Thought
Leadership

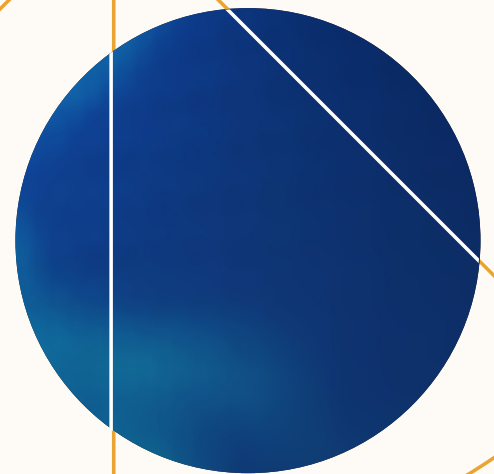# The Heart of IFRS 17 Compliance
Why data and data architecture are vital in addressing insurers' technology challenges

Chartis
Independent. Insightful. Actionable.

About Chartis

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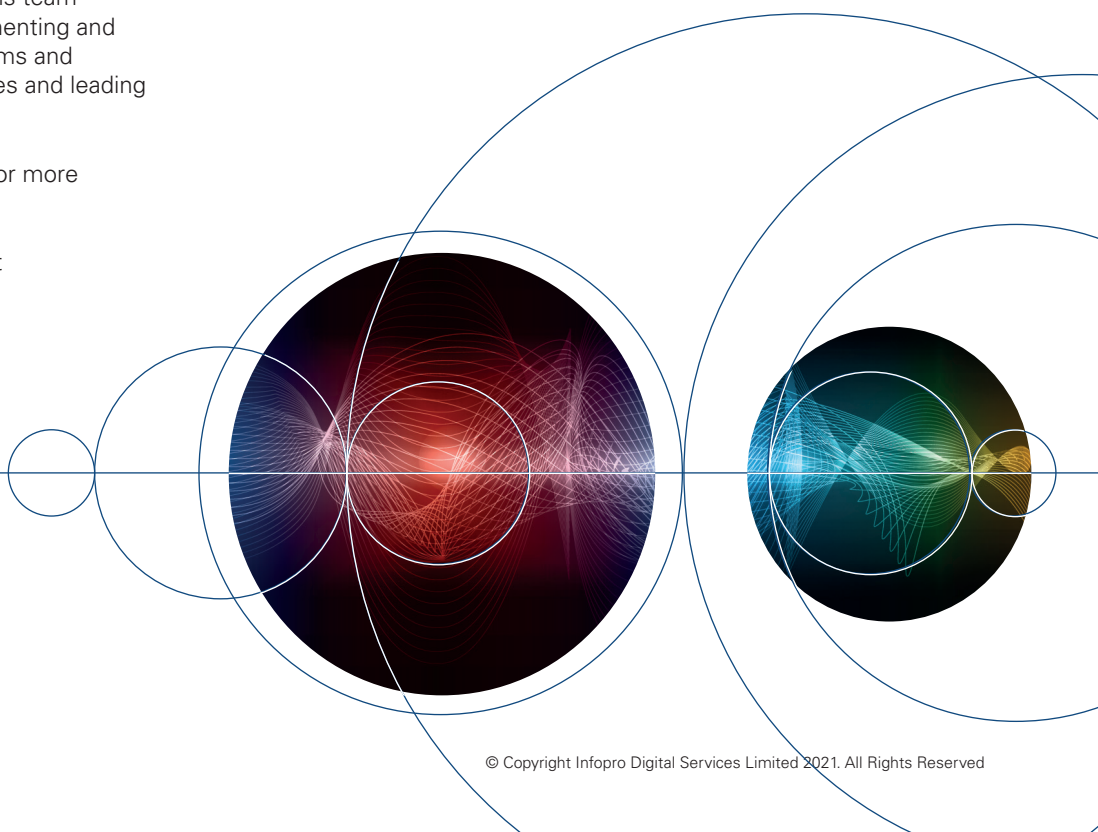
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Its data-driven financial services solutions are designed to help businesses build digital ecosystems, and to gain insights to enable better business-critical decisions.

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1. Executive summary

International Financial Reporting Standard (IFRS) 17 (and its US counterpart US GAAP[1] Long-Duration Targeted Improvements [LDTI]) have been significant milestones in insurance accounting and insurance risk infrastructure. The standards have substantially modified the trajectory of insurance firms' technology and operational requirements. IFRS 17 establishes a varied set of new accounting rules, defines new process requirements, and necessitates a vast range of new calculations. These new calculations will impact insurers' technical capabilities, such as their actuarial modeling systems and accounting engines.

In this report we focus on the centrality of data management for long-lasting effective compliance with the new standards. We make the case that for institutions implementing new IFRS 17 systems or modernizing their legacy platforms, it is vital to pay attention to the flexibility of data management and the scalability of computation. While IFRS 17 compliance entails many process and rule changes, as the implementation date looms closer it is clear that the biggest shift for insurers will be in the elements of technology architectures. Interviews conducted by Chartis reveal highly fragmented implementations when it comes to IFRS 17 compliance within insurance businesses. This fragmentation is more intense for large insurers with multiple regional operations.

