Technology in insurance regulation

Opportunities for the industry

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Executive Summary

- This paper reviews the opportunities for using technology in insurance regulation ('regtech') and supervision ('suptech'), supported by insights from a series of focus groups with UK insurance industry practitioners conducted during the summer of 2021.
- Firms across financial services are increasingly exploiting the opportunities of using technology to reduce the substantial costs of regulatory compliance. Insurance firms have been slower than those in banking and capital markets to seize these opportunities. They can therefore learn from the experience of other firms.
- The most prominent of these opportunities for insurers are large potential cost savings in the employment of technology for automated prudential reporting. For UK insurers these include the reporting of financial assets, those required under Solvency II, and any future regime emerging from the review of Solvency II for UK insurance firms.
- The past two years has seen increasing worldwide engagement of regulators with the opportunities for using regulation to automate reporting. The BoE/FCA 'Digital Regulatory Reporting' initiative is playing a leading role. A central lesson is the need for industry/ regulatory collaboration on; (i) establishing and adopting common standards for recording of financial data and financial contracts; and (ii) using these common standards wherever possible to support reporting based on processing of underlying granular data.
- The UK insurance industry is as yet rather less involved in these collaborations on automated prudential reporting than firms in other areas of financial services. This can be expected to change as insurance firms recognise the benefits from engaging and collaborating at industry level in order to develop common standards for recording of financial assets, and reduce the costs of Solvency II reporting.
- There are also opportunities from employing technology to reduce the costs of conduct regulation for insurers compliance costs and penalties, while also improving outcomes for customers. A key development in the

UK is the FCA's new 'Consumer Duty', currently under its second phase of consultation. This will require UK retail financial firms (including insurers) to be responsible for assessing and, critically, evidencing that their actions are delivering good outcomes for consumers. Our judgement is that the new systems and processes required for assessing and evidencing fair outcomes for consumers will be most effective if they are technology-based.

- Our work highlights the major challenges for insurers in relation to data security and data sharing, though these challenges are far from being insurance specific. They include (i) concerns about data security, including cyber security and inappropriate use and dissemination of customer information; (ii) achieving the right balance between sharing of data between firms, and protecting and achieving returns from their investment in data; (iii) the ethical use of data and ensuring the outcomes of automated data processing are ethically acceptable. Our focus group discussions on these issues were particularly lively.
- Finally, our analysis supports the view, also emerging from much of the other research conducted as part of our TECHNGI project, that the challenges of employing data and AI technologies in UK insurance are organisational and cultural more than technological. The technologies themselves are increasingly mature but to make full use of them requires considerable investment in systems and processes, whose returns can only be fully realised over the longer term. Marginal changes to operational systems will not suffice. What is needed is consistent cross-firm technology strategy that orchestrates technology-based change across the organisation.

1. Introduction

This paper examines the emerging opportunities for employing technology in insurance regulation and supervision. The opportunities on offer in this regard have not yet been pursued to the same extent by insurers as by firms in some other areas of financial services; capital markets, asset management, and commercial banking. The insurance industry is thus something of a 'late starter' in the application of regulatory technology (regtech) and supervisory technology (suptech) to reduce costs of compliance and achieve better regulatory outcomes. This is not necessarily a problem – for example, it means that insurance firms can benefit from the experience of applying technology in regulation elsewhere in the financial service industries.

The goals of this paper are; identifying the most promising avenues for employing technology for regulatory compliance and supervision in insurance, and providing some guidance to the industry on how best to pursue these opportunities. It combines review of the use of technology in regulation and supervision across financial services with insights obtained from a series of focus group discussions with insurance industry practitioners.

The three focus group sessions were held between 21st June & 5th July 2021, covering the distinct topic areas of capital adequacy & solvency, conduct risk & client/customer protection, and data sharing & data protection. A total of 22 industry participants were registered for these sessions. Meetings were recorded and transcribed shortly after occurrence, and the transcripts circulated to participants for further comment. Participation in these focus group meetings was too small a sample to be a meaningful representation of the entire industry; it was however large enough to provide a range of insights into the use of technology in insurance regulation, and views around this. In the remainder of this paper we freely combine information obtained from public domain sources with the various perspectives taken from the focus group discussions.

