DeltaHedron
Shaping the future

Innovation Insight

No 2/17 April 2017

DeltaHedron Innovation Insight is a series of reports and newsletters exploring aspects of the technological future and technological innovation, with a specific focus on the strategic business opportunities, threats, risks and impact presented by emerging technologies and the dynamics of technological change

'Anticipating what can happen in the future is one thing, knowing what to do about it is quite another'

The impact of emerging technologies on the insurance industry

Calie Pistorius
calie.pistorius@deltahedron.co.uk

Executive summary

This report examines the **impact** of ***recent trends*** in **technological change**, **innovation** and **emerging technologies** on the **insurance industry**, from a vantage point of **exploring strategic business opportunities, threats and risks**.

- It is evident that a number of **technological innovations** and **emerging technologies** are poised to cause **significant disruption in the insurance industry**. 'Insurance 2.0' will happen in a new world where '**connected, everywhere, any time in real-time**' is the norm and '**instantism**' is expected as part of a **mobile-enabled multi-channel customer experience** which accepts **personalisation** as standard.
- The insurance industry is viewed by many as being very '**conservative**' and certainly not as agile and progressive as their banking counterparts. Insurance is not known for innovativeness and is perceived to be slow to adopt new technologies and business models. Many insurers are hindered by **outdated and costly legacy IT systems** which are entrenching inefficient back office processes such as claims processing, invoicing and particularly **workflow**. Cloud-based IT solutions, application program interfaces (APIs) and everything-as-a-service (XaaS) provide many opportunities to **revitalise back office operations** in the insurance industry, with **insurtechs** and **other fintechs** standing ready to address the gaps. The key is to ensure that **value is delivered to the customer** – as opposed to implementing systems designed 'by insurers for insurers, which are easy for the IT department to use and understand but not appreciated by customers'.
- The **mobile revolution**, underpinned by **broader digital transformation**, is driving much of the disruption, particularly with regard to the customer experience. The **global proliferation of mobile phones** enables personal two-way communication with circa 5 billion people world-wide, with an impact way beyond the ability to just 'talk to friends and family'. It is a very **powerful societal force** enabling billions of people personal access to information, news and services (including banking, insurance, health and education. Mobile signals can reach **remote areas** even where it is difficult to provide electricity, clean water and sanitation.

- The imperative is to create an exciting '**mobile and digital customer journey**', rather than merely 'digitising' paper-based processes (of which many remain prevalent). Mobile technologies present excellent opportunities to build personal **m-relationships** with customers, particularly if the customer can be convinced to install 'your app' on their mobile phone (and keep it there). The key is to ensure that the app delivers value to the customer, rather than just being another channel for unsolicited 'electronic ads'. **Tech companies** such as Google, Apple and Netflix have become the **benchmark reference points** with regard to **customer experience**, rather than peers in the financial services industry.
- Insurance is an **information driven and hungry industry**. **New sources** of **information** as well as processing technologies will **take underwriting to an entirely new level** and are enhancing insurers' ability to manage risk and offer more sophisticated and personalised policies. The advent of **big data, turbo-charged by analytics and artificial intelligence (AI)**, is a game changer. Information from the **internet of things (IoT)**, including telematics from cars, patient generated health data (PGHD) from mobile devices and sensors in the home, as well as '**alternative data**' gleaned from social media sites are providing valuable new types of datasets. The IoT relies on **sensors to gather environmental information**, and it is foreseen that interest in sensors will grow as the IoT expands. This provides significant business opportunities.
- **Cyber security of data and information** remains a very **high priority** for customers, government and the industry, including insurers and other financial institutions. Insurance companies need to ensure that they deploy state-of-art **cyber defences**, which require significant investment and 24/7 attention. **Blockchain** is a high-profile emerging technology with very useful characteristics that have applications in a number of relevant areas in the financial industry, including data security and smart contracts. Insurers should also be considering the nature of their **insurance product offer** in the **evolving data security environment** in the face of constantly evolving new threats and risks.
- **New types of data** from **IoT devices and social media**, coupled with AI and analytics, enable insurers to develop much **more sophisticated risk profiles** of individuals, enabling **personalised policies** (rather than treating an individual as part of a risk pool). At the same time, it enables insurers to **encourage and incentivise** safer and healthier **lifestyles** and **individual behaviour**, aimed at **preventing** adverse events **rather than compensation 'after the accident'**.
- The notions of **personal authentication and 'digital identification'** is an important global issue with a wide range of applications, including many in the financial services sector. It presents major opportunities for businesses.
- Interest and investment in **insurtechs**, a specialised type of fintech start-up focusing on the insurance industry, is rising. These new types of fintechs are power users of emerging digital and mobile technologies such as big data, analytics, the internet of things and blockchain; and are not **hindered** by **legacy IT systems**, corporate cultures and fixed assets (such as brick-and-mortar and branches). They gain **competitive advantage** by **nimbly and swiftly using the technologies** to create **great customer experiences**, enabled by their ability to get close to and learn about their customers' needs and wants. Some insurtechs **compete directly** with legacy players in the insurance sector, whereas others focus on **supporting incumbents** in areas where they are struggling. Insurtechs seem to compete in markets aimed at consumers and small businesses, with many pioneering new business models such as **peer-to-peer (P2P) insurance**. A number of incumbent insurance companies are working with insurtechs, but many are also reported to be working with other fintechs and start-ups external to the insurance industry (many with technology-related foci). There is significant interest in **innovation hubs and business incubators** focusing on fintechs and **insurtechs**, as well as **internal corporate venturing schemes** – although insurers seem to lag behind banks in this area.
- Indications are that incumbent insurers **consider large technology companies** such as Google and Apple as **potential threats**, together with other incumbents; and insurtechs to a much lesser extent. One

recent survey concluded that many **consumers** will **happily switch to the technology companies** if they offered **financial services** (which they currently don't), **including insurance**. In addition to anticipating competition from other companies (and types of companies) as well as emerging technologies, insurers should also consider new business models such as **platform-based models and digital ecosystems** from a competition viewpoint.

- A **number of emerging technologies** are exhibiting an **impact on the insurance industry**, its operations, products and the underlying nature of insured risk. They include data and information-related technologies such as **big data, analytics, artificial intelligence and blockchain**. The **internet of things** will become increasingly important, in part due to its ability to provide new types of data regarding the lifestyles of individuals. This not only allows **personalised risk profiles**, policies and premiums, but also the **ability to influence, encourage and incentivise healthier and safer lifestyle behaviours**. **e-Payments, e-wallets** and **cryptocurrencies** are already changing payment behaviours and preferences. **Robotics** and automation (including chatbots) will have a profound effect on the insurance industry, **with many jobs in the industry slated to be replaced with automated processes**. Other emerging technologies that will impact on the insurance industry include **wearables, digital health technologies, virtual reality and drones**.
- Emerging technologies and technological change will **impact all sectors of the insurance business**, starting with the **nature of insured risk and risk management**, and including health insurance, life insurance, property and casualty insurance and microinsurance. It is already having a significant impact on the **auto insurance** industry, fuelled by the use of **telematics and usage-based-insurance** (UBI). There are a number of predictions that the **auto insurance business is ripe for a major disruption** and that it will experience a **significant shrinkage** in its current form in the near future. Technological change and emerging technologies always bring **new opportunities and inspire new lifestyles** which often lead to **new societal trends** – all of which bring **new risks**. Insurers should always be vigilant about **new technological-induced risks** that **need to be insured**, including those posed by emerging technologies currently on the radar screen.
- Financial institutions, including insurance companies, operate in a **heavily regulated environment**. **Governments** are keen to **stimulate innovation** as a driver for economic growth. However, innovative technologies, companies and business models bring **new risks** which may not be completely understood and have unintended consequences. Regulators are aware that regulations designed for the incumbent industry may stifle innovation. The **dilemma** is to find a balance between the **encouragement of innovation** while at the same time **protecting the public and financial system**. To address this issue, authorities in the UK, Singapore and elsewhere are starting to introduce the notion of a '**regulatory sandbox**', which allows companies to **test innovative new financial products and business models** for limited time and a limited market within well defined parameters.

Emerging technologies and technological innovations, particularly those driven by digital, mobile and data, are set to the disrupt the insurance industry in a number of ways - 'creative destruction' on steroids. Opportunities abound for the swift and nimble who can leverage the emerging technologies to create greater customer value and enhance efficiency. At the same time those unable to adapt will probably follow their technologies into obsolescence. New insurtech start-ups are seizing opportunities, but incumbent companies who develop and implement forward-looking innovation strategies can remain formidable players.

DeltaHedron Ltd is a UK-based business consulting company specialising in the management of technological innovation. We support our clients with the development and implementation of innovation strategies, and in assessing and capturing the strategic business opportunities and mitigating the risks and threats presented by emerging technologies and the dynamics of technological change.

Contents

Executive summary 1
Contents 4
1. Introduction 5
2. Disruption in the insurance industry 6
   2.1 The changing nature of insured risk 6
   2.2 Technological disruptions in a 'conservative' insurance industry 6
   2.3 Digital transformation in the financial industry. 7
   2.4 'Momentum of legacy' 7
   2.5 The mobile revolution and its implications for the insurance industry 11
   2.6 Fintechs and insurtechs 13
   2.7 The changing customer experience 16
   2.8 Liability 18
3. Emerging technologies - driving opportunities and threats in the insurance industry 18
   3.1 Information and data security 18
   3.2 Big data, alternative data and useless data 20
   3.3 Analytics 21
   3.4 Artificial intelligence 21
   3.5 Internet of things (IoT) - enabling personalisation and reducing uncertainty 22
   3.6 Wearables and digital health technologies 23
   3.7 e-Payments, e-wallets and cryptocurrencies .. 23
   3.8 Robotics and employment 24
   3.9 Chatbots 24
   3.10 Virtual reality 25
   3.11 Drones 25
4. Technological impact on different types of insurance segments 25
   4.1 Risk management 25
   4.2 Car insurance 25
   4.3 Health insurance 28
   4.4 Life insurance 28
   4.5 Microinsurance 29
   4.6 New technologies require new types of insurance 29
5. Incubators, innovation hubs and sandboxes 29
   5.1 Corporate innovation labs and incubators 30
   5.2 Sandboxes – a regulatory innovation 31
6. Discussion 31
Appendix 34
The dynamics of technological change, technological innovation and the nature of emerging technologies 34

This report is not intended to be a historic review or an exhaustive discussion on the insurance industry or technological developments in that industry. Instead it discusses a *selected number* of *relevant recent* developments which may be helpful in the assessment of strategic business opportunities, threats and risks posed by emerging technologies, innovation and technological change in the insurance industry.

The report also considers the technological impact on the wider financial industry where appropriate, since of the technologies that impact on the insurance industry will necessarily also have an impact on the broader financial services industry, including banking. In the same vein, insurtechs are considered to be a subset of fintechs, and hence many of the general fintech-related trends discussed will also impact on insurtechs.

An analysis of technology-related strategic opportunities, threats and risks, needs to account for a range of factors, including evolving markets, industry structures, regulatory environments and economic conditions. This report does not emphasize all of these, but instead focuses on technological change as a driver of innovation.

1. Introduction

It is estimated that the global insurance industry is worth circa $5 trillion[1]. Yet there is a view that **insurance companies** are at **risk of losing a share** of this valuable market to new entrants, mainly because **incumbent legacy players** have been even **slower** to **embrace innovation** than their counterparts in other financial services industries.

This edition of ***DeltaHedron Innovation Insight*** examines the impact of a number of recent trends in technological change, innovation and emerging technologies on the insurance industry, from a vantage point of exploring strategic business opportunities, threats and risks.

A **number of emerging technologies** have the ability to **reshape the nature of insured risk**. **New sources** of **data** originating from the **internet of things** and **social media**, coupled with **big data, analytics and artificial intelligence** now provide the ability to **personalise risk profiles**, policies and premiums; and to encourage and incentivise safer and healthier lifestyles in an effort to **avert adverse events** rather than paying compensation 'after the accident'.

There is a view that many insurance companies are very 'conservative', slow to innovate, resistant to change and not proactive to adopt new technologies. This is due in part to the '**momentum of legacy**' imposed by their legacy IT systems, but is also a reflection on the culture in the industry.

All of this is **about to change**, as new emerging technologies enable **customer experiences** are now **'connected, everywhere, any time in real-time'**, 'instantism' is expected and personalisation is standard. New entrants, including **insurtech start-ups and large tech companies** from the outside the insurance industry as well as new **platform-based business models** are all poised to grasp new opportunities in insurance, putting incumbents at risk. **Incumbent companies** who develop and implement **forward-looking innovation strategies** can, however**, remain formidable players**.

Various aspects of disruption in the insurance industry are then considered, including the changing nature of insured risk, the hindrances of a 'conservative' industry and the digital transformation in the financial industry. The effects of the 'momentum of legacy' are discussed, with an example of the demise of branches in the banking industry, as well as the challenges of 'keeping the IT lights on' and a number of new technologies such as cloud, XaaS and API to improve back-office efficiency. The mobile revolution is driving much of the disruption, and hence its impact is discussed in some detail.

> "Whereas inventions create new knowledge, innovations create new wealth"

Insurtechs and other fintechs are exploiting new technologies and the customer experience, with some competing directly with incumbent insurers and others providing support. The nature of insurtechs and fintechs are considered, including recent investment trends and the competitive landscape.

The changing customer experience is a major driver of change, and the report examines the notions of personalisation, mobile-first, generationalism and 'instantism'. New technologies bring with them new risks, which in turn requires a new look at liabilities.

Recent trends pertaining to the impact of a number of emerging technologies on the insurance industry are discussed, including information and data security, personal authentication and digital identification, blockchain, big data, analytics, artificial intelligence, the internet of things, wearables, e-payments and cryptocurrencies, robotics (and its effect on employment), chatbots, virtual reality and drones.

A cross-cutting analysis considers the impact of technological change on a number of insurance sectors, including car insurance, health insurance, life insurance, microinsurance – and the notion that emerging technologies in general require new types of insurance. Recent trends in corporate insurance ventures, including innovation hubs and incubators are discussed, as well as the introduction of regulatory sand boxes. The report concludes with a summary and discussion.

An appendix provides a brief look at the dynamics of technological change and the processes of

[1] http://www.businesswire.com/news/home/20170329006244/en/Artificial-Intlligence-Internet-Attract-InsurTech-Funding-Globally

technological innovation, which are helpful in understanding the trajectories of emerging technologies, how they develop and interact with other technologies.

2. Disruption in the insurance industry

A number of trends are driving transformational change in the insurance sector, as well as the broader financial services industry. These include new technologies (and the legacy of old technology), changes in the competitive landscape, distribution and business models, customer behaviour and regulation. In this discussion, the focus is specifically on the technology and innovated related drivers, but it is important to recognise the other dimensions and changes including social, technological, environmental, economic and political on a macro level, as well as changes on a micro level on the industry and company levels.

