



universität
wien

MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

“The impact of digitalization on mutual insurance
companies“

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of
Master of Science (MSc)

Wien, 2018 / Vienna, 2018

Studienkennzahl lt. Studienblatt /
degree programme code as it appears on
the student record sheet:

A 066 914

Studienrichtung lt. Studienblatt /
degree programme as it appears on
the student record sheet:

Masterstudium Internationale Betriebswirtschaft

Betreut von / Supervisor:

ao. Univ.-Prof. Dr. Johann Brazda

Acknowledgment

This work would not have been possible without the valued contributions of many people whose assistance deserve the highest praise.

I would like to first of all extend my deep appreciation and thanks to my thesis supervisor ao. Univ.-Prof. Dr. Johann Brazda and also Stefanie Zeman, MSc for their invaluable guidance during the writing of the thesis. They have provided great ideas, scope, resources and feedback throughout the creation process.

Furthermore, I would like to thank my parents Serdar and Sema who have supported me every step of the way and always encouraged and allowed me to complete this journey with their wisdom and care together with my friends who have always been there for me. In addition; I would like to also thank the lecturers and staff of the University of Vienna who have all contributed my education.

Abstract

Nach der Wirtschafts- und Finanzkrise im Jahr 2008 stieg die Bedeutung gemeinnütziger Organisationen, da unethische Geschäftspraktiken als Hauptursache für diesen wirtschaftlichen Abschwung angesehen wurden. Im Versicherungssektor erlebten global gesehen die Versicherungsvereine auf Gegenseitigkeit ein Wachstum, das vergleichsweise höher lag als bei kapitalorientierten Versicherer. Dieses Wachstum und dieser positive Ausblick haben die Frage aufgeworfen, ob die Gegenseitigkeitsversicherer diesen Aufwärtstrend fortsetzen können. Um den Erfolg und die Nachhaltigkeit solcher Organisationen vorherzusehen, sind die disruptiven Auswirkungen der Technologie im Versicherungssektor zu berücksichtigen.

Die laufenden Entwicklungen werden sich noch stärker auf unsere Gesellschaft auswirken, da Daten über individuelle Personen und Gruppenpräferenzen digital und leicht zugänglich sowie sammelbar werden. Die Versicherungsbranche könnte sich aufgrund der möglichen Chancen der Digitalisierung erheblich verändern und neue Strukturen schaffen. Neue Entwicklungen wie Peer-to-Peer-Versicherungen oder Mikroversicherungen beginnen bereits das derzeitige Versicherungswesen zu revolutionieren. Anwendungen für Smartphones versprechen die Versicherung zugänglicher und genauer zu machen, während die Prozessdigitalisierung Verbesserungen im Management als auch Erleichterungen bei Agentur- und Zugangsprobleme versprechen. Verbesserungen bei Technologien und Erfindungen wie dem intelligenten Auto stellen jedoch auch eine Bedrohung für den Markt dar. In diesem Zusammenhang bietet insbesondere die innovative Technologie des Blockchain-Systems neue Herausforderungen und Chancen, die einerseits bessere Möglichkeiten für bereits existierende Geschäfte bieten, andererseits auch unsere Art zu interagieren und zu organisieren revolutioniert.

In dieser Arbeit möchte ich zeigen, welche Auswirkungen die digitale Technologie auf die spezielle Form der Gegenseitigkeitsversicherungen hat und in Zukunft haben wird. Ebenso wie Veränderungen durch neue Entwicklungen mit den Prinzipien der Gegenseitigkeit und Solidarität übereinstimmen. Dazu gehört auch das Potenzial der Technologie, die sich in den nächsten zehn bis zwanzig Jahren entwickeln wird und in die Versicherungs- und Wirtschaftslandschaft einwirken wird. Hauptkern dieser Arbeit ist die möglichen Erfolgspotentiale der Gegenseitigkeitsversicherungen unter den aufgezeigten technologischen Entwicklungen mit Berücksichtigung der einhergehenden Risiken und potenziellen Probleme zu analysieren und einen innovativen Ansatz für die Veränderungen in der Versicherungsbranche zu bieten.

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1. Introduction

1.1. Background and topic relevance

Solidarity and cooperation for fulfilment of the needs of a group are concepts that are as old as civilized history. Mutual societies as they are called today form a large part of the social economy by the virtue of being grounded on the principles of solidarity and Mutualism. One of the main areas where they are prominent is the insurance sector; since solidarity and social protection principles are particularly compatible and desirable with risk insurance among individuals and groups interest exists that lead individuals and groups to seek out such non-profit oriented entities when they seek to ensure they have a safety net in the case of the unforeseen.

With the development of trade based on currencies and the ever-increasing importance attributed to growth and return on investment; such groups and societies may seem to have lost their significance at first glance. Especially with the notion of demutualization; the process of Mutuals converting to stock-owned companies rising to prominence in the late 1990s and 2000s due to various mostly capital related reasons (Meador & Trahan, 2008, p. 90). It is not a surprise that until recently some publications and analysts chose to regard Mutuals as having left their glory days behind.

However, recent developments, especially the financial crisis of 2008 and the after effects it has caused has created perhaps a suitable atmosphere for such mutual organisations to thrive once again or at the least turn back this perceived decline (Darren Pain, Kulli Tamm, Melissa Li, & Irina Fan, 2016, p. 6). One of the reasons for why such a development might have taken place is the inherent reduction in trust towards institutions that primarily focus on return on investment and profits rather than the wellbeing and fulfilment of their members. The 2008 economic crises shattered the trust many had regarding the financial system and the good will of those that directed it. As careless borrowing or lending and an excessive focus on profitability was seen as the causes of the painful crises; it is understandable why some have sought Mutuals to insure what matters to them. These developments following the end of the economic crises that have enabled the mutual insurance organizations to push themselves into a surging and adventurous position in their competition with for-profit insurers also mean however that these types of insurance organisations now must face the same challenges that test their counterparts as new technologies challenge the sector and even our understanding.

In today's modern world perhaps the defining challenge as well as opportunity for businesses, entrepreneurs and individuals alike is personified singularly with the word; technology. An ever-improving technology as well as its effects on individual choice and demands promises to be the defining test of adaptability and flexibility of insurers. Everything is not lost however; as technology also enables easy access to information: a commodity that is very precious in the field of insurance, one which promises to increase efficiency, flexibility (Dr. Laila Neuthor & Tim Jehnichen, 2017, p. 28).

As (Henderson & Venkatraman, 1999, p. 472) point out; until the 90s and even today: Advances in technology such as information and communication technologies were seen mostly as improving support functions or 'back office' utilities. Such as the aforementioned access to information and distribution channels; which are important opportunities for advancement in the market, however these technological changes if tapped may also provide avenues for advancement in areas that might be unthinkable for the organisation initially. Potential foundational technology related future changes will be discussed further in the paper.

Once access to specific customer information through digital data is gained; customization of services on an individual manner can be offered. Companies that offer a standardised selection of products, in our case perhaps levels of premiums and coverage for insurance; might be able to tweak their coverages based on customer needs in a very specific and detailed way. Such drastic changes might influence the structure of the organisation or even make organisational adaptation a necessity (Henderson & Venkatraman, 1999, p. 473). Can Mutuals undertake such drastic organisational changes that sometimes become necessary with technology application and adoption? Compared to stock firms; for Mutuals having no access to the capital markets for capital and growth may prove to be a disadvantage when technological adoption is questioned and this weakness must be considered (Born, Gentry, Viscusi, & Zeckhauser, 1998, p. 173). Can the efficiency increase and cost reductions offered by new technologies overcome the limited access to capital that Mutuals suffer from?

There is an absence of relevant research on the impact of technology and digitalization on organisations; especially so for mutual organisations and insurers; therefore, extrapolating the potential impacts of such an unrelenting phenomenon as technology on an important part of our third sector social structure feels important and necessary. As the impact of more accessible technologies are starting to be felt today and more so due to the upcoming expected

developments that if proven right; promise to enact immense changes (Iansiti & Lakhani, 2017).

Another development that has also piqued my interest and made me consider the importance of technology as well as the implementation of that technology in Mutuals and mutual insurance especially; is the recent cyber-attack that occurred during the May of 2017 which effected multiple countries and showcased just how vulnerable our healthcare systems can be (BBC, 2017). It is another reminder that even if as organizations and individuals, we do not immediately implement or even become aware of certain technological deployments; that they catch up to us as increased risk regardless. Cybercrime and security of digitally stored data are increasingly becoming major concerns for insurers and policy holders which needs to be taken into account when considering all insurance and customer related activities (Tanguy Catlin, Johannes-Tobias, & Lorenz, 2017, p. 28).

Most healthcare and by extension; insurance organisations operate through the internet due to the world-wide web providing itself as an already established macro network infrastructure and the prohibitive costs of establishing a separate network structure between different branches or customers of organisations. Utilization of internet as a basis for communication and organisation of activities brings about certain risks however, risks that must be managed.

For insurance organisations cybersecurity will be a very important topic when we discuss technological opportunities and challenges. For Mutuals adoption of technological advantages to help compete with for-profit insurers is very important but cybersecurity especially after the events of the summer of 2017 will be an important testbed for the reliance and very important trust relationship between insurers and their customers. I aim to look into these developments and potential means to alleviate some of these concerns in the following chapters.

1.2. Objective of the thesis

The developments in technology and the effect of such on Organizations are important topics for today's academia and business. This on-going technology driven adaptation and transformation of businesses, organization design and processes are all significant market forces that are driving capitalistic structures to change.

A unique area that is perhaps overlooked to some extent is the effect of such developments and digitalization on non-profit Mutuals and specifically mutual insurers. The question of how a

system based on shared risk and communality could tackle the quick on-set of sudden developments in technology and market demand driven by these changes have interested me greatly.

The main objective of this thesis is therefore to provide a ‘state of research’ review and by utilizing market data; assess the sustainability of mutual insurance when faced with digitalization forces in an effort to forecast how current and upcoming developments may shape the market and the organizations themselves. Can Mutuals muster the resources needed for combatting cyber risks? Will Mutuals be able to adjust themselves to better fit the technological opportunities our age provides? Are Mutuals adopting accessible technologies fast enough to remain competitive? Will technology provide an opportunity for Mutuals to develop and better utilize their mutuality principles such as self-government and responsibility as well as equality between members? What potential barriers exist that might prevent such advantages from actualizing? Do for-profits suffer from these setbacks as well? Does the fit of principles of some of the upcoming technologies and Mutuality principles provide an advantage to Mutuals?

Finding answers or at least perspectives to these questions will be in my opinion vital for the future of Mutuals in the insurance sector.

1.3. Methodology of the thesis

To provide a background grounding for the thesis, theoretical concepts are important to be included. Current models and perspectives concerning the impact of technology on various aspects of organizations will be mentioned, as well as mutual societies, organizations and insurance systems will be touched upon for providing a stable ground for the thesis to evolve from.

Since the topic of the thesis includes a broader perspective on the success and competitiveness of mutual insurers in the overall insurance market; data from the global as well as some local insurance markets will be provided to assess their performance in the aim of forecasting their future success and to offer opinions of how their advantages can better be utilized, as well as showing and attempting to mitigate their shortcomings. While mostly focused on stock-holder, for-profit insurers; market reports and strategies will be included with projections on how they may apply to Mutuals.

Digitalization while attracting attention is still a recent topic especially when concerned with its impact on organizations. For non-profits and especially mutual insurance field this is even more apparent as these fields still to this day suffer from limited statistical data availability and research. However, these deficiencies will be attempted to be minimized through utilizing secondary data-gathering from international bodies such as the European Union economic reports or market research conducted by various organizations and institutions.

1.4. Structure of the thesis

Introduction part of the thesis is concerned with the background information on topics of import, why digitalization might impact mutual organizations and insurers, the research question as well as the objectives and goes on to mention the methodology and outline of the thesis proper.

The middle section is dedicated to the theoretical background of mutual societies, their role or import in today's society and economy, as well as definitions and an overview of their current state in the market.

The third part of the thesis will expand upon how technology affect Mutuals. The primary goal of this section will be to provide examples of recent technological developments such as micro-insurance and peer-to-peer insurance with an emphasis on the Blockchain technology and its implications not only for insurance but other sectors as well. Using this information, it will attempt to forecast an outline of how the insurance mutual will evolve thanks to and because of advancements in technology both in the long and short term.

The final part will be conclusions and discussion; a general overview of the findings will be presented and ideas for future research and business advancements will be developed with final opinions.

2. Theoretical background

2.1. Mutuality principles

As stated before cooperation and Mutuality are ancient concepts that have been with us since the dawn of time. Schumpeter (1934) in his famed book on Economic Development states that entrepreneur is an innovator by nature because they must always adapt to changing market conditions. These changes in the market are distinct characteristics of our Capitalist system and that the moment the entrepreneurs engage in a routine; they lose their innovative nature (Schumpeter, 1934, p. 104). Scarcity of resources and products provide opportunities for individuals or organizations to make profit and smart entrepreneurs are those that recognize such opportunities and act upon them aggressively, however the very same conditions and realities that enable immense profit and growth also inhibit overall benefit for the community as a whole as the resources that allow one individual to prosper are contested by many members usually (Elinor Ostrom, 1990, p. 2). The exploitation of market opportunities over-time tends to create ‘bubbles’ of artificial value association that burst eventually; creating crises and other stresses for the economy on top of the overall reduction in resources and quality as a whole due to seeking of self-interest rather than the interest of the common.

While problematic for business; such financial crises have extremely more destructive effects for the public at large. During financial troubles governments reduce spending which means large segments of the population risk potentially losing their benefits and securities, an example of this which can be quite deadly is insurance coverage as some segments of the public rely on the government to provide such services.