This research builds on an earlier analysis conducted by our research project; Milne, Miglionico & Watson (2020), Automated Regulatory Compliance in Insurance. The evidence reviewed in this earlier paper indicates that for UK insurers, costs of regulatory compliance can amount to around 2%-4% of revenues, with a greater burden falling on smaller firms. This is less than in banking and capital markets, where these costs can be as much as 10% or more of revenue; but it is still a substantial amount. The earlier research also outlined opportunities for using technology in know your customer (KYC) processes, client and customer protection, solvency regulation, and also in organisational awareness of changing regulations. It found that the insurance industry lags approximately two years behind banking and capital markets in the adoption of technology in regulation.

This paper is organised as follows. Section 2 reviews the development of regtech and suptech in financial services. Section 3 focuses on compliance with prudential regulatory requirements and the associated challenges of risk management and capital adequacy.

Section 4 discusses conduct risk and client protection. Section 5 examines data sharing and data protection. Section 6 concludes.

2. The increasing use of technology in regulation

This section is a desk-based review of the increasing use of technology in regulatory compliance and supervision. It covers developments across financial services with a view to better understanding the challenges of using regulatory technologies, and identifying their potential applications to insurance.

Across the financial services industry firms are spending substantial and increasing sums on investment in, and adoption of, new technology. A major part of this is in the application of technology to regulation and supervision (commonly referred to as 'regtech' and 'suptech', respectively). There is simultaneously a growing interest and awareness amongst regulators of the possibilities of using technology; both to reduce the substantial compliance costs of current regulation, and to support more effective regulatory oversight.

An indicator of this growing level of interest is the range and number of new regtech companies offering solutions (as classified in a recent Deloitte report on the regtech universe 2021) for (i) regulatory reporting; (ii) risk and capital management; (iii) identity management and control; (iv) compliance with regulatory rules, such as those on anti-money laundering; and (v) transaction monitoring. Several services, for example the regtechanalyst, provide an overview of the sector.

Insurance-relevant regtech solutions include the regulatory reporting and reconciliation systems of Arep in Germany and Autorek in the UK; KYC, AML, and anti-fraud compliance solutions such as those of CaseWare RCM's Alessa, BAE System's NetReveal, iSpiral's RegTek+, and AutoRek's solution for automation of compliance with client asset segregation; Natural Language Processing solutions to streamline processing of regulatory information, and the extraction of information from unstructured documents such as .pdf. Leading providers include Expert System, inDoW technology, and Infosistema; and intelligent workflow solutions for interpreting and then implementing regulations across organisations, such as those of ClauseMatch and TrilLine GRC's Tirage PRO.

The most significant development over the past two years is the increasing engagement of regulators with these technologies. In the UK, the BoE/FCA have been pursuing their 'Digital Regulatory Reporting' initiative, with a 2020 consultation paper 'Transforming data collection from the UK financial sector' and 2021 road map 'Transforming data collection from the UK financial sector: a plan for 2021 and beyond'. The European Banking Authority has recently launched a consultation on integrated reporting based on digital technologies. Regtech and suptech are also of central interest to the pan-European

insurance regulator (see EIOPA (2020) Supervisory Technology Strategy). In the US, the FDIC held a technology competition, with four companies now selected to develop prototype regulatory reporting solutions in conjunction with their technology lab FDITECH. This new direction of travel is also summarised in recent papers from the Bank for International Settlements (FSI insights on policy implementation no 29) and the Financial Stability Board (The Use of Supervisory and Regulatory Technology).

