


May 2019 **Digital Ecosystems Series**

Mobility ecosystems

striving towards a seamless interface for customers



| | |
|----|--|
| 01 | Executive summary |
| 03 | Trends reshaping the mobility landscape |
| 08 | New mobility business models are emerging |
| 18 | Contrasting perspectives on value within mobility ecosystems |
| 25 | Building blocks for integrated mobility |
| 28 | Implications for re/insurers |
| 44 | Conclusion |



The rapid growth of megacities and conurbations means that societies will need evermore sustainable and resilient mobility solutions to fulfil their potential.

Evangelos Avramakis, Head Digital Ecosystems R&D

Executive summary

Mobility has been at the heart of insurance since merchants pooled their maritime risks in the 14th century. The automobile was the strongest growth engine for insurance in the 20th century, but mobility in the 21st could look very different. Urbanisation, changing demographics and greater environmental consciousness are putting pressure on existing mobility infrastructure. As the world looks for more sustainable means of moving goods and people, we all need to make better and more dynamic use of existing systems, as well as experiment with newer tech-enabled mobility platforms.

Executive summary

New mobility business models are emerging and transforming the way people and goods get around.

Highly networked, data-driven mobility business models are emerging, led by a variety of industry participants working closely with technology players. Automakers have launched mobility services to remain relevant, and a new class of mobility companies are connecting multiple networks through GPS-enabled smart phones. The most advanced companies are simplifying the entire customer journey and have integrated payments across all modes of transportation.

Insurers have key roles to play in de-risking the multi-dimensional impact of mobility innovations.

Insurers have key roles to play within these new data-centric mobility models. They can provide services that assess and reduce risk, or even establish their own sub-ecosystems that cater to specific individuals and institutions. Emerging digital risks create new protection gaps and new business opportunities around cyber security, IoT risk, counterparty risks and business interruption. Integration of multiple transport options will pose challenges in allocating liability to responsible parties.

However they need to make strategic choices on “how and where to play” in the world of ecosystems.

Insurers need to make strategic decisions over how deeply they want to engage in the new reality of digital ecosystems. Different options balance deeper access and control against demands of investment and agility, and could include:

- 1 Modular producer:** provide plug-and-play products or services that can link to a variety of platforms or ecosystems;
- 2 Ecosystem bundler:** create relationships with other providers that offer complementary or sometimes competing services; and
- 3 Ecosystem owner:** more aggressive insurers could act as active ecosystem owners or orchestrators.

The industry structure and value chain could be impacted in new ways as insurers respond to these trends.

Collective choices by insurers will have a significant impact on the structure of the industry. Ecosystems that work with insurers could require specific and different combinations of capabilities from an insurer’s toolkit. For insurers to succeed in this new world, “modularisation”, that is the ability to de- and re-couple different combinations of these services and plug them into varied mobility platforms will be a key differentiator. In any event, all ecosystems will need to comply with applicable regulations, particularly in relation to data protection and privacy, competition and records retention.

Trends reshaping the mobility landscape

Key trends

Mobility, defined as the ability for people and goods to move around, is undergoing several changes.

Rapid urbanisation is re-shaping the relationship between mobility providers and consumers.

We define mobility as the ability for people and goods to move from A to B, accessing the infrastructure and facilities that enable transport and interactions. Different macro-economic and technology trends are impacting mobility, with the mobility industry itself set to transform the economy and society.

At breaking point: existing urban mobility infrastructure

In Europe, North and Latin America, more than 70% of the population live in cities. Urbanisation has pushed up social costs, including environmental degradation, traffic congestion and accidents, which are immediate, pressing issues. Technology is essential to providing safe and sustainable transport for millions of people sharing the same limited space, and for the sake of supply chain resilience.

Figure 1

Degree of continent urbanisation 2018 and projected urban population 2030

Degree of urbanisation (percentage of urban population in total population) by continent in 2018

55% Worldwide

82% North America

78% Latin America and the Caribbean

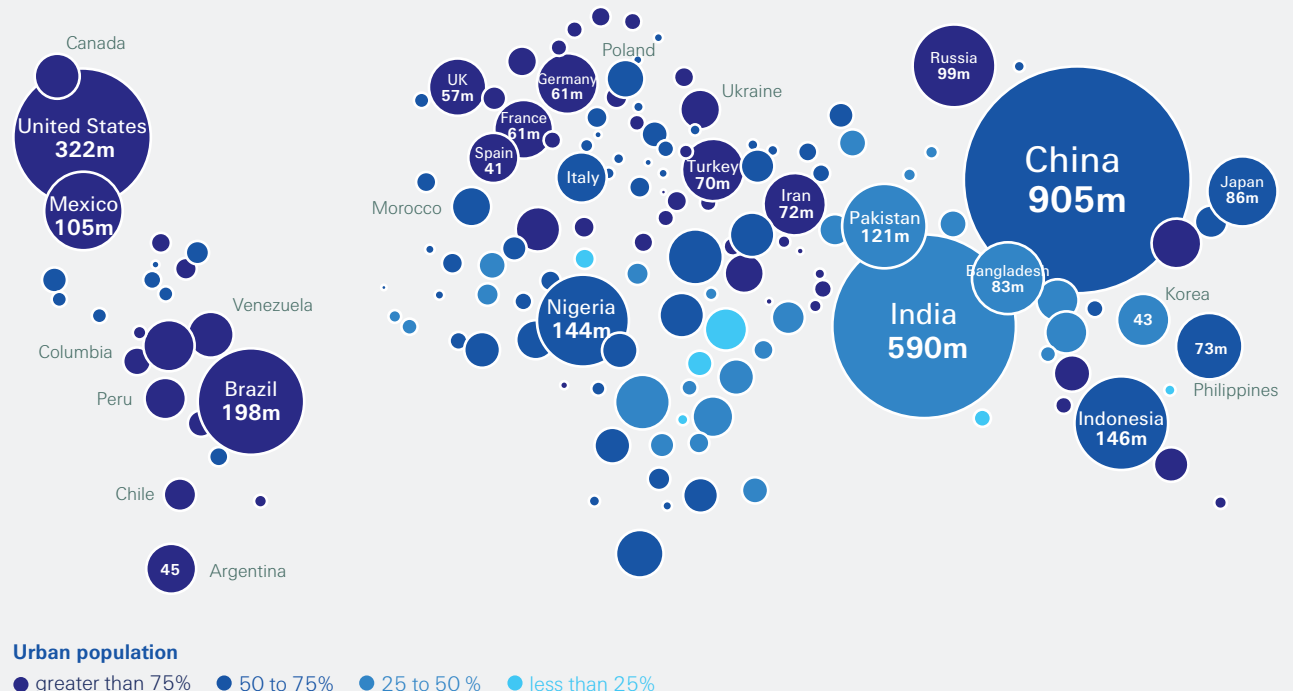
74% Europe

43% Africa

49% Asia

67% Oceania

Projected size of urban population in millions by country in 2030



Note: Circles scaled to urban population size; colour reflects percent of people living in cities or towns
Source: *An urban world*, Unicef (2012)

Trends reshaping the mobility landscape

With changing demographics, future generations will be more modal agnostic in their choice of transport.

Acceleration in technology could make new types of mobility services a reality sooner than expected.

Environmental concerns have led to rising demand for eco-friendly options.

Changing demographics result in rapid switching between travel modes

Studies show that younger generations increasingly expect mobility to be integrated and multi-modal.¹ They are more willing to switch between travel modes depending on what makes most economic sense. Consumers have rapidly embraced micro-mobility, which shows an even faster growth curve than ride-hailing.² Further, income uncertainty may be driving lower car ownership and increasing the attraction of less burdensome pay-as-you-go mobility options.³

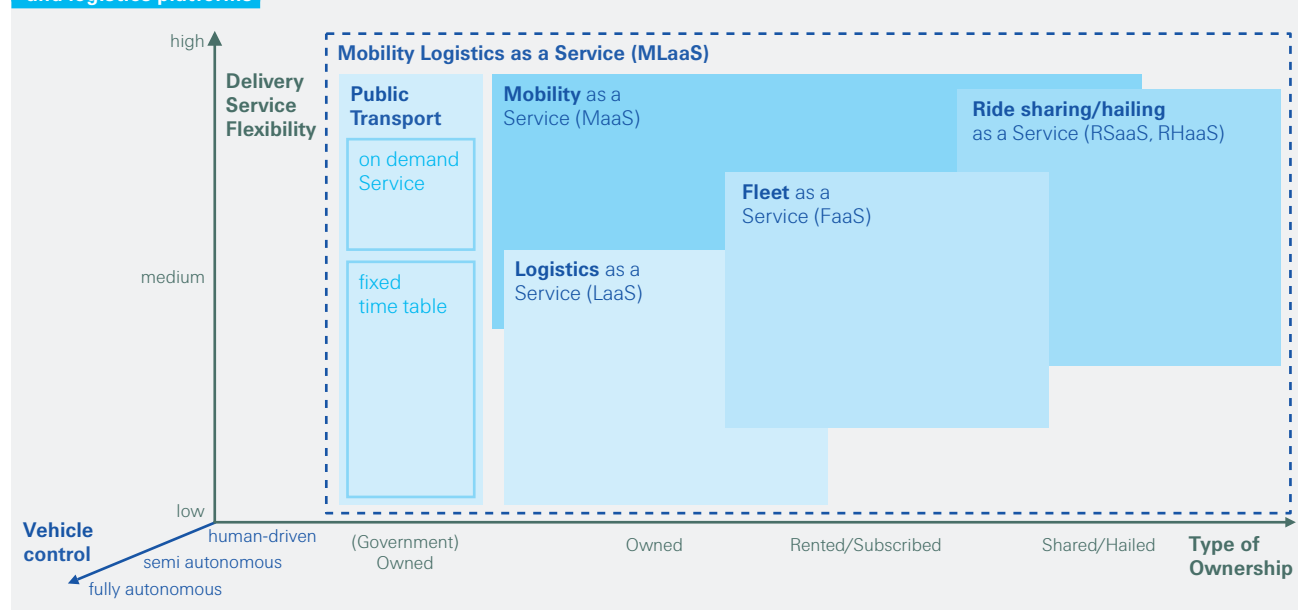
Advances in technology make new mobility services possible

Investments in technology underpinning electric drivetrains, car sharing, ride-hailing and autonomous driving may make newer types of mobility service commercially viable. For example, Toyota is developing Level 4 automation technology with a focus on the mobility service model. Its e-Palette Concept Vehicle represents a new mobility concept that supports peoples' lifestyles by providing various services, including transportation, logistics and deliveries.⁴

Growing environmental and cost factors

In recent years, the mobility and logistics industry has sought to reduce its carbon footprint. This has encouraged the introduction of new types of mobility services, especially for short-distance trips. Consumers can switch to new options like micro-mobility, especially in high-traffic cities, where vehicles like e-scooters can move people quicker and more inexpensively than ride-hailing or personal vehicles.

Figure 2
Schematic showing the range of possible mobility and logistics platforms



Source: Swiss Re Institute

- 1 Frost&Sullivan found that Gen Z (born between 1995–2009) are more interested in integrated, multi-modal usage rather than brand-centric, single ownership. See *Gen Z: The Rise of 1.8 Billion New Influencers is Shifting the Mobility Landscape*, Frost&Sullivan, 4 June 2018, <https://www.prnewswire.com/news-releases/gen-z-the-rise-of-1-8-billion-new-influencers-is-shifting-the-mobility-landscape-300658025.html>
- 2 "After 'The Year Of The Scooter,' The Micromobility Movement is Part Revolution and Part Gold Rush", *thedrive.com*, 4 February 2019, <https://www.thedrive.com/tech/26314/after-the-year-of-the-scooter-the-micromobility-movement-is-part-revolution-and-part-gold-rush>
- 3 Chatterjee, K., Goodwin, P. et al., *Young People's Travel – What's Changed and Why? Review and Analysis in 2018, Report to Department for Transport*, UWE Bristol, UK, <http://eprints.uwe.ac.uk/34640/>.
- 4 e-Palette is a next-generation electric vehicle designed for Mobility as a Service. Toyota and Softbank plan to roll it out in Japan by 2020. See "Toyota's e-Palette concept is edging closer to reality", *engadget.com*, 4 October 2018, <https://www.engadget.com/2018/10/04/toyota-softbank-monet/>

Beyond people mobility, platforms are simplifying the movement of goods.

This report explores the implications of new ways to access integrated mobility.

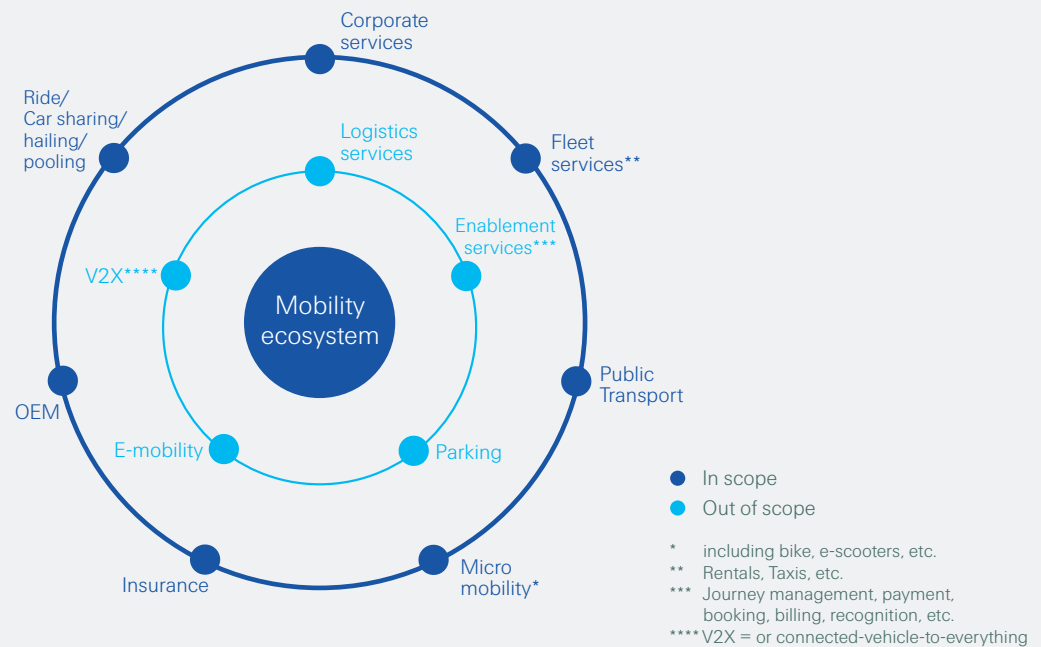
Finally, mobility is not limited to people movement

It includes goods transportation, within cities and internationally (see *The rise of e-commerce could put pressure on mobility infrastructure*). Several platforms are facilitating services like digital freight tracking, freight forwarding, and fleet management application programming interfaces (APIs). These will enable businesses to provide “Logistics as a service” or “Fleet as a service” to operate with flexibility over levels of delivery service and across different types of ownership.

In this report we assess mobility from the point of view of access to mobility services, and examine how insurers can leverage these new means of access (see Figure 3 for scope). The focus is on personal mobility, but our conclusions apply to mobility of goods too. We reference associated technologies (eg, autonomous and electric cars) for illustrative purposes.

Figure 3

**Scope of coverage
of this report**



Source: Swiss Re Institute




The rise in e-commerce could put pressure on mobility infrastructure

With internet access deepening, especially in urban areas, demand for goods and services is increasing. In the consumer driven world, immediacy is key. Amazon started with a regular delivery service, then added Amazon Prime which offered next-day delivery for a flat annual fee. Next came Amazon’s “Prime Now”, a service that can deliver certain goods to specified post codes within four hours. This need for immediacy and rapid delivery time that e-commerce fulfils can cause a higher frequency of deliveries per customer, as customers may not be willing to wait to club or aggregate their purchases. This could result in more low cost, low-volume deliveries, and potential for greater congestion on the roads. However, this is counter-balanced by fewer in-person shopping trips by consumers. For example, the UK has seen a drop of 30% in physical shopping trips over the last 10 years.⁵

⁵ “The importance of user perspective in the evolution of MaaS”, *ScienceDirect*, 10 January 2019, <https://www.sciencedirect.com/science/article/pii/S0965856418307134>



A photograph of a city street at dusk. The sky is a mix of orange, pink, and blue. Tall buildings line the street, with their windows reflecting the colorful sky. Several cars are on the road, some with their headlights on. A person is walking on the sidewalk in the foreground. The overall scene is a busy urban environment during the 'blue hour'.

**Mobility ecosystems are changing
mobility into a truly consumer
centric domain.**

Aakash Kiran Raverkar, Research Analyst, Swiss Re Institute

New mobility business models are emerging

A diverse set of players seek to capitalise on these trends, and build integrated multi-modal mobility capabilities.

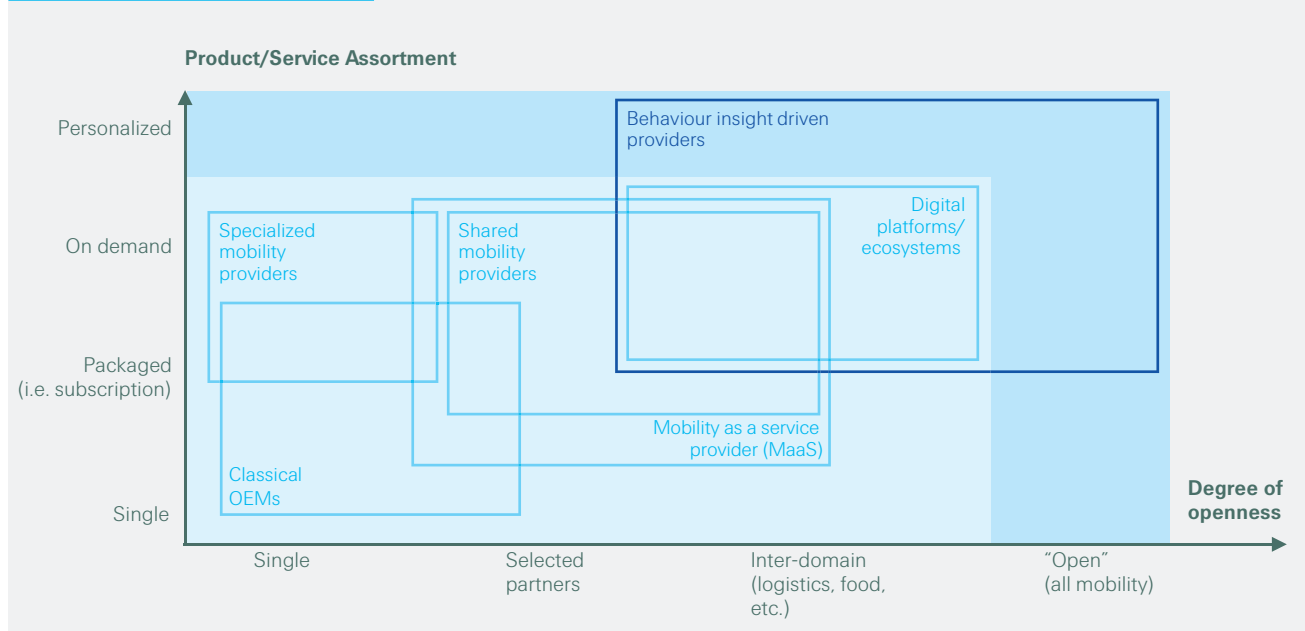
With time they could become more open in their architecture, but none are completely open or personalised as yet.