The concept of non-profit organizations and other forms of associations sometimes referred to as The Third Sector, together with the concepts of mutual aid and mutual societies offer an alternative and much more creative solution to the problem of protecting the vulnerable during the corrective and violent swings of the capitalist economy that the state structure may be unable to provide full coverage for (Richard Hull, Jane Gibbon, Oana Branzei, & Helen Haugh, 2011, p. xiv)

Coming up with definite principles or defining characteristics for Mutual societies is a difficult task. Local and regional variations on characteristics and scope as well as field of operations make identifying distinct characteristics difficult, however an effort can be made to come up with certain common observations to help develop a narrower overview to help us better define

these entities. In its 2011 report the European Parliament (2011) outlined a concise summary of (Archambault, 2009) and provided the principles that societies must adhere to for them to be considered Mutuals (European Parliament, 2011, p. 19); these principles are as follows:

- Absence of shares: Mutuals are a grouping of persons (physical or legal), called members, and not a pooling of funds as in the case of corporations;
- Free membership: that means free entry (and free exit) for everyone who fulfils the conditions laid down in the by-laws and abides by the principles of mutuality;
- Solidarity among members: a historical principle rooted in the 19th century workers' movement and the ideology of the solidarity movement. Today, that means joint liability and a cross subsidisation between good risks and bad risks and no discrimination among members;
- Democratic governance: conveyed by the principle "one person, one vote" in contrast to the rule "one share, one vote" which is symbolic of corporate governance. The board's members are volunteers, in contrast to the corporations' practice paying their directors a fee;
- Independence: Mutuals are private and independent organisations, neither controlled by government representatives nor funded by public subsidies;
- Limited profit sharing: the profit of a mutual can be shared among the owners/ members, usually as discounted premiums or rebates, but the main part of the company's proceeds is re-invested in it to improve services, finance the development of the business or to increase its own funds (Archambault, 2009, p. 1; European Parliament, 2011, p. 19).

As stated in the report; these are observed characteristics from a number of EU states and are not strict rules a supranational organisation requires for membership in a mutual organisation form. Therefore, these rules tend to be applied differently between EU states in accordance with the historical and legal development within these countries as they evolve over time. It is perhaps possible to surmise that since the initial development of mutual societies occurred during earlier periods when legal and financial standardization of rules and regulations regarding their operations were not commonplace yet (Kropotkin, P. A., 1903, p. 211) and since Mutuals mostly developed within small local communities; that divergence in such norms and characteristics is to be expected. The general observations provided by the European commission and parliament report still helps us in identifying and characterizing Mutuals today; a somewhat difficult task. I feel expanding upon each characteristic and point would be

apt and serve as a starting point for further discussion in the paper as defining a mutual is of paramount import for the topic and technological developments to be considered will have interactions with these principles.

- Absence of shares: Mutuals are a grouping of persons (physical or legal), called members, and not a pooling of funds as in the case of corporations. (European Parliament, 2011, p. 19)

From this specific point, we understand that uniting for common cause or need is the singular objective and means for Mutual members and not creations of corporations or other interest groups. For formation of a company or other for-profit venture pooling capital is essential for the purposes of engaging in an activity in the market or the exploitation of a certain chosen resource; however, such pooling of resources what otherwise could be also called ‘investments’ bring about an expectation of profit to initially make up for the loss of capital and to overtake it as gains; a return on investment (Schumpeter, 1934, p. 53).

- Free membership: that means free entry (and free exit) for everyone who fulfils the conditions laid down in the by-laws and abides by the principles of mutuality. (European Parliament, 2011, p. 19)

This characteristic is also a simple yet important one. The ease of joining and leaving such institutions is one of the more beneficial sides of engaging in one. They are not exclusive corporations or interest groups but rather unions of like-minded or similar individuals. It is a matter of debate whether if all members of Mutuals such as mutual insurance groups all share a similar focus on the mutuality principles and their importance when choosing to become a member. Member engagement and ease of participation in the governance of such organizations is an important topic.

With the lack of a market oversight in the form of investors; who would be looking out for their own interests in the form of company success and shareholder value increases; the management and oversight of the mutual is nearly entirely rested upon the board of directors. With no investor promotion and recruitment ability; the power to appoint and oversee managers rests upon the members of the mutual. Depending on the bylaws the members of the mutual also usually get a say in corporate governance issues and exercise this power through voting on decisions. Although issues exist in participation and legal enforcement of this voting power over decision making in Mutuals.

This lack of a direct control is an oft discussed potential issue for Mutuals. Stock holder companies with shareholders must abide by certain laws and regulations for decision making purposes. Important and consequential changes might stockholder approval and by design; shareholders that have a larger investment ratio will due to the portion of their ownership usually get more say in the making of such decisions. Also depending on the country and state the stockholder company is located in: Shareholders may possess the power to call special meetings and demand replacing of directors as well as managers. Mutuals on the other hand have to rely on voting of members for such decisions and the legislation and guidance from state laws when it comes to internal management practices of Mutuals are comparatively absent (Greene & Johnson, 1980, p. 166). However legal and technological developments or reforms that enforce and aid in the voting process may help to alleviate some of these concerns.

Technology is expected to have an impact of the seeming disadvantage that Mutuals suffer despite having free membership. This topic will be of interest in the following pages and will be expanded upon.

- Solidarity among members: a historical principle rooted in the 19th century workers' movement and the ideology of the solidarity movement. Today, that means joint liability and a cross subsidisation between good risks and bad risks and no discrimination among members; (European Parliament, 2011, p. 19).

The members of the Mutuals possess primary roles as both customers and owners of the organization that they participate in (Talonen, 2016, p. 2). It is due to this dual role of members that the solidarity principle is exercised exceptionally well in Mutuals as the individual's benefit coincides with that of the entire group. Ownership is discussed heavily in regards to agency issues and the customers become owners; malpractice and fraudulent behaviour due to self-interest is seen much less within Mutuals compared to for-profit companies (Fama & Jensen, 1983, p. 337) (Boose, 1990, p. 500). An interesting strategy utilized by for-profit firms is to grant a percentage of the shares of the company to the chief executive manager in an attempt to incentivise actions that serve the interests of the company rather than those only of the manager themselves. Mutuals already possess this advantage and more.

- Democratic governance: conveyed by the principle "one person, one vote" in contrast to the rule "one share, one vote" which is symbolic of corporate governance. The board's members are volunteers, in contrast to the corporations' practice paying their directors a fee; (European Parliament, 2011, p. 19)

The nature of the organizational structure for stock companies alternatively called for-profit companies causes a conflict of interest between shareholders and policy holders (Born et al., 1998, p. 169). As the customer and owner are different entities under stock insurance companies unlike Mutual insurance; managers might take actions and enact decisions that may not be in the best interests of the policy holders or customers (Talonon, 2016, p. 2). The above democratic governance principle negates this issue as policy holders themselves undertake decisions that concerns themselves and their policies. The ease of participating in his voting process (Greene & Johnson, 1980, p. 169)

- Independence: Mutuals are private and independent organisations, neither controlled by government representatives nor funded by public subsidies; (European Parliament, 2011, p. 11)

The independence principle is a primary consequence of the nature of mutuality as it originates from usually small likeminded and similar individuals for a specific common purpose (Kropotkin, P. A., 1903, p. 211). From conception the initial cooperation which births Mutuals arise from local and specific needs; in this instance as a measure to build or develop something of value as a group. While ensuring ownership remains with the members of the Mutual; this principle does not prohibit Mutuals from engaging in alliances with state structures to help communities in dealing with external pressures (Richard Hull et al., 2011, p. 46). The fact that alliance and cooperation with outside actors such as states or institutions will be of import later on. As we start to discuss the digitization of data for insurance purposes; gathering of this data will be a crucial factor. Before Mutuals can use this data in smart systems such as insurance claim verification; they need to be able to gather it without issue and this can be managed by engaging in agreements with weather stations, crop fertility researchers among others. The fact that Mutuals are not forbidden or discouraged from being able to engage with outside actors and groups is a factor in their ability to compete with for-profit firms.

- Limited profit sharing: the profit of a mutual can be shared among the owners/ members, usually as discounted premiums or rebates, but the main part of the company's proceeds is re-invested in it to improve services, finance the development of the business or to increase its own funds. (European Parliament, 2011, p. 11)

This principle is very logical when considering the overall theme of Mutuals however an important factor is the competition when it comes to premiums and prices. Smaller more focused Mutuals may be able to have much less loss ratios and can concentrate on coverage

and benefit of members rather than seeking profit, however large Mutual insurers that have to compete with other firms especially globally; may feel the pressure of the market forces and reduce their premiums. Mutual insurers as a whole tend to not increase premiums due to the decision maker customer alignment. Mutual insurers for instance possessed a relatively higher loss ratio compared to non-Mutuals even during the high period of 2007-2014 after the economic crisis of 2008 (Darren Pain et al., 2016, p. 9).

In my effort to try to understand the current and potential effects of technological developments on Mutuals and insurers. I deemed it apt to attempt utilizing the Mutuality Principles as guide stones in developing an understanding of the disruption technology might present to the core principles of operation of the Mutuals and Mutual insurers. Unlike for-profit insurers that only must concerns themselves with the survival of the profitability and operations of their organizations; Mutuals must also consider the effect these developments will have on the implementation of the principles upon which they are founded upon. Signals exist today that point towards not only positive alignment of these principles with the technologies that will be mentioned; but also of new opportunities that may universalize these principles across sectors.

This potential effect that technology may have here can best be described as an impact on the Mutuals and a chaotic paradigm shift in the insurance sector (Kuhn, 1962, p. 93). The resulting changes will complement and challenge the principles of Mutual design as well as their original founding philosophy while providing immense benefits to the society and introducing new risks at the same time (Schanz, 2015, p. 74). The survivability and adaptability of such principles as solidarity and mutuality in the face of a rapid-onset disruption of technology in an already competitive market was of prime interest for me in my research. Such an initial analysis may also provide some insight into the competitiveness and sustainability of Mutuals in the future as for-profit insurers stand to lose sizable portions of their profits in coming decades as the technological developments evolve towards providing immense benefit in the short term; to completely negating consumer origin risks from multiple sectors such as driving and home safety (Tanguy Catlin et al., 2017, p. 12). Mutuals may become much more competitive in the coming years due to such unforeseen side effects of profit-increasing technologies and access to digital data.

2.2. Mutual insurance companies

Mutual insurance has a long and rich history. Originating in 1696 in England, mutual insurance companies were the initial developers of the life insurance model. Small tightly knit communities such as local farmers of a village or firefighters usually lacked the resources and income to benefit from insurance coverage offered by large companies. In such small, usually isolated communities; work that required more than one person's effort or resource level would be typically undertaken by the members of that group not for the individual benefit even though that might also be gained from the greater community thanks to the improvements, but for the betterment of the entire group and community.

Such activities are not unique to the human species either, animals that possess individual characteristics and roles often cooperate to weather harsh conditions or situations that might threaten the individual.

Kropotkin (1903) in his influential work on mutual aid had even considered such mutual aid as he calls it an essential part of the evolution of societies and species. In his view cooperation and seeking the betterment of the group are essential attributes that not only aid in the survival of the group, society and individual, but also allow for development and betterment; evolution of the species, group and civilization (Kropotkin, P. A., 1903, p. 6)

From such early concepts of cooperation and mutual aiding to help survive as family units, then as ages progressed towards clans and villages; comes the tradition of finding strength and security from among communal units and groups. With such a broad perspective, we can perhaps understand why mutual societies and in our case; insurance was developed by and for the members of a group or village, it is perhaps the following or the modern iteration of a trend that has helped in the creation of our current civilization.

The first iteration of such mutual insurance as a proper company was in 1696 England, firstly starting out as an informal association of farmers and people that relied upon the land to live. Fire and the loss associated with it would often times be devastating to locals that relied upon the crops for their survival and well-being, they could not afford the high rates asked by larger insurance companies so they instead formed their own mutual insurance companies to offer much lower and affordable rates. In the late 1870s official legislation was passed that formalized these associations as participants of a proper industry and the mutual insurance and insurance industry as a whole, developed very rapidly in England and afterwards in other nations (Steven Deller, Ann Hoyt, Brent Hueth, & Reka Sundaram-Stukel, 2009, p. 42).

However, developments in the conduct of business the formalization of company and trade structures, as well as the technological developments of the industrial age created many challenges for the working-class employees and groups. As states grew in power and absolved more responsibility over the wellbeing of individual citizens; the concept of a welfare state slowly developed. As mutual societies especially in the insurance sector were not omnipresent in all sectors and geographic areas and as social insurance and health care increasingly became a national concern; states across the globe and especially in Europe started to develop and build special departments to provide basic health care and social security services to their citizens. Such developments lessened the need for localized mutual insurance societies somewhat and most of such societies opted to join the state structures or adapted to cater to more niche and localized roles that the overall state sponsored health care systems did not or could not reach (Archambault, 2009, p. 3).