2.1 The changing nature of insured risk

Organisations and individuals need to make decisions about the future in the face of **uncertainties** of what that future will hold. These uncertainties create **risks**, which can in broader terms be thought of as either the **probability of an adverse event** or the **probability of missing a good opportunity**. Actions aimed at mitigating risks and reducing the uncertainties include the gathering of more information, data and intelligence; diversifying; and obtaining insurance. Businesses are very interested in exploiting new opportunities, although it is also important to continuously assess threats, including those presented by emerging technologies.

It is the protection against the adverse effects of risk that lies at the heart of the insurance business, where an organisation or individual requiring the insurance pays a premium, in exchange for which they expect to be compensated by the insurer for damage if the adverse effect happens.

The ability to gather information about and anticipate the future, whether is called estimating, forecasting, predicting, foresight (or crystal ball gazing), is a key component of the insurance model. Actuaries use comprehensive assumptions ('best estimate') as the basis for complicated actuarial models to calculate the 'net present value' of the future. The concept of '**pooling**'**,** where a large cohort is insured as a pool, based on average parameters and probabilities, is central to the model. It relies on big numbers, statistics and probabilities, in the absence of knowing what will really happen to a specific individual person or element in the cohort. The insurer then hopes that the pool of insured individuals is large enough to account for the variation in the predictive model, i.e. the insurer takes in more in total premiums than it pays in compensation to the individual cases that do actually suffer damage.

> "….it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"
>
> …said the Red Queen
> *Through the looking-glass*
> Lewis Carroll

In order to do this, the insurer needs to understand the nature of the risk that is being insured. This can, for example, include an individuals' health in the case of health insurance, the probability of an accident in the case of automobile insurance or the probability of a bridge collapsing in the case of the professional liability insurance for a structural engineer. Even though pools are insured, it is the behaviour of individuals that effect individual cases.

2.2 Technological disruptions in a 'conservative' insurance industry

The **rise of fintech** ('financial technology') is turning the world of finance upside down. This includes the insurance industry, with emerging new 'insurtechs'. Insurtechs are enabled by a number of emerging technologies which are driving disruption in what is generally described as a 'conservative' insurance industry.

Even though **insurtechs** and other fintechs and are **important manifestations of the technologically enabled disruptions** in the financial industry, they are not the only emerging innovations causing disruption. A **number of emerging technologies** are now **impacting on the insurance industry** to extent that the **traditional assumptions** about business models are not only being **challenged**, but are

fundamentally being changed, with all the disruptions to the industry that **'creative destruction'** brings.

A recent survey of CEOs by PWC (2017) indicated that chief executives in the insurance industry **expect more disruption going forward than in any other sector**[2]. Two-thirds of the CEOs consider creativity and innovation as very important to their organisations, more than in any other financial services sector. Interestingly, while 60% see more opportunities, 61% anticipate more threats. Relevant to this report, 86% per cent of CEOs in the insurance industry believe that **"technology will completely reshape competition in the industry or have a significant impact over the next five years"**. A recent report from Accenture[3] (2017) indicates that 86% of the respondents believe that they "**must operate at an increasingly rapid pace simply to retain a competitive edge**".

The insurance industry has been seen by many as '**conservative**' – a euphemism that it has been slow[4], or least somewhat slower than other industries (even in the financial sector), in adopting new business processes and models, 'a bit' resistant to change and reluctant to exploit the advantages of new technologies[5].

> "Be in the city around lunchtime and stop the people walking around carrying big reams of paper – they're insurance brokers"

There are signs that the pace of change is picking up, no doubt spurred by a number technological innovations which are poised to disrupt the insurance industry.

First movers (including new types of companies, such as insurtechs, but also incumbent players) and **(very) fast followers** will **reap the benefits** of the disruptions, whilst **laggards** and luddites will be **marginalised**, left in the wake and pay the price. All business, by its very nature, engages with the financial sector. Hence no firm is immune from the disruption in the financial industry - including the insurance industry - and every organisation should have a strategy to harness and capture the opportunities and mitigate the risks. In the case of the insurance industry, this applies not only to companies but also to individuals who want to insure their personal possessions, health, lives, pets and travel, amongst others.

2.3 Digital transformation in the financial industry

Digital transformation is without a doubt one of the most significant drivers of change in the financial sector. Not since the 1970s, which saw the introduction of financial and technological innovations such as index mutual funds, discount brokers and ATMs[6] (all against the backdrop of the broader wave of digitalisation) have we experienced the **scale of disruption** that is now evident. Some go so far as to say that one is either 'living in a pre-fintech or a post-fintech world'[7].

This is not a new insight of course. Computers (and what used to be known as 'data processing') have been used in the financial sector for many decades. However, digitalisation is much more than 'going paperless' – it is about **providing a digital customer journey**. What is important is how new and emerging digital-based technological changes are impacting the industry *now* and what that future impact will be – **creative destruction on steroids**.

The 'new digital transformation' also brings with it cryptocurrencies, such as bitcoin. The engine of bitcoin is blockchain, a very powerful algorithmic technology the provides data security through a distributed ledger system. It is important to note that the use of blockchain is not limited to bitcoin and other cryptocurrencies. It is a much more universal technology and is at the core of many new digital innovations, including smart contracts.

2.4 'Momentum of legacy'

Technological disruption often requires one to make step changes in **embracing not only the adoption of new technologies**, but also in **abandoning legacy trajectories** and embarking on entirely new

[2] http://www.pwc.com/gx/en/ceo-agenda/ceosurvey/2017/gx/industries/insurance.html
[3] http://www.fintechinnovationlablondon.co.uk/pdf/The-Rise-of-InsurTech.pdf
[4] http://uk.businessinsider.com/route66-ventures-and-anthemis-on-insurance-fintech-2015-9
[5] https://medium.com/@kyronGlobal/fintech-more-than-just-banking-31134acef00
[6] http://www.businessinsider.com/fintech-ecosystem-financial-technology-research-and-business-opportunities-2016-2?IR=T
[7] https://generalassemb.ly/blog/fintech-innovation-blockchain-panel-at-general-assembly/

directions of travel. This requires **vision, boldness and courage – and is not for the faint-hearted**.

The historic development of the financial industry has created many legacy structures, technologies, processes, products and cultures. Many of the legacy assumptions have become 'part of the furniture' and are accepted as a given, rather as something to be challenged.

> The '**momentum of legacy**' … is one of the greatest hurdles when it comes to creating value in a new world

The '**momentum of legacy**' – the difficulty of letting go for whatever reason, including just the financial, energy and physical challenges of renewing - is one of the greatest hurdles when it comes to creating value in a new world enabled by new technologies. The **imperative to 'challenge assumptions'** without fear of favour is a very powerful instrument (asking 'why' as well as 'why not') in creating future value, particularly if it can be enabled by new emerging technologies that are within our reach.

In order to '**see what is coming next**', to grasp the nature of the disruptions, to understand why they are occurring and how they will create future value, it is useful to also understand how we came to be where we are in the insurance industry and the broader financial industry and how the technological development trajectories that brought us here, evolved.

2.4.1 Reviewing root and branch

Consider an example from the banking sector to illustrate the point. In a former era, before computers when paper was king, banks relied heavily on **branches** to conduct their business[8]. As the banks started converting from paper-based to digital-based systems, not all branches were digitised at the same time. Subsequently many of the **digitised processes were in essence just electronic copies of paper-based processes**, rather than exploiting the new technologies to the full. In many ways banks continue to interact with their customers and each other in a digital representation of the paper world of the 1970s. The practice of tying account numbers and sort codes to branches, for example, reflects back to this - an unnecessary complication in a connected and digitised world, yet one that remains pervasive even today. How often are we still asked to provide the physical address of our bank branch in the course of a transaction?

Customer demand has shifted away from branches, due in part to technological innovations that have enabled more convenient ways of doing banking. Customers now want to do their **banking online** and **increasingly on mobile platforms**, without the inconvenience of going to a branch (to deposit a cheque for example). Not surprisingly, branches are **no longer viable** nor can they all provide the services that customers want and expect. One financial services company has revealed that more of its customers engage with its mobile app in one minute than visit all of its physical locations combined in one week.

Many of the customer-facing decision making powers that customers want have now been removed from **branches** and centralised, but branches are still **saddled with backward compatibility with the legacy paper-driven processes**. Traditional branches have become costly. It was reported in 2015 that the top 25 banks were spending more than twice on their branch networks ($500 billion in 2012) than the top 25 global tech companies were spending on R&D[9]. The branch model is clearly **not sustainable** and banks are now rethinking this fundamental premise of their business model. No surprise that they are reconsidering the value of branches and the fact that many branches are closing.

> "Incremental innovation and marginal cost savings won't be enough to sustain profitability and growth in this disrupted [insurance] marketplace"
> PWC, 2017

[8] http://zafin.com/our-articles/banks-sleepwalking-extinction/

[9] http://zafin.com/our-articles/banks-sleepwalking-extinction/

2.4.2 Hybrid branches

The diffusion of emerging technologies as they substitute mature technologies are sometimes accompanied by '**hybrid solutions**' – products and services which incorporate elements of the old and new technologies in the same artefact, often as an **interim transitionary measure**[10]. We saw ships with sail and steam propulsion and aircraft with propeller and jet engines, for a while at least, and now cars with internal combustion and electric engines.

It is interesting to note the adoption of '**hybrid branches**' by some banks[11]. Traditional branches are closed and replaced by hybrid branches, often in the same site. These hybrid branches no longer have humans serving clients at counters. Instead, they have full-service ATMs with employees walking around to assist clients with the use of the machines.

2.4.3 'Keeping the IT lights on'

We are living in a **mobile, 'connected, everywhere, anytime and in real-time**' world, where peer-to-peer lending is transforming loans, crowdfunding is shaking up investment, new electronic payments methods are changing the way we pay online and blockchain technology is enabling new cryptocurrencies as well as providing an enhanced level of cyber security.

It is not surprising that banks are **investing huge amounts in their IT systems** and offer. Some question though, whether it is not the '**wrong type of IT**'[12] and if banks are spending enough on the right sort of IT that will deliver the **transformational new value** that customers want. It is estimated that of the circa £1 billion a Tier 1 bank typically spends on technology, more than 97% goes to **incremental improvements or routine maintenance and upgrades**[13] ('to **keep the lights on'**). A recent study has shown that banking executives may be a bit over optimistic about what they are really achieving[14]. The majority of surveyed executives (70%) rated their proficiency in digital transformation readiness high; however just 38% of executives and 42% of employees were of the view that decisions were made in real-time and only 50% of executives and 46% of employees thought their organisation can adapt to real-time decisions. This **does not bode well** in a world where **'everywhere, anytime and in real-time' is demanded,** and 'real-time' (and '**instantism**') is an important metric for the **quality of decision support** driven by big data and analytics. A recent report (2017) indicates that **only 9%** of companies in the financial services industry claim to be '**digital first**', compared to 11% across all sectors[15].

Financial institutions expect their IT departments to improve efficiency, reduce costs and at the same time facilitate innovation. This is a **challenging ask**, particularly when IT departments are trying to balance the costs associated with supporting their legacy IT systems. Recent reports suggest that the **IT departments of legacy insurance providers** are having **difficulty in coping with all of this**. It is difficult enough trying to maintain an even keel with legacy IT systems which were designed in very different era - some legacy systems used for managing claims processes are more than 40 years old and written in Cobol. **Trying to innovate and disrupt** whilst **at same time** maintaining and continuing to spend on (also known as 'invest in') the same legacy systems that are to be disrupted, is **difficult**. The fact that new fintechs can exploit new technologies which resonate with the current environment without the burden of maintaining and transforming legacy systems is proving to be a huge competitive advantage.

Digital transformation – ***creating a digital customer journey*** - has become an essential business process in the insurance industry, with delay a serious risk. Two comments from recent reports resonate here, viz. "Most insurers have been slower than other types of financial services companies, such as banks, to rethink their business from the customer's point of view—and to invest in end-to-end transformation of legacy technology systems that makes shaping customer journeys possible"[16] and "Insurers should draw inspiration from the enthusiastic example set by retail banks. They can also learn from the

[10] The notion and role of 'hybrid products' is a very interesting one in own right, and essential to understand as part of a company's broader innovation strategy.

[11] http://www.bbc.co.uk/news/business-39503707

[12] The British will no doubt fondly recall the notion of 'the wrong type of snow…'

[13] http://zafin.com/our-articles/banks-sleepwalking-extinction/

[14] https://www.forbes.com/sites/sap/2017/01/19/study-shows-financial-industry-exposed-to-major-threats/#7c45a6379f20

[15] https://econsultancy.com/reports/2017-digital-trends-in-financial-services-and-insurance

[16] https://www.bcgperspectives.com/content/articles/generating-value-while-transforming-insurers-legacy-technology/

different models employed by banks when engaging with the FinTech Scene"[17].

The environment is dynamic, the pace of change is fast and flexibility remains important. Comparisons with industry peers no longer define customers' digital expectations. Instead, **digital leaders outside** the insurance industry such as Netflix, Apple and Google or new insurtechs, such as Oscar and Lemonade, have become the **benchmarking reference points**.

Although customers focus is said to be top of mind, one often gets the impression that systems and customer interfaces in banks are 'designed by bankers for bankers', rather than for customers and an enhanced customer experience – and similarly for insurance. It is important that **new systems** are chosen and designed to be **customer friendly**, rather than something that is easy for the IT department to use and understand, but not appreciated by customers.

2.4.4 Going forward - Cloud, XaaS, APIs and workflow

Applications and data storage are increasingly being moved to the **cloud**, i.e. offsite hosting accessed through digital connectivity, very often by a third party such as Amazon Web Services (AWS). A recent survey indicated that 84% of institutions are operating in the cloud, with 50%+ reporting that cloud reduced the amount of work for IT teams[18]. Cloud based computing relieves the user of the need to own and maintain hardware (servers, data storage and the related infrastructure) on-site, but introduces other concerns regarding data security and availability. In the case of financial institutions, there are also regulatory restrictions as to what can be hosted in the cloud.

An analogous trend is **software-as-a-aervice (SaaS)**, where the user does not own the software system, but rather pays for use. The software would typically be hosted in the cloud. The concept of SaaS is rapidly being expanded to a range of other areas, from aircraft engines to tyres for personal cars. This is a manifestation of a **'no-need-to-own' culture** that is developing, leading to **everything-as-a-service (XaaS)**. The insurance industry needs to consider policies for XaaS users (renting a car, for example) as opposed to owner policies (owning a car). Mindful of insurtechs, **platform-as-a-service (PaaS)** can be a useful model for the insurance industry to consider.