In this report we examine these, and other, trends and dynamics. After providing a brief overview of IFRS 17, we explore the major shifts in architectural components occurring in insurers. We then consider the reason why long-term success for insurance firms (as far as IFRS 17 compliance is concerned) requires a heterogeneous, flexible and scalable data-management framework. We also lay out the most effective components of a data warehouse for IFRS 17 compliance, and consider centralized versus distributed data frameworks. A key strand of our effective data management story is the importance for insurers of versatility when they are confronted with diverse database types. Versatility also supports adaptability, which for insurers can enable better system and platform integration.

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[1] *Generally Accepted Accounting Principles*

2. IFRS 17: Overview and regulatory context

Regulatory context

The accounting standard IFRS 17 (issued by the International Accounting Standards Board [IASB] in 2017) was initially set for implementation in 2021, but after two deferrals the effective implementation date is now January 2023. IFRS 17 (which replaces IFRS 4) is the first comprehensive global accounting standard for insurance and reinsurance contracts, and represents a supervisory move toward complex risk-based standards (so-called 'risk-aware accounting'). At its core, the aim of IFRS 17 is to standardize the diversity of accounting practices that were authorized under IFRS 4. The IASB developed IFRS 17 to unite the globalized insurance industry and improve the comparability of its valuations, and the extent of the principles-based standard reflects the complexity and variation of the insurance contracts it has been designed to measure.

For insurers and reinsurers, compliance will come at substantial cost, and will put pressure on their three core technology systems: *accounting*, *data management*, and *actuarial modeling*. Effective IFRS 17 compliance is an especially data-intensive process, and will depend on firms having a strong core data management and reporting framework. An institution's compliance stage will depend on a variety of factors, including institution type, operating region and, to a lesser extent, the impact of the COVID-19 pandemic.

Throughout the transition process, the IASB has engaged continuously with the industry. As a result of this, it has developed a series of amendments designed to address various industry concerns and challenges. The IASB issued the final, revised version of IFRS 17 in June 2020. Some of the amendments it features include the following:

- The deferral of the effective date to 2023 (the deferral also includes IFRS 9 for insurers).

- The way that profit is recognized for investment services, and the clarification of what is considered an 'investment component'.

- The way acquisition costs are recognized.

- Held reinsurance contracts, as well as derivatives, can now be recognized in profit and loss using the fair value approach.

- Products that do not include insurance as a contract feature, but which provide insurance coverage (such as credit cards), will be excluded from IFRS 17.

- Eligibility for the variable fee approach (VFA) can be assessed at contract level rather than group level.

IFRS 17: an overview

IFRS 17 will affect different contract types – contracts with direct participation features, long-term contracts and short-term contracts – in different ways (see Figure 1), although long-term contract issuers, especially those with direct participation features, will feel the brunt of the impact.

Interaction with other regulations and standards: the IFRS 9 effect

How prepared for compliance an insurer is will be impacted by the Solvency framework of its region (see Figure 2). Compliance will also be affected by how IFRS 17 interacts with other accounting standards, notably IFRS 9.

While IFRS 17 focuses on the liability side of a firm's balance sheet, IFRS 9 is its counterpart on the asset side. Combined, these two standards provide a new up-to-date market-adjusted view of a firm's balance sheet, and lay the foundation for new market-based asset and liability management (ALM) practices.

Although the IFRS 9 implementation date for banks was January 2018, insurers can opt for an exemption, and have until 2023 to prepare their compliance efforts. Those institutions that have not opted for an exemption will have complied with IFRS 9 in 2018. The deferral of IFRS 9 to 2023, alongside IFRS 17, highlights the importance of a coordinated response to both standards. It also signifies that the standards are part of a wider regime of 'risk-aware accounting', and are intended to transform the way that balance sheets are recorded and presented. To comply with both IFRS 17 and IFRS 9, insurers will have to make important decisions about their accounting strategy and underlying technology.

Many insurers may choose to closely coordinate their IFRS 17 and IFRS 9 implementations, an

Figure 1: IFRS 17 – measurement models and contract features

Contracts with direct participation features (i.e., unit-linked products)	Long-term contracts without direct participation features	Short-term contracts of less than 12 months. Contracts longer than 12 months are subject to projected liability.
The VFA	**The GMM**	**The PAA**
• CSM: accumulated interest is represented through direct adjustments to the CSM. • Financial assumptions: the VFA requires repeated calculations to measure how changes to the underlying items affect fee fluctuation. • Risk adjustment: non-financial risk calculations need to be integrated into the fulfilment cash flows to reflect liability uncertainty. • Discount rate: interest rate changes can be accounted for under the variable fee. However, the rate is not locked in at inception and must be repeatedly calculated over the life of the contract.	• CSM: estimates need to be remeasured each reporting period. • Risk adjustment: non-financial risk calculations need to be integrated into the fulfilment cash flows to reflect liability uncertainty. • Discount rate: insurers can choose between the 'top-down' or 'bottom-up' methodologies. Firms can recognize the impact of changes in the discount rate in either P&L or other comprehensive income (OCI). • Cash flow: unbiased probablity-weighted calculation, composed of the pay-out obligation, the premium rate of the contract, and any underlying financial asset.	• Cash flow: the remaining liability is calculated by applying a pattern for incurred claim costs. • Cash flow: premium allocation recognized over time as revenue. Subject to changing risk patterns.