In response to these trends, a surge of funding has created many mobility-focused products and services. Figure 4 illustrates how different types of entities (from tech firms to manufacturers) are entering the mobility services market. Many of these are focused on the concept of ultimate mobility, or making vehicles available in places and ways they were not in the past.

These business models have varying degrees of openness to partners (x-axis); and incorporate different types of products and pricing models (y-axis). Blockchain-based platforms are targeting offerings that are fully personalised and open, but they are not yet commercially viable. Progress requires clear thinking and delivery on frameworks and comprehensive standards (eg, for information sharing).

Figure 4

Participants vying for consumer attention in the mobility landscape



Source: Swiss Re Institute

Auto OEMs look to offer multi-modal solutions to target new customers, and future proof their business.

However their customer base could be replaced by layers of mobility providers, thus creating new risks.

Six business models

1 Classical OEMs (eg, conventional automakers)

Historically, OEMs (original equipment manufacturers) have had a narrow focus on manufacturing and distributing vehicles under their brand name (bottom left of Figure 4). With vehicle ownership declining in developed countries, and in response to competitive challenges from new entrants such as Uber, Google and Waymo, OEMs are evolving their focus to multi-modal mobility solutions, although specifics regarding monetisation and other aspects are still being worked out.

Conventional automakers are expected to be competitive in new mobility models like car-sharing, due to their large customer cohorts, and innovative R&D capacity (eg, advanced driver-assistance systems (ADAS)). Their powerful distribution networks can help build and sustain mobile services at scale, but the consumer-facing part of their business could change significantly. As consumers buy "Mobility as a service", the direct consumer retail opportunity may be replaced with layers of fleet management and logistics providers, and consumer-facing mobility service providers.

Specialised mobility providers are also leading the way on shared mobility and personally owned micro-vehicles.

Large traditional mobility providers are also trying to integrate other modes of mobility into their traditional offerings.

Mobility-as-a-service providers bring options together from different providers into a single mobile app.

2 Specialised mobility providers

These niche providers already offer on-demand solutions that can be used either for last mile connectivity or for short-distance needs (eg, Lime, Bird).⁶ These are usually electric vehicles below 500 kg in weight, which can be owned or shared, and carry one or two passengers as an alternative to traditional modes of transportation. These vehicles are equipped with sensors to ensure data analytics, app integration, remote locking and mobile payment opportunities. Consumers typically need a separate subscription and app for each provider, although some try to merge services through a single app (eg, Gotcha offers electric bike rentals, electric scooter rentals and ride sharing all on the same app).

3 Shared mobility providers

Shared or mixed mobility is where a leading mobility player integrates other modes into its offering. For example, SBB “Swiss Federal Railways” offers last mile connectivity through taxis or rental bikes at railway stations.⁷ In the US, rail services partner with for example Hertz and Avis to make rental cars available at railway stations. These can be reserved through the rail system’s website or app.⁸

4 Mobility as a service provider (MaaS)

MaaS is the integration of various forms of transport services into a single mobility service accessible on demand (primarily in an urban setting). A MaaS provider (eg, Whim, Citymapper) owns no assets, but acts as a mobility aggregator at the heart of an inter-modal ecosystem, with a strong grip on the user interface.⁹ It is usually a monthly subscription in which public transport (a key-component) is supplemented by alternatives like shared cars, taxi and city bicycles.

6 Lime and Bird are firms that offer micromobility solutions, ie, small, electric vehicles, typically used for first and last mile transport, eg, electric scooters, e-assist bikes and pedal bikes

7 *Travel from door to door*, SBB, <https://www.sbb.ch/en/station-services/auto-velo.html>

8 “Avis Partners with Passenger Rail Service Brightline”, *autorentalnews.com*, 5 October 2018, <https://www.autorentalnews.com/316098/avis-partners-with-passenger-rail-service-brightline>

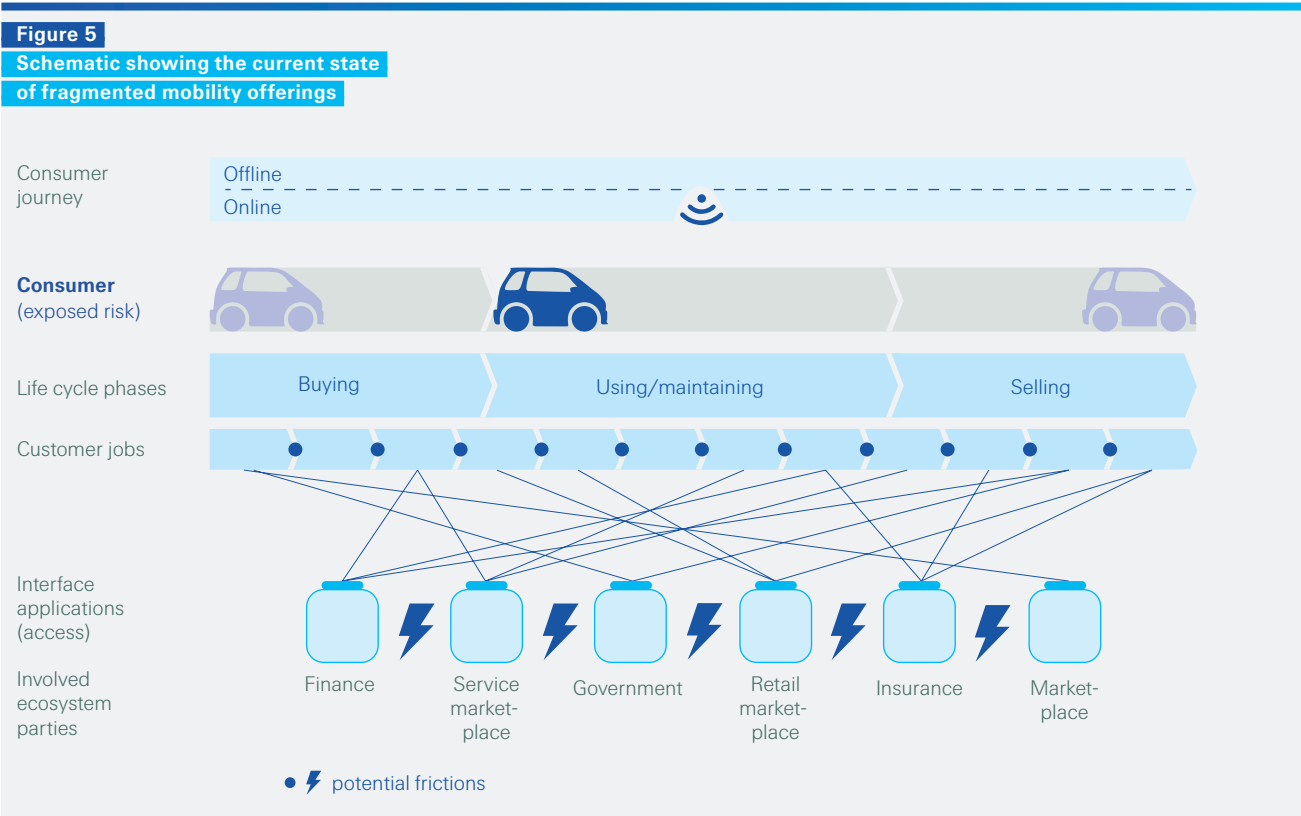
9 Whim and Citymapper are firms that offer users access to both public and private transportation, including buses, bikes and scooters, in one platform. See <https://whimapp.com/> and <https://citymapper.com/london?lang=en>

New mobility business models are emerging

Digital ecosystems seek to offer a one-stop-shop solution for mobility related services.

5 Digital platforms/ecosystems

Digital ecosystems offer a one-stop-shop solution for a broad range of mobility related services, in place of a consumer making separate purchases for different travel elements (eg, car, taxi rides, hotel stays, foreign exchange, payment solutions, service plans and insurance). Ecosystems simplify the current state of fragmented mobility offerings (represented by Figure 5) and replace them with a more integrated and comprehensive set up (represented by Figure 6).



Source: Swiss Re Institute

Figure 6 provides an architectural view of how a mobility ecosystem plugs in a variety of parties, including transport operators, payment companies, insurers and municipalities, across both B2C and B2B spheres. Grab and Go-Jek are leading pioneers in this area, moving towards ecosystem models with a wide range of offerings.¹⁰ (See *Example of select services within Grab's mobility ecosystem*).

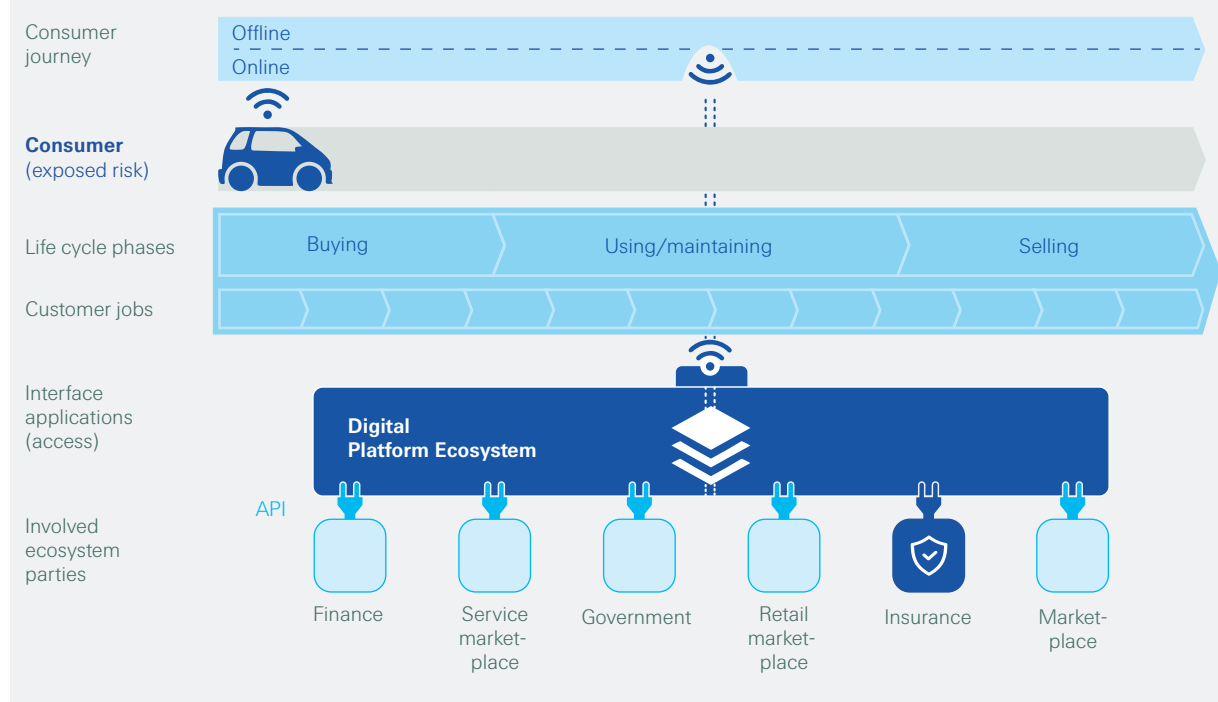
Insurance can fit naturally into the mobility experience, and can address customer needs across their life cycle.

Figure 7 offers a view of how an ecosystem plugs in multiple modes of transport to offer an integrated offering. Insurance fits very naturally into such mobility ecosystems. Data generated by ecosystems allows insurers to re-evaluate multiple independent (vertically-oriented) policies for each service, replacing them with a single policy that covers any mode of transport the individual chooses at any time.

¹⁰ Established in 2010 as a motorcycle ride-hailing phone service, GO-JEK has evolved into an on-demand provider of transport and other lifestyle services, eg, food, commuting, digital payments, shopping, massages, and at-home beauty appointments. <https://www.go-jek.com/>
Grab is a Singapore based technology company offering ride hailing transport services, food delivery and payment solutions. <https://www.grab.com>

Figure 6

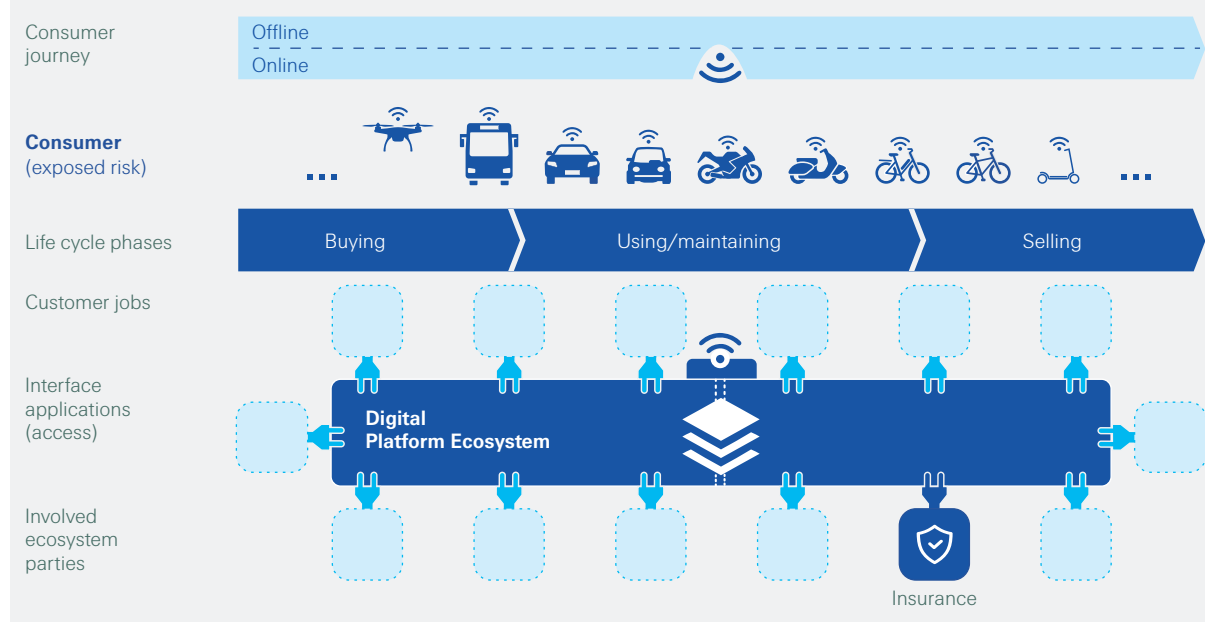
Structure of a comprehensive mobility ecosystem



Source: Swiss Re Institute

Figure 7

Structure of a comprehensive mobility ecosystem



Source: Swiss Re Institute

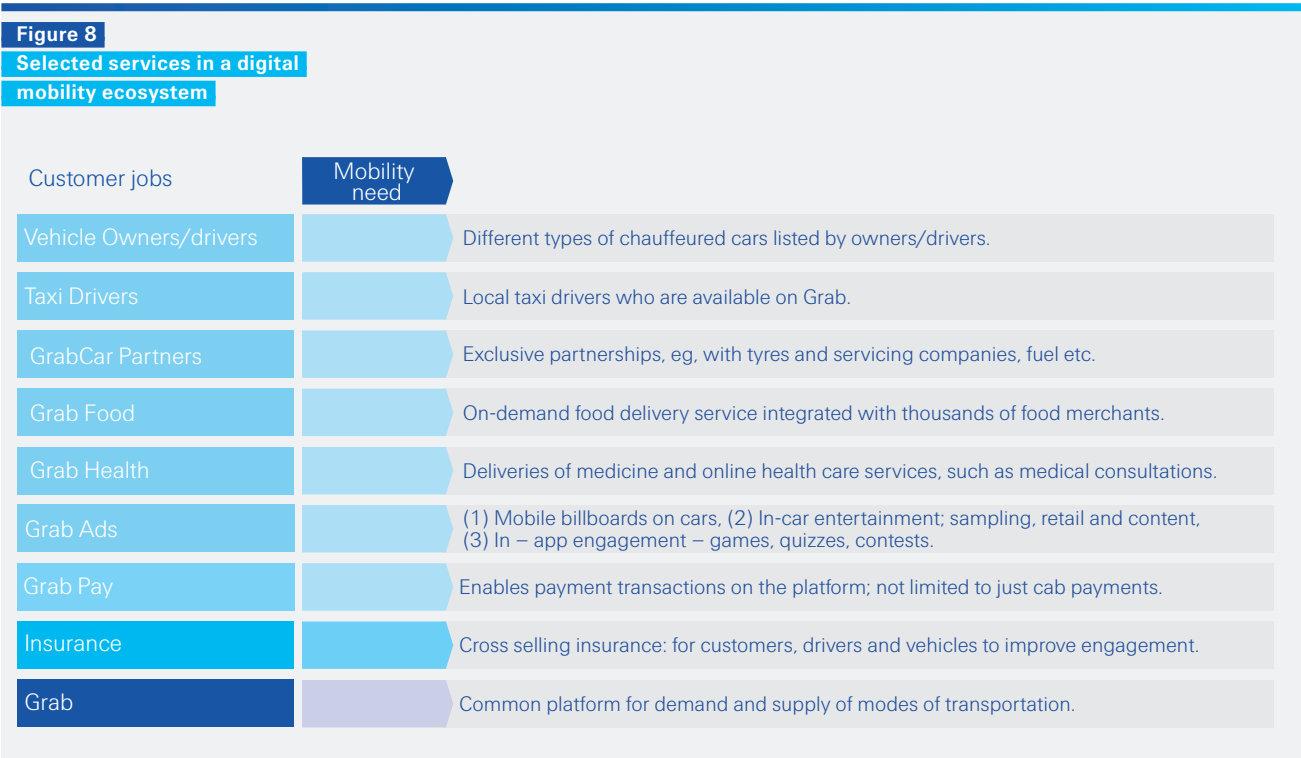
New mobility business models are emerging

A mobility ecosystem like Grab combines offerings from multiple providers to address different customer needs.