The integration of **APIs (application program interfaces)** is an important element of digital strategies all businesses should be aware of, including insurance companies. In Europe, for example, the new Payment Services Directive (PSD2) will take effect in 2018. Financial institutions will be required to open up their application program interfaces (APIs), enabling fintech apps and services to tap into users' accounts. This will shake things up considerably and significantly lower entry barriers for new entrants (such as insurtechs and other fintechs).

> "...almost all insurers in the US and Europe use complex legacy technology that constrains their ability to operate in today's digital world"
> BCG. 2016

As is the case with other businesses, insurance companies need to ensure that their **back-office processes** (including the streamlining of business processes, time management, reducing the cost of doing business and eliminating unnecessary paper-based systems) are **effective and efficient**. A number of recent reports emphasise the **inefficiencies of legacy systems**. Invoicing in the insurance industry, for example, is one of the areas that is ripe for innovation (and one that will no doubt be addressed by insurtechs and other fintechs).

Another problem area highlighted in recent reports is the use of better, automated and digitised **workflow**[19] processes in the insurance industry. According to one report, insurance agents using digital workflows reported a 65% cost reduction and 90% reduction in turnaround time on key processes. Enhanced workflow processes enable agents to spend less time on paperwork and more time to interact with clients.

Above all, it is import to deliver **value to customers**.

[17] https://www.insly.com/en/blog/3-technology-trends-for-the-insurance-industry-in-2017/

[18] https://www.insly.com/en/blog/3-technology-trends-for-the-insurance-industry-in-2017/

[19] https://www.insly.com/en/blog/3-technology-trends-for-the-insurance-industry-in-2017/

2.5 The mobile revolution and its implications for the insurance industry

The **mobile revolution** is now fuelling **a new era of the digital transformation** in the financial services sector. Customers are expecting to access their bank accounts with mobile apps and are embracing new types of **electronic payment systems** and e-wallets such as PayPal and Apple Pay. Mobile-driven e-commerce is creating increasingly greater opportunities for small businesses, with peer-to-peer sites like Etsy and Shopify putting small business head to head with large retailers.

Enter technology savvy, customer oriented insurtechs and other fintechs, who are capitalising not only on digital innovation, but particularly on emerging mobile technologies (without the need to deal with legacy IT systems and other high overhead fixed assets).

Digital and mobile

It is important to distinguish between 'digital' and 'mobile'. In essence 'digital' refers to products and processes which are performed and transmitted in digital format (as opposed to analogue format). Compare for example a watch with a digital display to a traditional analogue watch showing the time with hour, minute and second hands; or the analogue dials in cars indicating speed and engine revolution as opposed to the digital display of distance travelled on the odometer.

'Digital' is the language of computers and peripheral hardware devices, software as well as modern telecommunication transmissions (although older analogue broadcasting and transmission systems are still around – think FM and AM radio).

Devices which can be carried around are 'portable', with 'mobile' in the context of this discussion typically referring to mobile phones, smart watches and tablets (and their connected peripheral devices) that can connect via the internet. They do this directly through wireless networks or via local wifi connections to networks in homes, offices, public spaces and so on. Most modern mobile devices now communicate through digital channels (typically 3G or 4G with 5G to follow soon).

'Bluetooth' is wireless-type connection used for communicating between devices over very short distances, but is not used with the 3G, 4G and 5G networks or internet networks.

The **mobile revolution** provides an excellent **opportunity** for insurers to **reach potential clients** everywhere, anytime and in real-time. From a business engagement viewpoint, mobile enables the business (insurance agent) direct, personal and immediate access to the client and vice versa, either through a call or text. It provides a new mechanism for building and maintaining relationships ('**mRelationships**'). The imperative is there to search for ways in which to connect and engage with customers in the most convenient way. As mobile and related technologies are changing business-to-consumer (B2C) transactions, new opportunities for both sides are emerging. Consumers now have access to a range of tools that help them gauge prices and pay, find alternatives, locate vendors and shop; and they use a multitude of channels. Businesses are seeing benefits and leveraging technology to help them build their brands and stronger relationships with customers.

Mobile phones not only connect two parties one-to-one, they also enable **one-to-many** and **many-to-one communications**, news distribution and information exchange. This is partly enabled by the growth in social media and the fact that people are using multiple channels to communicate. It is underpinned by a number of mobile-related trends and the staggering proliferation of mobile phones across the globe.

The diffusion of mobile telephony across the globe

Mobile phones have a huge and growing global penetration. It was estimated in 2016 that by 2020, 5.4 billion people around the world will have a mobile phone, compared to 5.3 billion people will having electricity and 3.5 billion people having running water[20].

According to the World Development Report (WDR) 2016[21] (*Digital Dividends*), among the poorest 20% of households, nearly 70% have a mobile phone, improving their access to markets and services. It mentions that "In rural Niger, agricultural price information obtained through mobile phones reduces the search costs by 50%. The poorest households are more likely to have access to mobile

[20] https://www.cnet.com/uk/news/by-2020-more-people-will-own-a-phone-than-have-electricity/

[21] http://www.worldbank.org/en/publication/wdr2016

phones than to toilets or clean water." However, the costs of connectivity are very high in developing countries, with the median mobile phone owner in Africa spending more than 13% of their monthly income on phone calls and texting. In the Central African Republic, one month of internet access costs more than one and a half times the annual per capita income.

The WDR estimates that more than 40% of the world's population has access to the internet with new users coming online everyday. It also notes that with nearly 60% of the world's population still offline and not able to participate fully or at all in the digital economy, universal 'digital dividends' have not spread. The report concludes that "to maximize the digital dividends requires a better understanding of how technology interacts with other factors that are important for development". The report refers to these factors as the 'analog complements' of digital dividends and makes the case that they need to be addressed on a global scale.

The proliferation of mobile phones is, in turn, also driven by innovative schemes for buying airtime such as pay-as-you-go and ever increasing bandwith and coverage. 5G wifi will soon be a practical reality and bring with it tremendous advances over current 3G and 4G wifi systems. This will significantly enhance the competitiveness of wifi technology. Mobile devices can operate wherever a mobile signal can be provided. This can often be done in remote and rural areas, even where the distribution of water or the large-scale distribution of electricity is problematic. Mobile devices in these areas can be charged via solar panels or other smaller renewable sources.

Mobile access to services, including financial services, is becoming the access of preference ('mobile-first') for many segments of customers.

The **worldwide proliferation of mobile phones** is truly **empowering the global population** – noting of course the imperative above to provide affordable digital access to those who do have it. It not only allows people to contact relatives and friends, but also enables a two-way exchange of information, commercial activity and social development on a scale and with a scope not possible and never seen before. Individuals everywhere, from developed urban areas to very remote rural environments, can instantaneously receive news, information, and education (as they can with radio and television). With mobile phones, however, the messages can be personalised, they can access personal services and they can also respond. The ability of billions of people to participate in two-way communication via wifi and to respond personally, is a **very powerful and life-changing global societal force**.

One of the other benefits that the mobile revolution has brought is enabling of large numbers of people to become **'bankable' and 'insurable'** – a huge emerging market, also for fintechs and insurtechs.

> "The ability of billions of people to participate in two-way communication via mobile phones is a very powerful and life-changing global societal force "

The digital and mobile revolutions have also given rise to social media, underpinned by a growing 'sharing economy', and a **demise of the 'need-to-own'** as one of its characteristics. New **platform-based companies** such Airbnb in the hospitality industry, Amazon and Alibaba in the retail industry and Uber in the taxi industry are disrupting the legacy industry structures. The same phenomenon is occurring in the banking industry, with **peer-to-peer (P2P)** lending schemes. In the insurance industry, we are now also seeing the emergence of P2P insurance, based on self insuring groups connecting through P2P insurtechs.

Apps are important for utility but also for brand awareness

Mobile apps now afford businesses an opportunity to **connect directly with consumers**. They no longer have to wait for customers to walk into their premises or to spot an advertisement prompting them to engage. Even when customers aren't actively shopping, businesses – including insurance companies - can **still be on their minds and command attention**. The constant presence of a business' app on a customer's phone reminds them that the **brand is out there**. However, an individual decides which apps they want and don't want on their smartphone. It is a very personal thing, and **convincing a customer to have your app on their phone (and keep it there) is a challenge**, albeit a very rewarding one. The key is to ensure that the app delivers value to the customer.

Email notifications are being replaced by smartphone push notifications. A recent report reveals that 55% of online traffic to the leading retailer websites originates from mobile devices[22]. Roughly 50% of all web traffic overall is derived from mobile devices (smartphones and tablets).

The business idea driving insurtech **Brolly** is to provide a free single mobile 'concierge' app which brings together all of a customer's insurance, driven by artificial intelligence. The founder noted that "I was blown away by the size of the industry and how old fashioned it was… Insurance companies struggle to catch up with consumer demands, seemingly unaware that young people organize their lives with a few taps on their smartphones".[23] Brolly benefitted from unexpected customer loyalty when it crowd-sourced a logo redesign (after facing a legal threat from Travellers Insurance). It received 250 entries with a large number of sign-ups to its app[24].

2.6 Fintechs and insurtechs

2.6.1 The nature of fintechs and insurtechs

e-Commerce is a broad term referring to commercial and financial transactions conducted electronically and often remotely, typically using the internet and mobile connections. **Fintech** is an all-encompassing label applied to companies using the internet, mobile phones, cloud computing and open source software, bringing the digital revolution to the financial sector (including banking, insurance and investing). The term typically refers to new start-up companies using emerging technologies, with all the characteristics, benefits, excitement and growing pains that this brings. '**Insurtechs**' is a **subset of fintechs focusing on the insurance industry**. Fintechs and insurtechs, in turn, are part of the e-commerce ecosystem, but it is important to note that the digital and mobile transformation of the financial sector is much broader then just fintechs and insurtechs.

As its stands, **some fintechs** are **supporting incumbent legacy providers** to deliver better products, while **others compete directly** with legacy players. Fintechs focus either on delivering consumer-facing services, offering digital tools to improve the way individuals borrow, invest and manage money, make payments and buy insurance; or on back-office services that support incumbent financial institutions to improve and streamline their operations. These fintechs are focusing on delivering better user experiences for an assortment of financial tasks, including insurance, payments, invoicing, budgeting, banking and loan applications. Insurtechs are leveraging emerging technologies and a better understanding of consumer expectations to increase efficiencies in the insurance industry. Many insurtechs' products and services are targeting retail customers, small businesses and consumers.

Lemonade[25,26] is an insurtech with a new business model. Launched in November 2016, it is licensed as a full-stack insurance carrier by the State of New York for homeowner and renter's insurance. Cover was extended to Illinois in April 2017, and it is also considering expanding into the UK. It claims to be the world's first 'peer-to-peer' (P2P) insurance company with "a forward-thinking business model and incredible tech". The goal is "just 90 seconds to get insured, three minutes to get paid and all with zero paperwork". The P2P business model is contra to the traditional insurance model. Premiums paid are considered as 'your money'. The company takes a flat fee, pays claims really fast and returns what is left to causes the customers care about. With P2P, everything becomes simple and transparent.

Fintechs are enabling more universal access to financial services. Social media profiles – often also referred to as 'alternative data' in this setting - are being used to a greater extent to develop credit scores and risk profiles instead of relying on the traditional measures of creditworthiness such as credit card and mortgage payments (which many credit worthy people have difficulty obtaining). Fintechs are reported to use posts from Facebook, LinkedIn and other social media sites, as well as user profiles from sites like eBay and Airbnb, to **build a credit reputation/score for consumers.** This provides non-traditional lenders and insurers such

[22] http://www.huffingtonpost.com/michael-lazar/e-commerce-technology-tren_b_14665416.html
[23] https://www.thetimes.co.uk/article/f97a29f8-d69b-11e6-b069-6105840fb14c
[24] http://www.insurancetimes.co.uk/analysis-insurtech-aims-to-rock-your-world/1421389.article
[25] https://singularityhub.com/2016/09/26/5-tech-forces-that-will-change-insurance-for-good/
[26] http://www.insurancetimes.co.uk/lemonade-begins-expansion-drive-with-illinois-launch/1421378.article

as fintech and insurtechs with **different ways of evaluating a person's credit**, and to offer options for young people who may not have the traditional jobs and resources required to build traditional credit. **Fintechs** are also providing people **access** to products and services that **normally would be out of the public's reach**. Online banks, for example, are allowing people to open accounts with lower balances and no fees; similarly, for insurtechs in their business areas.

2.6.2 Recent investment in insurtechs and other fintechs

Fintechs continue to **attract significant investment**, but **interest in insurtechs is rapidly growing**. Recent reports on the amounts invested in fintechs are a bit open for interpretation. According to one report, venture-capital firms invested more than $17 billion into fintech start-ups globally in 2016, a six-fold increase from 2012[27]. Another recent report states that after attracting $19 billion in 2015, global fintech funding had already reached $15 billion by mid-August 2016[28]. According to a report by Accenture[29], investment in fintech firms in 2016 increased by 10% worldwide to $23.2 billion. Whichever way, it is still a significant investment.

It was reported that **China overtook the US** as the **top destination** for **fintech investment in 2016**[30]. China secured $10 billion in investments in 2016, accounting for 90% of investments in Asia-Pacific; followed by the US ($6.2 billion). Europe experienced an 11% increase in deals despite the UK suffering a drop in funding due to the uncertainty surrounding Brexit. The growth of China's fintech sector was reportedly largely enabled by the relative age of its current banking system. It was easier for people to use mobile and web-based financial services since phones were more pervasive and more convenient to access than traditional financial instruments. The fast pace of urban life seems to stimulate an appetite for convenient financial products and creates huge opportunities for fintechs in developing countries.

It was reported that only a **handful** of **fintech** ventures have **gone public**, hence investors are **anticipating a wave of share offerings** and **acquisitions** as fintech start-ups mature and financial services institutions search for the benefits fintechs can bring.

Insurtechs on the rise

Not too long ago venture capitalists were complaining that, "while insurance was ripe for disruption, there weren't many entrepreneurs who wanted to tackle it". The view that "in the whole insurance industry, there's a lack of innovation and the user experience is pretty horrible"[31] and that "insurance remains one of the few areas of finance that is still stubbornly old-fashioned", was referred to above. Many **insurers continue** to operate **mostly** through **brokers**, with a high percentage of business still conducted on **paper** and many insurance products seemingly outdated. Such an environment creates an **ideal breeding ground for technological disruption**.

There are signs that things are now **changing rapidly**[32], with one commentator expressing a view that "**Insurtech right now is where fintech was a couple of years ago**". It is reported that insurtech investment in the UK increased more than 50% in 2016, to nearly $19 million[33].