Source: Chartis Research

approach that offers multiple benefits. By adopting such a comprehensive approach, insurers can identify early accounting mismatches that may occur between their IFRS 17 and IFRS 9 reporting. This approach is also useful when assessing balance sheet volatility that may arise from compliance – a key concern for insurers. To offset these mismatches insurers can use a variety of strategies, such as hedge accounting and adapting product features.
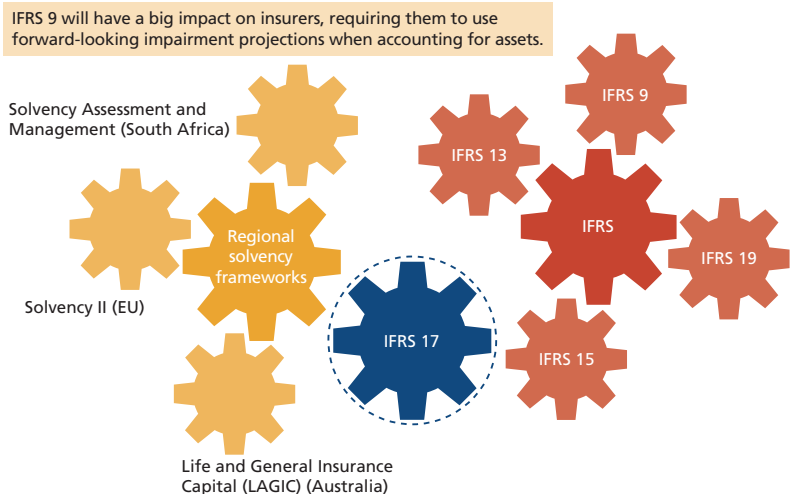
Another advantage of a combined approach to IFRS 17 and IFRS 9 approach is that it enables a comprehensive view of the balance sheet, which insurers can use to achieve effective ALM. By aligning their asset and liability measurement practices and accounting policy choices, insurers can improve their ALM processes.

A closely coordinated response to IFRS 17 and IFRS 9 may not make sense for all institutions, however. For some insurers, there is too much separation between the respective teams responsible for asset measurement and liability measurement, and this separation extends to budget distribution.

Core technology is key

Regardless of the implementation strategy a firm adopts, both standards require key core technology components. IFRS 17 and IFRS 9 both span the finance and risk functions in an

Figure 2: Mapping IFRS 17 compliance

IFRS 9 will have a big impact on insurers, requiring them to use forward-looking impairment projections when accounting for assets.

Solvency Assessment and Management (South Africa)

Regional solvency frameworks

Solvency II (EU)

Life and General Insurance Capital (LAGIC) (Australia)

IFRS 9
IFRS 13
IFRS
IFRS 19
IFRS 17
IFRS 15

Source: Chartis Research

institution, so effective compliance demands a shared scalable data infrastructure that can handle diverse data, and plenty of it. Both IFRS 17 and IFRS 9 require strong, flexible accounting engines and cash-flow generation functionality. The modeling at the center of each standard, however, differs considerably. While IFRS 9 compliance is built on expected credit loss (ECL) calculations and stress-testing frameworks, IFRS 17 compliance depends on discount rate modeling and non-financial actuarial calculations. But they both require the integration of computational engines into the accounting system.

3. The insurers' response

This section focuses on insurers' varying responses and approaches to IFRS 17 compliance, and the factors underpinning these differences. We argue that the main drivers of an institution's response to compliance are its **type** and **product mix**. We also discuss how the regulatory and reporting environment in which insurers operate (the regional trends), and the sophistication of their existing technology, will also affect how they respond. Finally, we also consider how regional differences in technology and operations can intensify compliance the fragmentation of implementation approaches within businesses.

Key drivers of an insurer's response: institution type and product mix

The impact of IFRS 17 on insurers is strongly defined by their product portfolio. The three measurement models outlined by IFRS 17 give specific directions about how to account for different types of contracts and their features. Life insurers will face the biggest challenge. The premium allocation approach (PAA) is the simplified option for general insurers – for which 12 months or less is the most common contract length.

Another strong dynamic in terms of compliance programs is the relative maturity of larger firms, many of which have had IFRS 17 programs running for at least two years.

Regional trends: the regulatory and reporting environment in which insurers operate

The greater the divergence from existing practices that IFRS 17 compliance represents, the more work there is for insurers to do. Firms in regions that have previously been governed by standards and directives based on a risk-aware approach to insurance contract valuation may find the transition less of a challenge, both operationally and technically (see Figure 3). However, readiness to comply with IFRS 17 does not necessarily determine the maturity of an insurer's compliance journey. Insurers in South Korea, for example, identified the magnitude of work to be done promptly, and started early as a result.