Example of select services within Grab’s mobility ecosystem

Mobility ecosystems fulfill multiple “customer jobs” (eg, insurance, maintenance, replacement of damaged parts after an accident).¹¹ The ecosystems combine offerings from different suppliers, financiers and insurers to fulfil multiple needs. For example, Singapore-based Grab started with passenger mobility, then entered food and goods delivery, and is now expanding into new domains such as healthcare, mobile payments and financial services. Figure 8 highlights the diverse set of partners that work with Grab.



Source: Swiss Re Institute

A virtual assistant servicing all consumer needs for mobility may be a possibility in the future.

6 Behaviour insight-driven providers

The final group, not yet in operation, would seek to own the entire customer interface. They would operate across domains (eg, logistics, food) and offer highly personalised interactions. Those with deep insights on consumer data (access to travel, bookings) may in the future be able to manage mobility for consumers, and provide access to any kind of mobility service in a provider agnostic manner. For example, a provider like Google could connect insights based on behaviour (email, calendar entries, and hotel bookings) and map these to offerings from mobility service providers.

11 A “customer job” is what the consumer is trying accomplish in a given circumstance. See “Know Your Customers’ Jobs to Be Done”, *Harvard Business Review*, September 2016, <https://hbr.org/2016/09/know-your-customers-jobs-to-be-done>

The business models discussed so far can be considered along at least three dimensions.

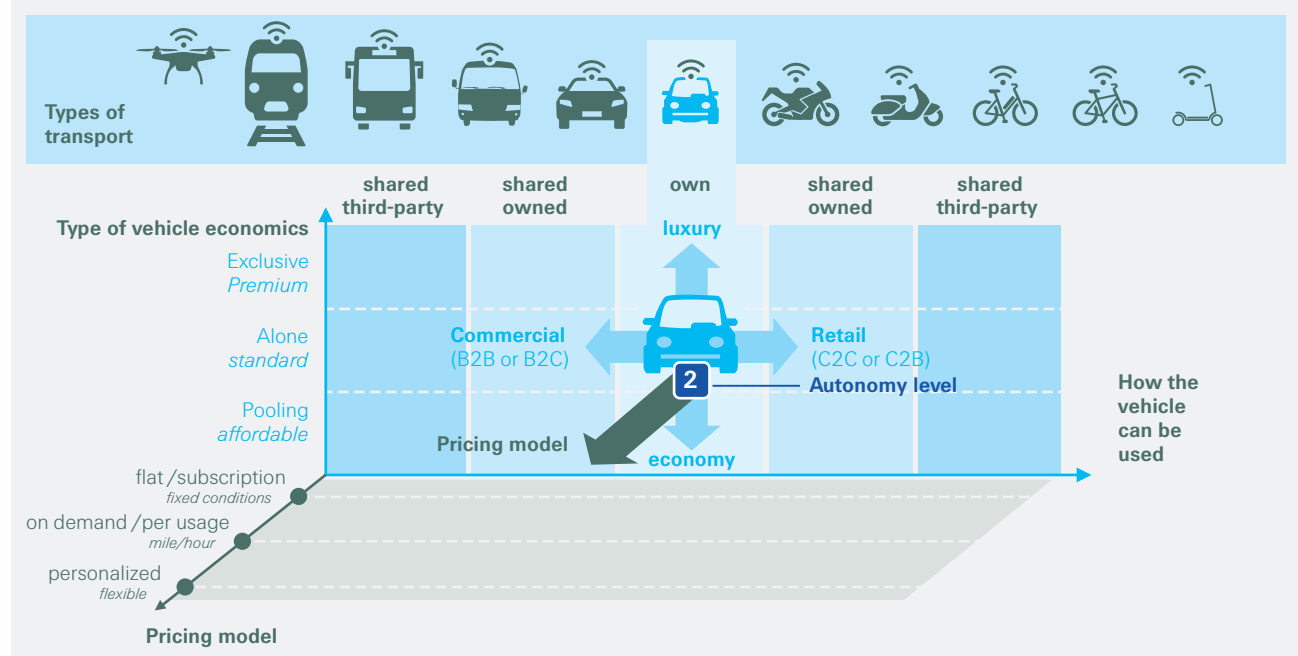


These business models have multiple dimensions

The business models we have discussed so far can be considered along three dimensions (see Figure 9 for the framework). These include (1) vehicle economics; (y-axis), (2) how the vehicle can be used (x-axis); and (3) pricing models (z-axis). For example, Uber offers vehicles at different levels of affordability (eg. pooled, premium), it targets different customer segments (eg. retail versus commercial customers), and uses different pricing models (subscription mode, on demand pricing). This meta model can be extended to map other types of offerings and service components. For example, Grab offers several additional services which go beyond the vehicle itself.

Figure 9

Meta model to map mobility business models



Source: Swiss Re Institute

Shift to integrated mobility could track different scenarios

Insurers need to take into account different scenarios as they prepare for the integration in mobility services.

The evolution of mobility services could unfold in several ways before achieving critical mass. Scenarios provide a framework for insurers to run through strategic assumptions in different mobility situations.¹² The four scenarios below (see Figure 10) show different elements of a typical consumer, while also indicating which mobility provider is responsible for servicing each element.

¹² For an analysis of scenarios, see *Plan Your 2025 Smart Mobility Digital Roadmap*, Gartner, 6 November 2018, <https://www.gartner.com/smarterwithgartner/plan-your-2025-smart-mobility-digital-roadmap/>

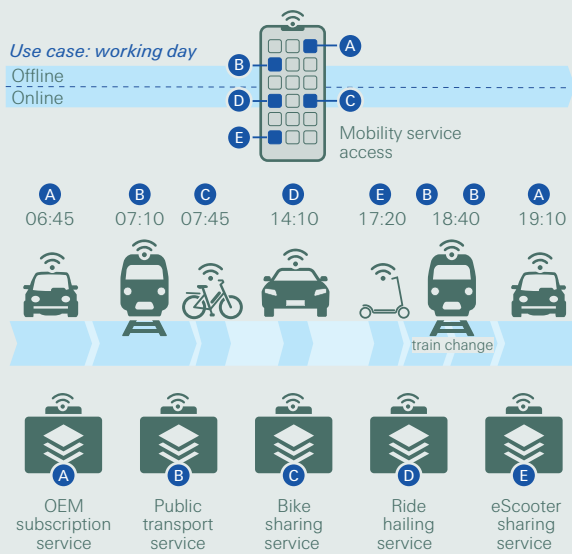
New mobility business models are emerging

Figure 10

Four scenarios for the advancement of mobility

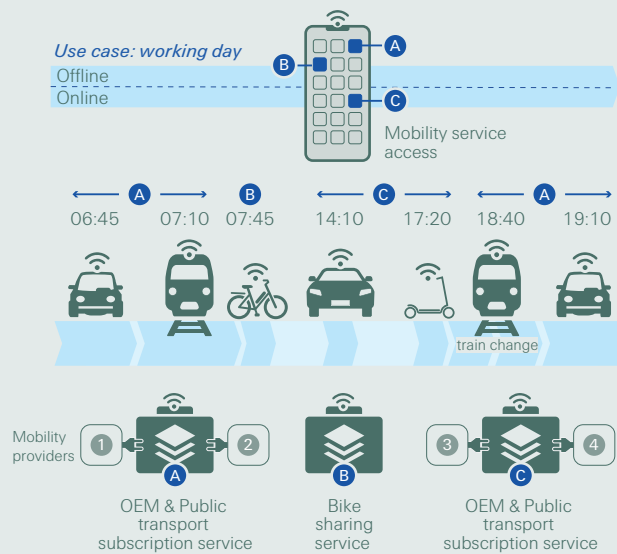
Scenario 1

Mobility journey with separate mobility players



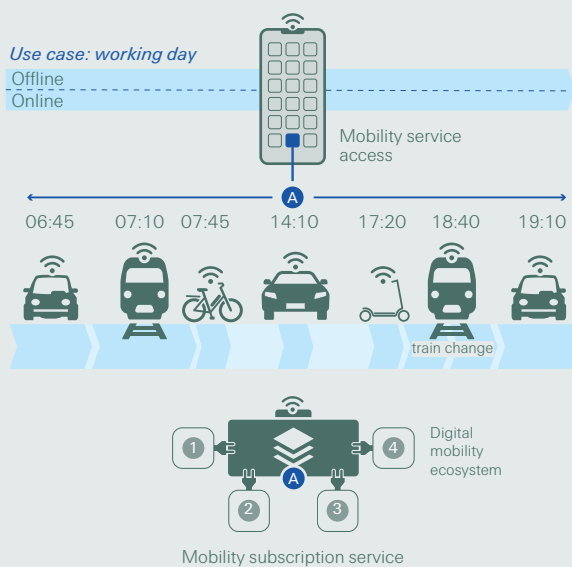
Scenario 2

Mobility journey with semi-aggregated/merged mobility players



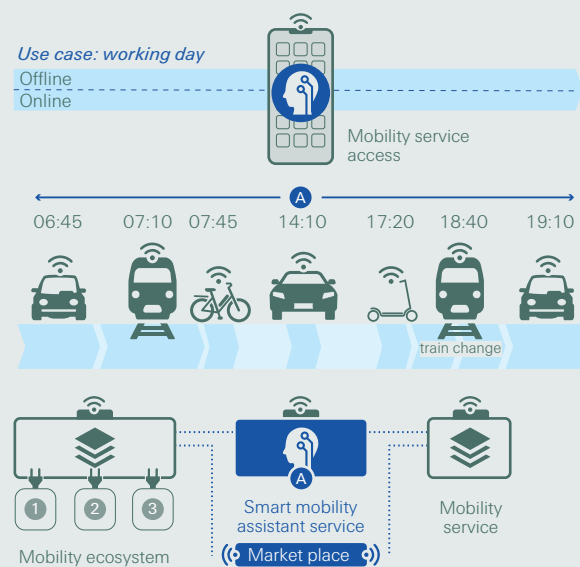
Scenario 3

Mobility journey supported by an aggregator mobility player



Scenario 4

Mobility journey supported by a smart assistant service



Source: Swiss Re Institute

A typical working day in a customer's life is used to illustrate how the aggregation of mobility services could unfold.

In Scenario 1, mobility remain scattered among a set of operators due to regulatory and logistic reasons.

In Scenario 2, there will be limited integration with different players dominating pockets in each market.

In Scenario 3, a few large aggregator mobility players will begin offering multimodal options.

In Scenario 4, smart personalisation engines will recognise customer intent and arrange mobility journeys.

In each of the scenarios, the consumer uses his OEM subscription service to take a car at 6:45 am to the public train station. After getting off the train at 7:45 am, they rent a bicycle from a bike sharing start-up to reach work. At 2:10 pm they hire a city taxi for a client meeting, after which they take an electric scooter at 5:20 pm to get back to the train station and then make their way home. Today the consumer would typically interact with multiple mobility providers each day: in the world of mobility ecosystems, they interact with fewer or even only one provider.

Scenario 1:

Journey with separate mobility players. The no-change scenario where current patterns continue. Data and customer interaction around mobility remain scattered among a set of operators due to regulatory and logistic issues. There might be integration across rail operators but not between rail and other modes of transport. In this scenario, it will take a long time before a fully integrated holistic interface is accepted, because of technical challenges, consumer reticence, and lack of regulations. Insurers will need to monitor how long it takes to address these issues.

Scenario 2:

Journey with semi-aggregated/merged mobility customer interfaces. This scenario assumes the gradual rise of merged mobility players. Legislation is enacted across markets to allow the operation of connected mobility services. However, regulation could be different in each market, leading to localised solutions which would limit the potential scaling of business cases. Due to an extended period of debate over regulations and slow consumer adoption, different players would most likely dominate different pockets in each market.

Scenario 3:

Journey supported by an aggregator mobility player. In this scenario, a few firms begin offering multi-modal options (including public transport) in a single app. For example, Finnish app Whim offers unlimited rides on public transit, access to city bikes and low-cost short-distance taxis and cars for a monthly fee. It is seeking to expand into the US, Europe and Asia later in 2019.¹³ Such firms are likely to be aligned with regional transportation systems, and will benefit from city authorities that mandate open data sharing across transport systems.

Scenario 4:

Journey supported by a smart assistant service. This scenario sees the emergence of new mobility players that bring all transportation modes together, accessible by a smart advisor service that recommends options from different providers, handling everything from travel planning to payments. They could enable automation of routine tasks in the near term, while more sophisticated tasks may be automated over time. These smart advisors or virtual assistants could operate at the explicit or implicit direction of the user, rather than completely autonomously. Multiple virtual assistants might even interact to execute a complex user request that touches multiple systems.

¹³ "Netflix-Of-Transportation App Reduces Car Use And Boosts Bike And Bus Use, Finds MaaS Data Crunch", *Forbes*, 28 March 2019, <https://www.forbes.com/sites/carltonreid/2019/03/28/netflix-of-transportation-app-reduces-car-use-and-boosts-bike-and-bus-use-finds-maas-data-crunch/#538cf9624923>

Which cities will be the early movers in integrated mobility?

Change will happen unevenly around the world.

The “smartest” cities will embrace multi-modality to ensure seamless mobility long before the advent of autonomy since no transport mode can suit all conditions. These are cities where data is digitised and open, network connectivity (4G and soon 5G) is good, and with a history of public-private tech partnerships. On this basis, western Europe will lead the way in the next five years, as cities with large transit networks and many shared mobility options such as Paris, London and Munich are well positioned to leverage platforms. In the US, public transit is less complete, and mobility ecosystems could end-up being very car-centred. We classify cities into three broad categories (See Figure 11).

Cities with large transit networks could be early adopters of shared mobility.

Public-transport dependent cities

These are large cities with high population density, high congestion and well laid out public transport infrastructure. In such cities, integrated mobility ecosystems will find it easiest to scale and incorporate multiple modes like public transport, taxis, car renting and micro-mobility. A recent study found that newer urban mobility models work best in environments that are densely populated and have good connectivity to jobs, commerce and retail.¹⁴

Cities with high multi-modality, could also rapidly adopt integrated mobility.

Multi-modality transport including bicycle use, and walking

Users in such cities seem to excel in multi-modality, and use a variety of shared mobility services to facilitate first and last mile choices.¹⁵ Cities with a significant proportion of movement by foot or bicycles, are starting to shift towards shared use of bicycles or scooters. Use of private cars and public transport is also well balanced and can be integrated into mobility platforms quite naturally.

Car-centred cities could be later adopters of integrated mobility, and first need to address matters of convenience.

Car-centred cities

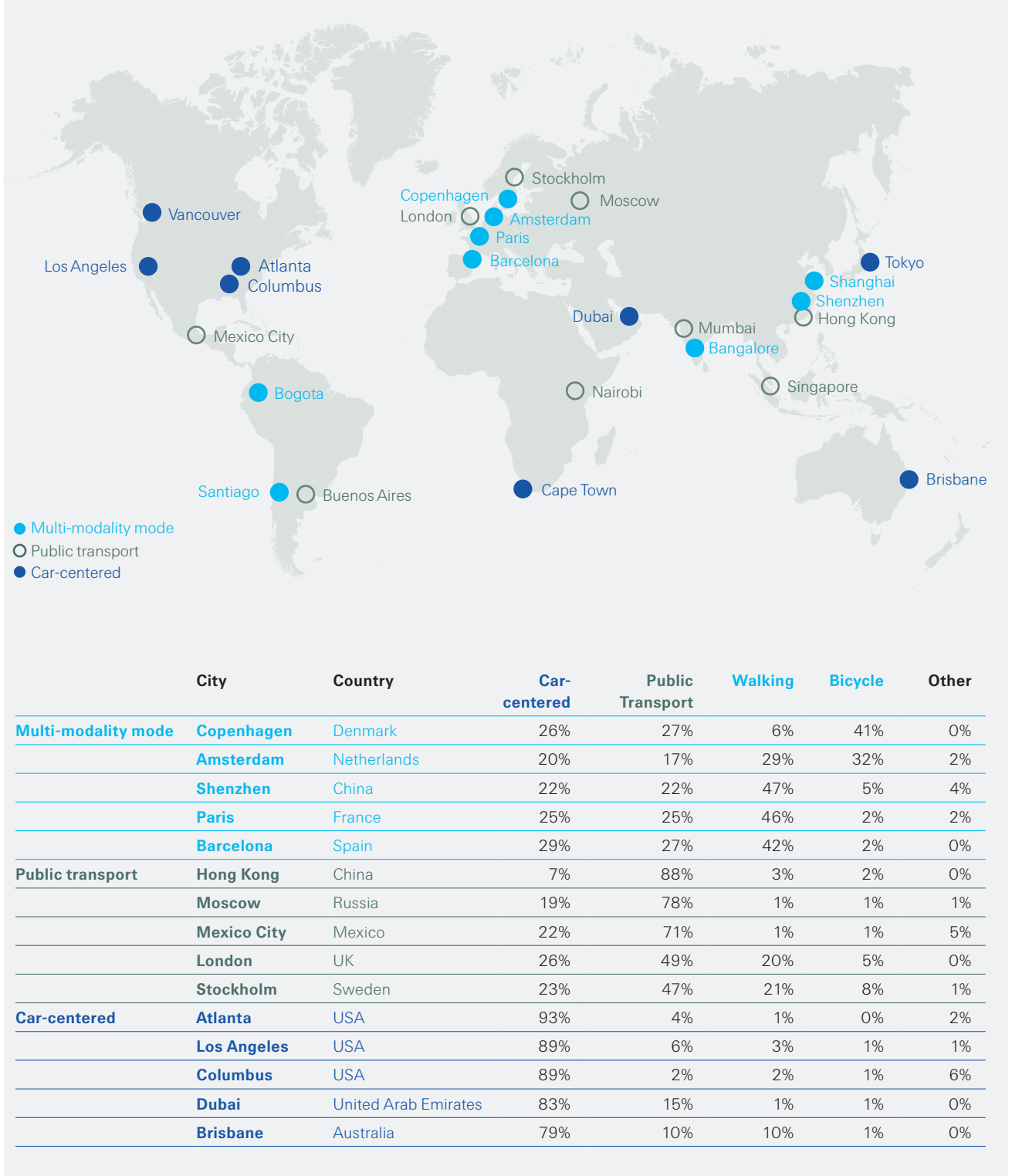
Personal car ownership seems to be in the decline in mature markets, but we are still some way from well-integrated mobility platforms in cities with incomplete public transport. Without cars, consumers would still struggle when shopping, travelling with luggage or reaching distant places. Although new platforms will seek to integrate multiple modes of transport, they may continue to rely heavily on car transport through ride hailing, taxis and car hire.