2.6.3 Are fintechs threatening traditional financial institutions?

In order to address (rather than answer) the question of competitive threats, it is helpful to return to innovation basics, viz. the dynamics of technological change. Innovation is a dynamic environment where the sands are continuously shifting and **today's ally may well be tomorrow's competitor**. Technologies interact with one another

[27] https://www.bloomberg.com/news/articles/2017-02-24/fintech-the-buzzword-finance-loves-and-hates-quicktake-q-a

[28] http://www.businessinsider.com/fintech-ecosystem-financial-technology-research-and-business-opportunities-2016-2?IR=T

[29] http://www.businesswire.com/news/home/20170329006244/en/Artificial-Intelligence-Internet-Attract-InsurTech-Funding-Globally

[30] https://www.bloomberg.com/news/articles/2017-02-24/fintech-the-buzzword-finance-loves-and-hates-quicktake-q-a

[31] http://uk.businessinsider.com/fintech-hot-insurance-insurtech-vc-economist-finance-disrupted-2017-2017-1?r=US&IR=T

[32] http://uk.businessinsider.com/fintech-hot-insurance-insurtech-vc-economist-finance-disrupted-2017-2017-1?r=US&IR=T

[33] https://www.helpnetsecurity.com/2017/04/03/insurtech/

in competitor, symbiotic as predator-prey modes; and these relationships are constantly changing[34].

Whereas some fintech companies are ***currently*** **competing** directly with legacy players, many are providing services that complement and enhance the offers of the legacy players. They are filling **market gaps** the **legacy players** have **difficulty in addressing** themselves. Many fintechs focus on enhancing customer interfaces or back-office operations of legacy players by providing business-critical non-core support. This symbiotic relationship is one of the reasons why legacy players are interested in cooperating with, sponsoring and in some cases, acquiring fintechs.

Fintechs have the **potential** to **transform** a range of **financial services** (with the concomitant impact on the related legacy players), including insurance, retail banking, lending and financing (including home mortgages, auto financing and microfinancing), payments and transfers, wealth and asset management as well as markets and exchanges. Rather than being seen as a threat, collaboration with insurtechs businesses can help more established insurers to make the leap from incremental to breakthrough innovation. This includes improving insurers' ability to analyse huge amounts of data, lead to develop better customer understanding, higher win-rates, more informed underwriting and better decision-making. Partnership with insurtechs can also help insurers improve processes, increase efficiencies, and reduce costs.

With regard to the *current* competition (or predator-prey relationships) it is also useful to keep in mind the nature of disruptive innovations. Innovations addressing a **lower (niche) end** of the market which are often **ignored** by **main players** as **'innocent and harmless'** – until they develop with time to such an extent that they **threaten the main markets**, by which time it can be **too late**. This may well be the case with insurtechs and other fintechs, and is definitely something that strategists in incumbent legacy player financial institutions should be aware of and account for.

Online-only banks, for example, can offer many of the same services with higher rates and lower fees. **Peer-to-peer (P2P) lending** marketplaces are reported to be **growing much faster** than traditional lenders. In the asset management space, robo-advisers offer lower fees, lower minimums and solid returns to investors. Traditional legacy players are of course trying to compete with their own innovations in these spaces (see also Innovation Labs below), but the **question** is whether they can **'out-innovate' the fintechs**. Disrupting (and often cannibalising) your own organisation, processes, products and technology that have been established over decades is not easy.

A recent survey[35] undertaken in 18 countries indicated that roughly **one in three** banking and insurance **customers *globally*** would **consider switching** their accounts to **Google, Amazon or Facebook** if they offered financial services, with **almost 30% of respondents indicating that they would switch for insurance**. This, despite the fact that these tech companies don't (currently) offer banking or insurance products. Interestingly, Google and Facebook do allow users to send payments to their contacts online, whereas Amazon has a limited service providing loans to some small sellers.

> "the question is whether the legacy players can 'out-innovate' the fintechs"

A recent report[36] underlines the **perceived threat** by **large tech companies** to established financial institutions. **Large legacy financial players** consider **other incumbents** and **technology companies** (particularly Amazon, Apple and Google) as their biggest threats, to a large extent because of their significant innovation capabilities and powerful brand presences. This is not surprising given the findings above.

A number of interesting trends regarding the interaction of established players in the insurance industry with insurtechs and other fintechs, as well as with other start-ups from outside the insurance industry have recently been reported. Accenture

[34] http://www.sciencedirect.com/science/article/pii/S004873339600916X

[35] http://fortune.com/2017/01/11/google-facebook-amazon-banking/

[36] http://www.consultancy.uk/news/3130/capgemini-tech-giants-biggest-threat-to-banking-sector

(2016)[37] surveyed insurers globally and reported that established insurers perceive the greatest threats to come from:

- 27% - start-ups from outside the insurance industry
- 24% - start-ups from inside the insurance industry
- 37% - established companies from inside the insurance industry
- 22% - established companies from outside the insurance industry

According to the report, many established insurers intend to work with start-ups in some way or another, both from inside and outside the insurance industry, viz.

- 44% intend to pursue digital initiatives with start-ups from the insurance industry during the next two years (noting the date of the survey).
- 31% plan work with start-ups from outside the insurance industry.

The report mentions that during 2016, 14% of insurtech deals featured an insurer or its strategic division (up from 3% in 2014 and 12% in 2015). Insurers were apparently not investing significantly in insurtechs, but they did invest in other types of start-ups - 83% of the deals were with start-ups outside the insurtech space (although often with a technology focus) and 17% with insurtechs.

Ecosystems and platform-based business models

It worth noting that '**the competition**' may not only come from other companies, other types of companies or emerging technologies, but indeed also **new types of business models**. Platform-based companies are disrupting industries in many sectors[38]. Well known examples include Amazon and Alibaba in retail, Airbnb in accommodation and Uber in transport. This notion also links to the concepts of everything-as-a-service (XaaS) and the platform-as-a-service (PaaS).

A **digital ecosystem** is a related organisational construct, essentially a network of companies, institutions and consumers who create mutual value and combined service through their interaction. A recent report by BGC asserts the view that "emerging ecosystems could **threaten insurers all along the value chain**"[39]. The report identifies three types of ecosystems at play, viz. 'segment of one', 'one stop shop' and 'connected object'. A recent survey by Accenture[40] indicated that **96% of insurers think that "digital ecosystems are having an impact on the insurance industry**" and 94% view the adoption of platform-based models and forming digital ecosystems as critical to the success of their business.

2.7 The changing customer experience

Digital and mobile technologies are **driving** a number of **changing trends** in **customer behaviour** which are impacting on all businesses, including insurance companies. Customer expectation of the **scope, quality and delivery mechanisms** of services are changing, which is impacting on the value and benefits they expect. Whilst the notion of the 'customer is always right' has always been valued, there can be no doubt that '**customer first**' is a **defining characteristic** of the new 'customer experience' where new technologies are causing a shift in the power relations in the value chain.

> "When it comes to digital and technological collaboration with start-ups, insurers are significantly less developed than their retail banking counterparts"
>
> Accenture, 2017

2.7.1 Personalisation and mobile-first customers

We are living in an increasingly 'connected, everywhere, anytime and in real-time' world with **'personalisation' becoming standard**. It is a world where customers value convenience and ease of

[37] https://www.accenture.com/gb-en/insight-insurance-technology-vision-2016

[38] See for example Geoffrey Parker, Wayne W Van Alstyne and Sangeet Paul Choundary, *Platform Revolution* https://www.amazon.co.uk/Platform-Revolution-Networked-Transforming-Economy/dp/0393249131/ref=sr_1_1?s=books&ie=UTF8&qid=1492343185&sr=1-1&keywords=platform+revolution

[39] https://www.bcgperspectives.com/content/articles/insurance-technology-financial-institutions-disruptive-force-ecosystems/

[40] http://www.fintechinnovationlablondon.co.uk/pdf/The-Rise-of-InsurTech.pdf

use, and expect instant communication through a multitude of channels. In order to service, acquire and retain customers, businesses must adapt to the new customer service standards enabled by technological developments.

Many people are '**mobile-first**' consumers, meaning their **first and preferred** way of **digital engagement** is through **mobile channels**. They are leading the charge in enabling fintech and insurtech companies to become more customer focused, noting that one of the main reasons for the rise of fintechs is because of their delivered ease of operations and convenience to the customer.

2.7.2 'Generationalism' and how different generation interact with technology

Segmentation of customer markets often looks towards **'generation'-related trends** – what drives **baby boomers**, **generations X, Y and Z** and particularly **millennials**. There is now even talk of the '**linksters**'[41] – those born after 2002 and who have been 'linked' to technology from the day of their birth. Marketeers are interested in the extent to which 'generationalism' is a differentiator according to which markets can be segmented. The adoption and use of technology by the different generation feature prominently in these analyses.

> "Many people are 'mobile-first' customers…."

Even though millennials are considered to be the e-generation, often referred to as digital natives, and are a significant market for the immediate future, it is important to keep in mind that many people in the 'other' generational groups are equally adamant in their demand for mobile-enabled services, including financial services.

An online insurtech announced a funding round of $3.25 million to seed the creation of an all-digital insurance product **targeted at millennials**[42] in April 2016, expressing a view that "… there's a huge coverage gap right now. About 80% of millennials don't have enough insurance for the things they care about …. The industry is stuck in a previous century. We're on a mission to reinvent how people buy and use insurance."

2.7.3 'Instantism'

In addition to email, the internet introduced online browsing, gathering of information, accessing of services (including financial services) as well as online shopping and payments. The mobile revolution is now shifting user preference towards mobile interaction with service providers, specifically towards an expectation of 'connected, everywhere, anytime and in real-time' and 'mobile-first' users. Consumers have come to expect **instant gratification and response** ('**instantism**') in addition to great experiences from their (mobile) service providers – including their interaction with digital financial tools.

'Instantism' is an increasingly important element of the customer experience, enabled and fuelled by technology. One manifestation is that the digital and mobile revolutions have made it much **easier for impatient customers to switch to alternative providers** and to do it quickly. Service providers, including financial institutions, should be aware of this trend in the 'customer experience' and how it translates to customer acquisition, retention and also loss. In a world of instant gratification, **high responsiveness** becomes critical, particularly so when money is involved. Customers expect **instant response**, and will quickly **move on to another supplier** or lose interest if that **doesn't happen**. A lag in response time may prompt the consumer to switch to competing service providers, particularly when there are many other quick responding competitors.

It is interesting to note the notion of '**service expectation transferability**'. When users become used to service quality and features they experience with one type of service provider, say Google in searching or Amazon in online purchasing, they come to **expect** the **same type** of **service quality** and speed and responsiveness (including speed of response) from **other types of online services**, such as banking and insurance.

[41] http://metro.co.uk/2017/04/11/move-over-millennials-make-room-for-the-linkster-generation-6568264/

[42] http://www.huffingtonpost.com/ella-thuiner/insurance-fintech-and-inn_b_11303720.html

Some banks now make it possible to deposit a cheque by taking a photograph with a mobile phone or linking Apple Pay to a checking account (with no need for any more excursions to the branch or deposit slips). Health insurance claims can be made by sending copies of documents via a number of channels. Some bank customers can pre-schedule an ATM withdrawal via an app. When they arrive at the ATM, they simply wave a near field coupled (NFC) enabled smartphone at the ATM or look into the ATM's camera for facial recognition to verify their identity and then collect their cash.

2.8 Liability

Technological change and **emerging technologies** have a **significant impact** on the notion of **liability**, something that is of great importance to the insurance industry, and no doubt also to the legal profession.

Emerging technologies such as artificial intelligence and robotics are enabling machines to act with a much **greater degree of autonomy** and with less (or no) intervention from humans. **Driverless and self-driving cars** are good cases is in point. It has been suggested that driverless cars can be much safer because they eliminate human (driver) error. However, they do also introduce the notion of 'human programming error', when the artificial intelligence algorithms can lead to incidents where they do not prevent an accident, cause an accident or other technological components in the system (such as sensors) fail, resulting in an accident. If a driverless car is involved in or causes an accident, how is the **liability apportioned**? With the manufacturer of the car or the driverless technology, the owner or occupant? Imagine the complexities where multiple driverless cars are involved in a same accident.

Verdict on a Tesla crash

A recent case of a driverless Tesla car involved in an accident in Florida which caused a fatality, drew significant media attention. The US National Highway Traffic Safety Administration investigated the accident. It cleared the Autopilot system of any fault in the accident and even praised its safety design[43]. It was noted that crash rates involving Tesla cars have dropped by nearly 40 % since Autopilot came online. See also the discussion on driverless and self-driving cars in car insurance.

In the **healthcare** field, **robots** are now performing **surgery** and **artificial intelligence** systems (such as IBM's Watson) are being used to **diagnose** patients and suggest cures. A study in the British Medical Journal in 2016 reported that human error is the third-leading cause of death in the United States. If machines can help to reduce this rate, it will be very beneficial. However, it still leaves the issue of liability in cases where machines do cause accidents or harm, to be resolved. Similar issues arise with the increasing use of emerging digital health technologies used to monitor a patient's health and suggest treatments in a home environment by digital and mobile technologies.

3. Emerging technologies - driving opportunities and threats in the insurance industry

From the viewpoint of assessing the strategic business opportunities and threats presented to a company by technological change and emerging technologies, it is important to keep in mind that:

- The **opportunity or threat** from an emerging technology very often comes from a **completely different industry** than the one it impacts on; and
- Technologies are **continuously interacting** with one another, be it in competitive, symbiotic or predator-prey modes, and these relationships are dynamically changing.

From the viewpoint of strategic opportunities, threats and risks, an **assessment** of the impact of emerging technologies on the insurance industry should therefore also **include** a consideration of a **number of emerging technologies**, some of which may at first blush come from seemingly unrelated industries. The emphasis below is on recent trends and cases.

3.1 Information and data security

Information and data security in the financial sector – **cyber security** in the digital space – is an issue of paramount concern to customers, consumers and patients, regulators and the industry.

[43] https://singularityhub.com/2017/01/30/when-intelligent-machines-cause-accidents-who-is-legally-responsible/

We live in an age where **cybercrime** is **rampant**, with the perpetrators ranging from 'teenage hackers' to sophisticated criminal organisations to state actors. By their very nature **financial institutions** are amongst those that need to maintain the highest **levels and standards of cyber security**. The rise of fintechs will no doubt give rise to a new breed of criminals who focus on these companies. The level of data security provided will be a **differentiator**.

Customers' concern with data security can be **inconsistent**, though. People are increasingly concerned about data security in the sense of their personal information being comprised and then used for identity theft, fraud or violation of privacy (and prying from the government). It is interesting to note that although they expect the institutions they deal with to ensure data security and will hold them to account when there are breaches, many individuals and organisations are at the same time not taking enough measures to ensure personal data security side on their devices.