'There will be a reaction in insurers' product design. Some of the effects will be explicit, but others will take time to emerge, as insurers look to make their products as capital-efficient as possible in the revised IFRS world.'

CRO, large global European bancassurance firm

The sophistication of existing technology

The maturity of an insurer's various technology segments is shaped significantly by institution type and region. The life insurance market has a strong legacy of core predictive analytics from a mortality perspective, however strong product design issues and challenges are present. General insurance firms are accustomed to data-intensive processes and have strong infrastructures; however, IFRS 17 still presents a huge data challenge. Firms in mature insurance markets (such as Europe) that have complied with Solvency regimes will have a head start when it comes to their existing data infrastructure technology. Our interview data highlights that insurers that have already complied with Solvency II are leveraging their Solvency II data marts for IFRS 17.

The impact of COVID-19 on compliance

Another factor that will affect an insurer's readiness to comply with IFRS 17 is the COVID-19 pandemic, which is likely to have long-lasting effects on insurers' balance sheets. The squeeze on profit margins that insurers will feel could even lead to cuts in technology and implementation budgets. A more likely outcome of the pandemic, however, will be delays in the transition process. Insurers in regions where technology infrastructures will require a costly overhaul may struggle to stabilize their business while making the necessary investment in tools and technology. Although most insurers' compliance teams will not face budget cuts, many may have to deal with some level of resource diversion. Businesses are tackling immense volatility in the market, as well as pressure on their IT systems as a result of working-from-home policies.

Figure 3: Regional trends in insurance standards

Europe
- Mature insurance market.
- 31.1% of the world's insurance premiums in 2016.
- Relatively high proportion of life insurance business, especially in Italy and Scandinavia.
- French life insurance sector will have a high degree of VFA eligibility due to its rapidly growing market for unit-linked products.
- European insurers benefit from their experience with Solvency II compliance.
- European insurers are generally ahead in terms of their compliance stage.

India
- Complying under Ind AS 117.
- The Indian insurance market has had rapid growth in recent years as companies and governments push to extend insurance to wider demographics.
- Unit-linked products are a popular form of life insurance contract in India, so insurers will have to contend with accounting for variable fees.

Canada
- Major IFRS 17 market.
- 2.44% of the world's insurance premiums in 2016.

- South Africa - which has a a large life insurance market - is by far the largest insurance market in Africa.
- Compliance in parallel with the South African Solvency Assessment and Management (SAM) framework (2016).
- Unlike Solvency II and LAGIC, SAM risk calculations do not have a high degree of overlap with IFRS 17.

Asia
- Asian insurers in South Korea, Singapore and Malaysia were quick off the compliance mark and conducted early gap analyses.
- Asian insurers have more to do than their European counterparts.
- Asian insurers do not generally have the same level of sophistication in their technology infrastructure.
- Rapid growth means they do not have the same experience when it comes to market-adjusted accounting and regulatory compliance.
- A key operational issue for Asian insurers is that their headquarters are based overseas, creating procedural bottlenecks.
- South Korea in particular has an especially large direct-participation contract market. Measuring these contracts using the VFA will affect the long-term attractiveness of the products.

Australia
- Complying under AASB 17.
- Relatively large life insurance market. Unlike parts of Europe and Asia, it is not saturated with investment-style contracts.
- Australian insurers are accustomed to stringent regulatory oversite by the Australian Prudential Regulation Authority (APRA).
- Compliance in parallel with the Life and General Insurance Capital (LAGIC) adequacy framework.
- Procedural bottlenecks associated with overseas headquarters.

Source: Chartis Research

The pandemic is unlikely to directly impact the viability and execution of insurers' IFRS 17 programs, especially those at larger firms. However, the priority treatment that digitalization programs are receiving may affect how IFRS 17 programs are run. While digitalization programs have often been run in parallel with those for IFRS 17, the perception that firms must improve their operational resilience in the face of COVID-19 may make digitalization a priority. As a result, these initiatives may receive larger budgets, and IFRS 17 programs may be significantly influenced by them, or have to align closely with their processes and goals. These programs can range from operational digitalization to the digitalization of reporting and actuarial processes. The emphasis some firms

'Regulators are going in the right direction (stress tests, scenarios), even if it's the early stages. Requirements for scenario testing, stress testing and reverse testing could increase in the future.'

CRO, European re-insurance firm

are putting on digitalization is increasingly shifting the focus of IFRS 17 programs to their underlying architectural elements.

Market volatility can affect insurers' discount-rate methodologies, especially for those that already have compliance processes up and running. The two approaches to discount rate modeling are 'top-down' and 'bottom-up'. To model the rate, both

Interview highlight – fragmented technology implementations

Our previous IFRS 17 research has highlighted how implementations of IFRS 17 compliance have been fragmented. Our current interview data sheds light on the extent of the fragmentation of systems. Fragmentation is partly an effect of and response to the diversity of systems insurers have, and the componentized nature of compliance.