2.3. Historical background in technological developments

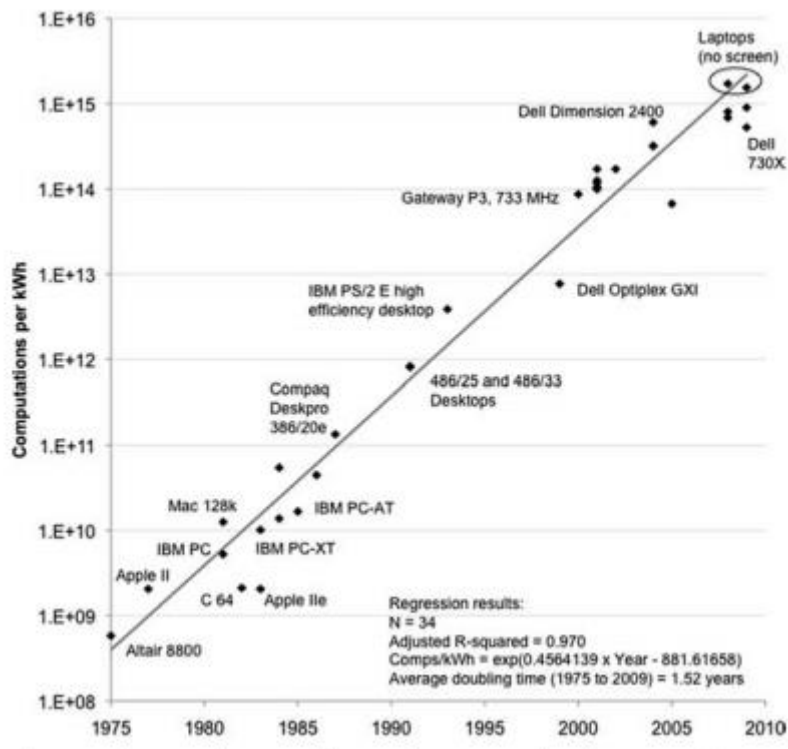
Castells (1999) in his book 'The information age Economy, Society and Culture' argues that the first decade of the 21st century gave rise to an entirely new and different human condition (Castells, 1999, p. 1) Transformations that were spearheaded by advances in technology has in essence melded our social, economic, technological and cultural lives into a union of existence the different facets of life are not separable from the others. Technology; through movies, films, news sources and other entertainment access defines and shapes our culture, or at least becomes a medium in which culture is created and transferred

The economy is of course immensely affected by technology; the mere existence of an economy was brought for by advances of technology in the early periods of human existence, however if look at it from a mode modern perspective; today majority of trading is done through computers and the internet and through the use of trader bots, digital transfer and storage systems technology has become an important part of the financial activity area. Technological innovation and inventions that result from such are the primary cause of market and economy shocks in the modern world and advance scientific insight which also diffuses into business applications and processes, generating innovation and growth.

Figure 1 shows us computations per kilowatt-hour over time for personal computers. The historical data shows us just how powerful the equipment we daily use have truly become. In an exponential manner we are seeing continuous development towards more efficient and

powerful systems that are changing how we interact with the world (Koomey, Berard, Sanchez, & Wong, 2011, p. 52). Technology is growing as it feeds off failures of branches of advancement yet always in an ever-increasing capacity and slope. This advancement promises to shake up the insurance world more than any other development has threatened to date, yet insurance companies are yet to feel the full power of this change as consumers will begin to demand more from insurers (Matt Cullen, 2015, p. 10).

Figure 1: Computations per kilowatt-hour over time for personal computers.



(Koomey et al., 2011, p. 50)

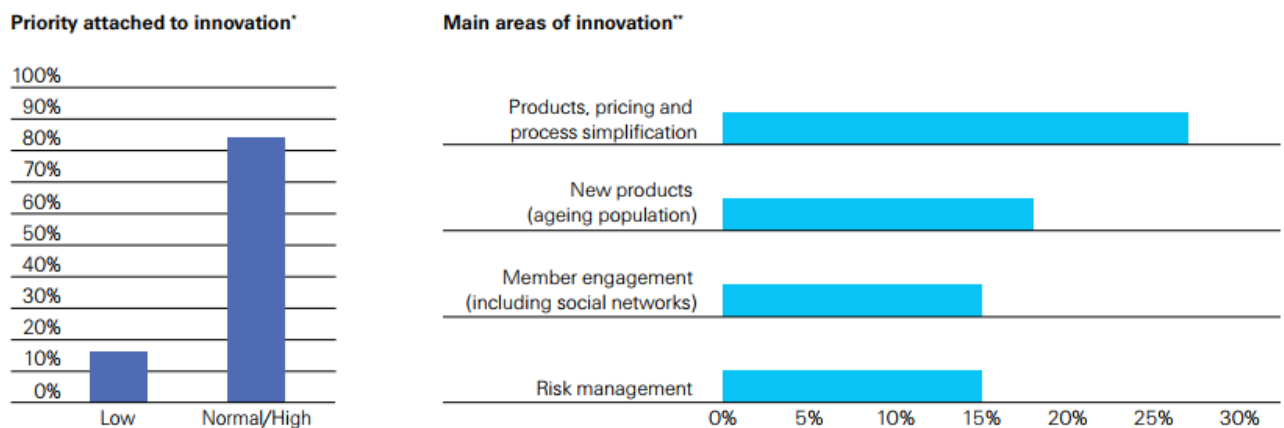
3. Mutual insurance and digitalization

3.1. Mutuals and technology

Technology has penetrated our lives to such an extent that its presence has not only become expected but also to a great extent; unnoticed. Devices such as smoke detectors or health bands that measure blood pressure and heartrate are universal and common place today. What is an increasing theme however is that these devices are becoming ‘smart’ thanks to advances and expectations that technology brings. These smart devices while being of help and use for the consumer also provide invaluable data on the most important variable for insurers; risk.

Previously insurers had to rely on imprecise observable variables such as age and sex to determine health risks for instance; yet with accurate timely specific observations that are translated into data that can be manipulated and analysed which is in essence; digitalization, provides a source of certainty that was simply inconceivable mere years ago for insurers. (Schanz, 2015)

Figure 2: Mutuals’ innovation efforts



* Based on a question about how highly innovation features in the respondent’s organisation. Normal/high priority refers to those respondents who saw innovation as a regular element of how they run their businesses or were investing considerable resources to stimulate innovation.

** Based on a question highlighting the main areas of innovation effort in the respondent’s organisation.

Source: Chief Executive Insights: perspectives on leadership in the fastest growing insurance sector, ICMIF, 2013.

(Darren Pain et al., 2016, p. 32)

Figure 2 shows us that the Mutual insurers understand the importance and seriousness of the impending technological developments. A very high emphasis is given to innovation and this interest primary focuses on our area namely technology and digitalization of activities and data. Recent advances and applications are allowing insurers access to large quantities of consumer data. While at the same time; the same advances are also changing customer preferences by allowing direct comparison of prices and utilities of insurers. They are signalling their preferences and habits while demanding more interaction and seamlessness; all thanks to technology (Darren Pain et al., 2016, p. 30).

Mobile phones aptly called smartphones in our modern age are probably the best example of the technology and data revolution that we reside in currently and they also provide the best medium for insurance companies to implement and develop solutions and problem identifying measures as well as providing a means for easing customer interaction complexities; which are crucial in today's world. As Darren Pain et al (2016) posit; there are already examples of mutual companies that dedicate precious resources into developing and implementing smart solutions to better take advantage of the technology and digitization that is spreading globally, this adoption tends to be influenced by the size of the Mutual and larger Mutuals find it easier to adopt new innovations (Darren Pain et al., 2016, p. 32). Funding and access to capital may be the primary reasons for this although more research is needed in this area.

The United Services Automobile Association which provides mutual insurance and financial services to active and retired members of the United States Military is one of the leading adopters of digital technology with services such as; mobile transactions, buy life-insurance and file claims from smartphone apps. They even provide an accident animation in their mobile application so that users can explain and narrate their automobile accident when filing for insurance claims; capabilities that the Mutual developed through their dedicated technology research and development laboratory (USAA, 2014).

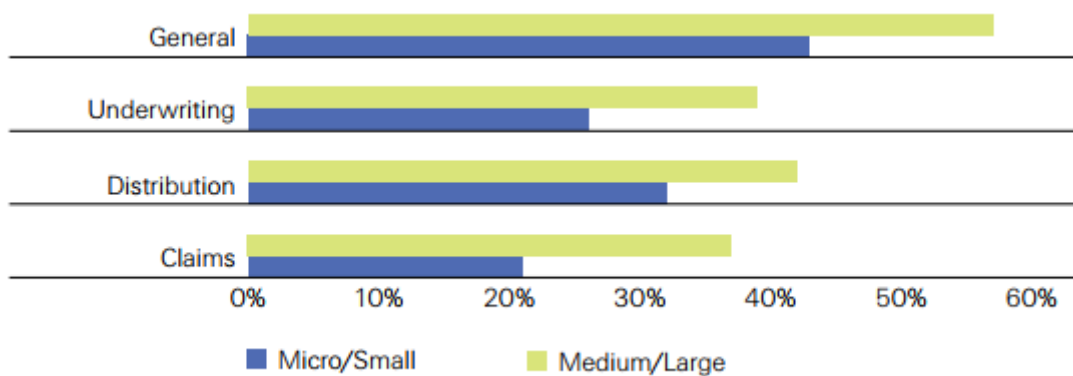
Mutuals due to their very nature of democratic management and equality based non-hierarchical organisation can also fit the ideals and functioning of start-up tech companies and potentially fit the world view and sensibilities of the new generation tech-minded entrepreneurs (Helmut K. Anheier & Stefan Toepler, 2010, p. 1020). We see that the task oriented and top-to-bottom organization forms are usually not a good fit for innovation based companies and these older organisation forms are usually designed or adapted or changed later on to better fit the requirements of innovation (Bloom, Garicano, Sadun, & Reenen, 2009, p. 2877).

While companies like Google or Apple try and implement such changes in their respective departments that deal with technology and idea creation; the company as a whole, as a structure remains the same with clear manager and supervisor roles such as CEOs. On the other hand, mutual organizations due to their very founding philosophy are already constructed in a way that is based on democratization and serving a common need of the members, this notion that such companies should be able to better implement or develop tech solutions therefore makes certain sense, however lack of resources and investment/diversification will probably continue to be the single most important barrier for Mutuals in adopting new technologies.

4.2. Rate of technological adoption in mutual insurance companies

As seen in Figure 3 the age and size of Mutuals become important indirectly when we start considering the impact of digital technology and its adoption. Perhaps due to resource requirements or exposure to more ideas from a larger pool of members or simply due to having to cater to demands sooner by having more customers to pay attention to; larger Mutuals which we may also assume to be older are engaging in more activities and adopting new technologies faster when it comes to innovations.

Figure 3: Mutuals' adoption of technology, by size



(Darren Pain et al., 2016, p. 32)

Increasingly; digitalization in insurance is not just seen simply as a new opportunity to make processes faster or reduce transaction costs or possibly reach customers more efficiently, but instead it is expected to shake the very foundations of how business and even coordination and organization will be conducted in the future. Some new technologies are already being defined as not only *disruptive* but *foundational technologies*; technologies that may create new foundations for our society and economy (Iansiti & Lakhani, 2017).

In perhaps a pattern that is rudimentarily similar to the Product Life Cycle Model and strategy; insurance companies and organizations may very well face the same cyclical demand that new products face in the market. Product life cycle model envisions that products and services go through phases starting from development towards growth, maturity and eventual decline (Levitt, 1965). Things are new and interesting, demand for them grow over time reaching an evening out period and phase to finally crumble as other new things are developed to replace the prior, interestingly; one of the primary factors influencing this cycle is technological advancement over time. How can this be related to insurance companies and technological adoption?

Technological adoption is difficult both for organizations and customers or policy holders. Modern technology that is freshly introduced takes time to be incorporated into daily use; this exactly fits the product life cycle model in which there are early adopters and followers (Levitt, 1965) this is also true for organizations.

Technological leaps such as the smart phone or the internet bring about opportunities to incorporate these inventions into the business model for insurers (Darren Pain et al., 2016), however these inventions usually begin as novelties or gimmicks that few initially take advantage of. Early adopter organizations and insurers in our case might start utilizing such resources but their actual usage remains relatively low for some time, only showing a slow increase over extended periods.