¹⁴ *Whimprint: Insights from the World's First Mobility as a Service System*, Ramboll, 28 March 2019, https://ramboll.com/-/media/files/rfi/publications/Ramboll_whimprint-2019

¹⁵ Ibid.

Figure 11

**Dominant mobility patterns
in selected cities**



Source: Swiss Re Institute, based on the 2019 Deloitte City Mobility Index

Contrasting perspectives on value within mobility ecosystems

Consumers prioritise convenience and safety over cost, which makes an integrated mobility service attractive.

Providers could deliver personalised services based on customer profiles, as mobility as a service evolves.

Customer profiles can emerge as better data becomes available from the aggregation of different travel modes.

User perspective on demand for integrated mobility

Surveys on transportation show that consumers are more influenced in their mobility decisions by convenience and safety than cost.¹⁶ In trials for integrated mobility as a service, participants' perceived need for flexibility was even greater than that currently offered by mobility services.¹⁷ Convenience is likely rated so highly because of the physical, cognitive and emotional efforts in preparing for and undertaking journeys: travellers prefer the easiest route.¹⁸

Over time, consumers may be willing to share information on their mobility behaviour in exchange for personalised services. As mobility becomes more integrated, we could see the development of customer profiles based on mobility footprints. Figure 12 has examples of data-centric mobility profiles based on the type of trips that customers undertake and their complexity. Panels A-F show different steps in how a mobility behavioural profile could be created. Trips vary in frequency and complexity, from a simple and recurring commute to work, to a one-off complicated weekend camping trip (Panel A in Figure 12).

As platform usage increases, mobility patterns for consumers will begin to emerge (shown in Panel B), which will be an aggregation or mosaic of different travel modes (examples in Panel C). With integration of complementary data and additional analysis, mobility risk profiles can be developed with risk scores based on mobility behaviour (Panel D). A representation of a mobility profile (for a segment of a day's journey) is shown in Panels E and F. This particular profile includes: (1) the daily commute to work; followed by (2) an Uber drive in the afternoon; and (3) the evening journey home.

¹⁶ *For Mobility as a Service to Work, CIOs Must Help Deliver Convenience to Customers or End Users Over Cost Reductions*, Gartner, 10 November 2017, <https://www.gartner.com/doc/3827064/mobility-service-work-cios-help>

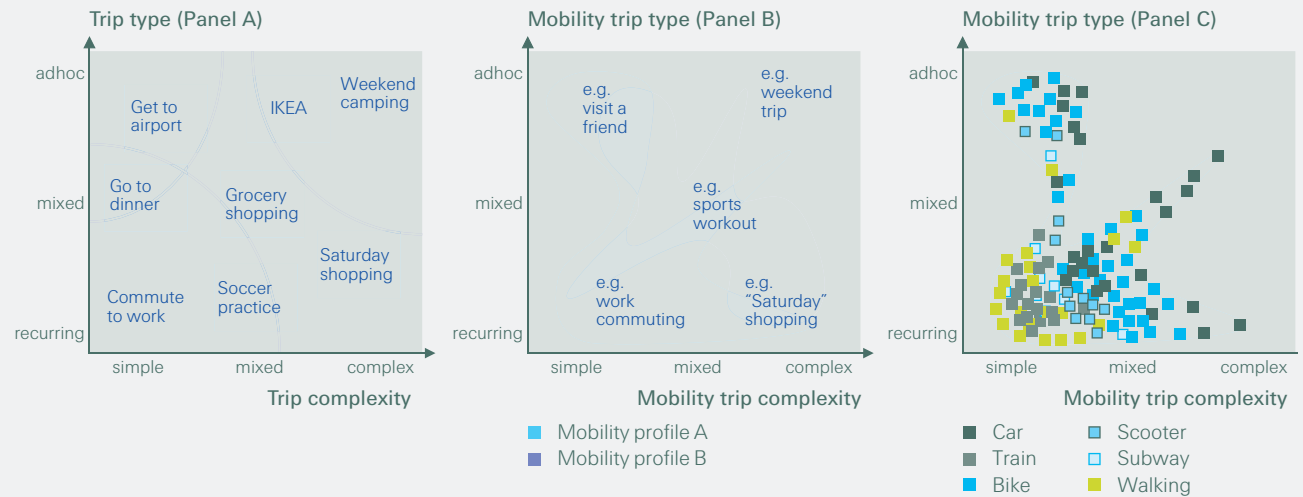
¹⁷ For instance, they wanted more transport providers included. See "Developing the 'Service' in Mobility as a Service: experiences from a field trial of an innovative travel brokerage", *Transportation Research Procedia*, Volume 14, 2016, <https://www.sciencedirect.com/science/article/pii/S2352146516302794>

¹⁸ Stradling, S., "Moving Around: Some Aspects of the Psychology of Transport", *Review Commissioned for the Foresight 'Intelligent Infrastructure Systems' project*, Office of Science and Technology, Department for Trade and Industry, London, 2006.

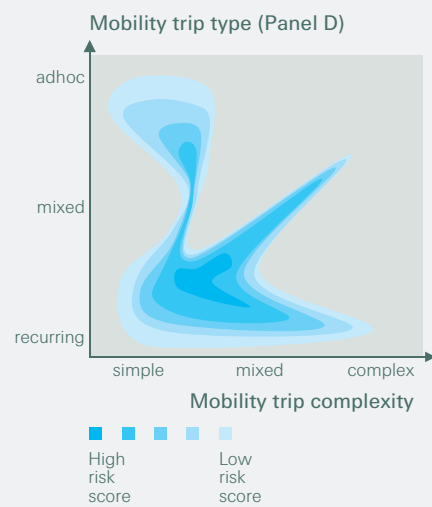
Figure 12

Example of a consumer behavioural mobility profile

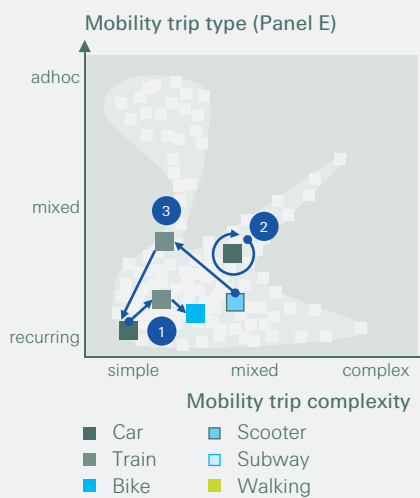
Consumer behavioural mobility profile (use cases)



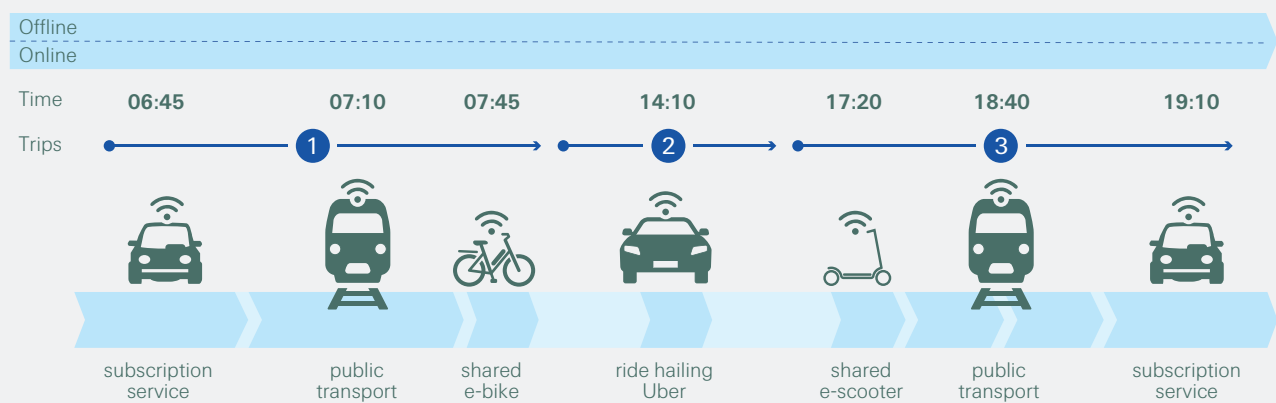
Behavioural mobility risk profile (use cases)



Consumer behavioural mobility profile (one day)



Use case: daily commute to work (Panel F)



Source: Swiss Re Institute

A well-integrated, cohesive mobility ecosystem will revolutionise how consumers and commercial enterprises experience their environment.

Corinne Fitzgerald, Researcher, Swiss Re Institute



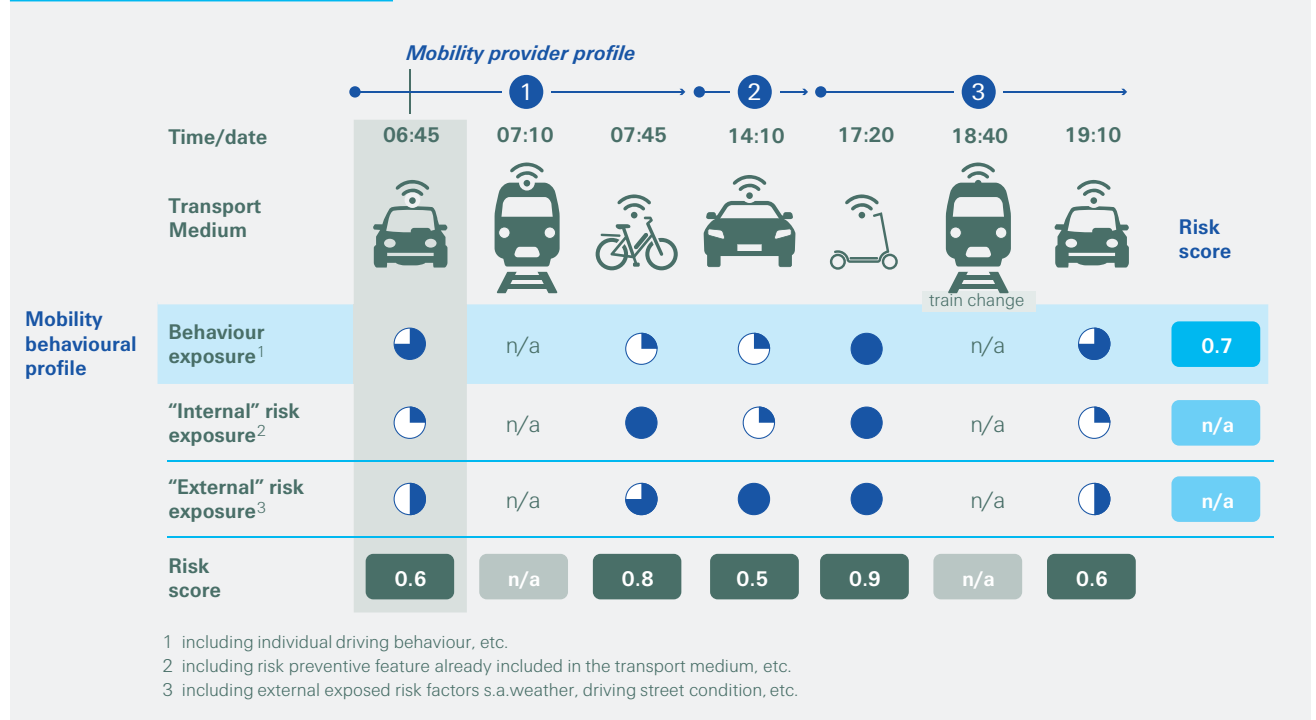
New methods may be used to collect risk behaviour from geographical network information, smart phones and dynamic traffic conditions.

Consumer behaviour mobility profiles can help quantify different kinds of exposure, (eg, behavioural, internal risk exposure and external risk exposures, across different mobility providers, eg, cars, trains, cycles (see Figure 13)). Behaviour exposure (see Figure 13) covers the risk of aberrant behaviours, like speeding and failure to maintain safe distance. Behaviour exposure should consider relevant personal details (eg, pedestrian fatality rates may vary with age). Internal risk exposure covers the inherent risk of each mode of transport as traffic fatality rates vary by transport mode (eg, cycling is perceived as an unsafe transport mode in many countries).¹⁹ External risk exposure covers environmental factors like bad weather, street conditions and choice of dangerous routes.

Mobility behaviour profiles could offer new (risk) related opportunities for a variety of stakeholders involved.

Together with additional qualitative input, consumer behaviour mobility profiles could be used to quantify mobility risk through risk scores, valuable both for underwriting and for identifying personalised insurance and other product needs. Through machine learning, Uber has already identified a variety of rating factors, such as current traffic, weather conditions, time of the day, news events, holidays, and built them into their risk models.

Figure 13
Different types of exposures that can be incorporated into risk scoring



Source: Swiss Re Institute

¹⁹ "Comparative fatality risk for different travel modes by age, sex, and deprivation, Journal of Transport & Health", *Journal of Transport & Health*, 13 September 2017, <https://www.sciencedirect.com/science/article/pii/S2214140517301457>

Contrasting perspectives on value within mobility ecosystems

Mobility as a service can have significant impact on the existing business model of suppliers.

Transport providers will need to stay relevant and form alliances with new mobility intermediaries.

Platforms will need to convince mobility providers to provide third party access to their APIs.

Over time as more platforms emerge, they need a differentiation strategy where new revenues are maximised.

Increasing competition for the customer interface has implications for consumers, platform owners, as well as suppliers.

Provider perspective on supply of integrated mobility

Existing transport providers or entities operating transport assets (eg, cars, trucks) will be significantly impacted by new mobility intermediaries. Platforms will need to elicit cooperation from transport providers if they want to provide integrated offerings at a price that is attractive to consumers, but also that makes economic sense to both the transport providers and the platform operators.

Such co-operation does not exist yet. The level of integration is currently very low in some markets. For example, when asked how often they used Lyft or Uber in combination with public transit, 65% of US residents who had access to public transit replied “never”, while a further 21% said “infrequently”.²⁰ The situation is further complicated because public transport services are usually provided by monopoly or multiservice providers, which are more difficult to integrate.

Platform perspective on integrated mobility

Gaining a critical mass of end users, developers and service providers is crucial for the success of platforms. Platforms are typically unable to gain access to transport providers’ booking systems. In most markets there is no obligation for transport operators to provide third-party access to their APIs, and more regulators may need to mandate data sharing for integrated mobility ecosystems to build scale. For example in Finland, the 2018 Transport Service Act requires key data on transport services to be shared via open APIs to interested third parties.²¹

Over time, with many competing platforms, rides could become commoditised and platform providers will need to differentiate through value added services (eg, loyalty schemes). Furthermore, with many competing and non-interoperable platforms, there is the risk that no platform achieves a critical mass.

Increasing competition for the customer interface

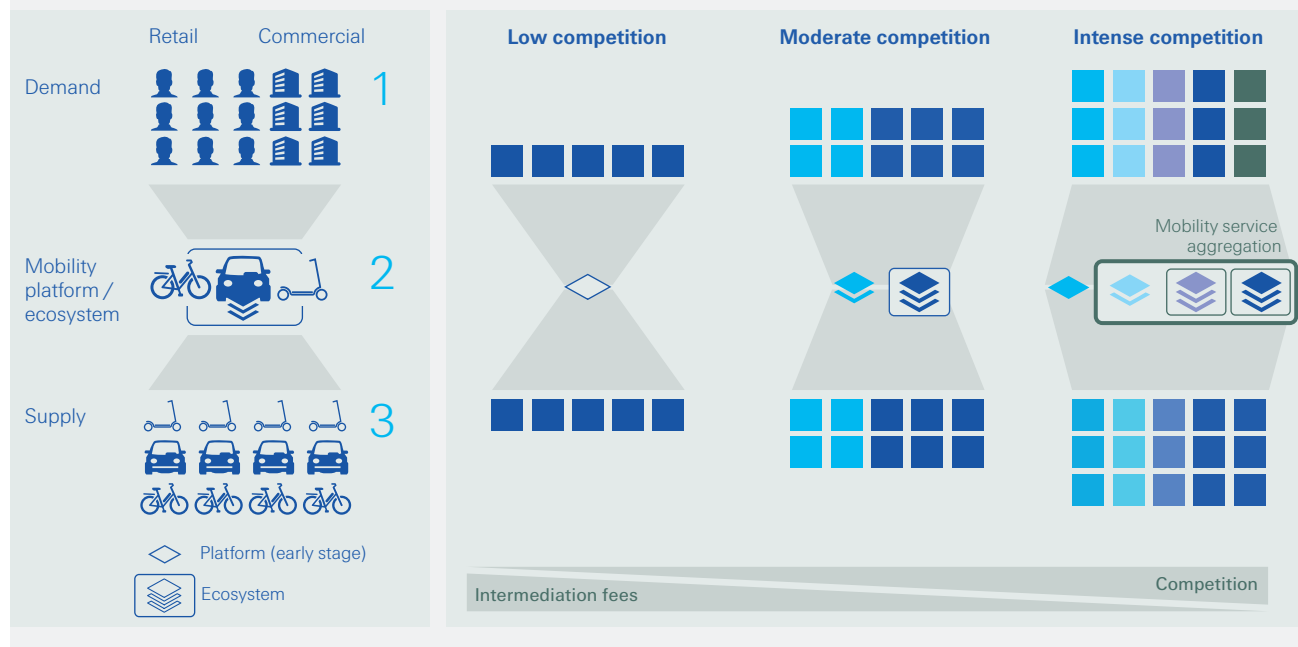
As a result of these pressures, there will be greater competition for the customer interface between platform providers and transport providers (suppliers). Suppliers will try to maintain control of customer relationships while platforms will look to solve end-user problems by creating new kinds of online travel experience. For example, Google has launched travel planning tools, and over the years has bought several travel tech firms to increase its focus on mobility and travel.²² Figure 14 shows how competition for the customer interface will gradually intensify as platforms and ecosystems begin to aggregate more services and play a more dominant role. This will pressure profitability, with implications for all involved.