Accompanying these developments in regulatory technology are indications of a shift in the relationship between regulated firms and regulators. Increasingly it is recognised that effective development of the automated data technologies underpinning regtech and suptech is a *collaborative development* amongst all the parties involved. The work of the Bank of England and FCA has demonstrated that achieving the full potential for automation of regulatory reporting requires a transformative shift towards adoption of agreed common data standards. This crucially requires a much fuller and deeper engagement than has been customary in previous consultations on financial regulation. Cross-industry co-ordination is needed on the regulations themselves, on the underlying technologies, and on the business processes that will employ the technology to address regulatory requirements.

A further critical challenge, alongside this standardisation of data and contract representations is a shift to the storing, processing, and summary of data on a granular rather than aggregated basis. Historically, the limited storage and processing capacities of some legacy systems has required financial institutions to rely on summary aggregated statistics for accounting, management, risk, and regulatory reporting. This aggregated data had to be extracted from the granular data held on underlying operating systems used for the processing of core products, such as deposits, loans, or insurance policies. The rapid advance of information technologies mean that is now possible, in principle, to base all internal and external reporting on direct access to, and processing of, granular level data held in core operating systems.

A prominent example of the kind of standardisation that could support automated regulatory compliance across much of financial services is the Algorithmic Contract Types Unified Standards, or ACTUS taxonomy. Actus represents almost the entire range of financial contracts employed in financial services as one of thirty contract types, in a form that supports an unambiguous statement of how cash flows are generated. This in turn allows automated computation of the cash flow, and portfolio impact of risk factors such as market prices.

In practice, continued reliance on legacy operating systems, each with its own internal data logic, limits the possibilities of a complete shift to automated processing of granular data in the near term. More feasible is an intermediate processing layer, such as an interface between underlying operating systems and reporting systems. An example of such an intermediate layer, promoted by the European System of Central Banks, is the BIRD integrated dictionary for banks, developed to support automated regulatory reporting

by banks to meet both statistical and prudential requirements, and also in bank resolution. Another initiative is the work in phase 1 of Project Ellipse at the BIS innovation hub with ISDA, on development of a common platform for cross-border digital regulatory reporting of derivative exposures.

Promisingly, collaborative discussions on the employment of technology to support automated regulatory compliance are now increasingly taking place. There is active networking and discussion, especially amongst banks and capital market firms, through for example the regtech community facilitated by the London consultancy JWG, and conferences such as the Global Regtech Summit. Insurance firms, for reasons revealed in our focus group meetings, are as yet rather less involved in these collaborations than firms in other areas of financial services. This can however be expected to change as insurance firms recognise the need to engage and collaborate at industry level, in order to take full advantage of the significant opportunities promised by regtech and suptech.

3. Capital adequacy and Solvency II

This section looks at the employment of technology in assessing the capital adequacy of insurers, and associated compliance with Solvency II regulations. This was the central subject of one of our focus group meetings, and provides the most obvious opportunities for the application of regtech and suptech in insurance.

A substantial, and relatively immediately achievable opportunity is from the standardisation of asset data. A large burden for insurance companies under Solvency II is their reporting of data on investment assets. This is a central part of reporting for life insurers, and is also required for assessing the capital adequacy of general insurers. Larger firms are required to report millions of data items on a quarterly basis. Perhaps 30 cells need to be completed for each asset. This raises issues of commonality – the way that one insurer describes a certain asset might be somewhat different from that of another insurer. There is a clearly productive role here for common data standards.

The establishment of common data standards is central to the BoE 2021 road map 'Transforming data collection from the UK financial sector: a plan for 2021 and beyond'. A key finding in their consultation response (Section 4.1), which applies just as much in insurance as in other areas of financial services, is the favourable balance of benefits to costs from agreeing on common data inputs – i.e., identifying an agreed set of key data items to be used consistently across all the varied reporting requirements imposed on firms, and developing common industry-wide data standards for collecting these key items of data.

Asset identification numbers can play a role, allowing automated completion of other details such as asset price or credit quality. This however can be a challenge in itself.