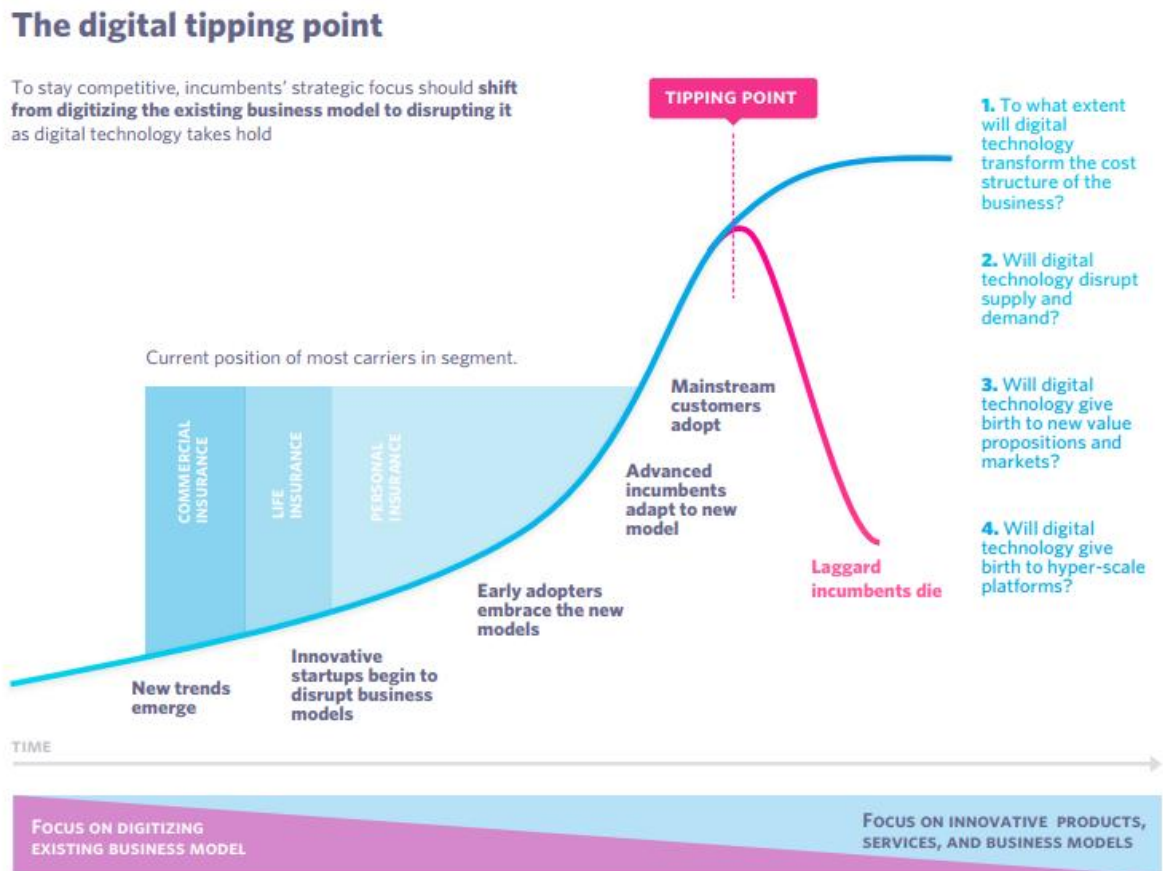
Tanguy Catlin et al (2017) point out a relationship between life cycle of products and the current adoption of technology in the insurance sector and mention a 'digital tipping point' that promises to leave behind those insurers that do not adopt new technologies quickly enough (Tanguy Catlin et al., 2017, p. 20). This expected tipping point as seen in Figure 4; occurs when the market gets saturated enough with innovative technology so that advancements developed through such as smartphone integration for insurance follow-up or purchase for instance; becomes a necessity and bare-minimum expectation for consumers. After this occurs the

companies that have failed to adopt and modify towards these technologies rapidly lose their relevance and competitiveness in the market and are simply left behind to slowly dissolve. While market share and profits are not major concerns for Mutual insurance companies; competitiveness against stock-holder companies is. If Mutuals fail to act quickly enough in expanding their offerings regarding digital options to their members; current and prospective members may change their preference towards for-profit insurance firms.

Perhaps this phenomena of grand market change fits the definition of a paradigm shift; as a drastic change that redefines the field when it arrives, and perhaps with some resistance at least initially (Kuhn, 1962, p. 93). There is a very crucial window where the shift in the considered-norm in insurance will take a while to arrive fully, during this time insurers must develop methods to start implementing technology and digitalization of data into their processes and Mutuals will have to go through the same experience if they wish to remain competitive.

While as discussed before Mutuals are not created with a drive for profit or market share; they are created and designed to satisfy the needs of their members and if those needs evolve due to technology then they must evolve themselves with it. Since they were initially organized in a similar fashion for satisfaction of needs in a solidarity mindset; it is not difficult to foresee that they would follow along and conform towards the needs of their members eventually. Hence the technological tipping point might affect for-profit insurers more although it is difficult to forecast these developments at this juncture unfortunately. However, despite this possible advantage there are signals that showcase the significantly slow speed of technological adoption in Mutual insurers which is worrying despite the inherent advantages they may possess.

Figure 4: The digital tipping point



(Tanguy Catlin et al., 2017, p. 20)

The principles of Mutuality are very much beneficial for covering the policy holders from low-probability yet catastrophic risk events as well as saving them from agency issues encountered with the managers in stock-holder insurance companies (Boose, 1990). However such decentralized leadership and lack of oversight from a singular majority stock holder position might create disinterest from the policy makers to engage in disciplinary control activity and more importantly for our technological adoption focus: this leadership structure might create a lack of long-term orientation and focus from the leadership (Born et al., 1998, p. 169). Without the advantage of a long-term strategy perspective that some large shareholders may instill; Mutuels may find it more difficult to forecast and adapt to how digital technologies will change their method and approach.

The tipping point argument of Tanguy Catlin et al (2017) stresses the importance of foresting the importance of the inevitable demand increase for technological solutions in the insurance market; for such a strategic risk to be realized and preventative measures to be taken a very capable and fast adapting long-term oriented leadership is very much necessary (Tanguy Catlin et al., 2017, p. 19). Recognizing this trend; what might be called a paradigm shift requires a long-term vision and perspective as well decisive decision-making power.

This focus on the long term and modernization of processes however seems to be lacking in Mutual insurers at least for the moment. Another issue is the fact that until this very late ‘tipping point’ hits the markets; the demand for the digitalization of insurance may not be a chief priority for policy holders or customers this is especially true for Mutuals. The demands of the consumers may lag behind others depending on geography and culture; Asian and especially Japanese Mutual insurers currently do not have as much digital disruption as other parts of the Globe perhaps related to cultural preference for face-to-face interactions when purchasing insurance policies (Darren Pain et al., 2016, p. 34). Mutual insurers in these areas may not become aware of a significant demand for new digital technology adoption until it may become too late to do so to effectively compete with stock-holder insurers. If that comes to pass then the by nature customer/policy holder oriented Mutuals may not realize the gravity of the situation quickly enough and with the added disadvantage of being unable to access the capital market for sudden massive expenses; they may fall off from this tipping point leaving the stage and the insurance sector to be an entirely stock-holder profit oriented market in their respective countries.

As (Born et al., 1998, p. 177) suggests and other publications support (MacMinn & Ren, 2011, p. 108), (ICMIF, 2015) the competitiveness of Mutual insurers is acknowledged as per their presence in the market and advantages they offer in comparison to stock-holder companies; however so are their disadvantages usually in the same studies and reports are always mentioned. The reasons as to their continued existence are a subject of study and curiosity and there is an on-going effort to explain this continued co-existence. Born et al. (1998) also posit that the market for insurance may have not yet reached maturity enough to conclusively decide on one or the other types of insurance organization to reach an equilibrium (Born et al., 1998, p. 169). Their suggestion that history may impact this equilibrium therefore creating the current indecisive atmosphere in the insurance market is of particular import as it aligns with the Paradigm Shift argument that technology adoption might introduce; such an eventuality where the foreseen impact of digitalization of the insurance market shatters the current norms might

shift the equilibrium towards one or the other of the two insurance organization types and with the current analysis it seems that both have a chance at coming out in top. However, Mutuals possess a far greater advantage in the impending technologies that promise to not only shape markets but the society itself; the most important one being the blockchain which will be mentioned later on.

For such opportunities to be realized however adoption of technologies is necessary and illustrated in Figure 5; even in 2016 the adoption of technology in line with modern trends seem to be lacking (Darren Pain et al., 2016, p. 34).

Social media and online presence; typically in a webpage form, are important fundamentals to be able to reach and conform to consumers within the web atmosphere however, other avenues such as Online Purchases, Smartphone application presence and Live chat possibilities not only increase the market penetration of any insurance organization but may also propel business process evolution as influencing factors of changes in organization form which is the mechanism that spearheads changes in the core processes of a firm (Li, Merenda, & Venkatachalam, 2011, p. 58)

Figure 5: How current customer journeys could be redesigned



(Tanguy Catlin et al., 2017, p. 47)

Tanguy Catlin et al. (2017) in their report on the impact of what they call digital disruption on the insurance sector; go on to provide the expected and on-going benefits that digital technology will provide for insurers (Tanguy Catlin et al., 2017, p. 47). As seen in Figure 5; the reduction in insurance purchase and claim times, total removal of need for agents at certain points of the process and other such benefits are naturally invaluable. A detailed look reveals to us that certain benefits the authors foresee; potential extensive digital infrastructure that go much beyond providing access to online purchases or a smartphone app. Instantaneous claims, automation of data collection, self-completing transactions, consumer tailoring of products, instant underwriting and quoting of insurance policies and interactive means for making changes to coverage are among the many advantages that digital technology allows or may allow to consumers in the near future. Mutual insurers need to catch up very quickly to be able to compete with stock-holder companies that are realizing the importance of such technologies and are implementing them.

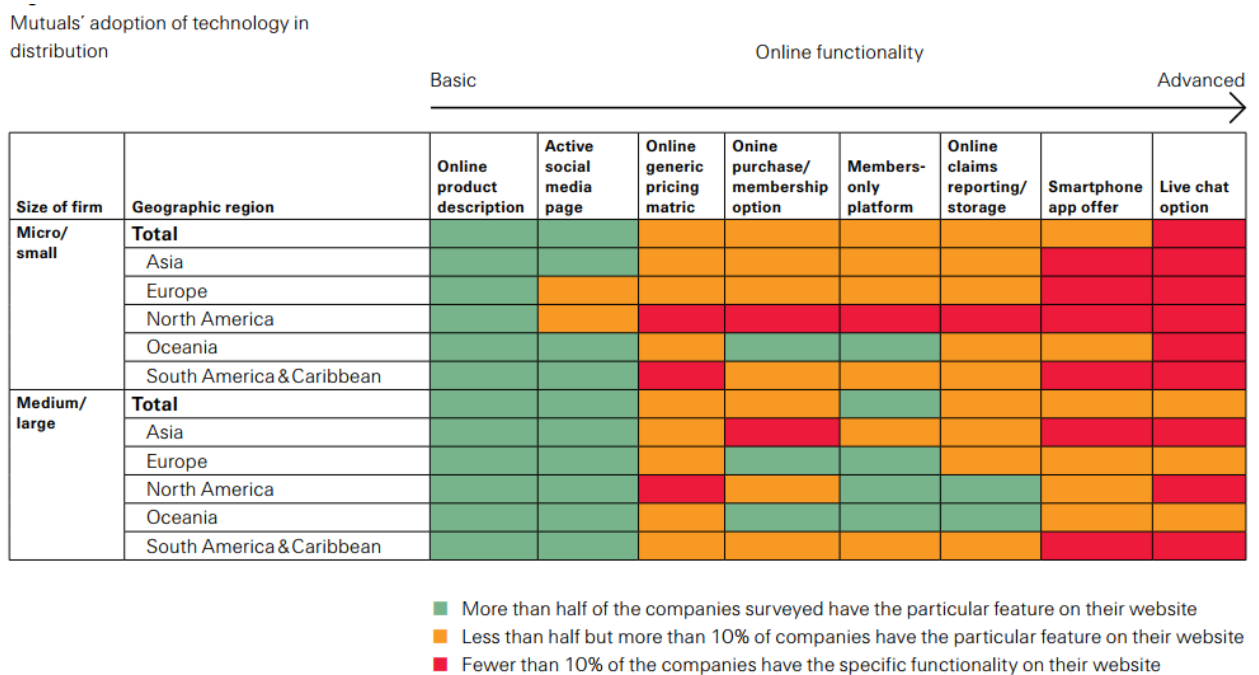
A potential advantage that the Mutuals may benefit from is concerned with the required connections between the state databases that certain applications of technology require and the insurance company that wants to utilize them for their new digital product offerings such as insurance claim settlement and underwriting techniques that may rely on public or private databases such as medical/legal records. Mutuals are seen as existing within the third sector as a supportive mechanism of the society (Richard Hull et al., 2011, p. 15). Therefore, Mutuals may have easier access to state assistance and resources when setting up their networks compared to for-profit companies that may be subject to much more scrutiny and distrust or expensive tenders when attempting to establish database connections with the states for their daily customer interactions. There is an inherent effect of trust that works behind the scenes as well. In today's atmosphere when access and leak of public records especially those that are related to health information of consumers; safety and security of sensitive information is of paramount importance (BBC, 2017). Mutuals may be more trusted with this and other kinds of sensitive information. With an already existing focus on member wellbeing over profits; Mutuals and their members are perhaps less likely to misuse or sell medical records or legal documents of themselves that they may have access to through digital services that deal with underwriting or data collection for claims.

All this talk of foreseen advantages and ease of adoption of digital technologies in Mutuals is moot however if the Mutuals themselves do not bring the process of adoption themselves. With

the prior-mentioned tipping point argument in mind the window for adoption for Mutuals may be fast approaching its end (Tanguy Catlin et al., 2017, p. 20).

However as seen on Figure 6; the current rate of adoption of Mutuals for the present digital technologies itself is somewhat wanting. While most Mutuals provide online product descriptions or social media pages; many do not offer any online pricing, purchase or claim reporting options. Smartphone application offerings are slim as well, smartphone apps are seen as one of the primary digital technologies that enable insurers to not only provide extensive options and access to customer, but also as a means for the insurers to gain access to relevant data on consumers to better design and fit their services to the demands and preferences of the consumers. These applications represent the next level in insurance-consumer interaction and are crucial for the establishment and success of upcoming new forms of insurance such as micro/instant-insurance and peer-to-peer insurance networks. The adoption rate of technologies by Mutuals and Mutual insurers specifically needs to be observed carefully in the future when attempting to assess their potential competitiveness and success against stock holder companies.

Figure 6: Mutuals' adoption of technology in distribution



(Darren Pain et al., 2016, p. 34)

4.3. New forms of insurance through technology

It is relatively easy to grasp the operational benefits or changes technology may bring to the insurance market in terms of bettering the current insurance methods or in allowing the same insurance systems to reach more people faster. From daily usage we are exposed to; we already know how digital technology increases the speed and efficiencies of tasks that we must complete; the same applies for firms as well. On top of this efficiency increase however is the more nuanced and long-term benefit of new product and method development that digital technology makes possible. There is a decided relation between having more digital processes within a firm and the innovation rate of that firm (Li et al., 2011, p. 58). Perhaps Mutual insurers are not expected to develop entire new product lines or customer interactions by themselves but innovativeness is still a factor when adoption and application of new methods or products is a consideration. In Figure 6 we have an ideal redesign option presented by insurance experts in the industry, which showcases how digitalization may impact the current norms in insurance (Tanguy Catlin et al., 2017, p. 46). While there are many options and ideas projection what the near future might bring us; these are also evolving concepts and flexibility is of paramount import; as technologies that may be beyond our current projections may also be over the horizon very soon.