3.1.1 Personal authentication and digital identities

The quest for improved cyber security continues to intensify. Much of the effort is focused on developing **unique and secure personal digital identities for individuals**. Personal authentication and the ability of individuals to identify themselves online and over the phone, at ATM machines, when making purchases, conducting transactions, voting or accessing devices, will become an increasingly important issue. This issue is also addressed in the *World Development Report 2016*[44], by the World Economic Forum[45] and a in whitepaper by UBS on digital identity[46].

Biometric identification is one of the approaches receiving significant attention regarding personal digital identification. A number of smartphones are already using **finger-print based access** features, although these are **not infallible**. A range of other biometric measures are also being explored, including **voice recognition and retina scans**. As with all emerging technologies, there are many hurdles to overcome, including those in the regulatory, safety and ethics domains.

Personal digital identity and authentication is an issue that will be of great interest in a wide range of applications, and should be on the radar of companies searching for **innovation opportunities**.

3.1.2 Blockchain

On another level, there is a need to **protect datasets** and transactions through **encryption**. **Blockchain** is emerging as a **game changer** in this regard, partly because is enables the **automation** of one of the most basic value propositions for insurers, viz. **trust**[47]. It is a data structure based on a secure, reliable and open digital ledger of transactions shared amongst a distributed network of computers. Fraud consumes as much as 38% of all the money in the traditional insurance system[48] and technologies that can help to counter this will make a huge impact.

The adoption of **blockchain** technology in the **insurance** industry is gathering **momentum**. It could, for example, be used to design more intuitive insurance risk pools which would enable real-time auto-regulation of insurance subsidies. In 2015 Novarica reported that blockchain had not yet become relevant to the insurance industry. However, one year later it reported that blockchain had become the "**enterprise equivalent of a household name**"[49]. There is, however, still some ways to travel. In November 2016, an insurance strategic advisory firm reported that more than half of property and casualty (P&C) insurers surveyed were 'at least aware of the implications and potential' of blockchain in the industry. According to the report, 33% of P&C insurers polled 'are now starting to understand it',

> "The adoption of blockchain technology in the insurance industry is gathering momentum"

[44] http://www.worldbank.org/en/publication/wdr2016

[45] http://www3.weforum.org/docs/WEF_A_Blueprint_for_Digital_Identity.pdf

[46] https://www.ubs.com/magazines/...=/digitalIdentity-whitepaper-screen.pdf

[47] http://www.canadianunderwriter.ca/insurance/blockchain-technology-source-disruption-opportunity-insurers-novarica-1004104212/

[48] https://singularityhub.com/2016/09/26/5-tech-forces-that-will-change-insurance-for-good/

[49] http://www.canadianunderwriter.ca/insurance/blockchain-technology-source-disruption-opportunity-insurers-novarica-1004104212/

20% are 'aware of specific insurance use cases or are experimenting with the technology', 27% per cent were 'slightly familiar with the concepts of blockchain, but don't understand its implications and/or potential for insurance' while 20% were 'not at all aware of blockchain'.

Blockchain-powered **smart contracts**[50] can be applied to automate the claims settlement and applied to increase transparency of the products insured. One of the applications of blockchain-enabled smart contracts is in **building P2P** or **crowdfunded insurance models**. With the low level of awareness of such an important emerging technology indicated in the survey referred to above, it is not surprising that some feel that blockchain and related technologies such as smart contracts remain 'untested in the P&C market'[51].

In October 2016 five insurers and reinsurers announced the launch of the blockchain insurance industry initiative **B3i**, aimed at 'exploring the potential of distributed ledger technologies to better serve clients through faster, more convenient and secure services'[52].

3.2 Big data, alternative data and useless data

As is the case with other industries driven by the digital transformation, information is the lifeblood of the insurance industry. 'Smart' big data is a particularly important element, especially when coupled with analytics. A recent report indicates the number of **insurtechs** focusing on **big data and analytics** have **almost tripled** during the period 2014-2016[53].

A 2014 report by PWC indicated that although 70% of insurance companies said that big data and analytics have changed the way they make decisions, almost 40% of respondents saw 'limited direct benefit to their kind of role' and more than 30% believed that senior management 'lacks the skills to make full use of the information'. The report notes that, '… **many insurers** still **lack the vision** and **organisational integration** to **make the most** of these **capabilities**'[54].

Information about **customers** is **crucial**. A recent report offers interesting insights in this regard, reporting that only 59% of insurance companies surveyed indicated that they have 'access and control over customer and marketing application data', compared to 62% of retail banks and 72% of wealth and asset management companies.

The use of **alternative data** was referred to elsewhere in this discussion, and contains valuable information often hidden from official records. Social media networks, GPS locations and other alternative data can be used as inputs to intelligent underwriting algorithms. This presents the opportunity to make **assessments** of possible **risks** using **predictive analytics** regarding a particular individual based on their real **lifestyle**, rather than just relying on static records.

If the customer is required to provide (more) information, the company must provide more value for the information they are providing. For example, the information requested on the 'forms that need to filled in' (given the amount of activity that is still paper-based) are sometimes a bit archaic and questionable. Is providing three telephone numbers and the physical address of a bank branch really adding value? Much more useful information regarding the person's health history, lifestyle choices, occupations and their subsequent risk to similar life insurance buyers can be gleaned from alternative data. Machine learning algorithms to scan public data available on social networks and related sources to gather this.

More data is **not always** a **good thing** however, from both the customer and the technology's standpoint. For artificial intelligence (AI) and analytics algorithms, too many data points with too few example scenarios create too many variables to determine what is 'significant'. It is also important to ensure the ethical collection, analysis and disposal of data (also accounting for the 'right to be forgotten' where applicable). The key is balancing the want and need for more data with increased precision and value.

[50] https://www.fastcompany.com/3035723/smart-contracts-could-be-cryptocurrencys-killer-app
[51] http://insuranceblog.accenture.com/seizing-the-blockchain-opportunity
[52] http://uk.businessinsider.com/route66-ventures-and-anthemis-on-insurance-fintech-2015-9
[53] http://www.fintechinnovationlablondon.co.uk/pdf/The-Rise-of-InsurTech.pdf
[54] Referenced in https://www.pwc.com/gx/en/industries/financial-services/insurance/publications/insurance-2020-necessity-mother-of-reinvention.html

3.3 Analytics

Analytics is used in a wide of range of business applications and refers to algorithms operating on the big (and not so big) datasets to gain an understanding of what ***has* happened** and ***why***, what ***is* happening** and **anticipate what *can* happen**. In the **insurance industry**, the use of analytics is **no longer** a '**nice to have**', but instead is now a '**must have**'.

It is important to **distinguish** between **different** types of **analytics**. '**Descriptive analytics**' makes sense of a situation ('what happened') when provided with enough historical data. In a healthcare setting, for example, this would mean identifying a disease if told the symptoms. In a sense this is a reactive mechanism, as it deals with a medical condition that has already been manifested.

'**Diagnostic analytics**' would be able to determine 'why it happened', whereas 'predictive analytics' can assist by predicting which conditions can develop in the future ('what is likely to happen'), given conditions (symptoms or 'vital signs') measured now. However, **proactivity and actionability** are important - **anticipating** what **can happen** in the **future** is one thing, **knowing what to do about it** is quite another. Hence the importance of '**prescriptive analytics**', which suggests options for future interventions and courses of action[55].

> "Anticipating what can happen in the future is one thing, knowing what to do about it is quite another"

There is a **trend** of placing a greater emphasis on **preventive actions** than **addressing post-event claims**, which is also evident in the insurance industry. Combining the **new datasets** populated with information from **IoT devices** with analytics can be a very powerful mechanism for reducing risks and predicting claims[56]. The availability of the new data and the power of analytics to make sense of and **predict** behaviour, outcomes and risk on a **personal level** also enables to a much greater extent the ability to **influence personal behaviour**. The data and trends are available now to encourage and reward positive behaviour which can help towards avoiding adverse events and reduce risks, rather than dealing with claims after the event.

The insurtech **Atidot**[57] announced the launch of its cloud-based, predictive data analytics platform for incumbent life insurers. The company claims its platform can help life insurers to better leverage their data to make policy holder profiling more efficient by predicting their policy holders' behaviour. This will allow insurance companies to adjust their business strategies more effectively.

3.4 Artificial intelligence

The **age of artificial intelligence** (AI) and machine-learning has **arrived**, with AI capabilities touching many aspects of our lives. AI also has the potential to have a **transformational impact** on the **insurance industry**[58]. In fact, AI and the internet of things (IoT) accounted for almost **half of total investment** in **insurtech start-ups** globally in 2016[59].

The financial sector has traditionally relied heavily on algorithms for automation and analysis. However, these were traditionally exclusive only to large and established institutions. Enterprising ventures are now looking to AI to expose narrowing gaps in the market. **Machine-based algorithmic underwriting** can find **subtle patterns** and relationships between data points which are only apparent after it acquires a greater population of applicants. It can **outperform human analysis** to uncover complex intricacies. There are of course limitations with machine-based underwriting, and machines should know what they don't know and know when their analysis requires human intervention.

Much activity from insurtechs and other fintechs is aimed at empowering smaller organizations and consumers, with **AI a major contributor**. AI is also expected to have a major impact in insurtech and other fintechs due to potential of game changing insights that can be derived from the sheer volume of data that is being generated ('really big data').

[55] https://www.pwc.com/gx/en/industries/financial-services/insurance/publications/insurance-2020-necessity-mother-of-reinvention.html
[56] http://zafin.com/our-articles/banks-sleepwalking-extinction/
[57] http://uk.businessinsider.com/life-insurers-get-a-new-lifeline-2017-3?r=US&IR=T
[58] https://venturebeat.com/2017/03/30/how-ai-will-power-the-future-of-life-insurance/
[59] http://www.businesswire.com/news/home/20170329006244/en/Artificial-Intelligence-Internet-Attract-InsurTech-Funding-Globally

The insurtech **Emerge Analytics** wants to "bring back profitability to underwriting" by using an AI algorithm that predicts when policies will lapse as well as fraud. It claims to have predicted with a 99% accuracy which policies were likely to lapse in two months[60].

Applications of AI in insurance include[61]:

- Assessing risk based on past experience to monitor and mitigate risks in real-time.
- Instant decision on coverage while offering more competitive pricing due to higher accuracy, hence reducing risk.
- Personal finance applications to balance people's budgets, mapped specifically to a user's behaviour.
- Data capture and storage, data analysis and policy tailoring with personalised bundling.
- Serving as robo-advisers for guidance in managing portfolios.
- Contributing to business intelligence and analytics.
- Merchant services such as payments and fraud detection (including for example prevention of expenses on claims over staged accidents).
- Keeping companies up to date on the latest regulatory implementations and 'advise' them on policy development and pricing models.
- Applications in IoT devices, such as driverless cars.
- A wide variety of consumer-level applications for smarter and more error-free user experiences.

Insurance models require a history of underwriting decisions and the outcomes, third-party datasets and underwriting rules to follow. A typical algorithmic underwriting platform can use rules from 15 years of historical data or more and, say, a million applicants. These insights, combined with quality data sources and applicant information, enable the AI model to come to a decision. Insurers are still in the data collection stage in this regard, but it is foreseen that in a few years time, new tracking tools will have a more direct impact on pricing and coverage on a range of policies.

3.5 Internet of things (IoT) - enabling personalisation and reducing uncertainty

The **increasing diffusion** of the **connected devices** forming the **Internet of Things (IoT)** and the rise in intelligent automation are important emerging technologies which will have a **significant impact** on the **insurance industry**. Some refer to this wave as '**Insurance 2.0**'[62].

It is estimated that out of 28 billion connected devices forecasted by 2021, 16 billion will be related to IoT[63]; and that there will be an estimated 1.5 billion IoT devices with their own cellular subscriptions by 2021 compared with 'only' 400 million at the end of 2015.

Information is a key driver in insurance, not only for administrative and transactional purposes, but also as a mechanism to reduce uncertainty and mitigate risk. **The myriad of internet connected devices (IoT)** can provide a host of **new data** regarding the behaviour of individuals and organisations. This in turn can be used to **personalise risk profiles**, rather than viewing an individual as part of a risk pool. Personalised policies and premiums can then be devised, and desirable behaviours encouraged on a personal level. Similarly, patient generated health data (PGHD) from patients' use of mobile and portable devices (which can strictly speaking also be considered as part of the IoT) as well as genomics data are enabling personalised health insurance plans (and premiums), in part because **risk** can now be **personalised to much greater extent**.

Behaviours, trends and **actuarial underwriting** will **shift** to **another level** with the opportunity to combine historical data and detailed streams of new data from a variety of connected devices. It will allow accurate patterns analysis and forecasts. On the back of more accurate and detailed data emanating from sensory technology, underwriters will be able to contribute to the development of new products, tailored packages for different markets and pricing policies.

One of the outcomes of '**personalised data**' is the ability to introduce incentives that can **influence an individual's behaviour**, with the aim of preventing adverse events rather than addressing

[60] http://www.insurancetimes.co.uk/analysis-insurtech-aims-to-rock-your-world/1421389.article
[61] https://thenextweb.com/artificial-intelligence/2017/03/07/ai-will-determine-future-fintech/#.tnw_IF9cIcpH
[62] http://www.propertycasualty360.com/2017/04/01/insurance-20-is-a-game-changer?slreturn=1491328346
[63] https://letstalkpayments.com/the-sources-of-innovation-in-the-insurance-industry/

consequences after the event. Drivers can now fit **devices** to their **cars** ('**telematics**') which record their driving behaviour. Insurance companies can use this personalised data to de-risk and reward good drivers with lower premiums on personalised plans. Similarly, **patients** can demonstrate a **personal healthy lifestyle** by presenting their own **patient generated health data (PGHD)**, and be rewarded with more favourable terms and premiums in life and health insurance. **Home owners** will be offered discounts on insurance if IoT devices provide information and enable preventative measures for security and safety. In this respect, the internet of things will have a significant effect on insurance.

Cocoon, a start-up backed by Aviva, produces a smart security device linked to a mobile phone for home use. The device learns what 'normal' behaviour is for the home dwellers and then sends an alert via a video-link if something unusual occurs. Aviva sells the product with an associated discount in home contents insurance premium[64].

The efficacy of IoT devices and the information they provide depend on a number of factors. One of the most important is the nature of the **sensors** imbedded in the IoT device – what it actually measures, and how accurately and reliably it does so. The rise of IoT will no doubt boost the interest in sensor technology and as such provides exciting **business opportunities**.