Even today there are competing standards for asset identification (such as ISIN, FIGI) and none are universally adopted, or support fully automated extraction of associated information, which requires integration with other issuer information alongside market prices. The insurance industry therefore has an interest, along with the rest of the buyside of the markets, in building on existing numbering solutions to achieve adoption of effective universal and fully linked asset identification standards.

Achieving the required data standardisation to support prudential risk assessment and compliance with prudential regulations is a cross-financial services industry challenge. It must cover assets held by a range of different institutions; not just insurers, but also asset managers, banks, hedge funds, and others. Data on these financial assets is required for risk management, for internal management information, and for external financial and regulatory reporting. Therefore, considerable potential benefits exist from standardisation of data on financial assets. However, fully achieving these benefits necessarily requires collaboration and consensus across multiple areas of financial services.

While standardisation is crucial, our focus group participants also stressed the importance of having a fuller understanding of the application of reported data. Reporting firms want to understand what the required 'atomic level' of data is, and how it will be used. For example, it is sometimes the case, especially in one-off reporting requests, that firms reporting information are asked to disaggregate into certain 'buckets'. This can present challenges where these do not correspond to the buckets that firms use internally. A question then arises of how much time and effort should be put into estimating data that is not directly available for reporting. For this, judgement it is important, and therefore better understanding of what the end use of the data will be - how it is to be used by the regulator. Bridging the gaps between what is provided, and how it is required. This has been a source of frustration previously when data does not line up as required.

This example highlights two points. It is a further illustration of the importance of effective dialogue between firms and regulators to efficient regulatory reporting. It also illustrates the shortcomings of relying on aggregated rather than granular level data for such reporting. A shift to the direct processing of granular data for regulatory reporting would eliminate the need to produce estimates based on internal aggregated data. While this is the ultimate goal, in the interim industry and regulators will need to work together to find effective solutions to achieve desired prudential outcomes.

Inconsistency in asset classifications is also a problem in insurance supervision, as well as in regulatory reporting. Different firms can treat the same asset differently, making comparison across firms difficult for supervisors**.** In particular, both data and modelling inconsistencies can create problems in the processes for validation and acceptance of internal risk models, allowed for calculation of solvency capital requirements under Solvency II.

Subject to PRA approval, “Pillar 1” solvency capital requirements (‘SCR’s’) can be calculated using firm’s internal models as opposed to standard formulas. These internal models capture the exposure of the individual insurer to a range of risk factors affecting their balance sheet valuations. These risk factors include those impacting on: i) assets (equity risk, credit spread risk); ii) liabilities (longevity risk, property risk, and also lapse risks arising when life insurance policy holders fail to maintain premium payments through the full term of the contract); and iii) both assets and liabilities (such as interest rate risk).

The PRA also monitors for ‘model drift’ – differences in the change in capital based on internal models compared with those based on standard formulas, or net liabilities unadjusted for risk. These departures can be substantial. A recent Bank of England underground blog reports that over the three years from 01/01/2016 to 31/12/2018, while internal model-based SCR’s for UK life insurers rose by only around 2%, net liabilities grew by nearly 30%, and standard formula-based SCR’s rose by closer to 40%. Much of this difference can be explained by the more accurate treatment of exposure to interest rate risk in internal models, but there are also concerns that changes in the treatment of other risk factors, such as credit spreads, may not adequately capture firm’s risk exposures.

While not highlighted to the same degree in our focus group discussion, it seems that data inconsistency also affects the ability of insurers to claim so called Solvency II matching adjustments. These adjustments allow insurers who can demonstrate a close matching of cash flows on assets and liabilities to reduce their capital requirements, which can have a substantial impact.