In the case of globally distributed organizations, an IFRS 17 program will often be specific to particular jurisdictions. A single business may use multiple technology vendors for implementation. Fragmentation does not just occur in different compliance segments, it is also governed by regional practices and preferences. Although insurers have had to identify gaps in their technology architectures, they do not necessarily want to 'change what they know'. Overhauling systems when regional operations are accustomed to existing systems and providers is not always straightforward or desirable. For vendors and insurers alike, existing architectures will heavily influence the nature of future ones.

There will also be some degree of consolidation for globally distributed organizations. Parent organizations will influence smaller or less strategically vital satellite operations. Organizations that operate in a prominent and large market are more likely to retain an independent implementation program, based on their existing technology or their specific market needs.

The trend toward fragmented implementations emphasizes that there is no exact blueprint for IFRS 17 compliance. Insurers and vendors alike must assess their particular situation and develop a custom-built approach.

rely on portfolios of assets with similar cash flows or liquidity characteristics. As COVID-19 represents a tail-end risk, insurers may face difficulties in accurately calculating the discount rate in the middle of a pandemic.

A key business decision that insurers will have to make is how to adapt to the delayed implementation date. Firms may want to take advantage of the longer schedule – but delays can be costly. If possible, insurers should continue at their scheduled pace, and use any extra time for valuable 'dry runs'.

4. Technology and process challenges

This section outlines the key organizational and technology challenges facing institutions. IFRS 17 compliance is a complex process composed of various segments that require their own custom response. Insurers' decisions not only affect the efficiency and effectiveness of their compliance, they can also significantly change the appearance of their balance sheets.

The extent and complexity of IFRS 17 will create a number of challenges for institutions as they work out their compliance strategies. The standard will create a more transparent view, with market-adjusted figures, which will generate new business decisions for institutions. Because of IFRS 17's rules and procedures, and its principles-based nature, institutions will have to make important decisions about accounting and methodology.

Here we discuss the impact that IFRS 17 will have on institutions' internal organizations, and how their processes will have to adapt. We also provide a high-level overview of the key technical challenges in three broad areas:

- Accounting engines.

- Actuarial systems.

- Data management and reporting.

Impact: coordinating risk and finance

Although IFRS 17 is essentially an accounting standard, its many components straddle both the risk and finance functions. The impact of compliance will be felt mostly by the finance side, but compliance will also demand a high level of coordination between finance and risk. For many insurers, achieving the necessary coordination will require them to create new supporting processes and replace traditional siloed approaches.

A key change introduced by IFRS 17 is the requirement for institutions to update their assumptions and estimates at the end of each reporting period. For some institutions, the level of integration of actuarial and financial modeling into the calculation of accounting figures will be unprecedented. Insurers in the European Union (EU) will be accustomed to using actuarial and financial modeling to calculate solvency capital

and risk adjustments. However, while Solvency II is similar in some ways to IFRS 17 – both are moves to incorporate financial and insurance risk into balance sheet figures – their functional overlaps should not be overestimated. IFRS 17 is characterized by its complexity, and institutions will have to custom-plan the allocation of roles and responsibilities, and coordinate processes between their finance and risk functions (see Figure 4).

Figure 4: Measurement models and contract features

Finance	Personnel	Risk
• Accountant • Audit manager	Personnel	• Actuary • Risk manager
• Balance sheet • General ledger • Chart of accounts	Data	• Yield curves • Risk assumptions • Market data
• Accounting rules • Contract grouping • CSM calculation • Acquisition cost amortization	Processes	• Cash-flow projection • Risk assumptions • Discount rate • CSM calculation

Source: Chartis Research

The IFRS 17 compliance flow requires continuous integration and cooperation between different functions. It may necessitate repeated calculations that will increase the level of ongoing cooperation required between finance and risk. The VFA was designed by the IASB to account for the fluctuating fees caused by variations in the performance of the underlying items of a direct participation contract. An institution must therefore continuously update its financial assumptions when there is a significant change in conditions. In addition, under the VFA the discount rate is not locked in, which demands repeated economic scenario generation to calculate the rate.

Insurers will need to plan and adopt processes that suit their specific needs. Some will have to adapt actuarial models to fit lower levels of granularity than they were initially developed for. An important aspect of finance and risk coordination will be the integration of actuarial figures into accounting systems. Calculations such as the contractual service margin (CSM) and risk adjustment (RA) will need to be translated into IFRS 17 accounting entries. All firms will have to ensure a greater degree of collaboration, which will have

implications for their processes and technology infrastructures.

The technology perspective

In terms of technology, the complexities and scope of IFRS 17 demand *flexibility* and *scalability*. These core requirements apply across the technology infrastructure, including the accounting engine, the data management and reporting system and the actuarial engine.