In Figure 5 Darren Pain et al. (2016) showed us a sample of how Mutuals organizations are doing in terms of adopting certain technologies in distribution and customer connectivity (Darren Pain et al., 2016, p. 34). From that listing we can see that the main sections all fall within the scope of customers support, customer involvement and marketing areas, perhaps smartphone applications being the only branch that might be considered to involve more than those activities yet they also do not bring entirely new forms of insurance by themselves alone. Current discussion has always been regarding the betterment of already existing distribution channels and demand for them may be critical and involve the paradigm shift ‘tipping point’ argument from before if Mutuals fail to adopt them soon enough.

However due to advances technology and digitization provide today; certain types of insurance applications that would be prohibitively time consuming or expensive are increasingly becoming not only feasible but; adventurous and these new methods also expand the classical definition and activity areas of insurance in an extraordinary manner which may prove the need for quick adoption and innovativeness in Mutual insurers even more.

New information sources that technology provide to insurance policy makers are of absolute importance for Mutuals in particular. One of the primary risks that Mutual insurance faces is that of financial insecurity due to the general homogeneousness of the pool of clients that is usually a natural outcome of the solidarity and locality characteristics of especially small and European Mutual insurers (Meuwissen, Assefa, & Asseldonk, 2013, p. 14). Diversification is an important strategy in business and organizational sustainability however the nature of Mutuals might hinder such strategies as mentioned above; the advent of very sophisticated and detailed technologies that would help develop proper databases on potential and present customer profiles might aid in overcoming the usually financial barriers in implementing such new strategies. Most of the upcoming new methods of insurance possibilities are oriented towards low cost, efficient systems that promote resource-risk sharing, reducing costs of previously prohibitive activities such as insurance claim settlements or technologies that allow potential insurance consumers to find preferential insurers and coverages themselves while some advances even allow consumers to find and reach their potential insurers themselves with minimal expense or input from the insurance company. It is an exciting time for insurers and Mutuals; select examples of such new methods of insurance will be discussed in the next section.

4.3.1. Micro insurance

Traditional insurance methods require considerable expenses for the coverage itself and especially during the settlement of insurance claims. Insurance organizations especially those that are stock-holder companies therefore opt to insure copious amounts to cover. Smaller insurance policy coverages can sometimes be seen as too expensive to follow through if claims are eventually made or when they do cover for smaller amounts and risks they may require higher premiums which may be prohibitively expensive when compared to the risk probability or costs. It is usually not profitable to provide coverage for low value or short-term risks such as a single vehicle trip, or a movie session. For the insurer it is too much time and effort for minimal gain which means if consumers demand such small-scale coverage then the premium is usually extremely high; most often surpassing the total value of the item or service being insured in the first place. This situation does leave potential insurance demand and opportunities unfulfilled however; people may wish to insure themselves during a one-off rare travel overseas, but may not require a yearly or monthly travel insurance subscription as they may not engage in travel often. A person or company that usually does not engage in postage

of valuable packages may find themselves in need of quickly transferring an item of value that is risk and concern wise in-between a normal package and an extremely valuable one that would warrant extraordinary expenses to transfer. Previously; in such cases there was no middle ground for insurance consumers to benefit from, however this eventuality promises to change. The primary reason why coverage for such small-scale activities were not offered in serious quantities was the prohibitive cost of reaching to the consumer; as they are very often time sensitive and the cost of sending out agents to confirm the insurance claim as legitimate if such a claim were to be made, this is especially true for Mutuals that do not enjoy some of the benefits that stock holder insurers have access to such as capital markets for sudden financial needs.

Micro-insurance appears as a potential solution to some of these needs and issues; with its focus on low income areas, less bureaucratic barriers and a simpler process: it appears to be the perfect solution in being able to reach out to potential consumers that would have not been able to find the Mutual themselves, while also expanding the Mutual insurers' portfolio by spreading the risk in a spirit that still belongs to the ideal of solidarity. However prohibitive costs in reaching the potential clients and the extreme difficulty in the collection of necessary data have always been the main issues that prevented micro-insurance from becoming common place and more widespread (Virginia Tan, Allen & Overy LLP, 2012, p. 8).

However technological developments especially data digitization removes two very important barriers for assessing risks and true facts when assessing insurance claims as an insurance organization: the need for sending in agents to conduct extensive analysis on the ground and the need for real world paper work to conduct operations in remote areas for small number of consumers (Tanguy Catlin et al., 2017, p. 30). Systems that gather and combine data from vast sources such as local weather stations, government intuitions, universities and many others; very quickly can, not only asses the accuracy of insurance claims by checking historic data regarding extreme weather events or soil quality information to settle agricultural claims for instance, but these electronic data systems may even be helpful in forecasting future threats to policy holders. Utilizing digitized databases that many government and private organizations now gather and maintain to record relevant data regarding risk factors which decide insurance claims such as weather patterns and local insect infestations; small field farmers in isolated areas can be potential covered within a farming Mutual insurance firm for instance; even if the headquarters of the insurer may be quite far away.

The spread of the internet to even remote areas thanks to cost-effective means is another trend in technology that will only help to increase such possibilities in the future. Databases and easier access to them may solve the need for sending out agents to remote areas for small insurance claims; making micro-level insurance policies possible, but the spread of internet to remote areas may enable farmers and other individuals that may wish to become insurance consumers to be able to reach out and buy their preferred policy by themselves. In essence eliminating the need for insurers to operate and staff offices in reachable locations just to be able to find consumers in any given area or region.

The prospects are numerous; for-profit insurers may be able to expand their portfolios and consumer base by offering lower cost premiums to their low-income customers or turn up even more of a profit by reducing their claim process costs through digitizing it and eliminating the need for field agents entirely. For Mutuals however a more pressing issue has the potential to be solved: reduction in operation costs not only helps them reach more member numbers and better coverage but also help alleviate an important shortcoming of one of their primary weaknesses; the lack of access to capital, potentially increasing their competitiveness against stock-holder insurers which would enable them to maintain the uptick in performance they enjoyed after the 2008 economic crisis (ICMIF, 2015).

Trust in the database, data transport and intent of the individual becomes important issues immediately however, as digitization brings about the risk and fear of cheating and other possibilities of foul play especially without agents on the field or an office nearby to assure managers of insurers; both Mutual and stock-holder may feel it too risky to trust the digital possibilities and decide the risks as to be too high to engage in such small-scale insurance activities yet again as a continuation of the trend from before of micro-insurance being seen as not worth of being engaged in. This would only shift the main problem and disadvantage of engaging in micro-insurance from cost to lack of trust due to distance and digital nature of information. However, technologies such as Blockchain encrypted data ledgers promise to overcome this obstacle as well even if the implementation and adoption may take some time, as will be discussed further.

4.3.2. On-Demand insurance

This insurance system is utilized for short term specific insurance needs that appear on the spot with immediate need. Flight insurance that activates when a passenger boards a plane or enters

a specific border area are examples of this type of insurance. In parallel with the micro-insurance discussed before; this type of potential insurance is not only usually small-scale but is also extremely time and location sensitive with purchase decisions being made sometimes instantly. A sudden emergency or need may necessitate an unplanned bus ride or a consumer that just learned of an unexpected transfer flight may want to insure their luggage after all. these decisions and insurance needs are impossible to act on in the older and current markets.

With insurance purchases becoming as easy as opening an app on a smartphone and clicking some buttons however; such direct insurance purchases can be made very quickly exactly when they are needed and for specific purposes without extra bureaucracy involved. This in turn allows consumers who in the past would not bother with insurance for certain activities to benefit from it as well as expanding the possibility of insurers to reach more potential policy holders. Convenience is a major benefit of digital technology and quick immediate purchase decisions may become actionable due to it. Activation and deactivation of coverage based on current activity is such an example. For a small fee; equipment insurance can be purchased right before heavy usage of it such as fishing equipment being insured as the family travels for a fishing trip. Such an insurance coverage then may be deactivated after the trip ends at which point damage to the equipment becomes less likely as it will be stored rather than used for some time. Someone who uses their fishing equipment rarely such as every six months or so would most probably not bother with insuring them due to it not being a priority, the cost being seen as somewhat wasteful and the hassle of navigating the bureaucracy of finding an insurer and signing on a policy just for such a small amount of active usage which may bring about damage. If, however such a policy could be bought directly perhaps even during the trip thanks to a smartphone application for a limited determined time then majority of the barriers against such small scale and on-demand insurance may be lifted.

For Mutuals the main benefit is further reduction in costs and time for establishing insurance purchases and increasing presence in areas usually not associated with Mutual insurance such as consumer based insurance of equipment. However, presence in such areas requires participating in technological adoption as was discussed before and smartphone application implementation is currently especially weak in Mutuals currently as seen in Figure 5. It is an area that requires improvements for Mutuals to truly be able to benefit from in the future as the competition will increase over time due to new entries into the market (Darren Pain et al., 2016, p. 35).

4.3.3. Peer-to-peer insurance

Peer to peer insurance is an interesting concept and a major aspect in the importance of digital technology and adoption of it for insurers as well as Mutuals and therefore aligns perfectly with our core questions. It is in essence a culmination of non-profit seeking solidarity and new connection opportunities that technology presents to the insurance market combined in an innovation. Usually we see peer to peer insurance take the form of group purchases after aggregation by a third party. These aggregators can purchase insurance policies for groups that seek them out and allow members to take advantage of lower premiums thanks to group discounts or through preferable negotiating positions for lower premiums much better than individuals might be able to bargain for.

The group members themselves usually share common interests or understanding and more often than not; they are members of the same family or social group (Momoh, 2016). Already we are able to see a parallel between these organic peer-to-peer networks of potential insurance customers and the founding principles of Mutuality; ideals such as solidarity among members, free membership, democratic governance, independence and free membership are all inherently present in both Mutuals and peer-to-peer networks (European Parliament, 2011, p. 19). We may even be able to argue that the Mutuality principle of limited profit sharing also applies indirectly due to the common benefit that is to find a preferred low premium insurance scheme which is the end goal of such social networks which benefits all members equally if achieved.

Similar to the advantages Mutuals enjoy due to combining ownership, solidarity and administration; peer-to-peer networks also seemingly counteract the common moral hazard that plagues for-profit insurers as the policy holders and managers may have differing interests, however also of note is the fact that for-profit organizations usually experience market control and discipline which may reduce the Agency Costs of such firms and the question of control becomes especially vague when dealing with such networks or groups (Boose, 1990, p. 3). The common interests and personal connections of the group that is establishing such an insurance system themselves may create a common control and institution that may function similar to the market in ensuring agency costs are kept low; more research is needed in this area.

Also of note are upcoming technologies such as Blockchain that may ensure a non-breakable trust atmosphere through encryption and data retention which may eliminate concerns of malpractice entirely even in such groups while also reducing the need for perhaps time-

consuming coordination efforts and face-to-face meetings which will be expanded upon further in other sections.

As the name alludes to; the peer to peer system entirely benefits and relies on technology. The gathering of the interested group as well as reaching out to an insurer occurs in the worldwide web and in social media specifically. The possibility of direct communication between potential insurers and policy holders over great distances and in a timely fashion is one of the most profound advantages of technology that will only keep getting better and far reaching as internet access, speed and networking applications get better over time and insurance follows suit (Dr. Laila Neuthor & Tim Jehnichen, 2017, p. 5).

Perhaps Mutuals can utilize this new form of grass-roots insurance by being discoverable in the social networks and the wider web so that these social circles which may be looking for adventurous, affordable and philosophically compatible insurance policies and firms may get in touch and eventually become customers of Mutual insurance. It is very likely then that groups that may simply be looking for adventurous insurance policies may become full-fledged members of the Mutual themselves due to the very similar priorities and perspective between peer-to-peer and Mutual insurance organizations, we may see a new method for Mutuals to attract like-minded new members that are not only interested the products they offer in a capitalist sense but also those that may be looking for new approaches to their consuming habits and practices. There is an incredible potential here for Mutuals to not only continue the growth they have enjoyed during and after the 2008 financial crisis but to capture an advantage over for-profit firms that is sorely lacking in today's society; emotional and philosophical engagement in the principles and ideals of the groups, societies and organizations consumers purchase from. However, this engagement requires Mutuals to embed themselves in to the new technologies that are forming and as per Figure 5; we can see that there are still some ways to go before Mutuals can be said to be fully existing adequately in the internet.

While quite exciting, it is also important to remember that this development is not a ground breaking new form of insurance but rather the betterment of an already existing system, like-minded individuals discover each other through various social networking opportunities in the Web and together they combine their forces to find an insurance agent who helps them negotiate preferential insurance schemes with already existing insurance firms which may or may not be Mutuals in the end even though ideals of the networking system and members align with Mutuals; if a better offer is found from a stock-holder company the aggregator and social

network members will most probably chose the cheaper option rather than the ideologically more aligned one. When for-profit insurers are selected for the special policy offer and scheme a conflict of interest may occur concerning the unused premiums that may accumulate at the end of an insurance period; since for-profit companies prioritise profits they may not be willing to refund this accumulated sum from premiums especially considering the fact that the company may have offered a lower premium insurance scheme to the members of the peer-to-peer network in the first place (Momoh, 2016). Such issues show us that peer-to-peer insurance currently is in essence a betterment of the negotiation phase of an insurance contract with the added benefit of increased solidarity between policy holders which very much align with Mutual insurance if such a firm is found by the network however the system instead relies on negotiating favourable contracts with any insurer by taking advantage of the networking technologies as well as intermediaries that may have more pull with the organizations themselves during the negotiation phase.