According to a recent letter from the executive director, insurance at the PRA, these matching adjustments reduced the capital requirement of UK insurers at end 2020 by over 40%, from £197bn to £116bn. The essential logic of a matching adjustment is that *if* the current and future cash flows received from assets match those due on liabilities, then insurers can safely hold these assets to maturity, unaffected by fluctuations in their market value. Therefore, the capital requirements that would otherwise be required for the market risk exposure from holding these assets can be adjusted down, or removed. However, lack of agreement on the classification and recording of asset holdings makes it difficult to agree matching adjustments in a consistent fashion across the industry. These processes can be slow and arduous, with approvals sometimes taking many months. To an important degree, such problems also arise because of a lack of standardisation.

The insurance industry has not yet taken many of the steps towards exploring the opportunity from adopting standardised cash flow modelling frameworks, such as that offered by the ACTUS project described in Section 2. Such a common approach would for example, if implemented across the industry, allow for rapid supervisory assessment and comparison of internal models and matching adjustments.

There are further benefits to be obtained from consistency in data and risk modelling frameworks. These could reduce the costs of returns made for the regular stress testing of insurance firm's balance sheets, with the next regular stress test of UK insurers due to take place between May - September 2022. It would also assist in the additional 'Pillars 2 and 3' reporting; the Solvency & Financial Condition report ('SFCR'), which is reported annually & disclosed publicly, and the Regular Supervisory Report ('RSR'); a private report to the supervisor that is not disclosed publicly.

Data issues are also highlighted in HM Treasury's October 2020 review of Solvency II for UK insurance firms, examining the likely opportunities – now that UK is no longer a member of the EU – to tailor capital adequacy regulation for insurers to the specific features of the UK insurance industry. This has led in July 2021 to the PRA publishing the first phase of proposed changes to Solvency II reporting requirements, and the HM Treasury publication of its response to the initial call for evidence.

This Solvency II review, as well as endorsing the BoE/PRA road map on transformation of data collection from the UK financial services sector, raises other data-related issues. For example, climate change is beginning to be recognised as a central prudential risk for insurers. The PRA-supported climate change financial risk forum https://www.bankofengland.co.uk/climate-change/climate-financial-risk-forum provides support for the monitoring and management of climate risks. This in turn has two aspects: (i) the impact of climate-related risks on capital adequacy, notably of potentially rising natural catastrophe risks and their impact on property liabilities; (ii) ensuring that regulation does not impede the ability of insurers to include investments in their portfolios in renewable energy, or other avenues towards mitigating or averting climate change.

This second point, around incentives for portfolio allocation to deal with the challenges of climate change, highlights a wider issue; that insurance regulation may inappropriately limit insurance investment in illiquid assets such as venture capital, or infrastructure crucial to supporting long-term growth. Our focus group discussion suggested that some relatively modest changes could be made to the Solvency II regime to encourage more investment in these asset classes than occurs at present. For example, it is often presently the case that a life insurer might have greater incentive to buy a 30-year corporate bond in a mining company, than to invest in a wind farm. From the climate change perspective, this obviously makes little sense. However, our discussion also noted the concern that the primary risk focus of regulatory reporting could be diluted if there are attempts to use it to actively direct the allocation of capital. There would therefore most likely be some opposition to any potential use of the prudential capital framework in this manner.

4. Conduct risk and client / customer protection

This section looks at the opportunities that arise from using technology in managing and mitigating conduct risks. This was the subject of another of our focus groups. These opportunities for employing technology are not as immediate as those in the assessment of capital adequacy. It can however be argued that effective control of conduct risks, and ensuring client and customer protection, equally depends on coherent long-term plans for investment in, and improvement of operating systems and their supporting technologies.

Conduct regulation - while perhaps not as prominent an issue as in commercial banking or the fixed income, commodity, and currency markets, where multi-billion-dollar fines have been imposed for market manipulation - is still a key aspect of insurance regulation. Between 2016 and 2019, the FCA imposed fines in excess of £100mn on several UK insurers, both in life insurance/pensions and in general insurance. Fair treatment of retail customers also falls under the remit of the Competition and Markets Authority, which led to the FCA's May 2021 introduction of requirements on motor and home insurance for giving existing customers the same contractual terms as new customers.