3.6 Wearables and digital health technologies

Digital health technologies and related wearables will impact on the nature of health insurance. Please refer to a previous DeltaHedron Innovation Insight where recent developments in these technologies are discussed in some depth.

3.7 e-Payments, e-wallets and cryptocurrencies

3.7.1 e-Payments and e-wallets

There is a **growing trend** in **e-payments and e-wallets**, an analogous mobile equivalent to online payments customers make by accessing banks' websites. Mobile wallets have enabled cashless transactions on a scale never seen before, and the shopper is now more concerned about having their phone handy than their physical wallet. Mobile wallet companies are well placed to pave the way ahead for online transactions, spurred by the countless **incentives** that are **provided to consumers** to use these. A number of fintech start-ups aim to digitise payments (and routine financial tasks).

Payment processors such as Apple Pay, Samsung Pay, PayPal[65] (recall their recent acquisition of Paydiant for $280 million[66]), Stripe and Google Wallet are make checking out a much more convenient, simpler and more secure option. Checkouts may become easier and more convenient for the consumer – but more competitive for those providing the payment solutions. One of the biggest problems currently is the **lack** of **systems integration** between retailers[67].

Apple is predicting that its intention to **turn iPhones** into **e-wallets** will unleash a new **round of competition** between issuers of **credit cards**, which will in turn compel them to offer customers more perks for using their cards[68]. This is creating quite a flurry in the credit card industry. The key is that Apple Pay, which allows tap-and-go payments on the iPhone, makes it **easy for customers** to quickly **switch** their '**default card'** used for payments on the iPhone and to select another (rival) card if there is a better deal on offer. Credit cards companies are responding by offering deals to entice people to use their card in Apple Pay, with perks including extra frequent flyer points, discounts on shopping or cash-backs. Apple also argues that its system empowers smaller lenders, who can use Apple's system rather than having to develop their own, to compete with larger players in the credit card market.

Not surprisingly, **voices predicting** the **death** of **credit and debit cards** are being heard[69].

Whereas there was a need to **insure lost credit cards** and **lost mobile phones**, insurers need to consider the **data loss and potential data security issues**,

[64] https://www.thetimes.co.uk/article/f97a29f8-d69b-11e6-b069-6105840fb14c

[65] https://thenextweb.com/artificial-intelligence/2017/03/07/ai-will-determine-future-fintech/#.tnw_IF9cIcpH

[66] http://www.huffingtonpost.com/michael-lazar/e-commerce-technology-tren_b_14665416.html

[67] http://www.huffingtonpost.com/michael-lazar/e-commerce-technology-tren_b_14665416.html

[68] http://www.smh.com.au/business/banking-and-finance/apple-says-it-can-push-banks-to-compete-on-credit-cards-20170203-gu51kw.html

[69] http://www.readitquik.com/articles/fintech/fintech-predictions-for-2017/

including e-payment risks, when smartphones are lost.

3.7.2 Cryptocurrencies

Cryptocurrencies (such as **bitcoin**) are increasingly being accepted into the **mainstream financial mechanisms**. **Countries** are formally recognising this and developing mechanisms to deal with it. Increasingly **financial institutions** enable their customers to do transactions in cryptocurrencies and **many merchants** are **accepting** bitcoin as payments.

A recent article shows a photograph of a bitcoin ATM in Athens[70].

As is the case with other financial institutions, **insurers** must ensure that they **understand** the **intricacies of cryptocurrencies**, including the **regulatory and tax environments**; and that they can service customers who want to deal in those currencies. One can foresee that this can include '**exchange rate**' insurance and **forward cover** for **cryptocurrency deals**.

> "Insurance underwriters were at the top of the list, rated to be 98.9% at risk. It has been suggested that of the main players in the insurance industry, brokers are most at risk of disruption"

3.8 Robotics and employment

The notion of **robots taking over jobs** performed by humans because the robots can do it '**faster, cheaper, better**' is an issue that is currently being **discussed widely**. The Governor of the Bank of England recently warned that **automation could put 15m British jobs at risk**, equivalent to almost half of the 31.8m people in work. Research conducted by Oxford University points out that **35% of jobs in the UK are in danger from automation** over the next 20 years. **Insurance underwriters** were at the **top** of the list, rated to be **98.9% at risk**[71]. It has been suggested that of the main players in the insurance industry, **brokers are most at risk of disruption**. Agents of the future will definitely need to be more nimble, efficient and accessible. Insurtechs can easily replicate their services and are solving historical industry problems faster than legacy players.

Aviva[72] recently invited 16,000 of its workers in the UK to be retrained because their jobs are at risk of being taken over by robots. The company's call for volunteers for its automation programme is yet another indication that the notion of robots being able to perform some jobs 'faster, cheaper and better' has now become a reality, and also that it is threatening well-paid professional jobs. Staff who work in its call centres, assess customers' credit ratings and calculate the price of insurance policies are most likely to have to retrain.

In a recent report, McKinsey warned that **administrative staff** in **insurance companies** were **likely** to be **replaced**. However, it predicted that insurers would need more humans to sell, analyse and market digital products and to detect fraud.

Fukoku Mutual in Japan recently announced plans to **replace 30+ claim workers** with **IBM's Watson Explorer**[73] starting in January 2017. The Watson **artificial intelligence** system will be tasked with reading medical documents and determining pay-outs based on a patient's injuries, medical history and the administered procedures. Fukoku expects to **save $1.1 million every year** and to "reduce the burden of business process by about 30%". The company already uses Watson Explorer to analyse customer voices when they lodge complaints. It converts spoken words into text and also determines if the customer's tone of language is positive or negative. Another Japanese company, Dai-ichi Life Insurance, is also using a Watson system to process payment assessments.

3.9 Chatbots

The use of **chatbots is on the rise**, with many applications now integrating commercial chatbots (such as Google's Alexa). In the **insurance industry**, the use of '**robo-advisers**' is gaining traction.

[70] http://www.businessinsider.com/fintech-ecosystem-financial-technology-research-and-business-opportunities-2016-2?IR=T

[71] http://www.thetimes.co.uk/article/insurer-asks-its-16-000-staff-could-a-robot-do-your-job-2jj5nskxl

[72] http://www.thetimes.co.uk/article/insurer-asks-its-16-000-staff-could-a-robot-do-your-job-2jj5nskxl

[73] http://blogs.discovermagazine.com/d-brief/2017/01/03/artificial-intelligence-japan-insurance/

Chatbots can be used in the pre-purchase phase to help to understand an individual's needs and financial situation and then to provide quotes, thereby enabling them to proceed with confidence towards purchase decision. In order to do this, **chatbots** need to be **trusted**, be highly **sophisticated** and **personalised**, and need to have an adaptive tone that removes the need for irrelevant questions and steps.

3.10 Virtual reality

Virtual reality (VR) **replicates** a **real** or **imagined environments** and allows users to **interact** as if it were a **real environment**. Recent reports refer to a number of **VR applications** in the **insurance** industry.

One application of **VR** in insurance is its use in the **training of drivers** where they can be exposed to hazardous situations in a **simulated** environment and then taught how to take evasive action - analogous to simulators for airline pilots. This approach is aligned with the move towards introducing technologies that **prevent adverse situations** – such as accidents – rather than paying compensation after an accident.

Once a real **accident has occurred**, **VR** can be used to **reconstruct** the **actions** when used in conjunction with dashcams and related telematics[74]. The data can be used to recreate the crash scene, allowing insurers to view an accident from all angles and pinpoint the area of the damaged car.

VR is also used in **healthcare** settings, where it can contribute towards creating a more positive body image with patients who struggle with weight problems, for example.

3.11 Drones

Drones have been found to be useful with **estimating damage assessment** in the insurance industry. How to **insure drone activity**, whether for pleasure or business, is also something insurers need to consider, particularly as this becomes a more regulated activity. An increasing number of companies are reporting the use of drones for delivering packages of some sort, for example.

4. Technological impact on different types of insurance segments

In this section, a cross-cutting view is taken to summarise a number of the recent trends in technological changes and emerging technologies impacting on various types of insurance.

4.1 Risk management

Risk management lies at the **heart** of **insurance**, including estimating and mitigating risk and uncertainty. It is evident that a number of **emerging technologies** will have a **major impact** on **risk management** and hence also on the **insurance industry**, as discussed above. The Internet of Things, whether it is telematics in cars, personal health devices or sensors in the home, provide huge new datasets that allow insurance companies to personalise risk profiles, policies and premiums; as well as the ability to encourage and influence less risky behaviour.

Peer-to-peer insurance (P2P) brings a social networking model to the insurance industry, allowing customers to create **groups of friends** with whom they **share risks**. A portion of the group's premium is set aside to pay claims, and if the group has a lower-than-average number of accidents, everyone gets some money back.

> "Auto insurers are basking in a false sense of security, seemingly oblivious to the impending decline in market size and the threat of new entrants. The sector is ripe for disruption..."
> BCG, 2016

4.2 Car insurance[75]

Technological advances and emerging technologies are having a **major impact** on the **automobile industry** and the way individuals will **travel by car** in

[74] http://www.telegraph.co.uk/insurance/car/how-technology-is-driving-down-the-cost-of-car-insurance/

[75] https://www.forbes.com/sites/sarwantsingh/2017/02/24/the-future-of-car-insurance-digital-predictive-and-usage-based/#135dcbf752fb

the **future**. This in turn will impact significantly on the auto insurance business. A recent report by BCG notes that "**Auto insurers** are basking in a **false sense of security**, seemingly **oblivious** to the **impending decline** in market size and the threat of new entrants. The sector is **ripe for disruption**: the value of insurers' proprietary data and traditional expertise is diminishing, and other players are emerging with the data, analytics, and customer access needed to attack the value chain"[76]. The report estimates that the auto insurance market could shrink by 40-50% of its size in 2016 by 2030, and to 20-30% by 2040 in some mature markets. In mature markets, a drop of 65% is foreseen with regard to personal auto insurance by 2030. Much of the **disruption** will come from **new types of entrants** who capitalise on direct access to customers, better and proprietary information about drivers (including data from telematics) and analytics. A report by KPMG estimates that the auto insurance industry may in fact **shrink** by 60% by 2040[77].

4.2.1 Collision avoidance technology

Technologies such as **automatic braking** aimed at **collision avoidance** is already having an impact on safety and premiums. About 40% of new cars sold in 2016 were expected to have automatic emergency braking technology already installed[78].

This technology reacts much faster than a human can in the event of a potential accident. It is estimated that telematic collision avoidance technology can **reduce low-speed accidents by around 20%,** resulting in insurance discounts of up to 10%. The use of route maps as apps on smartphones as well as dedicated navigation systems are also considered to be accident preventing applications.

4.2.2 Driverless and self-driving cars

It is important to **distinguish** between **self-driving** vehicles and **driverless** vehicles. Self-driving vehicles have the ability to drive autonomously, but with the option of a driver taking over and making an intervention; alternatively for the driver to do most of the driving and leave autonomous driving to the vehicle under some conditions (more or less as automatic speed control is currently used). It is assumed that the driver will be in the vehicle, but they can also be located remotely (something that will be enabled by the arrival of **5G wifi**). Driverless and self-driving vehicles, on the other hand, are totally autonomous with no alternative for human intervention.

Driverless and self-driving vehicles will introduce **new opportunities and challenges** for **insurers** and no doubt also for regulators. Self-driving vehicles are already being tested and used on roads in the US, UK and elsewhere. There is a lot of speculation when driverless self-driving vehicles, whether they are powered by electric or internal combustion engines, will be in general use as personal vehicles, taxis or buses.

"Driverless and self-driving vehicles will introduce new opportunities and challenges for insurers and no doubt also for regulators"

Insurance cover for **self-driving** cars must offer protection for cases where **either** the **driver** or the **vehicle** is in **control**. The UK Government is proposing legislation that will make it easy for accident victims to claim compensation if a collision occurs when the cars are in autonomous mode[79]. Insurers could still try to recover their costs from vehicle manufacturers. The bill makes exemptions for cases where the vehicle's owner has made unauthorised changes to its software or failed to install an update that their policy requires them to. In these cases, the owner becomes liable. Similar liability issues are presented by 'self-parking technologies' for cars, which are already widely available. (See also Liability).

[76] https://www.bcgperspectives.com/content/articles/automotive-innovation-motor-insurance-20/

[77] https://singularityhub.com/2016/09/26/5-tech-forces-that-will-change-insurance-for-good/

[78] http://www.telegraph.co.uk/insurance/car/how-technology-is-driving-down-the-cost-of-car-insurance/

[79] http://www.bbc.co.uk/news/technology-39055395

4.2.3 Usage-based-insurance, telematics and pay-as-you-go

Usage-based-insurance (UBI) is an insurance model **where** how you drive, **when** you drive and **where** you drive and **how** you drive, affect your risk profile and can result in competitive quotes if you are considered to be a '**safe driver**'. The emerging technology enabling the implementation of **UBI** is **telematics** (combined with **AI** and **analytics**), and refers to the use of sensors in vehicles to detect, track and report on the status of the vehicle. This can include the movement, speed and acceleration of the vehicle and whether it was involved in an accident.

Pay-as-you-drive (PAYD) and **pay-how-you-drive (PHYD)** business models are likely to become the preferred types of metrics to calculate premiums. It was recently reported that pay-per-ride or pay-per-use models for car insurance can be expected to become increasingly significant as millennials make their influence felt. The use of data analytics will also prompt more **manage-how-you-drive (MHYD)** beyond 2020.

If will be interesting to see how the notion of 'no-need-to-own' will affect the way cars are used in the future. If car-sharing becomes a more prominent trend, it will also have insurance implications.

The use of **telematics** will have a **significant impact** on **car insurance**. The ability to record and predict an individual's driving style and estimate their risk based thereon allows for the **personalisation** of **policies** and also methods to **encourage** and incentivise **good driving** to reduce the probability of accidents. The safest drivers are rewarded with the biggest discounts and best premiums. It is estimated that more than 400,000 drivers already use telematics technology to lower the cost of their car insurance, and that this number is growing at the rate of about 40% per annum. For careful drivers, this technology can offer savings of up to 25% on premiums. A recent PWC survey indicated that 67% of consumers surveyed indicated that they would be willing to have a sensor connected to their home or car, if that would lead to reduced insurance premiums[80]. PWC estimates that **telematics-based insurance** will **grow** by **80%** per annum by 2018, increasing to more than 100 million.

Fuelled by an increase in the number of connected cars and smartphones, **UBI** has now become a **mainstream** offer by most insurance companies especially across North America and Europe. A recent report suggests[81] that the demand for UBI policies is growing and is expected to reach almost 100 million drivers by 2020, dominated by Italy, UK (with an exceptional push from a safety angle for younger drivers) and the US. About 30% of North American car insurers now have telematics programs[82] and this is estimated to rise to 70% by 2020. More than 40 insurers in the UK sell so-called 'black box policies'.