²⁰ Statista, Masabi, “Survey period Q4 2017, 1000 U.S. residents who have access to public transit in May 2018”, *Mass Transit Rider Research Report 2018*, page 29

²¹ “Transport Services Act entered into force on 1 July”, *www.lvm.fi*, 5 July 2018, <https://www.lvm.fi/-/transport-services-act-entered-into-force-on-1-july-980468>

²² “Google launches new travel planning tools”, *techcrunch.com*, 27 September 2019, <https://techcrunch.com/2018/09/27/google-launches-new-travel-planning-tools/>

Figure 14
Schematic showing increasing
competition for the customer interface



Source: Swiss Re Institute, adapted from UBS Research, *Who will win the race to autonomous cars?* May 2018.

With many choices consumers will prefer an aggregation service to a collection of separate apps.

In the face of competition, platforms will have to differentiate continually to maximise value.

Suppliers will need to differentiate too as the core product becomes commoditised.

Implications for the consumer (demand side)

Consumers will like to limit the number of mobility companies with which they maintain direct relationships and avoid the complexity of navigating multiple alternatives. If there are too many options (eg, separate apps from Uber, Lyft, BMW and Toyota), consumers may seek providers who seamlessly integrate multiple services and present the most relevant combinations based on their priorities.

Implications for platforms and ecosystems

Platforms/ecosystems that insert themselves as a layer between consumers (demand) and transport providers (suppliers) by making searching and matching easier, will put pressure on intermediation fees (Figure 14). However, platform owners themselves will need to differentiate over time. Whilst accessing new data sets is important, the key differentiator is assembling, standardising and calibrating such data to create unique insights about customers that are hard to copy.

Implications for suppliers / producers (supply side)

Suppliers will also need to differentiate over time, as their core product will gradually be commoditised. They will stay relevant by adding more services, or by finding a niche where they are best-in-class. In response to moves by platforms, suppliers are looking to engage more with customers eg, transport providers are using social media to deal with disgruntled customers, respond to urgent issues and obtain feedback.²³

²³ "How BART used social media to turn crisis into opportunity", *mobilitylab.org*, 12 April 2018, <https://mobilitylab.org/2018/04/12/how-bart-used-social-media-to-turn-crisis-into-opportunity-and-how-wmata-didnt/>

**Newer insights will change products
and how they are underwritten and sold.**

Aakash Kiran Raverkar, Research Analyst, Swiss Re Institute



Building blocks for integrated mobility

Key infrastructure

5G technology and next generation networks could enable greater visibility into mobility systems.

Better infrastructure is needed to make new mobility business models available. Municipal authorities and the private sector will have to work together in new ways to maintain and run essential infrastructure, from charging stations to railway platforms. Deployment of vehicle-to-everything (V2X) technology, although in early stages, will play a pivotal role in how data is exchanged, and could enable vehicles to communicate in new ways with devices, vehicles, pedestrians, businesses and road infrastructure (See Figure 15).

Figure 15

Deployment of vehicle-to-everything (V2X) technology

V2V – Vehicle-to-Vehicle

Alerts one vehicle to the presence of another. Cars “talk” using DSRC technology.

V2D – Vehicle-to-Device

Vehicles communicate with cyclist’s V2D device and vice versa.

V2P – Vehicle-to-Pedestrian

Car communication with pedestrian with approaching alerts and vice versa.

V2B – Vehicle-to-Business

Car communication with business with approaching alerts and vice versa.

V2H – Vehicle-to-Home

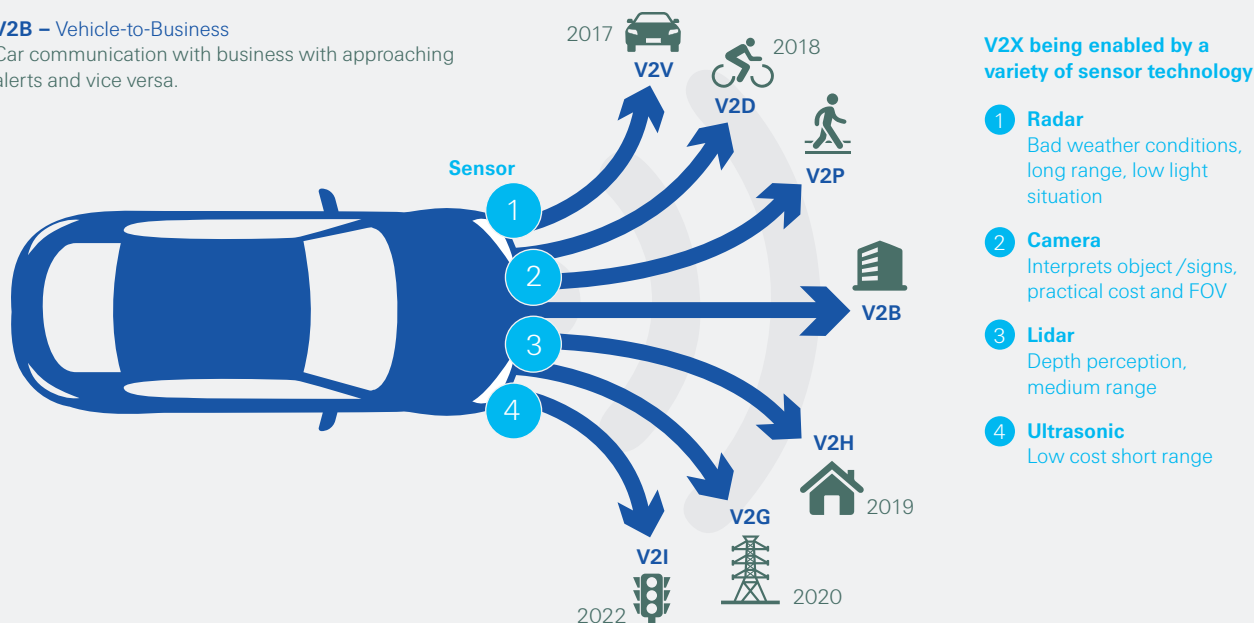
Vehicles will act as supplement power supplier to the home.

V2G – Vehicle-to-Grid

Smart grid controls vehicle charging and return electricity to the grid.

V2I – Vehicle-to-Infrastructure

Alerts vehicles to traffic lights, traffic congestion, road conditions, etc.



Source: Swiss Re, adapted from Courtesy Movimonto, Qualcomm (5G and Automotive, March 2017)

Physical infrastructure will need to be increasingly smart and connected, allowing constant, real-time monitoring.

As 5G networks gain traction, city authorities could gain real-time, end-to-end visibility into transportation systems, both public and private. Traditional wireless networks are expensive to expand. However, innovative companies (like Kymeta) are working on network solutions with satellite technology that could provide high-throughput mobile access to moving vehicles wherever the sky is visible.²⁴

²⁴ “Kymeta Brings SmartBus Program to Peru”, *satellitetoday.com*, 4 March 2019, <https://www.satellitetoday.com/mobility/2019/03/04/kymeta-brings-smartbus-program-to-peru/>

Data from multiple providers via open APIs may be combined to enable different business models.

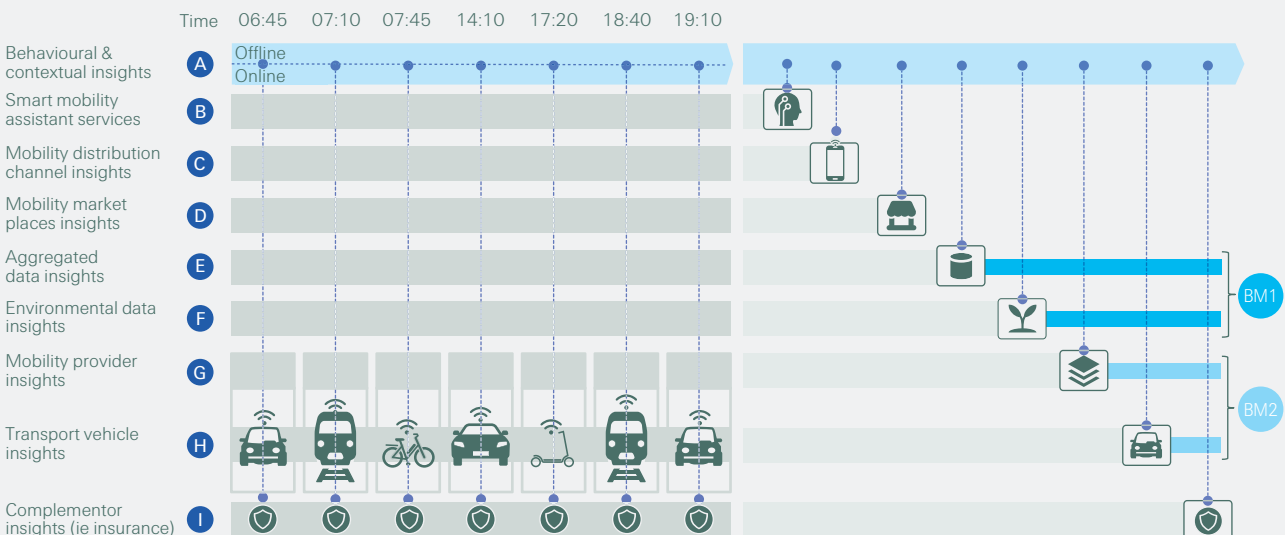
Data, and 'intelligence'

New business models for mobility will require secure access to multiple databases across travel modes and regions. Data that can be combined in different ways include insights from connected vehicles, transport provider data, behavioural insights from the consumer and environmental data (see Figure 16 for examples). No single firm or marketplace currently provides all these sources of data. While many are fixated on extraction and distribution of data, most are less focused on data refinement.²⁵ This probably means we will need specialised aggregators that focus on integration and refinement. The more integrated and refined the data, the wider the service offering to a customer.

Figure 16

Different types of data sources that can be incorporated

Modelling mobility business models along the customer



Note: BM = Business Model
Source: Swiss Re Institute

Insurers need access to better sources of data to underwrite new risks.

This has several implications for the insurance industry (eg, modular products, personalisation and better distribution). Insurers currently lack data and intelligence on mobility behaviour, including simple details as to who is driving the vehicles they insure. They are engaging in joint pilot projects and mobility working groups to gain access to this data. But in the future, data sharing standards and processes may be mandated by regulators. For example, Transport for London promoted open-data sharing and now provides over 80 different types of data feeds, powering more than 600 apps that are used by 42% of Londoners.²⁶

²⁵ *How data will shape the new urban future*, Swiss Re Institute, 15 January 2019, <https://www.swissre.com/risk-knowledge/driving-digital-insurance-solutions/how-data-will-shape-the-new-urban-future.html>

²⁶ *New study quantifies value of open data to London*, Transport for London, 13 October 2017, <https://blog.tfl.gov.uk/2017/10/13/new-study-quantifies-value-of-open-data-to-london/>

Regulatory architecture will play an important role in shaping the adoption of new mobility models.

Regulators have raised concerns about digitally-delivered advice and insurance products.

Regulation

Regulation will be a major factor determining the mobility landscape. Regulators could be influenced by how the public perceives innovation and will act to protect the public interest. Regulators could enforce new privacy constraints to build customers' trust in how their data is used to provide a continuous and personalised experience. They would also address any perceived competition restrictions. Indeed, a multiplicity of regulators may govern different types of service provided through the mobility ecosystem. For example, telematics-based offerings could come under an insurance regulator, but preventive services that go beyond insurance may be regulated by a different entity.

Insurers could face regulatory challenges on data protection and privacy, and on records retention, in their efforts to monetise new mobility data. In the Euro area, for example, citizens have the "right to be forgotten", a newer concept for insurers in the US and Asia. Errors or biases in algorithms might contribute to systemic risk or prompt inappropriate insurance decisions. Further, lack of transparency may make it difficult for regulators to investigate why complex and proprietary algorithms deny cover to particular individuals or reject claims, undermining their ability to fulfil core supervisory and consumer protection tasks.

Implications for re/insurers

Innovations in mobility have implications for traditional risk pools and create new opportunities.

Mobility has been at the heart of insurance since merchants pooled their maritime risks in the 14th century. With the automobile boom after World War II, the motor sector provided unprecedented growth but also some of the most challenging liability issues for insurers. The integration of many transport providers could exponentially increase the complexity of allocating liability across different parties.

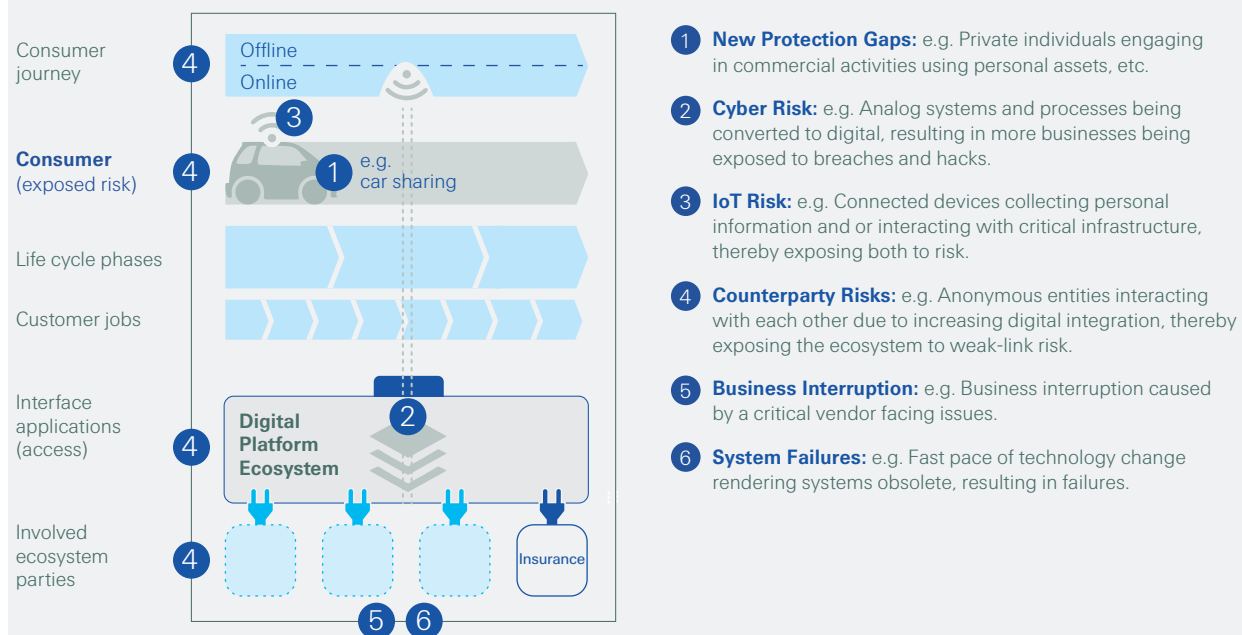
Emerging risks

We identify several risks as the overall complexity of ecosystems increase.

We predict rapid growth in several risk pools such as cyber, terrorism, product liability, supply chain and contingent business interruption (CBI) insurance. New risk categories will emerge as the complexity of ecosystems increases, giving rise to new exposures and associated insurance opportunities. In Figure 17, we identify where such risks will impact customer journeys through the mobility ecosystem.

Figure 17

Examples of emerging risks in mobility ecosystems



Source: Swiss Re Institute

Cyber security may be a challenge, as firms struggle to keep up with changing risk, compliance and IT landscapes.

Cyber risk

The growing dependency on wireless communications and controls could lead to a sharp rise in the need to protect against their failures. Hacking and terrorism risks could also rise significantly. Cyber is a critical risk for aggregator platforms. Data breaches, the resulting costs of remediation and loss of income are the main components under first-party coverage, and data privacy liability is the biggest third-party risk. Also, denial of service attacks can cause delays and related liabilities, as well as loss of income.

The challenge of IoT is that greater interconnectivity increases the likely severity of accumulation risk.

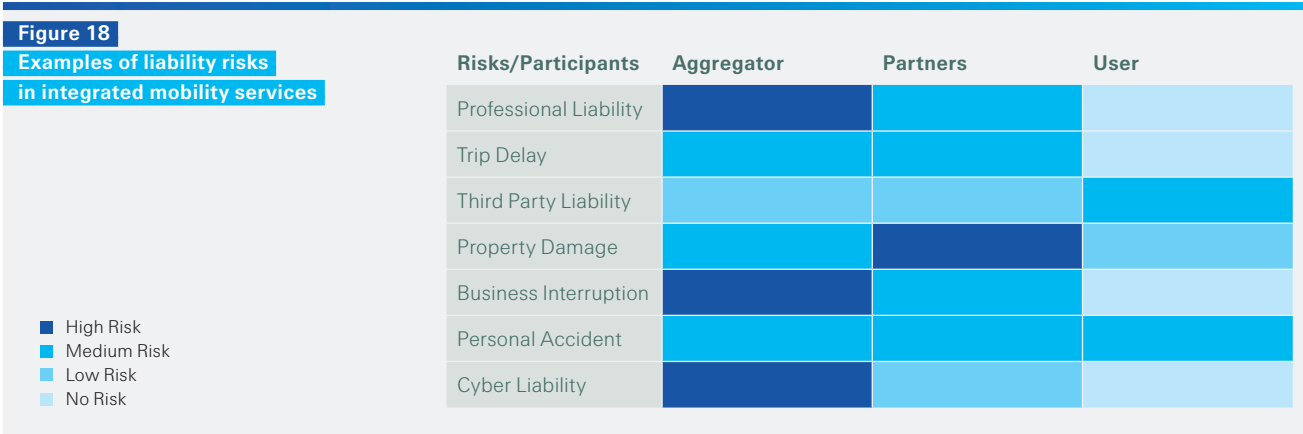
Insurers and law firms will be called upon to provide solutions for liability and counterparty risks.