There are however systems that are just over the horizon which promise to take away the need for intermediaries or in fact even the insurer firms themselves only to leave the members of the peer-to-peer network as the interested parties. Blockchain being the primary example of such technologies and one of immense import. The complexity of connecting and finding insurance or avenues to satisfy other common needs is becoming less of an issue as technology advances and user friendliness becomes a fact of life. In the interim period that we reside nowadays the need for intermediaries and firms still persevere however if the need for specific know-how as well as perception of legitimacy were to be somehow removed from the equation then such expertise needs may be able to be fulfilled by the policy seekers themselves and that is the potential of the Blockchain technology if it can be fully realized. Perhaps therefore it is possible to see the peer-to-peer insurance system and increased usage of it as a stepping stone in the road towards making internet networks and social communities that naturally form as a result of technological adoption as the core system for cooperation and solidarity going forward, which may evolve to new forms of organization for insurance purposes among others. These are very interesting concepts to ponder and prepare for the future.

4.3.4. Personalized pricing

Advances in digital technology have a more controversial side as well; sometimes the immense volume of data provided to companies is not voluntarily given or even known by the policy holders and consumers themselves. Through access to such controversial data; personalized pricing may be developed by some for-profit companies to increase premiums of certain individuals depending on risk factors that they may exhibit but not wish to share. Smartphones and fitness accessories may record and transmit data on the daily activity of users that purchase such devices; data from these and other sources may then be used to profile the activity and lifestyle of certain individuals and companies may adjust the premiums on their health and life insurance accordingly in a way that users and policy holders may or may not agree would be ethical or appropriate.

A comparable and related breach of sensitive user data occurred in the high profile story of a fitness app recording and publishing the daily run paths of soldiers stationed in top-secret military bases (Rory Cellan-Jones, 2018). Through utilizing a heat-map feature of the smartphone application; some users were then able to map and precisely locate secret military installations that the governments that owned them had not confirmed official until that point in time. In this high-profile and military-intelligence story a factor was overlooked due to the security and operational concerns of militaries; private exercise and daily routine data of millions of people were not gathered in mass but were also provided in an easy to access platform by the application developers themselves. If government level secrets can be ascertained and exposed through health and fitness accessories or apps then it is not a stretch of the imagination to believe that daily activities and lifestyle of users of such technologies are very much open for access for many companies and groups. What else may this detailed and massive data on user activity be used for aside from creating fun heat maps that exposed secret military installations? Would insurance companies especially for-profit ones be interested in accessing this data to categorize individual based on their health risk to adjust premiums after risk assessment and lifestyle concerns?

On the other hand, sometimes, data need not be even shared by the companies themselves; cybercrime and increased frequency and sophistication of hacking events mean that even if the origin company may not wish to abuse or share sensitive data regarding consumers; confidential information may be stolen through illegal means and may then be purchased by third parties and used against policy holders to adjust their premiums based on private information about their daily lives. Policy holders may not even be aware of their information

insecurity and leaks much later after the fact. 2017 witnessed a large scale cyber-attack against healthcare institutions across the globe which resulted in the destruction and more importantly withholding of crucial health care related information of millions of patients (BBC, 2017). The malware that infected healthcare systems of multiple nations was designed in a way to make databases on patients inaccessible unless hefty payments were made to the hackers themselves; if not provided with payment in a satisfactory timeframe the malware destroyed valuable databases. While the malware in question was eventually purged and normal operations continued after considerable life and monetarily cost; there is no way to be certain as to how much sensitive healthcare related information was lost or shared during the critical first hours of the attack. Such massive attacks are becoming more and more common over time and as insurance and healthcare institutions fail to take adequate protections they are poised to continue and increase in scope as well as complexity.

While some may see complete information gathering to be a good development in ensuring fairness of insurance premiums; such data leaks and unethical practices may create an uncomfortable future where data privacy may become non-existent and allow insurance companies to make calculations based on information that even the patients or consumers themselves might not be aware of regarding their own lives or risks. Combination of information from such data leaks and digital sources such as smartphones and applications may be used for the creation near perfect categorization of individual habits and risks.

Abuse of such cyber security issues and unethical usage of the immense amount of secondary data may cause a shift towards non-profit insurance especially in the areas of health and life which already occurred in the 2008 financial crisis due to similar ethical concerns (Darren Pain et al., 2016, p. 5). Such a shift towards moral and ethics based purchase decisions within policy holders may increase the competitiveness and future sustainability of Mutual insurers in the immediate and mid-term future. If for-profit insurance firms lose their perceived integrity and trustiness due to use and abuse of such sensitive, leaked or digitally gathered information we may see another resurgence of Mutuals in many sectors. Mutual insurers would need to satisfy their new customers and policy holders by ensuring an adequate digital security system however and this point is perhaps one of the examples of the prior-mentioned tipping point and paradigm shift arguments when concerned with the question of competitiveness of Mutuals.

Cybersecurity and encryption of data are both relatively new concepts in the realm of insurance and especially Mutual insurance however very soon there may come a point when the need for

data protection may switch in importance from being a nice luxury to have; to a bare-minimum requirement for insurance originations for them to be able to attract customers and therefore it is not impossible to imagine today that possible more high-profile cyber-breaches in the future may result in massive private data leaks similar to the 2017 events. Under such conditions the market's demand for security may shift towards being a bare-minimum requirement from any insurance company very quickly in the near future and Mutuals need to start implementation of cyber security measures to their digital efforts.

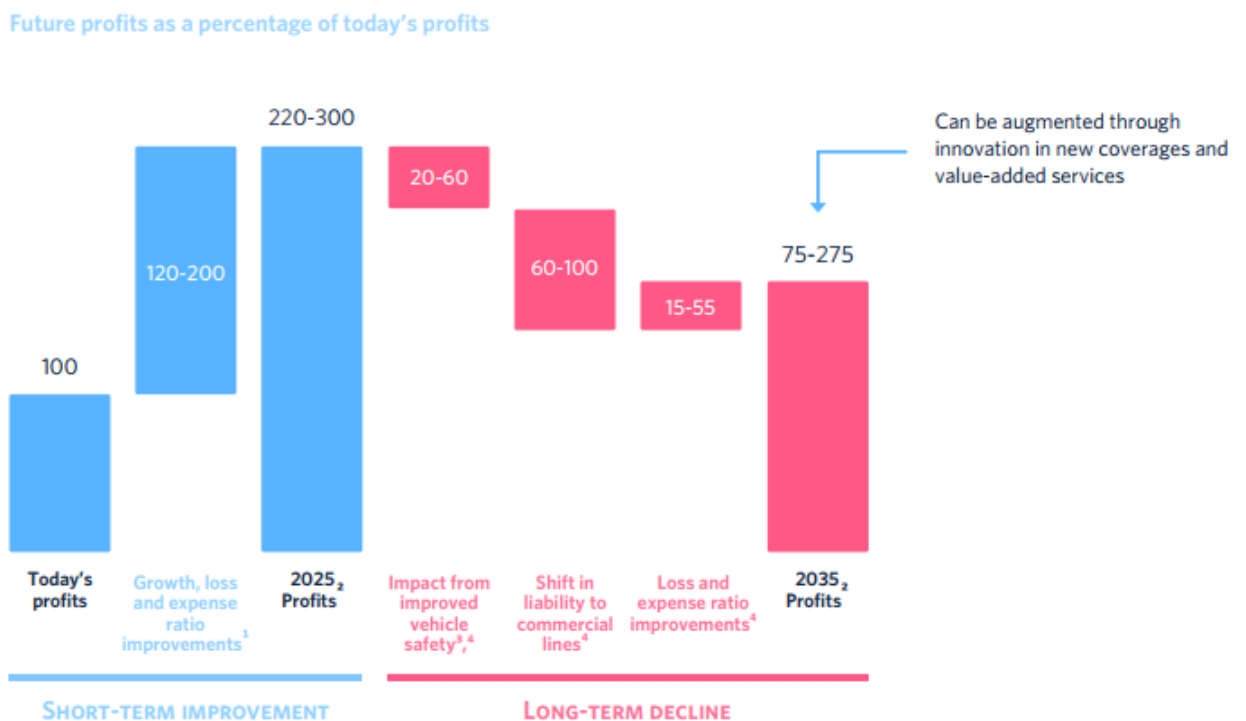
4.4. Risk mitigation technologies and their potential impact on insurance

Until this point in this work we have always looked at the developing technologies as means to improve the interaction between the policy holder and insurer. Technology enables better interconnectivity between interested parties; allows for more engagement of policy holders and finally provides much better tools for insurance organizations to act on through mass access to pertinent data through what is called digitalization of previously difficult to access information. All of this means that the regular practices of insurers are very much quickened and made easier thanks to technology (Dr. Laila Neuthor & Tim Jehnichen, 2017, p. 5). Which in turn is also presents both a challenge and opportunity for Mutual insurers as their relevance and competitiveness is being discussed in today's modern market (Darren Pain et al., 2016, p. 6). However, the disruptive nature of rapid technological development is not only changing or improving the way old insurance systems function but it is also changing the very insurance landscape as well as the very basic concepts such as risk in insurance.

It is perhaps most fascinating that in our effort to answer the question of sustainability and potential future success of Mutuals in the insurance sector when technology is taken into account; the part of the equation that promises to rapidly change the most in the coming years is not the Mutuals themselves, nor even the stock-holder insurance organizations but the very nature of insurance itself. In transactional relationships such as purchases of goods; insurance to date has mostly dealt with the customer side of the equation when dealing with risk. If we take the insurance of a motor vehicle. After the purchase is done; the customer usually purchases a car insurance to secure themselves from material costs of unforeseen accidents and the health insurance they might have bought for themselves also covers any unfortunate vehicle related injuries.

This focus on the consumer rather than the supplier of the vehicle in purchases is necessary because ultimately liability rests with the consumer most of the time who is in this case the driver of the vehicle. (Tanguy Catlin et al., 2017, p. 33) This methodology is very well known by insurers as across history the principle of insurance has functioned this way and digital technologies are only increasing the certainty in evaluating premiums for such actives such as health and driving thanks to smartphones and other mass data collection opportunities as discussed before.

Figure 7: Profit projection for an auto insurer digitizing its business



(Tanguy Catlin et al., 2017, p. 13)

However, the very integration of the same technologies that insurance firms are starting to take advantage of have already started to completely change and transform certain consumer products. A very visible example is the smart-car concept which is a transformation that is made possible thanks to the very same data gathering and digitization methods that many insurers took advantage of to increase their profits or coverage. In the coming ten years or so car manufacturers will start mass producing current prototypes of semi-autonomous vehicles as these innovations become fully self-driving vehicles which is foreseen to shift the liability

of the above discussed accident risks from the consumer; to entirely towards the car manufacture and suppliers themselves. The driver will increasingly lose their significance in the driving process hence they will become a much lesser and eventually irrelevant actor in the issue of accident risk in vehicles.

This perhaps makes us face another paradigm shift as the technology that will aid insurers reduce costs and inefficiencies will ultimately make certain insurance areas obsolete entirely; destroying avenues of profit and insurance activity for many insurers. In Figure 7 potential change in profits for an automobile insurer is presented; in the short-term profits for auto insurers is expected to rise exponentially due to easier and detailed access to data related to accidents and potential risks enabling insurers to better anticipate and benefit from trends. However, as technologies are developed and implemented in the midterm this trend of increased profits is expected to reverse course dramatically; as the accident risk plummets due to safer roads, smart systems in vehicles and areas such as street lights and finally as the risk is transferred wholly from the drivers to suppliers of the now dominating smart technologies; the opportunities for insurance policies will be completely eliminated from areas such as driver's insurance. For stock holder insurance companies this represents an incredible risk as certain important insurance areas and premiums may disappear entirely over the next ten to twenty years necessitating costly organizational and strategic change that they are already making plans for out of urgent necessity. For Mutuals the risks are varied yet present as well. When this shift occurs; insurance companies will have to establish connections with suppliers of certain industries such as vehicles and home construction firms and provide insurance schemes for them against future risks in the case of a malfunction of the smart systems or customer demands of compensation if they wish to remain in certain industries.

4.5. Blockchain technology and long-term implications

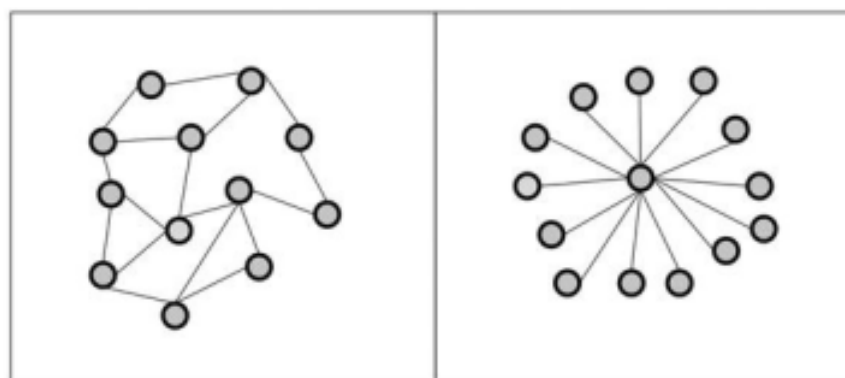
As discussed above many new technologies are causing immense disruptions in the insurance sector as well as other broad industries and are only expected to increase their on-going impact (Tanguy Catlin et al., 2017, p. 28). These new technologies and the disruptions they cause promise many advantages and disadvantages for stock-holder insurers and Mutuals alike.