UK insurers are subject to the general COBS business standards – particularly for life insurance and long-term care insurance contracts – and also to the more specific ICOBS business standards for general insurance (both set out at length in the FCA handbook www.handbook.fca.org.uk/handbook/). Applying these can however be far from straightforward. For example from Lexis PSL, "*Frustratingly for the insurance sector, the conduct rules in ICOBS and COBS differ, so the first challenge is to identify whether to apply COBS or ICOBS in relation to a particular circumstance*."

The FCA, well aware of limitations in their conduct of business regime, is engaged in a review of their approach to conduct risk. Part of this is a roll out of a conduct and culture audit. There is also the new concept of "consumer duty", recently published by the FCA, which was described in our focus group as a 're-set' of the regulatory framework around conduct. It offers the opportunity to improve upon current frictions and inconsistencies in the framework. An initial consultation covering the high-level principles of this new consumer duty, from 14th May - 31st July 2021, was followed by a further consultation on the detail, from 7th Dec 2021 - 15th Feb 2022. This is effectively replacing the broad 'principle 6', that "a firm must pay due regard to the interests of its customers and treat them fairly." While the principle itself is sound, the level of fines for unfair treatment of customers indicates significant weakness in its implementation. The new consumer duty therefore places a much-increased focus on outcomes: "Firms would need to assess and evidence the extent to which and how they are acting to deliver good outcomes."

Our focus group also briefly discussed technology-based responses to concerns about customer outcomes. Broadly, the consensus was that "good governance and culture on the part of the provider are more important in terms of outcomes … for example, in the case of annuity mis-selling, technology may not have fundamentally altered what

happened, in what was fundamentally an issue of governance." Technology might therefore be more useful in delivering good outcomes when used by consumers, for example on comparison sites, than by firms. It seemed to us however that this assessment may change when the new consumer duty comes into effect, since the responsibility for assessing and evidencing fair outcomes for consumers will require the development of new systems and processes, and it is difficult to see how these can possibly be effective if they are not technology-based.

There are other difficult challenges, such as in the understanding of regulations across multiple jurisdictions, where there is a clear role for technology. Our focus group participants suggested that solutions to such issues are primarily internally developed at present, but that there is a potential for start-ups to provide solutions that can be scaled across multiple firms. While there are promising initiatives of this kind, adoption is still far short of universal.

A further question remains around good culture, and whether this can be digitally embedded. Metrics for culture remain a difficult issue. Incident reporting provides a good example of this – the need to incident-report will often come about as a result of 'messing up'. Therefore, the reporting of an incident represents a 'critical cultural moment'; one which can produce conflicting incentives for those involved. The internal processes for logging and then following up incidents are at the point of intersection between technology and culture. A key issue here then becomes avoiding blame, as one focus group participant suggested that the wording of incidents is important. This should emphasise *learning* from experiences, to ensure that negative incidents can be prevented from re-occurring in the future, rather than apportioning blame for them. "The key is to be able to 'fail well', with a constructive approach to ensure staff learn from conduct mistakes."

A related point is whether staff are able to voice concerns about customer treatment, especially when financial incentives give insufficient attention to, or even conflict with, good customer outcomes. Again, technology-supported systems could be in place to record such concerns and responses. Still, our focus group participants expressed some scepticism on the extent to which technology can help in this regard. The does not though rule out the possibility that regulation may focus more in the future on the systems and supporting technology in order to embed and support good culture, and better customer outcomes.

5. Data sharing and data protection

This section examines the regulation of data, both data-sharing and data-protection, which was the subject of our third focus group. A useful overview of the role of data management and information architecture in financial services is provided by these recent minutes of the Feb 2021 second meeting of the FCA / Bank of England Fintech AI Public-Private Forum. This reviews four challenges in employing AI in financial services, challenges which emerge in all automated data processing: (i) data quality; (ii) data strategy and economics; (iii) data governance, ethics, and culture; and (iv) data standards and regulation.