The **dilemma for drivers** is that in order to qualify for lower premiums they need to be **prepared to share** more **data** with the insurer, including information about when, where and how they drive[83]. Telematics users sign a waiver form which allows their insurer to access data about their driving, essentially agreeing that data which could, in theory, expose their fault in the event of an accident, can be made available and used. The fact that auto insurers claim that "We get to know you better than your doctor"[84] may be too much of a risk for even the most careful of drivers. As one insurance executive put it, "Generally, someone who chooses not to use it is a worse risk"[85].

The telematic **sensors** need to be attached or built into the vehicle itself, but can also be located in a mobile phone, as long as the mobile phone is in the vehicle when the telematics data is being recorded. Smartphone apps, predominately targeted at millennials, that provide telematic **"try-before-you-buy" (TBYB)** options is seen as a 'cool' product, because it allows people to find out how safe they are behind the wheel, what score they can obtain and then share that with followers on social media, before buying the insurance.

[80] https://www.pwc.com/gx/en/industries/financial-services/insurance/publications/insurance-2020-necessity-mother-of-reinvention.html

[81] https://www.forbes.com/sites/sarwantsingh/2017/02/24/the-future-of-car-insurance-digital-predictive-and-usage-based/#135dcbf752fb

[82] http://uk.businessinsider.com/r-us-insurers-get-inside-cars-mouths-grocery-carts-in-profit-search-2017-1

[83] http://www.telegraph.co.uk/insurance/car/how-technology-is-driving-down-the-cost-of-car-insurance/

[84] http://uk.businessinsider.com/r-us-insurers-get-inside-cars-mouths-grocery-carts-in-profit-search-2017-1

[85] http://uk.businessinsider.com/r-us-insurers-get-inside-cars-mouths-grocery-carts-in-profit-search-2017-1

Dashboard cameras ('dashcams') are being used by a growing number of motorists to record events on video in real-time 'as the driver sees them'. Dashcams track the time, speed and location of the car and continuously film the view through the windscreen. For safe drivers, this enables lower insurance premiums. It also provides evidence when a claim is made. In April 2016, a retailer in the UK reported that **sales of dashcams** had **increased by 800% year-on-yea**r. One insurer in the UK offering a discount of up to 12.5% to customers with the gadget fitted reported however, that only 1.45% of its customers are using dashcams.

The **Aviva**[86] app in the UK has been downloaded by more than 550,000 people since its launch in September 2012. It uses smartphones to monitor how drivers accelerate, brake and corner. Once drivers have completed 200 miles, the app calculates a score out of 10, rating their driving safety level. Potential discounts are then displayed.

The South African financial services firm **Discovery**[87] has been tracking customers' driving and using the information in pricing since 2011. It has seen a 10% drop in accident claims. Discovery's ratio of losses to premiums for drivers in the tracking scheme is more than 25% lower than those not participating. Interestingly, the data has also led insurers to question the longstanding rule of thumb in the insurance industry that younger drivers are the riskiest.

Octo[88] retrieves data from 17 different sensors within a vehicle. By integrating data from these sensors, it can provide 10 to 12% reduction in the total cost of ownership of fleet insurance due to crash detection, better claims management and efficiency in getting vehicles repaired and back on the road.

Trov[89] is an on-demand platform-based insurtech recently launched the US, enabling the creation of customised insurance policies so that people can design coverage for specific items rather than buying more comprehensive (and more expensive) policies. All they need to do is to scan the things they want to cover in the insurance with their smartphones.

Cuvva[90] is a pay-as-you-go car insurance company founded in 2014. It has already insured 150,000 hours worth of driving covering 2 million miles. The company raised £1.5 million in January 2017.

4.3 Health insurance

A previous *DeltaHedron Innovation Insight* focused on emerging digital health technologies, which are **disrupting the healthcare industry**. One of the characteristics is '**empowerment of the patient**', where patients are using mobile devices to measure their own health status on a frequent basis to create useful patient generated health data (PGHD), and learn more about their conditions. These technologies enable patients to interact with healthcare providers remotely through two way communications. Patients can now engage much more assertive with their personal health situations and are empowered to take significant proactive and preventative measures.

The **emerging digital health technologies** and the benefits they provide will necessarily have a **major impact** on the **health insurance industry**. Significant personalised data is available from a range of IoT devices, which is enabling **personalised risk assessments**, policies and premiums.

Health insurers are also **encouraging** customers to adopt **healthier lifestyles**. Through the patient generated health data they can incentivise and monitor personal progress and compliance, which can then be translated into rewards for customers. Some health insurers are providing customers with wearable devices such as Fitbit and Apple Watch to keep track of their activity.

4.4 Life insurance

Life insurance is a market **particularly open** to **disruption** by **new technology**. It is a product typically bought once and not revisited often. Hence

[86] http://www.telegraph.co.uk/insurance/car/how-technology-is-driving-down-the-cost-of-car-insurance/
[87] http://uk.businessinsider.com/r-us-insurers-get-inside-cars-mouths-grocery-carts-in-profit-search-2017-1
[88] https://www.forbes.com/sites/sarwantsingh/2017/02/24/the-future-of-car-insurance-digital-predictive-and-usage-based/#135dcbf752fb
[89] http://uk.businessinsider.com/fintech-hot-insurance-insurtech-vc-economist-finance-disrupted-2017-2017-1?r=US&IR=T
[90] http://uk.businessinsider.com/fintech-hot-insurance-insurtech-vc-economist-finance-disrupted-2017-2017-1?r=US&IR=T

life insurers have fewer engagements and limited interaction with their clients, which puts them at a **competitive disadvantage**. Lack of continuous contact can diminish customers' loyalty to their life insurer and make it easy for insurance start-ups with better customer experience offerings to poach clients.

Many of the **emerging technologies** that are **impacting in health insurance**, will **also** impact on **life insurance**. Analytical tools will be especially valuable to life insurers as they can provide better insight into their clients' behaviour and how they can address their needs and wants.

One life insurance company started offering a policy in 2015 which provides customers with discounts on healthy groceries when shopping at certain retailers and rewards for hitting exercise targets as measured by a wearable device.

4.5 Microinsurance

Microinsurance is an interesting form of insurance addressing the needs of **low-income** or **disadvantaged groups** of the population. It is a particularly relevant form of insurance for regions with a large number of population living in poverty and otherwise excluded from the financial and insurance industries.

Mobile insurance start-up **BIMA**[91] has signed up 24 million customers across Africa, Asia and Latin America. The company offers microinsurance, allowing people to get accident or life insurance for as little as (US) 60 cents per month on rolling monthly cover. The product offers payouts of up to $1,000 for their family in case of death, for example. It takes just 3 minutes to sign up and premiums are collected through mobile phones.

Many insurers consider this segment of the market to be not financially viable. However, BIMA has shown that a simple, scalable product can work. Despite its large customer base, the company employs only 15 people in its London and Stockholm offices. In addition, it relies on a network of some 3,500 sales agents spread across its 16 markets in Africa, Asia, and Latin America who help to educate people about insurance and sell the product.

4.6 New technologies require new types of insurance

Emerging technologies are **continuously** being **adopted** by consumers, companies and countries across the world, and **older technologies** are **abandoned**. **Insurers** need to **engage** with this, noting how these **changes** are **impacting** on the **lives and lifestyles** of people.

> "Insurers need to embrace innovation as part of business as usual. Simply participating in third-party incubators or investing in a few start-ups will not be enough"
> Accenture, 2017

New and **emerging technologies** inevitably bring about **new risks**, with the **need for new forms of insurance**. Insurers need to consider what the risks, liabilities as well as the insurance requirements and complexities will be with regard to cyber security, data breaches and the use of blockchain, cryptocurrencies, robotics and automation, the internet of things, driverless cars, drones, 3-D printing and personalised healthcare, to name but a few.

Platform-based business models enabled by new emerging technologies have led to the rise of companies such as Airbnb in accommodation and Uber in transport, which some consider to be part of a growing no-need-to-own trend. It is suggested that **insurance products** based on **usage** ('per go') and on **sharing rather** than **owning** would be relevant here. Emerging technologies are also enabling emerging societal trends, which in themselves will require new approaches to insurance.

5. Incubators, innovation hubs and sandboxes

The notion of '**innovation spaces**' is not a new one - Lockheed's Skunk Works is a well known historical and almost iconic example. However, noting the secrecy that surrounded the project (building spy planes), it did have some unique characteristics.

[91] http://uk.businessinsider.com/bima-brings-microinsurance-to-africa-asia-and-latin-america-via-phones-2016-10

The idea is to create a space where new **ideas, technologies and business ideas** can be **conceived**, **examined, incubated and developed** in an **environment** where they are **not hindered** by '**bureaucratic, slow-moving and established**' thinking and cultures of more established technologies. In essence, the business processes and cultures that drive mature and the established businesses and their technologies are usually not well suited for the development of new business models based on new and emerging technologies – recall the discussion in the introductory section on the dynamics of technological change and the characteristics of emerging technologies.

5.1 Corporate innovation labs and incubators

Innovation hubs (centres and labs) are considered to be physical spaces (although many have substantial virtual aspects) where new and novel ideas and inventions are developed with the aim of turning them into innovations. Some innovation labs are **hugely successful** – consider for example MIT's Media Lab (granted that it may be another special case). One recent report claims that "One of the **most promising trends** in the modernisation in or even reinvention of business is the **rise of corporate innovation centers around the world**"[92]. Another article holds a rather more **cynical** view of innovation labs, to the point where it claims that "…Corporate America's **love affair with innovation**, it time to admit it's **not working**"[93]. It notes that a number of **corporate innovation labs** have recently been **closed** or downsized, including those of Nordstrom (2015), Ogilvy (2016), MicroSoft's Silicon Valley Research Lab (2014), Disney's research lab (2016), Turner's Media Camp (2014) and others. Regrettably, the report is lacking in its analysis and tells little about successful or new innovation labs (including those in the financial industry).

Incubators are spaces where **new start-up *companies*** are **created**, very often with new technologies at their core. The argument is made that the start-up companies in incubators deal with real world problems, including the technological challenges. Hence the appetite to invest in them.

It is interesting to note the recent mentions of innovation labs and incubators not only in the broader financial industry, but specifically also in the **insurance industry**. This includes in-house hubs where companies experiment with new technologies themselves, internal venture vehicles as well as the sponsorship of fintech and insurtech incubators. A recent report by Accenture notes that just 17% of insurers had in-house venture capital funds or similar funding structures to stimulate internal digital and technological innovations – whereas more or less double the proportion of retail banks were making such internal investments.

Aviva is one insurer that invests in interval ventures through its internal corporate venture capital division Digital Garage with an investment fund of £20 million annually[94].

> "It is difficult for small wheels to spin fast when they are mounted on the same axes as large, slowly rotating wheels"

A new financial services accelerator was launched in London in January 2016[95], specifically focused on insurance and backed by big names in insurance (Admiral, Allianz and Lloyds Bank). Accenture's Fintech Innovation Lab[96] in London signalled the largest program in its five-year history in January 2017, with 20 start-ups selected from a global field of more than 300 financial services technology entrepreneurs. It is modelled on a similar program co-founded in 2010 by Accenture and the Partnership Fund for New York City. Accenture also launched Fintech Innovation Labs in Hong Kong and Dublin in 2014.

---

92 http://www.innovationmanagement.se/2017/02/09/corporate-innovation-centers/

93 https://venturebeat.com/2017/03/22/its-time-to-ditch-your-innovation-lab/

94 https://www.thetimes.co.uk/article/f97a29f8-d69b-11e6-b069-6105840fb14c

95 http://uk.businessinsider.com/route66-ventures-and-anthemis-on-insurance-fintech-2015-9

96 http://www.businesswire.com/news/home/20170329006244/en/Artificial-Intelligence-Internet-Attract-InsurTech-Funding-Globally

5.2 Sandboxes – a regulatory innovation[97]

Innovation is also shaped by the **environment** in which it develops, including the **regulatory, legal and policy** environments. Instruments such as taxation, including tax credits for R&D for example, as well as health and competition regulation can all have an impact of the trajectories of emerging technologies and innovation processes. **Financial institutions** are **heavily regulated** in many countries which will affect the impact and development of technological innovations in these sectors.

Emerging technologies and the **new business models** they spawn are **not optimised** in **the early stages**. They need **space to grow and adapt** to the world, and also for the world to adapt to and understand them. **Regulatory authorities** are **aware** of the **encouraging** and **stifling** effects **regulation** can have on innovation in the financial sector. The **dilemma** they face is that emerging technologies may well be the fountainhead for exciting new products, but they can also **present new risks** and **unintended consequences**. These may not be well understood when they are first introduced and they may very well **run afoul of existing regulations**, all of which may in turn have a **stifling effect** on the innovations.

The **challenge** is to find a **way** to **innovate** with regards to the **regulatory environment** in financial services at the same time as the new business models and technologies are emerging, so as to ensure that the **encouragement of technological innovation** is **balanced** with a **duty to protect consumers** and the **financial system** - particularly in the early stages of emerging technologies. This provides an opportunity to figure out how the regulatory regimes themselves need to evolve. Regulators can work with applicants to develop appropriate parameters, performance benchmarks and consumer protection measures, depending on the design and risks of each proposal. In this regard fintechs have the ability to not only enhance the range of investment options on the market, but also to contribute towards improving the efficiency of the financial services industry and its regulation.

To protect the interests of investors and stimulate the development of the financial sector, the UK, Singapore and other countries are introducing '**regulatory sandboxes**' for innovators and entrepreneurs where they can **experiment with fintech products and services** in a **carefully managed regulatory environment**. A regulatory sandbox enables the government to allow eligible firms to test new solutions on a specified number of investors within a well-defined period (typically three to six months).

The UK's regulatory body, the Financial Conduct Authority (FCA), notes that before the introduction of the concept, some fintech innovators, start-ups and SMEs would have found it too time-consuming or costly to obtain authorisation. The new regulatory sandbox allows companies meeting a number of threshold conditions to apply for 'restricted authorization'.

In order to encourage entrepreneurs and innovators, three policy instruments will be employed on a case-by-case basis to provide oversight and regulation of the sandbox activities, viz. providing of individual guidance on the interpretation of rules, waiving or modifying certain requirements and, when ambiguities arise, issuing 'no enforcement action' letters (NAL) to provide immunity from prosecution to the tests. The UK and Singapore require applicants to formulate a fair and clear exit strategy for customers (e.g. transferal to third parties) when the tests finish or are terminated by regulators.

The US Office of the Comptroller of the Currency announced in December 2016 that it would begin issuing modified charters to fintech firms requiring them to follow some federal banking rules[98].