The componentized nature of the IFRS 17 compliance value chain presents a variety of integration challenges, as institutions generally adopt multiple systems and providers instead of a single end-to-end architecture. Institutions must implement systems that have been designed with software connectors and data adapters and, where possible, open application programming interfaces (APIs) that can manage the integration of different technology components. Systems will need to manage the integration of:

- Actuarial engine outputs into the accounting framework.

- IFRS 17 business events into accounting rules.

- The sub-ledger into the general ledger.

- Different data types from disparate sources.

- IFRS 17 figures into reporting and disclosure templates.

IFRS 17 is one of several drivers of insurance technology trends, and insurers will require flexible, scalable and extendible technology to address the calculations, granular data and ALM demands it will create.

The following sections outline the specific challenges that insurers face in their core technology areas as they transition to IFRS 17.

Accounting challenges

The challenges that arise from designing and implementing an IFRS 17-compliant accounting engine stem largely from the need for flexibility, as well as the need to process the required scale and scope of data. Insurers will need flexible designs to accommodate foreign exchange support, user system configurability, multiple business lines and multi-GAAP reporting. Another key challenge for

insurers is accommodating the necessary data granularity and drill-down capability.

Flexibility can be achieved using integration functionality, and by developing a sub-ledger. A sub-ledger enables institutions to store data in more diverse formats and at a greater level of granularity than that offered by a general ledger. It also gives institutions a more in-depth view of how accounting figures for groups of contracts are fluctuating according to changing rules and business events. Another way to approach accounting-system flexibility is through the adaptability and configurability of the business event manager – this is especially important for multi-GAAP support. The accounting engine will also need to support the mapping of data to accounting templates.

Integration with other accounting and regulatory outputs is also beneficial for parallel reporting, and is an important consideration for an insurer's ALM. Institutions will use a variety of actuarial modeling providers, and the accounting engine must be able to integrate outputs from separate calculation engines.

Actuarial and risk-modeling challenges

IFRS 17 presents a number challenges for insurers' actuarial functions. Models will have to be adapted to the new regime of repeated calculations and contract aggregation rules. To calculate the discount rate, insurers are required to develop a methodology that uses either the 'bottom-up' or the 'top-down' approach; they must also source the appropriate input data.

The structure of actuarial and risk modeling in insurance has been shifting in the past few years, due in part to new Solvency regimes and IFRS 17 itself. However, there are wider trends surrounding the actuarial function, including new market-based ALM practices. The new standard for actuarial engines is the ability to process heterogeneous data and different computational styles, and to support a shared environment with analytics (stress testing and economic scenario generation). The industry is also experiencing more demand for actuarial engines that can compute a large number of variables across multiple decisions. An investment in computational power and efficiency will be vital for insurers that offer unit-linked life insurance products. The complexity of life insurance products continues to increase as the

unit-linked market grows, and this is increasing insurers' reliance on option-theoretic modeling.

Data management challenges

Data management systems must provide certain essential elements: data repositories, integration and reconciliation, validation, data models, and mapping and tagging. IFRS 17 calculations require data from a large cross-section of the insurance process, including actuarial systems, trading systems, claims administration and accounting systems. Insurers must implement a data model that can support the variety of different data types that compliance entails. A core data management framework is critical for overall workflow support. The data model and data warehouse framework that specific insurance firms implement should be designed with their unique requirements in mind.

Compliance will also produce large volumes of information, as both the actuarial and accounting functions will continuously create data, often for the same calculations but from different perspectives. IFRS 17 calculations will require the repeated manipulation of data. Because of the time-sensitivity of calculations, and the data flows from multiple sources, heterogeneous data architectures are ideal candidates. Heterogeneous data architectures can also improve the flexibility of sub-ledgers, as they not only capture a wide array of data, they also enable a degree of client configurability.

Regulatory and management reporting challenges

Insurers adopt different approaches when managing their reporting. Thus the nature of various reporting architectures (the level of centralization and the respective trade-offs) can differ.

In the next section we consider the trade-offs of centralization versus the distributed model, and explore the mechanisms used to ensure that the data architecture is built to tackle inevitable shifts along the centralization/distribution scale.

Automating the reporting process that covers the extent of IFRS 17, including the different measurement models and the full range of calculations, is key for a successful implementation project. By automating the process, insurers can speed up what are otherwise daunting reporting requirements. This approach also improves an

insurer's ability to enact controls, and supports efficient and accurate auditing.

5. The centrality of data architecture

While IFRS 17 entails various core technology requirements, in this report we focus on the importance of a central data architecture. Chartis views data architecture as the crucial component at the heart of any successful IFRS 17 program. In this section we will explore the changes that IFRS 17 has introduced, and their technical consequences for insurers' data architectures.

A strong core data architecture enables insurers to control diverse requirements (see Figure 5). In this section we focus on the design of an effective data architecture, considering the different components of data management that can address the divergent elements discussed in the previous section. These include: data repositories, integration and reconciliation, validation, data models, and mapping and tagging.