Central to all of these are the new technological opportunities for various forms of data sharing and collaboration. These are highlighted in a recent collaboration between our TECHNGI project and Willis Towers Watson, published in the Willis insights series. See especially Figure 1, highlighting how technology is opening up various new opportunities for data sharing and data collaboration in the insurance value chain (including for example opportunities from federated learning so that data is not directly shared, but analytical insights can be built up from multiple data sets).

That analysis highlights four principal issues concerning regulation and data;

1. Data management challenges, and the need to keep long-term and/or societal benefits in mind to justify data investments, not just short-term returns.
2. Open data and competition. An influential view (voiced by e.g. the Open Data Institute) sees data as inherently a public good. Like clean air, the consumption of data by one firm does not preclude its consumption by others. Control over data is also a barrier to competition. But data also needs investment, and therefore must provide a return to that investment. So, what is the appropriate balance between the sharing of data and providing commercial incentives for data investment?
3. The standardisation of data and data analysis to support more cost-effective and efficient regulatory reporting and compliance. As earlier sections of this paper discuss, agreement on data standards and common approaches to risk modelling can support automated prudential reporting. Similar agreement on common operational approaches may help regulators to better assess outcomes for consumers and clients.
4. The ethics, transparency, and oversight of data. There are understandable public concerns about the use of data, including preserving privacy and ensuring that automated data processing is not introducing unfair or biased decision making. This is now widely appreciated, but there is not yet consensus on appropriate, practical solutions.

More broadly, other work in the TECHNGI project has highlighted concern around insufficient attention at board level to certain critical data issues. Cyber security certainly

receives attention, but other data issues perhaps somewhat less so. Is there an effective framework for data governance and management? There is a skills gap, both of data science specialists and also more broadly across organisations, a lack of understanding of data issues in both line and senior management. Are these gaps being addressed? Does the industry possess the necessary data/tech 'literacy' for full digital transformation, from the customer operations to the boardroom and if not, at which levels is this most lacking? Most crucially, how is a genuinely digital organisational culture to best be developed?

Our focus group covered all these issues, beginning with the challenges of data governance and management for individual firms. As also found in our focus group on prudential regulation, there is growing awareness in the industry of the importance of standards, e.g. in the 'Future at Lloyds' programme. "There is movement towards standard identifiers for insurance, examples given include identification numbers for vehicles and vessels. Some standards however are not currently universally used, and certain other data issues such as the quality, capture, and management of data remains below required levels". There is still a long way to go in terms of standardisation of data, and especially so at the international level.

To an important degree this is a legacy issue, with only a proportion of data being held in a truly digital format. Much is still held in paper or .pdf form, and work remains ongoing to convert this to digital. This conversion is a pre-requisite for the broader transformation issues in data management, and is an issue that should not be overlooked.

One participant commented on a pooling project in the industry to improve cyber risk modelling. There has been significant increase in phishing and ransomware attacks in recent years, often targeting corporate IT systems. This is a concern that has grown significantly, to the point that hacking 'services' are now available for purchase online to test a firm's defences against attempts to infiltrate its systems. Several insurers have therefore agreed to pool data around cyber, aggregated to maintain some degree of confidentiality but allowing for the identification of trends in the data, for example targeted companies. This is an area where the sharing of data is fairly active, but there are others where there is far more reluctance to share. However, there is also an expectation that data sharing will increase around emerging issues such as climate change.

There is a fine balance between benefitting from useful information, versus not sharing a firm's own intellectual property. This becomes less of a concern when sharing aggregated rather than individual data. Fraud initiatives are a major topic at present, particularly involving new technologies. New frameworks for permissioned sharing of data are attracting increasing attention. These might for example be based either on the concept of a data trust, providing both the technology and governance for compliant and secure data sharing, or following the example of open banking through the development of agreed APIs that support permissioned sharing of data.