6. Discussion

It is evident that a number of technological changes and emerging technologies are poised to cause **significant disruption in the insurance industry**. 'Insurance 2.0' will happen in a new world where '**connected, everywhere, any time in real-time**' is the norm and 'instantism' is expected as part of a mobile-enabled multi-channel customer experience which accepts **personalisation** as standard.

The insurance industry is viewed by many to be very '**conservative**' and certainly not as agile and progressive as their banking counterparts. Insurance is not known for innovativeness and is

[97] http://www.ejinsight.com/20160721-how-a-regulatory-sandbox-can-help-fintech-innovation/

[98] https://generalassemb.ly/blog/fintech-innovation-blockchain-panel-at-general-assembly/

perceived to be slow to adopt new technologies and business models. Many insurers are hindered by **outdated and costly legacy IT systems** which are entrenching inefficient back office processes such as claims processing, invoicing and particularly **workflow**. Cloud-based IT solutions, application program interfaces (APIs) and everything-as-a-service (XaaS) provide many opportunities to **revitalise back office operations** in the insurance industry, with insurtechs and fintechs standing ready to address the gaps. The key is to ensure that **value is delivered to the customer** – as opposed to implementing systems designed 'by insurers for insurers, which are easy and understandable for the IT department but not appreciated by customers'.

The **mobile revolution**, underpinned by **broader digital transformation**, is driving much of the disruption, particularly with regard to the customer experience. The **global proliferation of mobile phones** enables personal two-way contact with circa 5 billion people world-wide, with an impact way beyond the ability to just 'talk to friends and family'. It is a very powerful societal force enabling billions of people personal access to information, news and services (including banking, insurance, health and education) and have the ability to respond. Mobile signals can reach remote areas even where it is difficult to provide electricity, clean water and sanitation.

The imperative is to create an exciting '**mobile and digital customer journey**', rather than merely 'digitising' paper-based processes (of which many remain prevalent). Mobile technologies present excellent opportunities to build personal **m-relationships** with customers, particularly if the customer can be convinced to install 'your app' on their mobile phone (and keep it there). The key is to ensure that the app delivers value to the customer, rather than just being another channel for unsolicited 'electronic ads'. **Tech companies** such as Google, Apple and **Netflix have become the benchmark reference points** with regard to customer experience, rather than peers in the financial services industry.

Insurance is an **information driven and hungry industry**. New sources of information as well as processing technologies will **take underwriting to an entirely new level** and are enhancing insurers' ability to manage risk and offer more sophisticated and personalised policies. The advent of **big data, turbo-charged by analytics and artificial intelligence (AI)**, is a game changer. Information from the **internet of things (IoT)**, including telematics from cars, patient generated health data (PGHD) from mobile devices and sensors in the home, as well as '**alternative data**' gleaned from social media sites are providing valuable new types of datasets. The IoT relies on **sensors to gather environmental information**, and it is foreseen that interest in sensors will grow as the IoT expands.

Cyber security of data and information remains a very high priority for customers, government and the industry, including insurers and other financial institutions. Insurance companies need to ensure that they deploy state-of-art cyber defences, which require significant investment and 24/7 attention. **Blockchain** is a high-profile emerging technology with very useful characteristics that have applications in a number of relevant areas in the financial industry, including data security and smart contracts. Insurers should also be considering the nature of their **insurance product offer** in the **evolving data security environment** in the face of constantly evolving new threats and risks.

New types of data from **IoT devices and social media**, coupled with AI and analytics, enable insurers to develop much **more sophisticated risk profiles** of individuals, enabling **personalised policies** (rather than treating an individual as part of a risk pool). At the same time, it enables insurers to **encourage and incentivise** safer and healthier lifestyles and **individual behaviour**, aimed at **preventing** adverse events **rather than compensation 'after the accident'**.

The notions of **personal authentication and 'digital identification'** is an important global issue with a wide range of applications, including many in the financial services sector. It presents major opportunities for businesses.

Interest and investment in **insurtechs**, a specialised type of fintech start-up focusing on the insurance industry, is rising. These new types of fintechs are power users of emerging digital and mobile technologies such as big data, analytics, the internet of things and blockchain; and are not hindered by legacy IT systems, corporate cultures and fixed assets (such as brick-and-mortar and branches). They gain **competitive advantage** by **nimbly and swiftly using the technologies** to

create **great customer experiences**, enabled by their ability to get close to and learn about their customers' needs and wants. Some insurtechs compete directly with legacy players in the insurance sector, whereas others focus on supporting incumbents in areas where they are struggling. Insurtechs seem to compete in markets aimed at consumers and small businesses, with many pioneering new business models such as **peer-to-peer (P2P) insurance**. A number of incumbent insurance companies are working with insurtechs, but many are also reported to be working with other fintechs and start-ups external to the insurance industry (many with technology-related foci). There is significant interest in **innovation hubs and business incubators** focusing on fintechs and **insurtechs**, as well as **internal corporate venturing schemes** – although insurers seem to lag behind banks in this area

Indications are that incumbent insurers **consider large technology companies** such as Google and Apple as **potential threats**, together with other incumbents; and insurtechs to a much lesser extent. One recent survey concluded that many **consumers** will **happily switch to the technology companies** if they offered **financial services** (which they currently don't), including insurance. In addition to anticipating competition from other companies (and types of companies) as well as emerging technologies, insurers should also consider new business models such as **platform-based models and digital ecosystems** from a competition viewpoint.

A **number of emerging technologies** are exhibiting an **impact on the insurance industry**, its operations, products and the underlying nature of insured risk. They include data and information-related technologies such as **big data, analytics, artificial intelligence and blockchain**. The **internet of things** will become increasingly important, in part due to its ability to provide new types of data regarding the lifestyles of individuals. This not only allows **personalised risk profiles**, policies and premiums, but also the **ability to influence, encourage and incentivise healthier and safer lifestyle behaviours**. **e-Payments, e-wallets** and **cryptocurrencies** are already changing payment behaviours and preferences. **Robotics** and automation (including chatbots) will have a profound effect on the insurance industry, **with many jobs in the industry slated to be replaced with automated processes**. Other emerging technologies that will impact on the insurance industry include **wearables, digital health technologies, virtual reality and drones**.

Emerging technologies and technological change will **impact all sectors of the insurance business**, starting with the **nature of insured risk and risk management**, and include health insurance, life insurance, property and casualty insurance and microinsurance. It is already having a significant impact on the **auto insurance** industry, fuelled by the use of **telematics and usage-based-insurance** (UBI). There are a number of predictions that the **auto insurance business is ripe for a major disruption** and that it will experience a **significant shrinkage** in its current form in the near future. Technological change and emerging technologies always bring **new opportunities and inspire new lifestyles** which often lead to **new societal trends** – all of which bring **new risks**. Insurers should always be vigilant about **new technological-induced risks** that need to be insured, including those posed by emerging technologies currently on the radar screen.

Financial institutions, including insurance companies, operate in a **heavily regulated environment**. **Governments** are keen to **stimulate innovation** as a driver for economic growth. However, innovative technologies, companies and business models bring **new risks** which may not be completely understood and have unintended consequences. Regulators are aware that regulations designed for the incumbent industry may stifle innovation. The dilemma is to find a balance between the **encouragement of innovation** while at the same time **protecting the public and financial system**. To address this issue, authorities in the UK, Singapore and elsewhere are starting to introduce the notion of a '**regulatory sandbox**', which allows companies to **test innovative new financial products and business models** for limited time and a limited market within well defined parameters.

Emerging technologies and technological change, particularly those driven by digital, mobile and data, are set to the disrupt the insurance industry in a number of ways - 'creative destruction' on steroids. Opportunities abound for the swift and nimble who can leverage the emerging technologies to create greater customer value and enhance efficiency. At

the same time those unable to adapt will probably follow their technologies into obsolescence. New insurtech start-ups are seizing opportunities, but incumbent companies who develop and implement forward-looking innovation strategies can remain formidable players.

Insurance companies, be they incumbent legacy players are insurtechs, need to have articulated innovation strategies integrated as essential elements of their corporate strategies. It is important to note, that although technological innovation is important, an integrated broader corporate innovation strategy should also address business models, marketing, venturing and partnering, internationalisation and organisational structures – and particularly also learning.

Do you have an innovation strategy – and if so, can you describe it and determine whether it is working? If not, do you sometimes find yourself wondering what happened…. not even to speak of what can happen and which interventions can be made to steer that?

"There are three types of people in life – those who make things happen, those who watch things happen and those who wondered what happened…."

Appendix

The dynamics of technological change, technological innovation and the nature of emerging technologies

In order to assess the strategic business impact, opportunities and risks of emerging technologies, it is helpful to understand the dynamics of technological change and the characteristics of emerging technologies.

Any innovation, irrespective of its other characteristics, has **two important components**, viz. an **'invention' component** and an '**acceptance in the market' component**. Innovation encompasses the creation or invention of new products, processes or services *and* their successful adoption by users – it is where '**technology meets the market**'.

Technological innovation is not only an **inherently risky business**, it is also a **dynamic process** – things change with time, including the performance of the technology, costs, use and applications as well as adoption by users and diffusion patterns. The dynamics are often depicted in terms of S-curves, learning curves and the familiar Gartner hype cycle to name but a few, which are all helpful in interpreting the trajectories of the technology over time as well as the interaction amongst technologies.

A **mature technology** has many advantages, established over a long period. These include proven reliability, established user bases and distribution networks as well as intellectual property protection. However, these advantages can eventually become hurdles impeding change. The **bulk of innovations are of an incremental nature**, continuously improving existing products, processes and services, typically over a long period through the contributions of many role players all across the globe. Incremental innovations enhance existing products, processes and services by making them '**faster, cheaper and better**'.

From time to time, however, **radical and disruptive innovations** come along. They bring about a **step change in performance and benefits**, and are typically based upon one or more **emerging technologies**. Radical innovations tend to **upset the industry hierarchy**, often accompanied with the introduction of new business models, changes in the industry ecology as well as changing regulatory environments, new policies and new legislation. New types of companies (rather than just new companies) become the new industry leaders. As is often the case with disruptive technologies and radical innovations, a **shift** in behaviour patterns of role players and the 'centre of the gravity' in the **value chain in terms of power and influence relationships** between role players often come about.

Technological innovation, particularly radical and disruptive innovation, is known to bring about '**creative destruction**'. New products, processes and services as well as new companies, new types of companies and industries, business models and customer bases emerge, enabled and fuelled by the new technologies. At the same time the mature and

established orders fall by the wayside as they are replaced by the new. Emerging technologies often have the '**attacker's advantage**'[99] and it can take significant effort and ingenuity for legacy players to reinvent themselves in order to survive, prosper and be competitive in the new world. Start-up companies and ventures based on emerging technologies do not need to rely on legacy infrastructure investments that can become obsolete and may be difficult to dispose of; and they can exploit new engineering and scientific principles.

New technologies can be very disruptive, creating new markets and industries, accompanied by changes in business models; and sometimes new social cultures and norms. Emerging technologies often create '**disruptive innovations'**. They initially address the low performance end niches of a market segment[100] and are often perceived as 'non-threatening' by mature technologies. However, as the (soon-to-be disruptive) emerging technologies develop, they improve to a point where they supplant the mature technologies in the latter's main markets, often leading to the demise of the mature technologies as mentioned above. All of this happens over time, hence the importance of understanding the dynamics of the innovation processes that are playing out.

Very often the emerging technology causing the **disruption comes from a very different industry or sector in which the disruption is caused**, and/or the disruption is the result of a **number of emerging technologies having a simultaneous impact** rather than a single intervention. This is one of the major reasons why technological opportunity and threat analysis should track a wide spectrum of emerging technologies from diverse sectors in different stages of development; and why it is important to consider the impact a combination of technologies may have as well as the competitor, symbiotic and predator-prey influences that they may have on one another[101].

As **new technologies** emerge, they are **not optimised** in many regards. When decisions are made at an early stage to investment in or adopt emerging technologies (or not), it is easy therefore, to fall into the **trap of neglecting to account for the dynamics of change** when comparing the performance, costs and reliability of emerging technologies with more mature technologies. Emerging technologies are often judged in terms of benchmarks that apply to the mature technology, as the new technology has not yet had the opportunity to reveal its usefulness or new applications that it enables. As a new technology develops, **learning dynamics** come into play and the new technology becomes cheaper, better, faster and more users adopt it. It is important to **consider what 'could be' and probably 'will be', rather than just 'as is'**. In their early stages, the performance of emerging technologies may not (yet) be what the main market requires at the time. Initially emerging technologies may be **inferior** to the mature technologies they are challenging in many respects, they may be relatively expensive, sometimes unreliable and may not have established user bases. But **things develop and emerging technologies become more competitive over time**, often when competing mature technologies have little scope to improve further.

[99] See for example Richard N. Foster, *The Attacker's Advantage*, Summit Books, 1986.

[100] See for example Clayton M. Christensen, *The innovator's dilemma: When new technologies cause great firms to fail*, Harvard Business School Press, 199; and Clayton M. Christensen and Michael E. Raynor, *The innovator's solution*, Harvard Business School Press, 2013.

[101] C.W.I. Pistorius and J.M. Utterback, "Multi-mode interaction among technologies", *Research Policy*, Vol 26, 1997, pp. 67-84. http://www.sciencedirect.com/science/article/pii/S004873339600916X

Dr Calie Pistorius is the Chief Executive and Principal Consultant of DeltaHedron Ltd, and has extensive experience of consulting and research in the management of technological innovation. He is a former Chair of the *National Advisory Council on Innovation* in South Africa, former Vice- Chancellor of the University of Hull in the UK and former Vice-Chancellor and Principal of the University of Pretoria in South Africa, where was also the Director of the *Institute of Technological Innovation*. He is registered as a Chartered Engineer in the UK and holds a PhD degree in electrical engineering from the Ohio State University, a masters degree in the management of technology from the Massachusetts Institute of Technology, a bachelors degree in electronics engineering from the University of Pretoria, and is an alumnus of Harvard Business School.

Previous editions of *DeltaHedron Innovation Insight*

- Developments in emerging digital health technologies, No 1.1/17, April 2017

DeltaHedron
Shaping the future

DeltaHedron Ltd is a UK-based business consulting company specialising in the management of technological innovation. We support our clients with the development and implementation of innovation strategies, and in assessing and capturing the strategic business opportunities and mitigating the risks and threats presented by emerging technologies and the dynamics of technological change.

To subscribe/unsubscribe to ***DeltaHedron Innovation Insight*,** comment on or enquire about the contents of this newsletter or to learn more about **DeltaHedron** and how we can support your organisation with the management of technological innovation, please contact us through our website:

www.deltahedron.co.uk