Designing the right data architecture

When it comes to designing the right data model for IFRS 17 compliance, one size does not necessarily fit all. The diverse requirements of IFRS 17 compliance require a range of data use cases. The various types of data format that compliance entails can make a heterogeneous database architecture an

'Data has always been central to our business. We need more data sharing, sitting within a trusted central body, and more effective standards and tools.'

Quantitative analyst, Canadian life insurer

attractive option, as it can organize and store data in different ways to suit different data characteristics (see Figure 6). A 'multi-model'2 or 'polyglot' database3 system can support heterogeneous data models in one centralized integrated system. Different types of data models have various trade-offs, and it is vital that insurers fit the correct models to specific data and application use cases.

Insurers will also need to store accounting data and manage its access and integrity. Accounting figures such as cash flows, discount rates, cohort CSM measurements and risk adjustments must be stored and processed for reporting. However, because IFRS 17 requires repeated calculations as conditions change over time, institutions will need to implement a compute architecture that can respond to frequent new calculations and data. One approach is to implement data models that are compatible with in-memory processing.

The IFRS 17 compliance data flow is made up of many different layers (see Figure 7). Constructing an effective data architecture depends on its
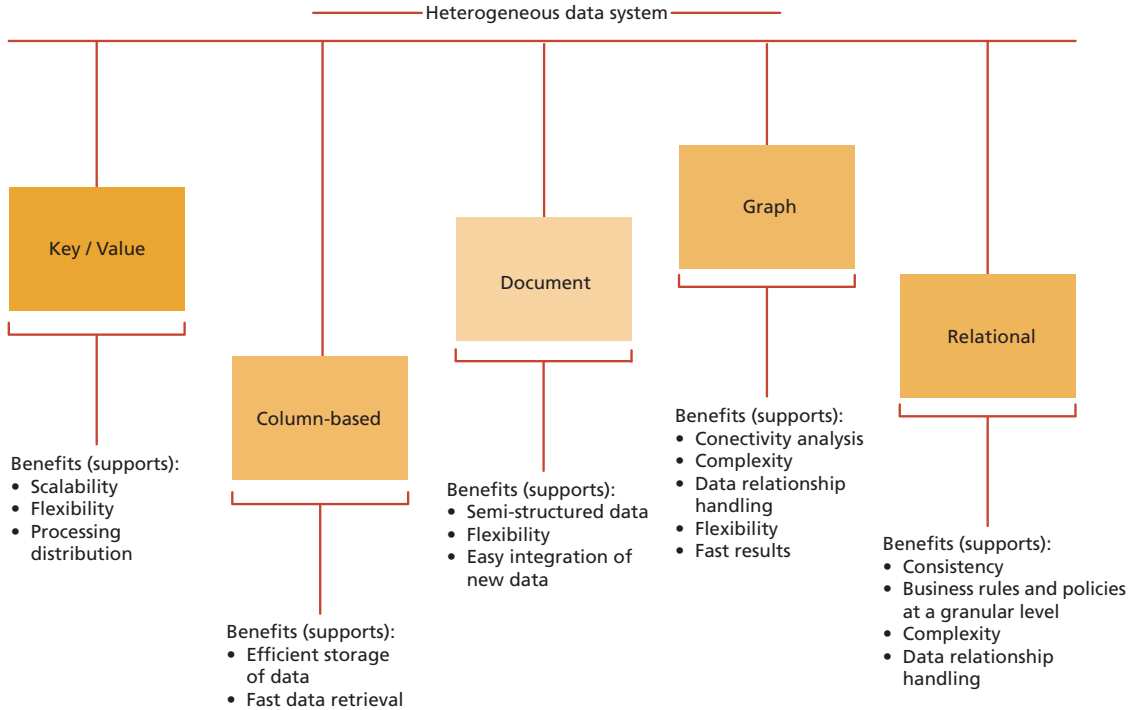
Figure 5: The diverse requirements of IFRS 17

Source Chartis Research

2 Supports heterogeneous databases with a single model.
3 Supports a single database with multiple models.

Figure 6: A heterogeneous data system

Benefits (supports):
- Scalability
- Flexibility
- Processing distribution

Benefits (supports):
- Efficient storage of data
- Fast data retrieval

Benefits (supports):
- Semi-structured data
- Flexibility
- Easy integration of new data

Benefits (supports):
- Conectivity analysis
- Complexity
- Data relationship handling
- Flexibility
- Fast results

Benefits (supports):
- Consistency
- Business rules and policies at a granular level
- Complexity
- Data relationship handling

Source Chartis Research

compatibility with the type of data involved in the different steps and processes. Essentially, insurers must implement appropriate data models and structures for different data types. On top of this, insurers need to link these heterogeneous data models into an effective framework.

The type of data involved, and its characteristics, dictate the structure and database that should be used in storage, access and processing. Important data characteristics include, volumetric uniformity, whether the data is multidimensional, and the data structure.

Cash-flow data, for example, is in an array structure. Cash flows are indexed to each individual cash-flow array, so each point is itself an array. Consequently, cash flows require a database that supports complex arrays. Some databases, however, are optimized to support single dimensional arrays and cannot support multi-dimensionality.