Our focus group discussed both of these possibilities. There is a lot of interest, but at the same time a certain caution around giving away commercial advantage. One participant suggested the term ‘knowledge sharing’, as opposed to data sharing - “the idea of ‘data sharing’ scares everyone, everyone is worried about giving away their data”. Privacy-enhancing techniques however can facilitate ‘protective’ data sharing; for example, differential privacy and secure multi-party computations. Several techniques of this kind are available to help protect privacy. Fundamentally, the data itself need not be shared. Algorithms can be applied to data with the resultant *knowledge* being shared rather than the data itself, ameliorating concerns around the latter.

What about open insurance, with the customer sharing data in much the same manner as is now possible through open banking? Possibly this can happen, but there also a more limited scope in insurance. Customers already benefit from price comparison sites, and the insurance business model is in any case quite different to banking, and so an ‘open’ model is possibly not as well suited. On the other hand, price comparison sites encourage competition largely on the basis of price, not quality. So there are possibilities around the sharing of information on non-price aspects of service, or other aspects of the contract.

There are also opportunities for cross-*industry* data sharing and collaboration. One example is motor transport, where multiple companies with different functions operate, and who could potentially share data and information for the benefit of all players in the chain. So this is an even broader issue – there are opportunities for sharing on a wider basis than simply within insurance markets themselves. Similar possibilities could arise in supply chain and logistics, both domestic and international where there are many complementary service providers, including insurers and banks, and where standardised data sharing could both substantially improve the quality of service and also reduce costs.

Agreement also seems apparent that culture and awareness is an issue here too, in terms of data and regulation. The regulatory framework can sometimes create ‘a battle between compliance and ethics – the letter of the law (compliance) vs. the spirit of the law (ethics)’, potentially resulting in conflicted incentives. This should also be considered as part of longer-term industry planning.

6. Conclusion

This paper is an investigation of the use of technology in insurance regulation, drawing on a review of public domain materials together with insights from a series of focus groups with UK insurance practitioners.

The principal findings, set out in the executive summary, involve (i) the immediate opportunities for using technology for automated prudential reporting under Solvency II regulations; (ii) the potential for using technology to improve outcomes for retail customers

and the requirements for compliance with the new FCA consumer duty; and (iii) the broader challenges of data sharing and data security affecting firms in all industries.

In conclusion we make one further point, something emerging from this paper and from much of the other research conducted in the TECHNGI project, of which this paper is a part. Conventionally, technology in financial services has been regarded as only a supporting function, captured for example in the pejorative term ‘back office’; a source of cost that is secondary to the central revenue raising functions of developing and delivering financial products and services. Our analysis highlights the imperative of broad cultural and organisational change required for co-ordinated and consistent adoption of new technologies, and hence achieving their full potential; not just in insurance regulation and supervision, but also more broadly across insurance operations.

An illustration of this change is the emphasis now being placed by regulators around the world on collaborative dialogue with industry to achieve collective agreement on technical and data standards. The current BoE/FCA initiative on automated regulatory reporting is a leading example. Currently, excessively costly manual compliance can only be automated cost effectively through a holistic approach, addressing fragmentation of operational data and systems across the industry.

The same need for a holistic approach applies to the use of technology to achieve commercial goals: automation of operations; reduced costs; improved customer experience; and meeting the challenges of data sharing and data security. These goals cannot be reached in a piecemeal fashion, based on marginal changes to existing systems. Rather, they require a *consistent, cross-firm technology strategy* that orchestrates technology-based change in systems and processes across the organisation. This will require building of skills and awareness across virtually all management, not just those responsible for the technology. It further needs cross-organisation collaboration and dialogue to ensure all the requirements of system change are identified and realised. Achieving the full potential for cost reduction also means adopting, wherever possible, industry-standard approaches supported by cross-industry dialogue on standards for recording data and contracts, and for secure, permissioned sharing of data or access to data so that the full economies of scale from industry-wide automation may be achieved.