IoT risk

Internet of Things (IoT) sensors on transport assets and infrastructure can provide valuable data for sharing across a wider ecosystem (eg, travel agents, auto OEMs, and logistics firms). The security of data being transmitted across networks and into central repositories will be critically important. The potential for interconnected risk only increases as transport systems and cities get smarter. However, Gartner predicts that supplier solutions for addressing IoT security issues will continue to be slow to market in 2019.²⁷

Counterparty risks

Mobility service providers could struggle to pinpoint responsibilities for delivering an integrated service. For example, what will happen where a mobility platform proposes a transport mode to a customer, and the mode is unable to respond to the request within a given time window? The customer could demand reparation by asserting passenger rights. But there is limited clarity about who is going to pay these liabilities. Will it be the operator that was unable to respond, or the platform that originally proposed the mode? Insurance buying patterns are still unclear in such arrangements, and we use a risk heat map to try to depict the extent of liability risks for participants in integrated mobility services. In our view, the platform aggregators will probably face the highest degree of risks (see Figure 18).



Source: Swiss Re Institute

Professional liability risk for errors in booking trips could be challenging to cover, unless better data is available.

Insurers may have to provide larger, more coordinated solutions than they provide today.

Trip delays and missed connections due to aggregator or partner errors can be challenging to insure because of insufficient data. Access to real-time departure and arrival data could enable parametric insurance covers. One solution would be for an aggregator platform to buy a master policy on difference in conditions (DIC) and difference in limits (DIL) basis, over and above the transport partners’ own physical damage and liability policies. The platform could then cover losses excluded or exceeding the base policies of the partners.

Business interruption

As mobility ecosystems become more connected, the frequency and breadth of product recalls could increase rapidly. This requires not only greater financial support (through insurance), but also ability to replace large volumes of key components quickly and reliably. Such events could trigger business interruption (BI) pay-outs. Aggregator platforms face risks for liabilities arising out of accidents or damage occurring on partner vehicles (eg, train, car, cycle, scooter etc). Platforms could take out separate BI policies, or providers could include the aggregator as an additional insured on their policies.

27 New study quantifies value of open data to London, Transport for London, 13 October 2017, <https://blog.tfl.gov.uk/2017/10/13/new-study-quantifies-value-of-open-data-to-london/>



Liability for new mobility services

The platform economy has made it harder to assess and trace liability, especially for losses in mobility services. This complexity increases with the number of parties involved, as the concept of ownership morphs into a cost sharing arrangement for services. Figure 19 depicts probable insurance buyers in relation to mobility services and the corresponding risks they face.

Shared personal mobility - This space is much more complex than personal use, as the identity of user and duration of use are progressively uncertain.

- **Scooter sharing** – In most cities, the company renting the electric scooters probably does not cover renter liability for third party loss. Also, motor insurance policies exclude liability for any vehicle having fewer than four wheels. One solution would be Personal Liability Umbrella Policies (PLUP), covering risks typically excluded from other policies.
- **Ride sharing** – Automobile giants that offer ride sharing, (eg, Tesloop (Tesla) and Drive Now (BMW)) include comprehensive insurance on car rentals. In the US, personal auto policies cover cars rented for personal purposes, so there would be some overlap between coverage.²⁸ In other markets, renters are insured under the policy of the ride sharing company.
- **Part car ownership** – An effective timeshare on a car, where an app helps organise car time and associated costs (including insurance). Both the car and the insurance are provided on a pay-as-you-go basis. The policy operates like a normal motor policy, where multiple parties are named as owner/drivers.

Figure 19

Insurance buyers in relation to mobility services and applicable risks

| Mobility/Risk | | Vehicle damage | Third party BD/PI | Owner/driver PA | Passenger BD/PI |
|--------------------------|----------------------------------|----------------|-------------------|-----------------|-----------------|
| Shared personal mobility | Ride hailing | CO/RHC | CO/RHC | CO/RHC | CO/RHC |
| | Peer 2 Peer car sharing | CO/RSC | CO/RSC | CO/RSC | CO/RSC |
| | Free-roaming car sharing | CO/RSC | CO/RSC | CO/RSC | CO/RSC |
| | Station-based car sharing | CO | CO | CO | CO |
| | Car rental | Re | Re | Re | Re |
| | Dynamic shuttle | CO | CO | CO | CO |
| | Part car ownership | CO | CO | CO | CO |
| | Ride sharing | CO | CO | CO | CO |
| | Scooter renting | Re | Re | Re | |
| | Cycle renting | Re | Re | Re | |
| Personal use | Car subscription services | CS | CS | CS | CS |
| | Personal contract purchase (PCP) | Le | Le | Le | Le |
| | Lease | Le | Le | Le | Le |
| | Buy | CO | CO | CO | CO |

Abbreviations

| | | |
|---------------------------|-------------|----------------------------|
| CO = Car owner | Le = Lessee | RHC = Ride hailing company |
| CSC = Car sharing company | Ls = Lessor | RSC = Ride sharing company |
| CS = Car subscriber | Re = Renter | |

Source: Swiss Re Institute

²⁸ Tesloop provides access to a shared fleet of Teslas, that any Tesla car owner can join, in a flexible manner, see <https://www.tesloop.com>. DriveNow is a car sharing provider that is part of the mobility joint-venture of BMW and Daimler, see <https://www.drive-now.com/de/en>

- **Dynamic Shuttle** – Usually an organisation owns the fleet for shuttle service and purchases automobile and other insurances. For example, Via Van is a joint venture between mobility-company Via and Mercedes-Benz Vans.²⁹
- **Car Rental** – Certain credit cards offer extra (above personal auto policy) insurance if the payment for car rental is made using the card.
- **Car sharing** – This arrangement can either be peer-to-peer (P2P), free floating or station based.³⁰ In P2P, the insurance arrangement is similar to ride hailing, since P2P car sharing is based on personal vehicles. In a station-based approach, the car sharing company owns the fleet, so it buys insurance and bills it into the rental charges. A free-floating model can adopt either of the approaches, and insurance purchasers can vary.
- **Ride hailing** – The ride hailing company and vehicle owner are both supposed to have auto insurance. However, the condition precedent to the loss determines which policy is on-risk. The ride sharing company's comprehensive auto insurance responds for losses when the app is in use (ie, when the vehicle is either picking up or dropping off a passenger). At all other times, the driver is required to maintain adequate personal auto insurance appropriate to the legal jurisdiction. Passenger liability is usually covered by the ride hailing company, as the drivers' personal auto policy will not cover it.
- **Personal Use** – This is the simplest of categories, with some complexity added where the car is leased or bought through subscription. The registered owner buys insurance, with the financier's interest included in a hypothecation clause. If the vehicle is on lease, the lessee buys insurance, and the premium for gap insurance is included in the lease payments.³¹ With car subscription, insurance is provided as part of the subscription package and premiums are charged as part of the subscription charges.

29 "ViaVan Is Launching an Uber-Like, On-Demand Bus Pilot Program", *thedrive.com*, 21 February 2019, <https://www.thedrive.com/tech/26574/viavan-is-launching-an-uber-like-on-demand-bus-pilot-program>

30 Station-based carsharing systems allow users to return rented cars to a designated station. Under free floating they can drop off the car at any location, not just a designated station.

31 Gap insurance is an optional insurance coverage that can be added to an insurance policy.

Impact on the insurance business model and value chain

Evolving towards Insurance 2.0

Figure 20 illustrates the evolution path for insurers towards a superior, more advanced set of capabilities, products, and services. We use Insurance 2.0 to denote this view of the future as changing demands will need different approaches in distribution, policy and claims management.

Type of insurance connection

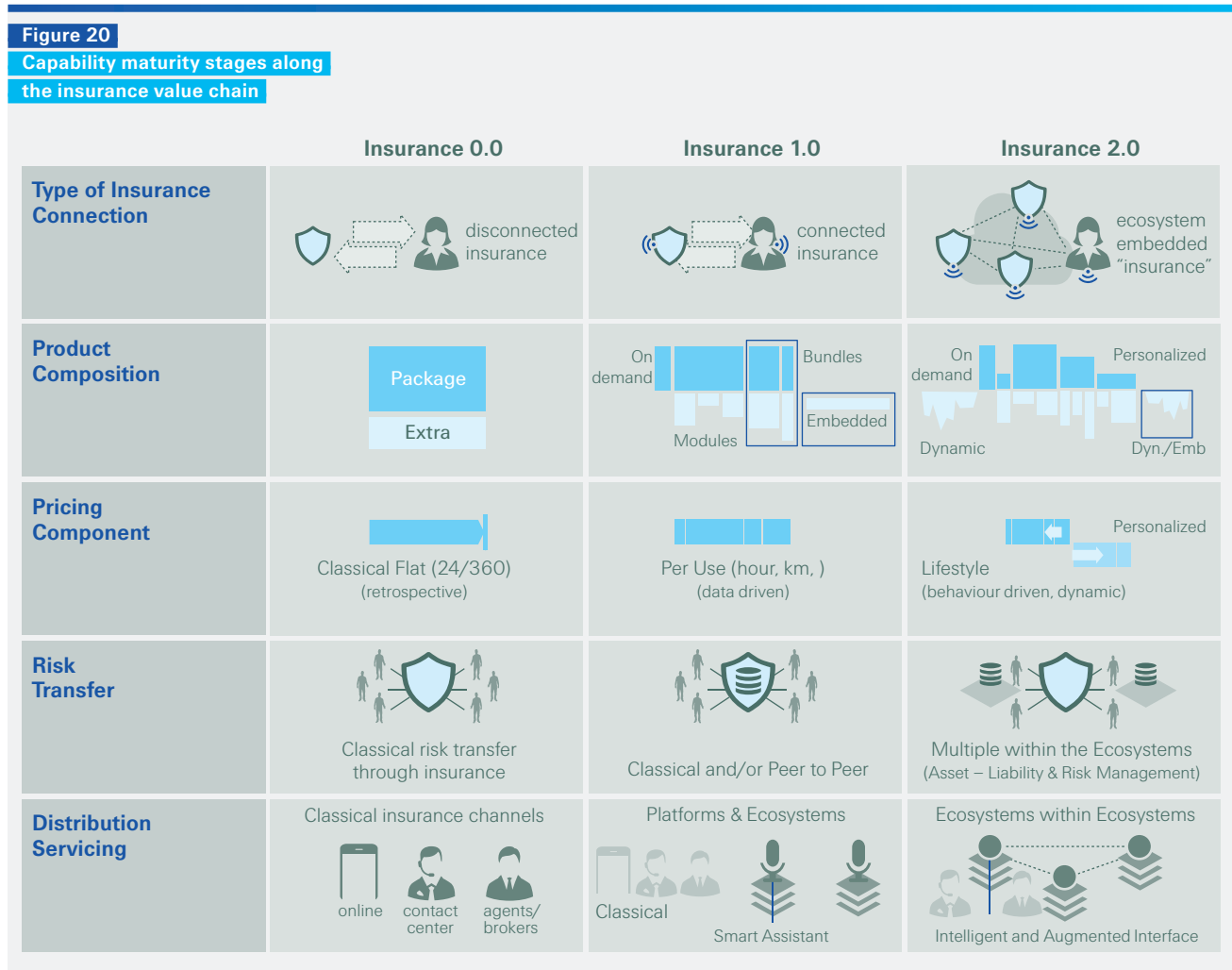
Many individuals want a seamless shopping experience whenever and wherever they are: whether online, by phone or in a store or agent's office. Similarly, seamless integrated mobility covers will be expected in the future. However, underwriting such diverse covers under a single window requires technical expertise across lines of business. It also requires insurers to demonstrate competitiveness and superior efficiency in each line of business.

Product composition

Wording complexity due to combining different covers can cause contractual uncertainty and reinsurance alignment may be challenging as treaties differ across lines of business. Finally, there may be reserving, accounting and other regulatory challenges due to the co-existence of multiple covers.

Underwriting seamless integrated mobility cover under a single window requires technical expertise across lines of business.

Product complexity could increase due to the availability of real-time data.



Source: Swiss Re Institute

Pricing could also change and will need to enable customised/behavioural tariffs.

Insurance could increasingly be a commercial risk borne by many operators in the ecosystem.

Distribution will move from aggregators and brokers in the personal market to commercial policies for fleet owners.

Re/insurers could provide risk mitigation across a variety of different business models (eg, B2B, B2C, and B2B2C).

Platform providers could incorporate a range of financial and insurance services.

Pricing

Pricing models for insurers will need to adapt to the availability of real-time data, enabling customised behavioural tariffs (eg, pay-as-you-go) and contextual offerings (eg, on-demand insurance). In shared mobility, passenger's third-party liability risk in self-driven vehicles may be covered through PLUPs, which extend across vehicles and where premiums are based on an individual's travel patterns and risk profile. Initially, pricing may be exposure-based, considering different profiles (eg, different age groups). Over time substantial data should be generated through high-frequency use of platforms, and experience-based pricing could be based on actual travel data.

Risk transfer

These platforms may allow individuals within a social network to pool premiums and underwrite each other's risks. If mobility models move to shared usage, the consumer no longer owns the vehicle. Insurance could then become a commercial risk borne by many operators in the ecosystem.

Distribution and servicing

Distribution may have to change with more focus on B2B models, and insurers partnering directly with OEMs on product liability and recall. Coverage may be incorporated into other products and services or distributed via new channels, and self-insurance may emerge as a dominant model for large shared (both driver-driven and autonomous) vehicle fleets.³² These patterns will affect the number of policies sold through traditional agents and direct channels.

Impact on customer segmentation

Mobility ecosystems offer multiple opportunities to re/insurers. Figure 21 illustrates different business models for B2B and B2C. Both corporate and retail customers are likely to demand greater flexibility in cover, either with more umbrella policies, or with easily altered policies. Tapping into these opportunities will require a holistic view of all risks: property, casualty, and life and health, as well as commercial and retail.

Insurers have opportunities such as liability risk for vehicles and car owners in mobility ecosystems (B2B insurance). New opportunities include accident insurance for passengers (B2C) and drivers (B2E), supply chain insurance for delivered goods (B2B) and health insurance for drivers and their families (B2B2C).³³ Platform providers will introduce a range of insurance products, partly to respond to regulation and to differentiate themselves from rivals. For example, in 2019, Didi Chuxing will offer protection insurance and credit services for both passengers and drivers who use its platform.³⁴

³² Uber combines third-party and self-insurance to protect itself against automotive, driver and passenger risks. See "Uber's USD 2.94 Billion Insurance Unit Illuminates Challenge of Disruptive Businesses", *The Wall Street Journal*, 11 April 2019

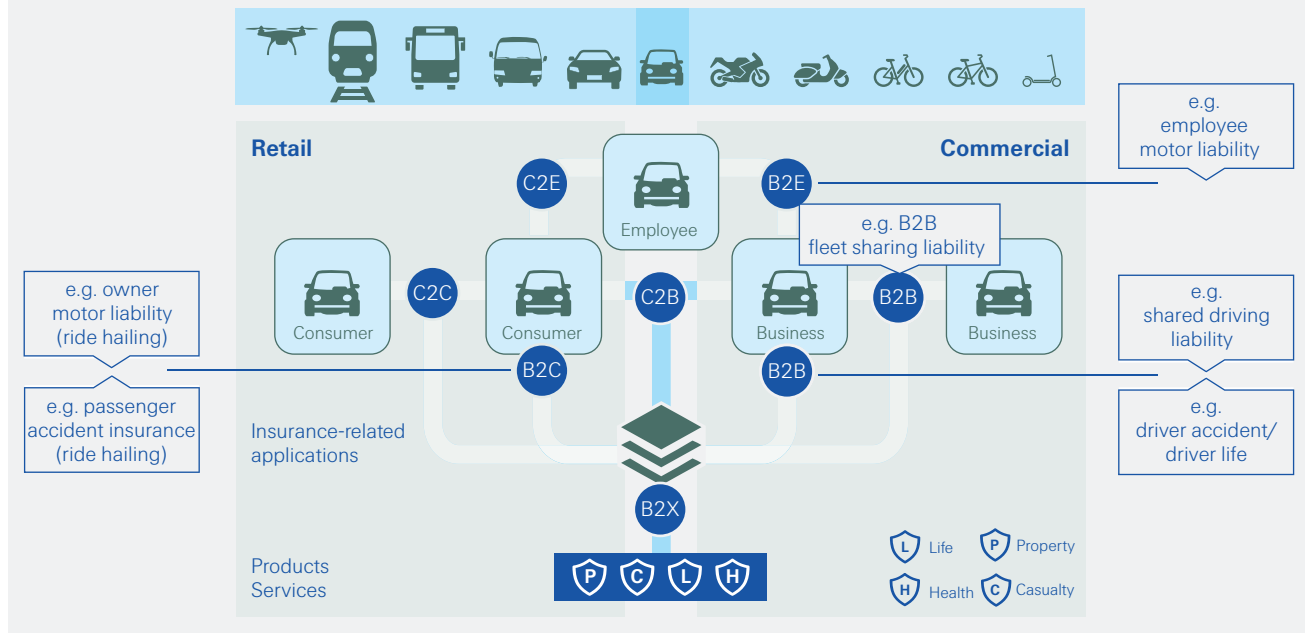
³³ Chubb has partnered with Grab to offer accident, hospitalization coverage to both passengers and drivers. AXA recently partnered with BlaBlaCar to offer three tiers of coverage from third-party liability protection to comprehensive insurance for risks including collision damage.

