumer advocacy groups are encouraging regulators to establish the following with respect to telematics UBI:[23]

- Data ownership and privacy standards;
- Standards for permitted and prohibited uses of policyholder data; and
- Standards for disclosure of telematics results to the policyholder that provide sufficient information to alter policyholder behavior for the purpose of encouraging safer driving and reducing premiums.

Standards for disclosure are important for society to realize any potential benefits from telematics UBI. Society benefits from telematics UBI when drivers alter their behaviour to reduce the amount driven and to drive safely. This can only be achieved if drivers receive feedback from the program that is comprehensible so that they can respond appropriately.

[22] NAIC CIPR Study, *Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications*, March 2015, The Insurance Market for Telematics UBI
[23] NAIC CIPR Study, *Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications*, March 2015, Consumer Concerns and the Promise of UBI

4 THE ROAD AHEAD

Despite the issues and challenges, it is clear that telematics UBI is gaining acceptance by insurers, regulators and consumers. It will have a significant impact on automobile insurance in the coming years. The number of telematics UBI polices is growing quickly. Currently, in the U.S., we have the following regarding telematics UBI programs in the U.S.:[24]

- All states have 10 or more telematics UBI programs available in the market;
- Greater than 10% of all policyholders are insured under telematics UBI policies;
- Consumers with telematics UBI policies have experienced an average discount in the range of 15% to over 20%.

The number of telematics UBI polices is significant considering that just ten years ago the number of telematics UBI policies was insignificant.

- In a 2014 report by Market Research Reports, it was estimated that in 2013 there were 4.5 million people worldwide with a telematics UBI policy, and that it was projected to grow to 85.5 million by 2018.[25]
- In 2015, it was estimated that there were just under 22 million policyholders with telematics UBI.[26]
- A 2015 EY report notes that worldwide "UBI market penetration is currently less than one percent, however expected market penetration in Europe, Asia and America is expected to be 15% by 2020."[27]

Telematics UBI programs are targeting specific markets to gain market share:

- Young drivers
- Low mileage drivers
- Fleets
- Drivers that believe they are safe drivers

Young drivers are the greatest adopters of telematics UBI for a couple of reasons:

- They tend to have some of the highest automobile insurance premiums so any discount represents a significant dollar savings for them; and
- They are already accustomed to allowing apps on their smartphones access to personal information and location.

---

[24] Pinnacle Actuarial Resources, Inc. http://www.pinnacleactuaries.com/Portals/0/SiteContent/Publications/September%202016%20APEX%20Webinar.pdf

[25] *Insight Report: Technology In Action - A Roadmap For Insurance Telematics,* Market Research Reports, Oct. 2014. As quoted in a Feb 2015 article by PRWEB, *Road Safety Initiatives Propelling Demand for Insurance.* http://www.prweb.com/releases/2015/02/prweb12510803.htm

[26] *Usage-based insurance market to account for 21.7 million policyholders worldwide in 2015: report*, Canadian Underwriter, August 11, 2015 http://www.canadianunderwriter.ca/insurance/usage-based-insurance-market-to-account-for-21-7-million-policyholders-worldwide-in-2015-report-1003757645/

[27] *Usage Based Insurance | The New Normal?*, EY, July 2015 http://www.ey.com/Publication/vwLUAssets/EY-usage-based-insurance-the-new-normal/$File/EY-usage-based-insurance-the-new-normal.pdf

The market for telematics UBI is quickly maturing. Previously telematics was strictly used to determine discounts. Now some programs are using the system to determine surcharges. Insurers are also increasingly adding value-added services in conjunction with telematics UBI to attract more policyholders. Value-added services with telematics UBI policies may include:

- stolen vehicle tracking,
- real-time vehicle health diagnostics,
- accident assistance,
- geo-fencing for households with young drivers and elderly drivers,
- expedited claims processing,
- road hazard alerts,
- real-time driving safety tips,
- roadside assistance services, and
- traffic and route planning information

While young drivers are comfortable with sharing location and personal information through telematics, many older drivers are not. In general, they do not share as much information through social media and apps. They appear to have a greater concern over misuse and mishandling of personal information. News reports of data breaches and other cyber events in large organizations fuels this concern.

Insurers must stay on top of UBI data security to ensure policyholder privacy and inform policyholders of the steps they take to ensure the information is safe from misuse and mishandling. Many older drivers may not gain a comfort level with insurers being in control of a great deal of personal information. This could ultimately limit the growth of telematics UBI policies. Unless the use of telematics UBI is mandated, some drivers will choose not to be insured with a telematics UBI policy.

Software included in some telematics devices is now becoming much more sophisticated. With sophisticated software, the data recorded can be analyzed in real-time to recognize patterns from driving manoeuvers and driving style. Pattern recognition can also be used to indicate driving behavior such as distracted driving, driving while fatigued and driving under the influence (DUI). This also leads to an interesting legal question for insurers; if they are in possession of evidence of illegal driving behavior, are they obligated to report it to the proper authorities? Would it depend on the offense (minor speeding/major speeding/DUI)?