Until now the main topic has always been the ability of Mutuals to adapt to the upcoming technological developments in an effort to not lose the advantage they enjoyed during the 2008 financial crisis and the following increase in their legitimacy as well as favourability within the

public psyche (Darren Pain et al., 2016, p. 6). However, there is an entirely different category of potential and projected technological change that currently more exotic and prototype advances may develop into which may have implications that go beyond simply improving upon existing means of conducting business and insurance. These new technologies boldly promise to make existing means of business obsolete in place of entirely new systems that vary from data storage to entire new systems of management and governance. Blockchain according to experts and market observers; promises to be the most visible and significant recent example of such a drastic change. Blockchain is starting to be touted as a foundational technology; an innovation or development so significant that not only will it find itself a place in our existing systems; but it may create new avenues for our social and economic systems as a whole, transforming our society and civilization in ways only speculated; this needs more attention (Iansiti & Lakhani, 2017).

Blockchain can be seen as a graceful combination of the above mentioned technological developments such as peer-to-peer and micro-insurance systems with added benefits and more possibilities. It is important to gain an understanding of this upcoming and recently trending technology to fully grasp its potential for Mutuals, insurance and digitalization of many areas of life. For Mutuals this technology represents an ability to systemize their principles and perhaps go as far as remove the need for leadership or management which often clashes with the ideals of solidarity due to agency and participation issues (Chohan, 2017, p. 2).

Figure 8: Distributed vs centralized systems



(Daniel Drescher, 2017, p. 31)

The structural differences between centralized and decentralized systems can be observed in Figure 8; the lack of a need for a central leading and controlling figure or node can be seen in the decentralized system, while the crucial role a single individual or node takes up in a centralized system is also apparent. The peer-to-peer network insurance was discussed as an example of a decentralized system based on common solidarity, pooling of resources and democratic participation and of note was the similarity of such principles with the tenets of Mutuality.

Similar to the peer-to-peer system discussed above; Blockchain is thought to be a decentralized or distributed system requiring no central control and instead relying on the combined resources of the network and members. To be more precise; Blockchain is a technology that enables decentralized systems to overcome some of their most important shortcomings while enabling them to preserve the benefits such decentralization brings. From an information technology perspective; centralized systems concentrate around a central component that usually takes on the responsibilities of coordination and control. On the other hand; decentralized systems consist of multiple nodes or computers that are only indirectly connected to each other with no central leader or coordination unit present (Daniel Drescher, 2017, p. 30).

While centralized systems ensure a primary node, person or manager deal with the allocation of resources and tasks; such a system also brings about costs of information transfer as managers or central nodes are required to gather all relevant information from the various decentralized parts of the system increasing time and inefficiency (Bloom et al., 2009, p. 2860). The central computer, person or node also possess decision maker as well as overall power over the other members of the group; a concept that has more to do with discipline and hierarchy than democracy, cooperation and solidarity that are important in Mutuals for principal and practical reasons.

In Mutuals insurers as with any Mutual there exists the problem of control; while stock holder companies must satisfy their stockholders and some laws mandate that their opinion be asked for major decisions in addition to this shareholder may call special meetings to challenge or even replace directors and CEOs if in their view wrong decisions are taken. For Mutuals that must rely on voting for major decisions and allocation of managers; actual participation in the voting and decision making process and ease of doing so remains an important issue (Greene & Johnson, 1980, pp. 3, 7).

Therefore, while Mutuals on principle should embody the ideals of democratic participation and mutual solidarity; they can be often left to the whims of the director or manager that manages to assume control of the organization during some period of its activity and their actions may go unchallenged for a long time as there exists a lapse in legal framework governing the assignment and control of such leadership positions for Mutuals. This situation is not present in stockholder companies that are subject to many laws and regulations in various countries and jurisdictions. The low participation of policy holders in the voting process within Mutuals only exasperates the problem as select few members may pool voting power or simply accrue it due to low participation of others and assume control. Under such circumstances the inefficiencies regarding a central leading and controlling figure may be applicable in the Mutuals as well and Blockchain as a technology offers to not only eliminate this information transfer cost as well as costs of participation in the decision-making process but; it also aligns with the core principles of solidarity and cooperation as no technology ever has to this day. Making issues such as participation, trust in systems such as voting and even positions of leadership obsolete concerns.

Here an actual definition of Blockchain is required. “The blockchain is a purely distributed peer-to-peer system of ledgers that utilizes a software unit that consist of an algorithm, which negotiates the informational content of ordered and connected blocks of data together with cryptographic and security technologies in order to achieve and maintain its integrity.” (Daniel Drescher, 2017, p. 65)

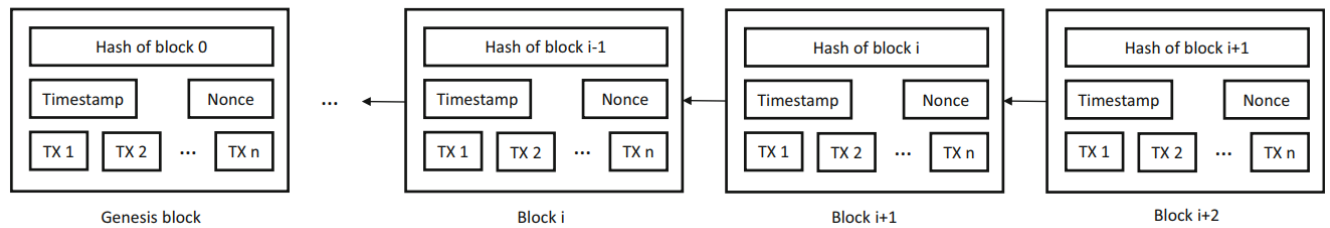
Blockchain is a tool of recording; a ledger that not only stores data but secures it as well; with proof of ownership, capability of transfer of that ownership and the possibility of changing the data as well as the states of records in it. It is not a secret system however and records of ownership of whatever is stored in it are open to everyone; transparency as one of the core foundations of true cooperation and solidarity is therefore ensured. However, such a ledger is always at risk of human error or disaster and destruction at which point the system would cease its function. Multiple copies of the entire record of ownership are therefore distributed to the entire network which are constantly checked through an algorithm and by consensus of the peers in the network are present in each user’s localized copy of the entire ledger or chain. To become a member of this network and make changes to it one must participate in this recording and assessment scheme ensuring safety and presence of numerous backups in a decentralized fashion. What all this means is that on top of the aforementioned peer-to-peer networking advantages in the above insurance example; Blockchain ensures integrity and trust in any

system it is implemented in. Every member of the Blockchain system owns a copy of the entire record, the copies of every member is continuously brought together and an aggregate correct structure decided on through algorithms. Every member participates in this process by allocating their resources to the pool for the calculations to take place, essentially the decentralized network takes on the role of the leader by themselves; voting on decisions is unnecessary as decisions can be taken only if a majority of the members present the change to the system. For insurance policy holders this is of tremendous import as the advantages of technology that was mentioned before regarding making reaching out and connecting with peers for insurance purposes may also move towards ensuring trust and information integrity within such contracts and agreements (Momoh, 2016).

Recording data in a blockchain system is similar to registering to the tax records of a government office but being able to take the entire record after the fact; cryptography means only the right person can see the relevant portions regarding the data but every tax payer would have a copy of the entire record for safekeeping and every month or so they could come together and compare their records; making sure no errors occurred and no malicious tampering was observed. This capability of keeping the entire ledger protected from manipulation and destruction while ensuring privacy through extensive cryptography means trust is a natural part of the blockchain system.

The fundamental underlying principle of Blockchain; peer-to-peer networking system structure can perhaps be called a technological counterpart to solidarity and Mutualism in the way relationships are required for it to function. Such systems enable individual members to share their capabilities with the group; adding their resources to the overall pool and without a central coordinating focus person or node as each member is an equal among their peers working to better the collective good. Hence all members of this computer network are equal without overbearing leadership roles and not only do they provide their resources but also utilize the resources of the entire network and the group themselves. To become a member of a Mutual organization based on the Blockchains structure means the individual must contribute to it in some way and their mere presence increases the overall capability of the group as a whole (Daniel Drescher, 2017, p. 36). Rather than being ideals that members of the Mutuals must adhere to due to ethical concerns and priorities; these principles are inherent characteristics of the Blockchain network that are minimum requirements to be able to participate and secure one's information in this encrypted ledger system.

Figure 9: Example of a blockchain



(Nofer, Gomber, Hinz, & Schiereck, 2017, p. 184)

In Figure 9 we can see a representation of a typical Blockchain structure. Blockchain is as illustrated above; a recording of transactions and in our case insurance activities that are contained in blocks of information. Essentially functioning as data recording nodes these blocks constitute the crucial main part of the ledger. They include the recorded information and a reference to the preceding block; ensuring the integrity of the entire chain and record structure. Algorithms constantly check and score each users version of the entire record tree against the agreed-upon collective ‘correct’ version of the entire network and aggregate a score; coming up with the most correct version among all the versions that each user possess in their local computers. This combination of encryption and version aggregation makes manipulation and corruption near impossible; any change large enough to influence this aggregate-scored correct version would be noticeable due to the transaction records that each user possesses and therefore would be counted as invalid. Any manipulation would require a prohibiting amount of effort to change the records of more than half the number of users in the exact same manner which would be noticeable as well. As each block references the one before it and there exists a consensus ensuring algorithm working towards making sure manipulation is practically impossible; absolute trust towards the record becomes a possibility and eventual reality.

With this trust and background network structure; an aspect that is gaining traction regarding Blockchains is the notion of ‘smart contracts’ that can complete transactions automatically if certain conditions are met and can even execute the terms of those contracts in a timely and secure manner. The concept is not itself new however Blockchain may allow this theoretical application of digital technology to become a day to day reality. Such automatic completion or transfer of contracts and ownership may make positions that are nowadays required for arbitration and establishment of trust (Nofer et al., 2017, p. 185).

Figure 10: Applications of blockchain

Type	Application	Description	Examples
Financial applications	Crypto-currencies	Networks and mediums of exchange using cryptography to secure transactions	Bitcoin Litecoin Ripple Monero
	Securities issuance, trading and settlement	Companies going public issue shares directly and without a bank syndicate. Private, less liquid shares can be traded in a blockchain-based secondary market. First projects try to tackle securities settlement	NASDAQ private equity Medici Blockstream Coinsetter
	Insurance	Properties (e.g., real estate, automobiles, etc.) might be registered using the blockchain technology. Insurers can check the transaction history	Everledger
Non-financial applications	Notary public	Central authorization by notary is not necessary anymore	Stampery Viacoin Ascribe
	Music industry	Determining music royalties and managing music rights ownership	Imogen heap
	Decentralized proof of existence of documents	Storing and validating the signature and timestamp of a document using blockchain	www.prooffexistence.com
	Decentralized storage	Sharing documents without the need of a third party by using a peer-to-peer distributed cloud storage platform	Storj
	Decentralized internet of things	The blockchain reliably stores the communication of smart devices within the internet of things	Filament ADEPT (developed by IBM and Samsung)
	Anti-counterfeit solutions	Authenticity of products is verified by the blockchain network consisting of all market participants in electronic commerce (producers, merchants, marketplaces)	Blockverify
	Internet applications	Instead of governments and corporations, Domain Name Servers (DNS) are controlled by every user in a decentralized way	Namecoin

(Nofer et al., 2017, p. 185)

In Figure 10 we can see potential and developing applications of the Blockchain technology in various industries and areas. For Blockchain technology, adoption and spread is always seen as a primary issue as the decentralized nature of the network system requires all users or members that seek to participate in the structure to be a part of it. For instance, if we combine the peer-to-peer and micro insurance digital technologies mentioned before and wish to embed them in the Blockchain to add that layer of trust and even the smart contract possibilities; we would require at least the majority of the participants to have access to the Blockchain technology. This would include the information centres such as weather stations or other disaster prevention and recording stations for insect infestations and other risks, the policy holder farmer themselves may need to be members of the Blockchain to have access to the insurance scheme. Sensitive transfer of data by large quantities of relevant parties over an as of yet untested system one which may fail to gain traction despite all the promise and

advantages it offers if enough intuitions refuse to adopt it for it to become truly empowered enough to be trusted.

However, we are already seeing signs of large scale and respectable adoption by reputable institutions. A joint effort by HSBC and ING banks with assistance from IBM resulted in a recent successful utilization of the Blockchain technology for an export and import transaction. A lending letter for the shipment of soybeans between Argentina and Malaysia for international trade purposes was processed through the Blockchain structure of a consortium. The highly sensitive document was transferred within hours and the entire process for validating the international trade order was completed within a day while old fashioned mailing of documents would have taken days with added risks. Due to the nature of the Blockchain both parties were able to reproduce and validate the transmission of documents eliminating any confusion or issues (Carsten Volkery, 2018). This application which involved big name banks and technology firms is a first step in ensuring the long-term trust and applicability of the Blockchain. While transmission and validation of a document is perhaps only a first step in realizing the full potential of the Blockchain, utilizing this technology for securing and transmitting insurance information of policy holders and later on to conduct automatic cost-effective contracts, claim settlements and new policy purchases over the Blockchain will become much easier to implement and accept when this technology will start to be utilized by the finance sector to reduce inefficiency and duration of most activities. While the finance sector is poised to be the first true arena where Blockchain may shine; it is not difficult to imagine a rapid adoption and spread of the technology when it proves itself fully in this most crucial of sectors. This brings us back to the tipping point argument and possibility as the public's opinion may very rapidly change towards demanding Blockchain's efficiency and security if it becomes as common place as encryption for banking purposes for instance.

We may inquire at this point regarding the grander meaning of this Blockchain technology and what effect it may have on insurance; with the prior example of peer-to-peer technology in mind we can foresee a movement and perhaps even a trend towards internet based social insurance schemes. Most investors and for-profit insurers today are preparing for the potential changes digitalization of all aspects of life-related data will bring or the impact future technologies will have on profitability, it is in fact is seen as the most important hurdle and opportunity of our time (Tanguy Catlin et al., 2017, p. 20).