³⁴ "Didi launches lending and insurance as new regulation threatens to lower driver numbers", *TechCrunch*, 1 January 2019, <https://techcrunch.com/2019/01/01/didi-launches-lending-and-insurance/>

Implications for re/insurers

Figure 21

**Types of insurance coverage depending
on different types of mobility modes**



Source: Swiss Re Institute

Insurance can be embedded into transactions between ecosystem participants.

Many insurers lack resources and expertise to develop integrated offerings based on new sources of data.

Insurance can also be embedded into offerings to ecosystem partners. This could include financing solutions for drivers, agents and merchants through working capital loans, and consumer good financing. Re/insurers could even participate in consumer-to-consumer (C2C) networks where risks with limited exposure are co-insured (eg, collision damage on a motor policy).

However, insurers are currently structured around separate lines of business, and may struggle to offer flexible products. Many still lack resources and expertise to develop tariffs based on telematics data. This is likely to be true of other areas in mobility as well. For example, Uber car owners, drivers, and passengers will represent different risks and opportunities on a platform, and insurers could struggle to take a portfolio approach in coordinating insurance and non-insurance products across lines of business.

**Utilised more fully and intelligently,
digital ecosystems present an opportunity
for the insurance industry to reinforce
its relevance to its clients whose tastes
and protection needs are changing.**

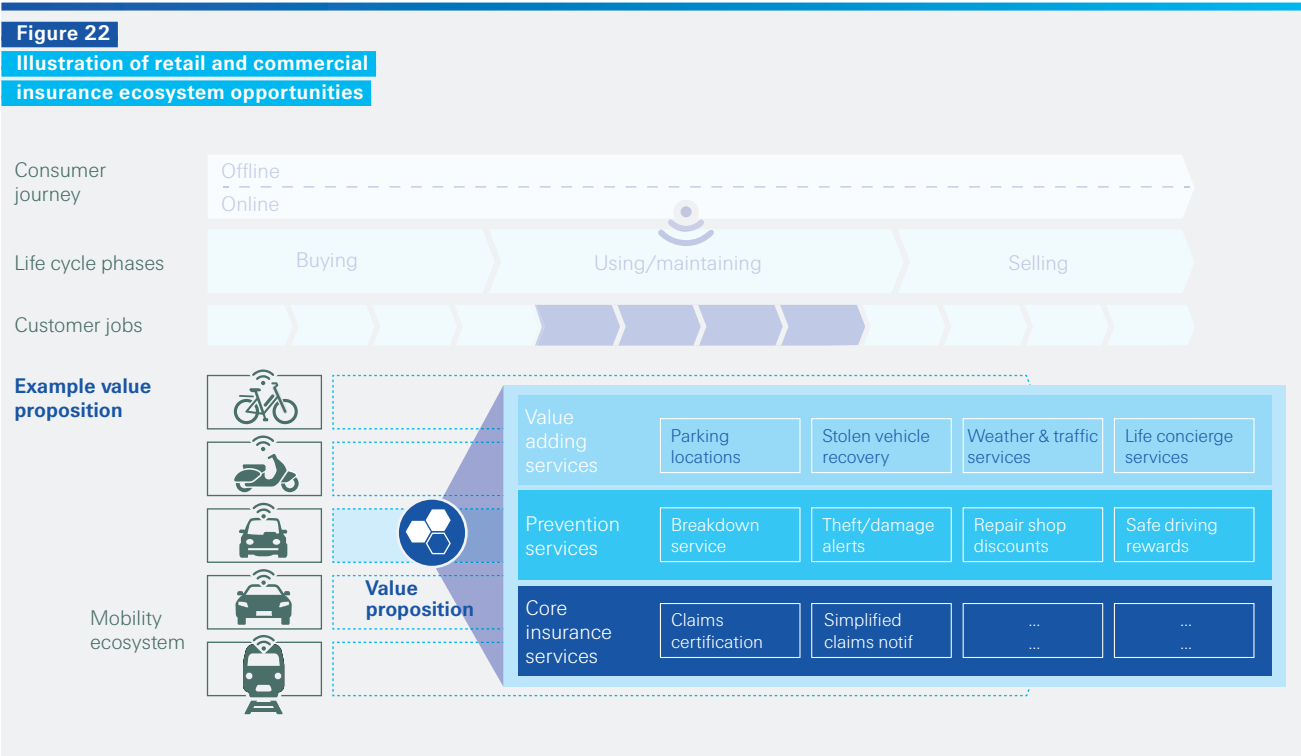
Jonathan Anchen, Head SRI Research & Data Support, Swiss Re Institute



Insurers may need to reinvent themselves and focus on preventing accidents and improving quality of life.

Prevention services

With deeper integration into ecosystems, insurers may need to reinvent themselves as focused on preventing accidents and on improving quality of life for clients through advice. Motor insurers may look to diversify into adjacent markets as well as gather more data or increase their value proposition. They could consider expanding in areas such as car safety features, car repairs, safe travel rewards and/or early warning systems (see Figure 22 for examples).³⁵



Source: Swiss Re Institute

Insurers can partner with firms that enable mobility services and connect vehicles to core business processes.

This will call for closer interaction with clients and more touch points, a challenge for many insurers. Remote diagnostics are increasingly important from a safety perspective. In commercial lines, insurers could partner with companies providing technology to monitor drivers and vehicles to improve fuel efficiency and driver safety, as well as for complying with regulations.

Value-added services

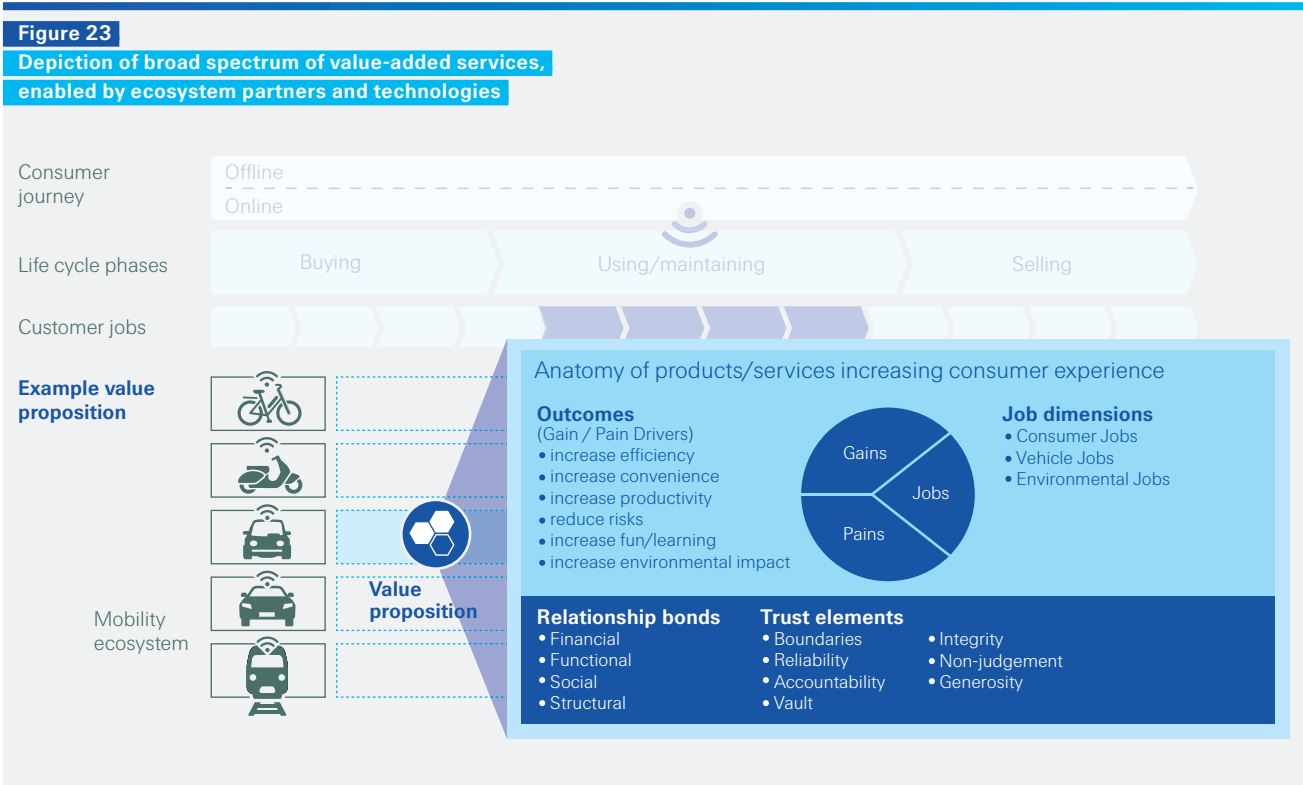
Value-added services could determine the success of insurers as insurance becomes commoditised.

To secure long-term profitability, insurers may need to go beyond prevention services to provide value-added services. Insurers with strong distribution networks, brands and ability to adapt to meet customer needs (simplifying tasks, offering outcomes that reduce pain/improve gain) could develop new relationships based on trust and value add. This could involve improving efficiency, convenience and productivity, reducing risks or increasing fun and learning (see Figure 23).

35 *Insuring the future of mobility*, Deloitte, 13 May 2016, <https://www2.deloitte.com/insights/us/en/focus/future-of-mobility/mobility-ecosystem-future-of-auto-insurance.html>

For most insurers, this would require significant investments...

In theory, insurers can target a number of outcomes. In reality, however, they will need to develop an integrated approach and compatibility within complex ecosystems to deliver enabling services to customers such as large commercial fleet clients. This could involve helping fleets operate more efficiently, receive real-time fuel prices, communicate with nearby drivers and provide route plans. Constructing monitoring systems to enable all this will likely be expensive.



Source: Swiss Re Institute, adapted from: Value proposition canvas (www.strategyzer.com), Chiu, HC et al-(2005). "Relationship marketing and consumer switching behavior", Journal of Business Research, "Dare to lead", Brené Brown (2018).

...and partnerships at a regional or global scale.

Insurers may also seek to partner with large third parties such as OEMs (as some have done with firms like Volkswagen, PSA and Tesla).³⁶ OEMs are already proposing assistance in bundled packages rather than through standalone offerings. However, most potential OEM partners compete on regional and global scale, and smaller local insurers may find it increasingly challenging to develop an appealing value proposition for them.

Implications for the insurance business model

Insurers will need to adapt business models depending on what they want to achieve within mobility ecosystems.

The future role that insurers play in digital ecosystems will depend on two factors: (1) Knowledge of the consumer (the extent to which insurers know the end customer's goals, needs and aspirations; and (2) Business design (the extent to which insurers want to control the insurance value chain, or drive an ecosystem that delivers on end customer needs).

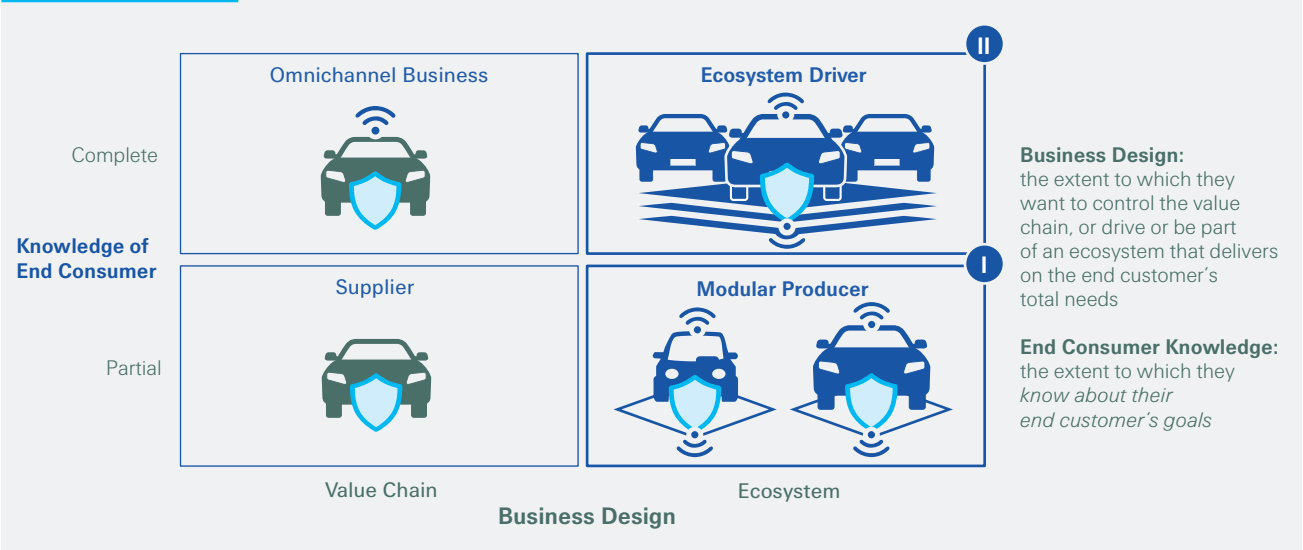
36 Annual Report and Accounts, Direct Line Insurance, 2018, <https://www.directlinegroup.co.uk/en/index.html>

Implications for re/insurers

Those with limited consumer access may act as white label modular producers, others could play larger roles.

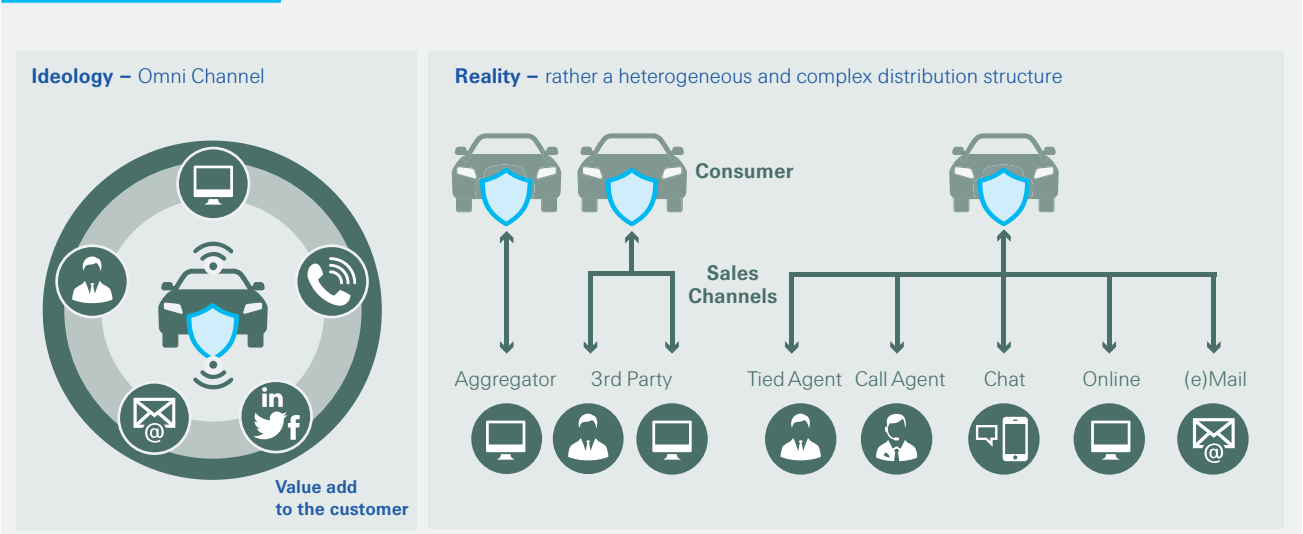
Insurers which possess only partial knowledge of the end consumer and typically sell a standard set of offerings through another company may be able to transform from “suppliers” into “modular producers” (see Figure 24). Modular producers offer white-labelled products or niche underwriting capabilities to third-party mobility ecosystems. Such producers could offer plug-and-play solutions, constantly innovate products, and rapidly adapt to newer ecosystems as they emerge.

Figure 24
Strategic options for insurers in a digital ecosystem



Source: Swiss Re Institute, adapted from: Woerner SL (2015) *Thriving in an Increasingly Digital Ecosystem*, MIT Sloan Management Review, 2015

Figure 25
Depiction of the complexity in the current interactions



Source: Swiss Re Institute

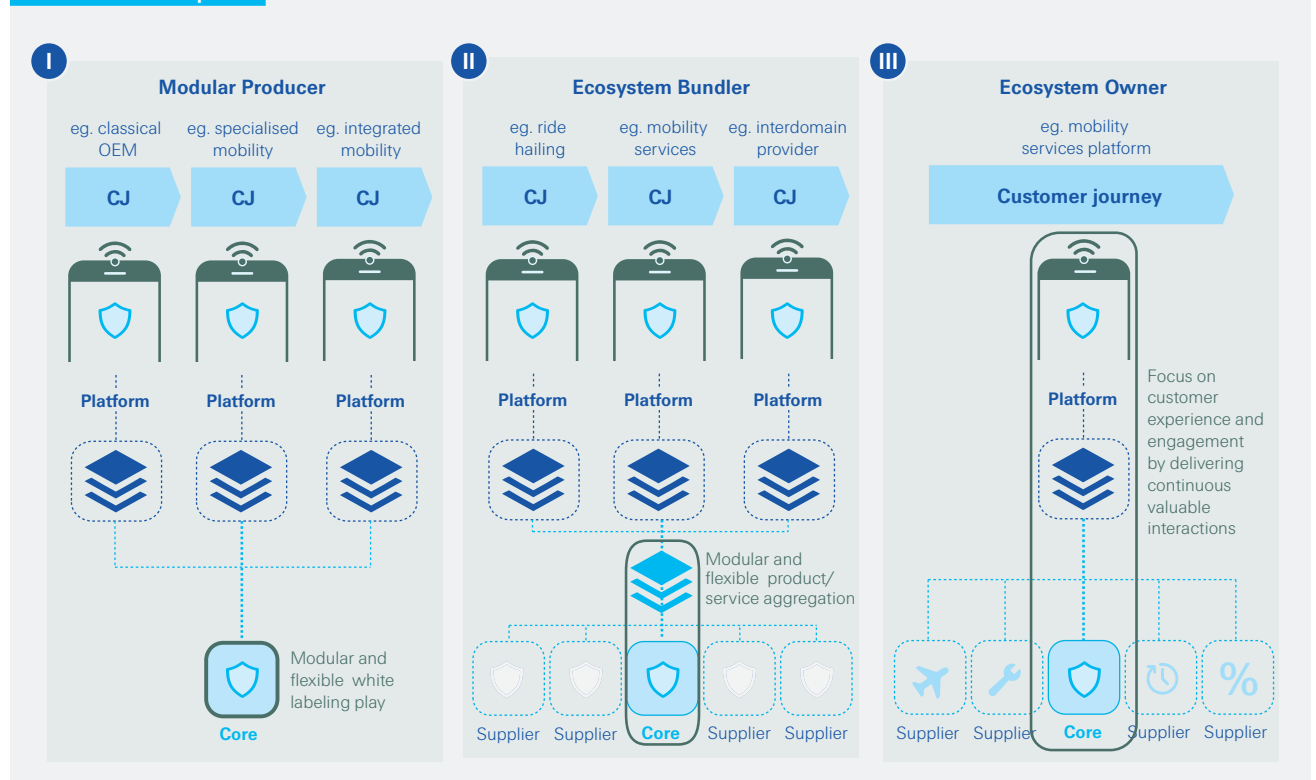
Some will choose to be multi-product, omni-channel insurers.