There is another factor to consider regarding the future growth of telematics UBI programs for automobile insurance. It is the development and increasing use of automated driver assistance systems (ADAS) in vehicles. ADAS implemented in some new vehicles include:

- emergency braking
- lane departure warning
- blind spot detection
- self-parking
- adaptive cruise control
- “auto-pilot” cruise control

Development of ADAS is placing an increasing reliance on vehicle technology over actual driving skill to reduce accidents; this will reduce the importance of telematics UBI rating. As we move towards an increasing percentage of vehicles on the road with sophisticated ADAS, collisions will decrease in frequency and they will be less severe.[28] A PwC study estimated that by 2025, automobile losses in the U.S. will be reduced by 10% by the increasing use of ADAS. By 2035, the reduction is estimated to be 35%.[29]

Insurers will be facing a challenge over the short-term. Telematics UBI programs will likely lead to a decline in premium volume for insurers as these programs encourage safer driving and lower mileage driving with a corresponding lower level of losses. Coupled with the reductions from ADAS, the decline could be significant.

The development of ADAS is ultimately leading to a world of self-driving cars. This will inevitably be a game-changer for automobile insurance because accidents would then likely be covered by a products liability policy. If there comes a time in the future when most cars are self-driving, telematics UBI will be irrelevant. The loss reductions previously noted from the PwC study will be even greater if there is an acceleration in the introduction of self-driving cars.

The U.S. National Highway Traffic Safety Administration (NHTSA) has developed the following categories for ADAS:[30]

Level	***Automation***	
0	None	Driver has complete control of braking, steering and throttle at all times.
1	Function specific	Automation of one or more specific control functions e.g., cruise control, electronic stability control.
2	Combined function	Automation of two or more primary control functions working together e.g., adaptive cruise control with lane centering;
3	Limited self-driving	Driver may cede control of all safety-critical functions under certain conditions relying on the system to determine when the driver should take back control (with sufficient transition time.)
4	Full self-driving	Driver is not required to provide any control of all safety-critical functions.

[28] Technically, accident severity could show an increase as ADAS would prevent the current lower-speed collisions leaving only higher-speed collisions. However, severity of higher-speed collisions would likely be lower with ADAS than without ADAS. Total loss cost should be reduced significantly.

[29] *Future of Personal Lines Auto Insurance: When and How Might the Industry Transform Itself?*, Dr. A. Rao, General Insurance Insights, Society of Actuaries, June 2016 https://www.soa.org/News-and-Publications/Newsletters/General-Insurance/2016/june/Future-of-Personal-Lines-Auto-Insurance--When-and-How-Might-the-Industry-Transform-Itself-.aspx

[30] NHTSA http://www.nhtsa.gov/About+NHTSA/Press+Releases/U.S.+Department+of+Transportation+Releases+Policy+on+Automated+Vehicle+Development

As noted in Market Research Reports:[31]

> *Vehicle manufacturers and technology providers have collaborated to develop and manufacture self-driven or driverless vehicles; … The technology is primarily aimed to increase road safety and reduce the rate of traffic accidents. Google claims to reduce the rate of traffic accidents by 90% with its driverless car technology, and Volvo claims that it will provide an accident-free driving experience with its new cars by 2020. Drivers' roles in driving these cars are expected to be very limited, or even non-existent, leaving little scope for insurers to track driving behavior and, therefore, making telematics redundant. However, driverless technology is still in a development phase, and it will take around two decades for driverless cars to come to the mainstream of the automobile industry and have a significant impact on insurance and telematics.*

With telematics UBI and ADAS there is now a question of whose responsibility it is to ensure that drivers understand driver safety. In the past this role was the domain of drivers' education and the government (through issuance of licences for drivers and enforcement of traffic laws.) It would appear that insurers and vehicle manufacturers now also have a role in ensuring that drivers understand driver safety.

- Insurers with telematics UBI have in their possession data regarding driving behavior for a policyholder; there is an obligation to provide feedback to the policyholder so that they can understand how to drive more safely.
- Vehicle manufactures that include ADAS features in vehicles improve the safety of driving only if the systems are used properly; there is an obligation to ensure that the drivers of the vehicle are instructed on how to properly use these features to understand driver safety in that vehicle.

Telematics is currently focused on automobile insurance, however developments are being made in other lines of business for telematics UBI policies. The proliferation of wearable technology (e.g., fitness trackers) has initiated research into Pay-As-You-Live (PAYL) policies for Life and Health insurance. Rates for life and health policies could be adjusted for items such as aerobic activity, step-counts, and heart rate. The issues addressed with telematics UBI for automobile insurance will likely be relevant to its use in other lines of business.

[31] *Insight Report: Technology in Action - A Roadmap for Insurance Telematics,* Market Research Reports, Oct. 2014. As quoted in a Feb 2015 article by PRWEB, *Road Safety Initiatives Propelling Demand for Insurance.* http://www.prweb.com/releases/2015/02/prweb12510803.htm