However, discussion and preparation regarding long term applications of digital technologies such as the Blockchain is not prevalent enough in the market and especially in Mutual societies today. Going forward during the next decade as we will start to see smaller scale examples such as peer-to-peer insurance destroy old accepted notions of capital requirements and even in some instances the need for a primary insurer itself; Blockchain type technologies that promise to eliminate positions such as arbitrators and even leaders may change our understanding regarding cooperation and organization as individuals (Chohan, 2017, p. 3). The fact that most of the ideals of a decentralized, user-contribution based system such as the Blockchain align with the Mutuality and solidarity principles should not cause Mutual societies and insurers to grow complacent in this new avenue and upcoming drastic change as any paradigm shift large enough to effect for-profit organizations in insurance and other fields will undoubtedly effect the Mutuals as the basic principles and the rules of the game are changed forever due to the nature of such shifts (Kuhn, 1962, p. 93). Mutuals possess an incredible advantage due to their founding principles and ideals that align much more closely with the internet and digital revolution that is slowly surrounding us, while extensive organizational cultural and strategic adaptation will be required from for-profit companies, Mutuals may have a much easier time entering this digital age that will more or less be governed by the same ideals and rules their founders and our species developed to better cooperate to survive and prosper. Mutuals may even become torchbearers of this new age and help societies, organizations and even countries in evolving themselves to exist within this new environment which is a potential role that far surpasses concerns of survival and competitiveness. Blockchain technology with its current brand-new adoption and expected wide-scale integration into our society may change over-time our basic concepts of ownership, leadership and organization; already there are groups and originations that aspire to challenge the notions of citizenship and countries through Blockchain networks (Souli, 2016). While other examples aspire to change the incentives of contribution and participation in communal works by tying benefits and reward to Blockchain secured measures of contributions and points in a trusted and fair system to make sure contribution rather than personal wealth, charisma or power is rewarded in our communities and societies while at the same time utilizing Blockchain infrastructure with added on economic benefits to members to create a commons that is by nature fair and easy to access, trust and participation designated as the primary issues of commons may be alleviated completely (Pazaitis, De Filippi, & Kostakis, 2017, p. 23).

As it develops Blockchain at its current iteration promises to increase customer satisfaction through eliminating the need for data verification processes such as identity and ownership proofs and the need for providing documents repeatedly for every bureaucratic action. Since Blockchain data ledger system can hold such sensitive information securely and in an easy to reach manner for the owners; this ease may eliminate one of the most irritating parts of engaging in any insurance activity for most policy holders; the lengthy effort demanding bureaucracy. Another aspect that Blockchain may drastically aid in is the prevention of fraud and going a step forward; it may even eliminate the need for investment and effort spent on fraud prevention (Tanguy Catlin et al., 2017, p. 68). When each side can have a perfect copy of every transaction and ownership records are stored in multiple backups by nature of the network not to mention the absolute difficulty of attempting to make illegal changes to the system; which would require cracking complex encryption keys of multiple users and a wholesale change that must be made to greater than half of every member in any one Blockchain, effort and resources that would be spent on agents that would need to verify every transaction or transfer of ownership or insurance claim may become unnecessary. These reductions in day to day expenses may do wonders for the competitiveness of Mutual insurers and societies while increased trust in such systems may increase policy holder numbers for all insurers as privacy and security of information become concerns of the past.

In a digitized world where information of all sorts is easily reachable, if technology exists that ensures the integrity and hence trustfulness of such information; insurance claims can be acknowledged and assessed on the spot in an instant accurately. Most governments and intuitions offer digital data services; it is therefore conceivable for a database structure of an insurance firm to request such data regarding past and projected weather patterns, insect infestation patterns or other natural disasters and to come to an informed decision regarding if the claim put forth by a policy holder farmer is accurate or not; no matter how distant or remote the farmer's field may be. If such a system exists then the need for insurance claim and assessment agents diminishes. Blockchain data structure and encryption that makes making changes impossible after first entry and the collective data integrity checks that exist within the system would make such a future very conceivable which would change the insurance sector drastically.

There are still questions and unknowns regarding Blockchain that the recent dubious performance of Bitcoin has exasperated. Adoption stands as the primary challenge as the above-mentioned advantages of secure and trusted method of connecting multiple databases

for fraud prevention and claim settlement depends on the numerous government and otherwise intuitions across the globe adopting and transforming their own ledgers or data systems to be compatible with Blockchain which more often than not means adopting Blockchain themselves fully. Naturally Mutuals themselves would need to be employing Blockchain systems themselves to take advantage of the possibilities the technology offers. A prospect that becomes even more daunting when we consider the fairly low adoption rates of Mutuals showcase today even with basic technologies such as Smartphone application offers or even online purchase options as seen in Figure 6 (Darren Pain et al., 2016, p. 34). Research, development and adoption of such bleeding-edge technologies will be vital going forward and the finance and banking systems' adoption of Blockchain may be the catalyst to propel its spread into other sectors. We are at the precipice of great change and while the prospects are exciting for consumers and Mutuals alike; the clock is also ticking for being ready to make the big jump.

5. Conclusion and discussion

Mutual insurance has been a part of the third sector and support structure of many countries even before the advent of welfare states and state backed insurance systems. While trends such as demutualization was observed the financial crisis of 2008 and the following distrust in for-profit organizational ideals allowed a resurgence in the performance of mutual insurers as they solidified their presence in the market. While this trend has slowed down presently; they still exist within the market and have loyal consumers which assures us that at least for the time being they are here to stay.

Digital technology on the other hand is growing and surrounding us exponentially, with each year bringing about more products and means that utilize digital data more efficiently and effectively. Developments such as the web, smartphones and social networks ceased being fancy gimmicks and have become essential parts of life. Most if not the majority of consumers would not trust a company that does not own their website today, same will be true for smartphone applications and integration if it isn't true already. Peer-to-peer networks that small groups of prospecting It students that were adopted by universities and militaries initially are now being used to spread essential security updates to everyday programs and have completely changed the nature of grand industries such as music production and sales. Ownership of music albums, DVDs, software and computer games have evolved from purchasing a physical box with a cd to possessing a letter and number combination key that is enough proof of ownership

for the vast majority of systems and firms in business today. We possess smart computers in our homes and pockets that gather vast amounts of data about our habits and preferences, our vehicles are and roads are becoming smart, self-adapting and even learning systems. Concepts of driver safety and risk factors and user-error are becoming old fashioned as smart homes and vehicles transfer the risks from the user to the supplier of the technologies and producers.

Entire networks of equal users participate and create complex systems in the social networking environments utilizing the internet; they even find each other based on their preferences and needs and together negotiate beneficial insurance policies for themselves from a position of strength sometimes seeking the aid of third parties to contact insurers.

Technologies that promise to change our way of life such as automation and Blockchains are at the periphery of our vision slowly developing themselves as they get experimented on and adopted by more and more respectable institutions and organizations. These are foundational technologies that are poised to upend our basic concepts and industries. While digitalization of activities and firms will generate new avenues for profits and efficiencies they will start to challenge the existence of for-profits and certain areas of sectors such as insurance.

The initial benefit of cost reduction that digital technologies will enable; such as reduction in needed agents for insurance actives and better personalization of policies and premiums will aid Mutuals and may even be of help for the incentive of adopting these technologies. Offering websites that many Mutual insurers today already showcase (Darren Pain et al., 2016, p. 34) increases exposure and potential for consumers to participate in mutual insurance for instance, better adoption of technologies that enable on-the-spot purchases such as smartphone apps may increase membership even more. These factors may enable Mutuals to muster the resources needed for the adoption of more complex systems down the line while solving certain limit and size problems that many Mutuals suffer from.

The initial and current prospects of digitalization favour large and profit oriented firms greatly as they will increase their market penetration and profits greatly while also reducing their transaction costs as well as losses due to bureaucracy. For-profit firms will need to adjust their organizational forms to better fit the more extreme digital technologies such as peer-to-peer and micro insurance models and may struggle to survive the middle to long range developments of reductions in risk due to smart technologies and alternatives such as Blockchain. Therefore, Mutuals may not receive the most benefit out of the digital revolution as much as stock-holder companies with vast research and development divisions but the mid to long term favour

Mutuals due to philosophical alignment and potential to survive foundational technological developments as their principles align much more to the decentralized network based commons and governance systems that promise to erupt around us.

Primary downsides of the Mutual insurance firm; lack of participation, lack of control mechanism on managers due to the elimination of control form the market and risk of outside purchase and finally; the lack of access to capital markets for expenses may all be eliminated in the long term. Participation in the leadership and direction of the Mutual may become extremely easy, as easy as pushing some buttons on an app and even easier perhaps by concepts such as smart-contracts; human interaction being required only for the most crucial and involved decisions while the system operates by itself in the background for more mundane day to day tasks.

Lack of control over managers and agency issues are also countered by transparency and participation which complement one another. Digital data is transpiration, easy to transfer and store and duplicate, more and easier participation by members of the mutual mean the risks of few members gathering voting power to themselves is much lesser, security of the data through encryption and backups through Blockchains eliminate the concern of data manipulation.

On the other hand, reductions in costs as discussed above through elimination of need for agents, arbitrators and exhaustive proceedings has the potential the alleviate the age-long capital issues that Mutuals face. It is difficult to ascertain at this juncture whether if these reduction in costs will truly bring Mutuals on par with for-profits for competitiveness when certain shocks in the market require sudden expenses or growth of the firm. Reduction of inefficiencies caused by better leadership, increased participation of members and growth potential due to more avenues to reach potential consumers through digital services may do just that and help alleviate these concerns, more research and observations of upcoming experiences that Mutuals will undoubtedly live through will be beneficial and required moving forward.

For the broader impact of technologies like Blockchain will have on our economies, social life and society are more difficult to project from today. We can definitely observe the similarities in principles and founding ideals between the myriad internet based societies, blockchain prototype organizations and societies and those ideals of mutuality, solidarity and the common good which have benefited humans from the dawn of time. While for profit firms look into the future and see drastic risks, reduction in insurance opportunities and profits; Mutuals may

instead see their core founding principles be reflected in technologies and developments that may start to replace our finance and governance systems (Chohan, 2017, p. 3).

The rabbit hole of digital technology and digitalization is quite deep; a work on assessing the sustainability of Mutual insurance in the coming hyper competitive digital dominated economy and market conditions has evolved into assessing how Mutuals may survive an upcoming wave of foundational paradigm shift that promises to challenge our ideas of cooperation, organization and leadership.

Mutual insurers need to increase their rate of adoption of current digital technologies to better take advantage of the possibilities that exist today. This will aid them to keep up the initial prominence they enjoyed right after the 2008 financial crisis before it dissipates completely but more importantly; adoption of these current technologies will create the required knowhow and stepping stone preparedness which will be crucial when the much more significant developments knock on the door in the next decade and afterwards. For a mutual that is already active in the web; it is far easier to develop and integrate a smartphone application than one that does not have any presence on the internet. Similarly, we may assume that integration of forward technologies such as micro-insurance and peer-to-peer networks will be easier as more complex technologies are adopted; finally, Blockchain which is an upgrade on the existing peer-to-peer networks would be easier to grasp and adopt for those Mutual insurers that already possess considerable digital infrastructure. This ease of adoption in a step-by-step nature compounds paradigm shift and tipping point arguments as missing one or more technological leaps makes adopting the later steps much more daunting and difficult.

Rather than having to compete in unfavourable conditions in a market and economy designed for profits and growth; Mutuals may live to see the market and society adapt to conform to their standards and ideals due to similarities between the internet revolution and Mutual principles. However, while these similarities exist there seems to be a lack of effort and even awareness on the existence of both; current developers of Blockchain prototype structures have not engaged with Mutuals for inspiration or adoption as of yet while Mutuals are still struggling to adopt what we may consider to be basic necessities of a digital market today. Cooperation and contact between these two groups may prove extremely rewarding for both and much more feasible compared to cooperation between stock-holder companies and Blockchain organizations or even government structure; both of which are somewhat threatened or challenged by the more projected far-reaching impacts of the technology.

Mutuals can become a valued middle ground and mediator between state structures and Blockchain or social start-ups during the crucial adoption phase of these new technologies for insurance and other purposes the trust and important role Mutuals poses as crucial parts of the social security net may prove immensely helpful during the transformation period which we may start to experience as more and more digital technologies are adopted for security, record keeping and transactions.

Mutuals have had an interesting history over the ages from being the first examples of a social net to becoming somewhat obsolete during the hyper competitive growth period, to yet again becoming crucial favoured alternatives during the economic crisis. They may face their greatest challenge and opportunity in the coming years and decades and increase in importance to a far greater extent than they have enjoyed. The new technologies may challenge their survival as well in the long term as leadership and prior ideas of organization are diminished through social networks and decentralized governance; yet if they catch the train of innovation early and engage with the new networks of people-lead insurance, leadership and governance structures; they may prosper and persevere while diminishing profits and avenues of activity may destroy for-profit firms and insurers completely if they fail to adapt.

Both the Mutual societies and forecasted social Blockchain networks have a lot to contribute to one another and it will be interesting to observe how the two develop over time and if the interaction will occur to the benefit of both.

The diversity Mutuals have provided to the sectors that they are active in will be of much more import in the coming years as entire industries will be challenged by the possibilities and risks that digital technology will bring about, and no matter how the end result of this struggle for survival will be; we may be thankful for the fact that we have alternative organizational forms and systems of governance in our markets which may increase the odds of survival of the economic system and society as a whole.

6. References

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