Such omni-channel firms can become ecosystem bundlers by going-to-market with other channel partners.

Another option for insurers is to aim for an omni-channel structure which allows them to offer a multi-product, multi-channel customer experience.³⁷ However, this is hard to achieve due to the complexity of managing customer interactions through a variety of channels and interactions. Figure 25 illustrates the contrast between the ambitious ideology of a seamless omni-channel structure vs. the reality that most insurers face (ie, navigating a heterogeneous and complex distribution structure).

Insurers that “own” the customer relationship and currently operate as omni-channel businesses with an integrated value chain could take a step further and design their business as “Ecosystem Bundlers”, with modular and flexible product/service aggregation capabilities (see the middle panel in Figure 26). Insurance would remain the core product, but insurers could create relationships with other suppliers that offer complementary mobility services, shown by the red lines in the middle panel of Figure 26.

Figure 26
Detailed view of insurance
business model options



Source: Swiss Re Institute Note: CJ = consumer journey

More aggressive insurers could act as active ecosystem owners or orchestrators.

More aggressive insurers could aspire to be “Ecosystem Owners”. In other words, be the sponsor that provides a branded mobility platform and leverages its customer knowledge and data to match customer needs with third-party providers. They would act as active ecosystem orchestrators, monetising new technologies and services, and accessing new revenue pools through proactive interaction based on continuous flow of data (personal, behavioural).

³⁷ An omni-channel approach allows insurers to easily launch new insurance products that customers can access through various devices and channels.

Insurers can offer an insurance manufacturing solution to many ecosystems, or even bundle other financial products.

Insurers can also build value propositions based on insights within a specific function (eg, health or mobility).

“Where” and “how” to play: a strategic decision for re/insurers

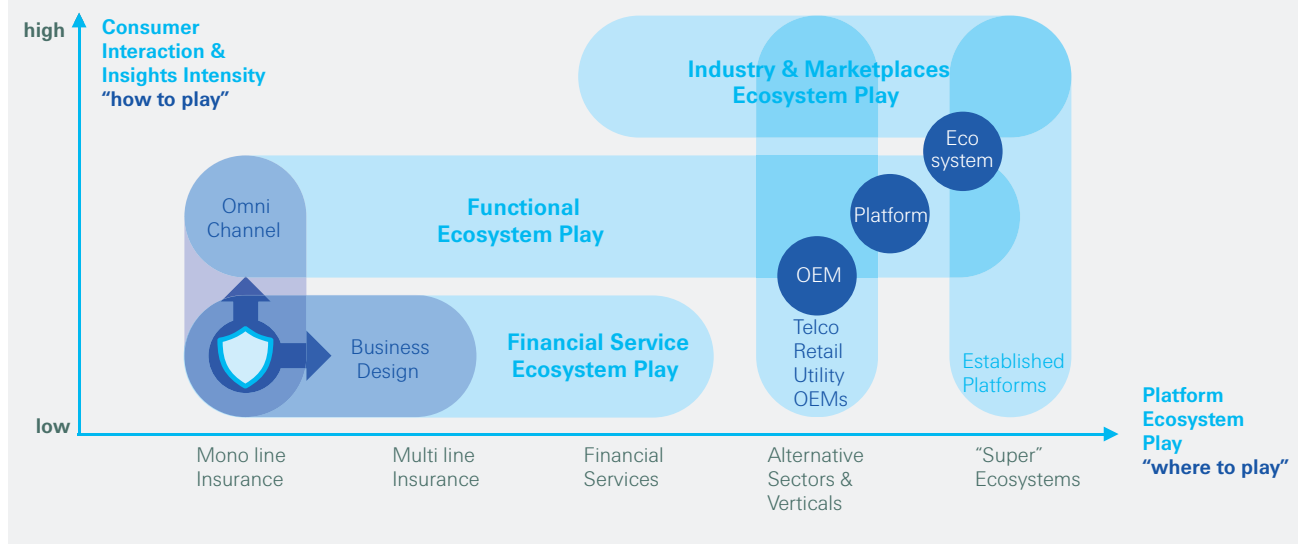
Financial services ecosystem play

A re/insurer ecosystem platform allows participants such as banks, service providers, OEMs and others to access bespoke white-labelled insurance solutions (see Figure 27). These participants would manage the sale, marketing and distribution of insurance covers while re/insurers, as modular producers, take care of policy administration, underwriting and claims services. In some cases, the partners could jointly design products and pricing together with the insurer. The more open a re/insurer’s platform in terms of APIs, the better it can plug into partner apps or websites. In addition to white-labelled insurance solutions, insurers may also aggregate a variety of mobility related financial services offerings from other players into the platform, thus acting as a modular bundler within the financial services ecosystem.

Functional ecosystem play

Alternatively, insurers could engage in functional ecosystems that focus on mobility and transport services. Building globally consistent capabilities and extending reach would mean creating a comprehensive portfolio with specific mobility offerings that suit the target market, tailored to meet regional, cultural and regulatory differences. Due to its digital nature, processes in these ecosystems are provided in a lean and cost-efficient manner, and insurance could serve as one of a variety of inter-connected mobility services.

Figure 27
“Where” and “how” to play:
a strategic decisions for re/insurers.



Source: Swiss Re Institute

As insurers collect more information about the customer journey, they can consider a holistic ecosystem play.

Holistic ecosystem play

Insurers able to aggregate information from multiple functions and develop deep and well-rounded understanding about how consumers and corporations behave would be able to consider a holistic industry ecosystem function. In this role, holistic (risk) insight is a key prerequisite, whereby customer behaviour is deeply understood and products/services tailored accordingly. This would be the hardest space to play in because re/insurers would have to operate in ecosystems that are almost purely digital, driven by high frequency interactions and transactions.

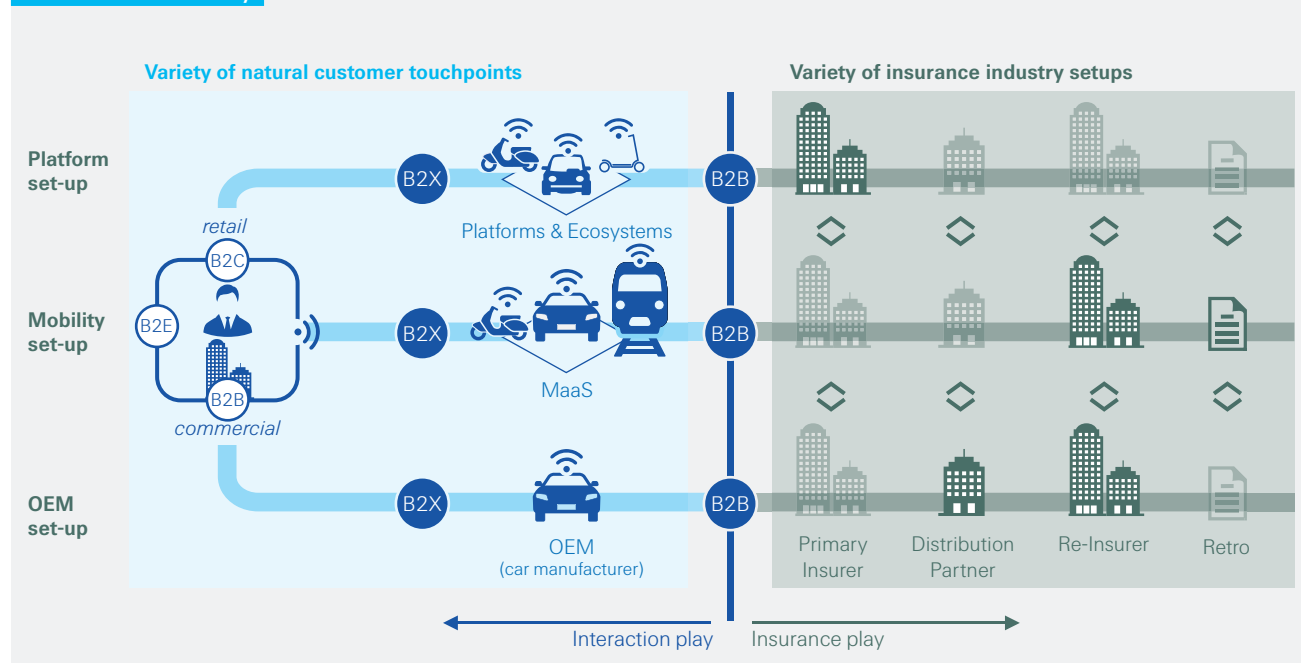
The insurance industry could change in terms of access to risks and in classical composition.

Impact on the re/insurance industry structure

The engagement of insurers with different ecosystems could fundamentally alter the structure of the industry. Different options of risk transfer could be explored as new mobility players emerge (see Figure 28). For example, Auto OEMs are in the early stages of collaborating and sharing data with each other, and access to Big Data could develop risk transfer solutions for newer technology. Capacity could be reallocated directly to alternative capital providers by brokers working directly with mobility ecosystems. Re/insurers or brokers might partner with "Mobility as a Service" start-ups, or larger ecosystems, providing access to risk-absorbing capacity and operational expertise in product, pricing and underwriting.

Figure 28

Impact on the structure of the mobility and insurance industry.



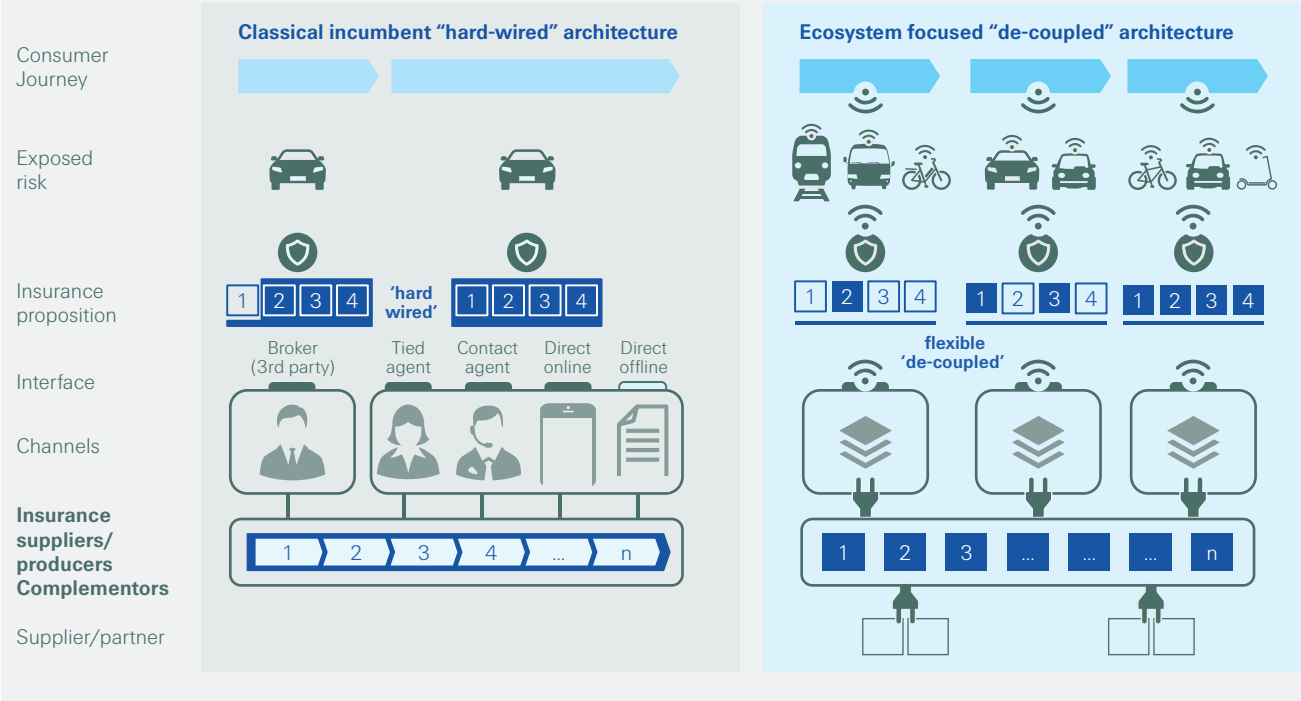
Source: Swiss Re Institute

Product capabilities are almost “hard wired” and cannot be accessed independently through micro-services.

De- and re-coupling of the insurance value chain

Different mobility ecosystems could have very different needs. As a result, insurers will need to move to more granular modules of cover, with modular sets of pricing and underwriting rules. This would be very hard to accomplish today when different elements of the insurance value chain are effectively “hard wired” (as illustrated in left panel of Figure 29), and not easily accessed independently through micro-services or APIs.

Figure 29
Schematic showing de-coupling and re-coupling of the insurance value chain.



Source: Swiss Re Institute

Modularisation is success in ecosystems.

Insurers will have to “de-couple” or liberate elements in the insurance value chain such as risk modelling, pricing, or prevention servicing. They will then need to re-compile services onto a platform, specific to its needs and those of the ecosystem that the platform serves. One platform might only require the pricing component, another might require risk modelling and pricing, whilst a third might need all insurance-related services for their specific market.



Customers are starting to disrupt the mobility landscape and insurers need to make sure they do not miss this opportunity.

Evangelos Avramakis, Head Digital Ecosystems R&D

Conclusion

Will the latest wave of mobility innovation prompt radical changes among insurers?

Several creative players are being drawn to the mobility and transportation ecosystem, from technology companies to ride-sharing innovators to app creators. In times of rapid technological change, market commentary often tends to telescope the long-distant future into the very near term. Historically, however, most innovation in insurance has tended to happen incrementally, shaped by gradual shifts in customer behaviour, risk-absorbing capabilities and importantly the regulatory framework within which insurers operate.

Such innovation will be crucial in responding to current and future competitive threats.

The latest developments in mobility present an opportunity for insurers to reinforce their relevance. Embracing the opportunities presented by mobility ecosystems will ensure that insurers are positioned intelligently to respond to future competitors. At its heart, insurance has always been a data-intensive industry with a unique ability to generate sustainable risk pricing based on actuarial methods and accumulation of risk data. However, with mobility moving to a highly networked, real-time and dynamically priced environment, insurers will be challenged to manage the overwhelming flows of data. They will need to apply behavioural science, and supplement traditional customer research methods to identify context-specific drivers of customers' insurance-related behaviour.

Insurers face an important decision about how they position themselves in the future at the customer interface.

Mobility ecosystems will be user centred and integrated, taking into account user needs and priorities. Customers will increasingly demand the same experience online from their insurers as they receive from other industries. Stand-alone insurance products are unlikely to survive. Insurers will need to begin to refine their product offerings so that risk cover becomes part of a larger package. Within this context, insurers face a fundamental decision: should they focus primarily on being specialised product providers, play a wider role as ecosystem bundlers, or actively design platforms to position themselves at the customer interface, which is presumably the hardest challenge.

Published by:

Swiss Re Management Ltd.
Swiss Re Institute
P.O. Box
8022 Zurich
Switzerland

Telephone +41 43 285 2551
E-Mail: sigma@swissre.com

Armonk Office:
175 King Street
Armonk, NY 10504

Hong Kong Office:
18 Harbour Road, Wanchai
Central Plaza, 61st Floor
Hong Kong, SAR

Authors
Dr. Evangelos Avramakis
Telephone +41 43 285 49 73

Jonathan Anchen
Telephone +91 80 4616 7601

Aakash Kiran Raverkar
Telephone +91 80 4616 7210

Corinne Fitzgerald
Telephone +44 20 7933 4339

Editor
Paul Ronke

Managing editors
Dan Ryan
Head of Insurance Risk Research
at Swiss Re Institute

Jerome Jean Haegeli
Swiss Re Group Chief Economist

© 2019 Swiss Re. All rights reserved.

The editorial deadline for this report was 22 April 2019.
The online version of the report may contain updated information.

Graphic design and production:
Corporate Real Estate & Services / Media Production, Zurich

The entire content of this study is subject to copyright with all rights reserved. The information may be used for private or internal purposes, provided that any copyright or other proprietary notices are not removed. Electronic reuse of the data published in publication is prohibited.

Reproduction in whole or in part or use for any public purpose is permitted only with the prior written and if the source reference 'Swiss Re Institute, May 2019, Mobility ecosystems: striving towards a seamless interface for customers' is indicated. Courtesy copies are appreciated.

Although all the information used in this study was taken from reliable sources, Swiss Re does not accept any responsibility for the accuracy or comprehensiveness of the information given or forward-looking statements made. The information provided, and forward-looking statements made are for informational purposes only and in no way constitute or should be taken to reflect Swiss Re's position, in particular in relation to any ongoing or future dispute. In no event shall Swiss Re be liable for any loss or damage arising in connection with the use of this information and readers are cautioned not to place undue reliance on forward-looking statements. Swiss Re undertakes no obligation to publicly revise or update any forward-looking statements, whether as a result of new information, future events or otherwise.

Order no: 1507590_19_EN

Swiss Re Management Ltd.
Swiss Re Institute
Mythenquai 50/60
P.O. Box
8022 Zurich
Switzerland

Telephone + 41 43 285 2551
Fax +41 43 282 0075
sigma@swissre.com
institute.swissre.com