Cash-flow databases can create time series, since organizations create cash flows daily. However, the amount of data produced daily is not stable, making cash-flow data volumetrically non-uniform. Insurers need a database structure that can handle this volumetric inequality across time. Some time-series databases and data frameworks are highly optimized to handle volumetric equivalence – such as the kind used for market data environments. One example of a standardized framework is

the interest-curves database, which enables institutions to keep a set number of interest-rate curves for a defined period of time. To achieve this, they will need to be structured in a uniform database with volumetric consistency and multi-dimensional accommodation.
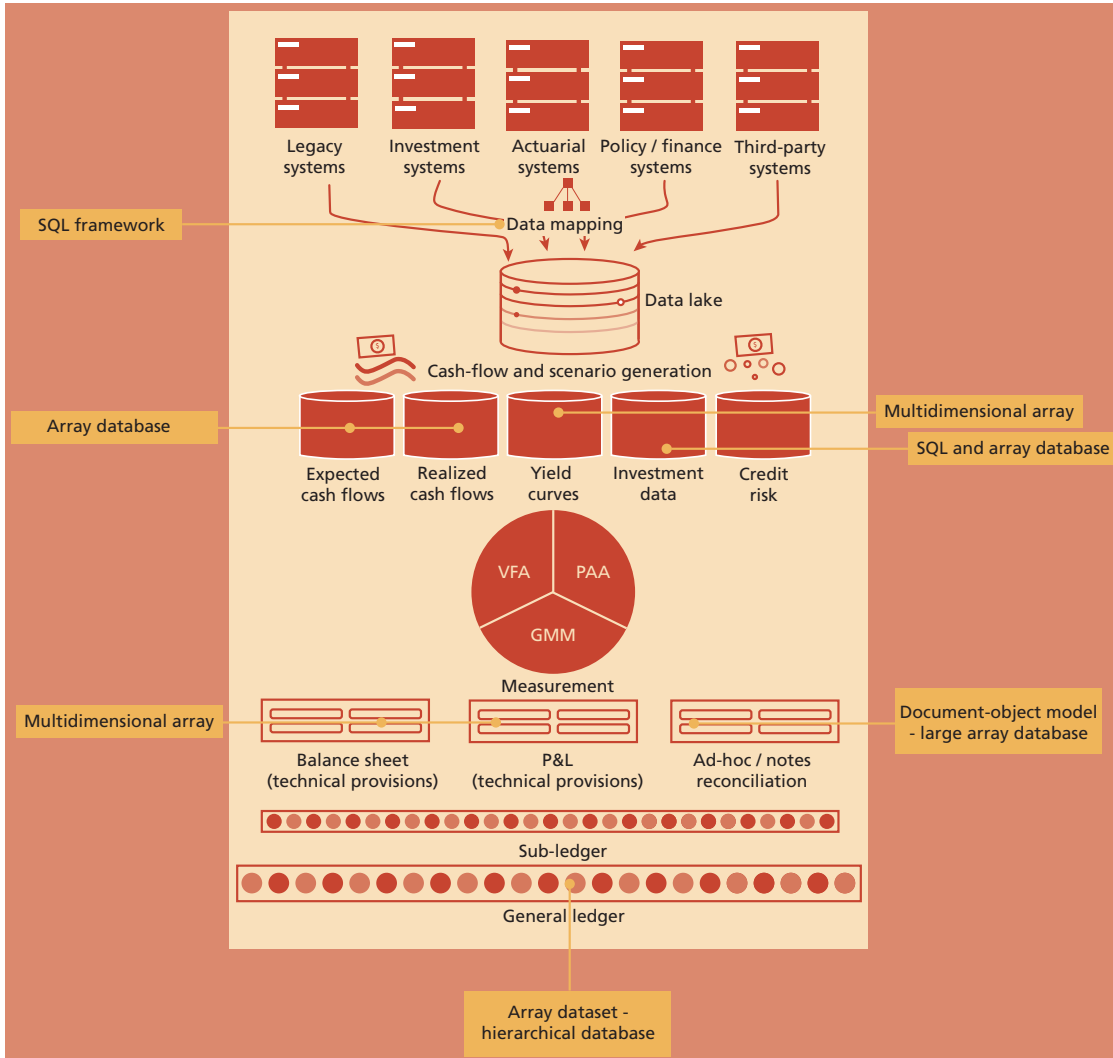
However, when handling cash-flow data, firms must ensure that the index structure is optimal, even when the number of instruments varies over time. The index structure can be expressed as a separate database with its own architecture, or it can be a different instantiation of the same database – but it must be a separate structure.

Investment data, by contrast, requires a data model that describes the asset classes covered and the associated coverage rules per business sub-unit. Investment data must have limits and compliance rules set against it, making an SQL/ relational database suitable. Actual investment data that tracks investment history is best held in an array database. Thus the ideal investment data structure consists of two parts: an array database linked to a relational database.

Versatility is key

Accommodating heterogeneous data models requires versatility, and data management systems

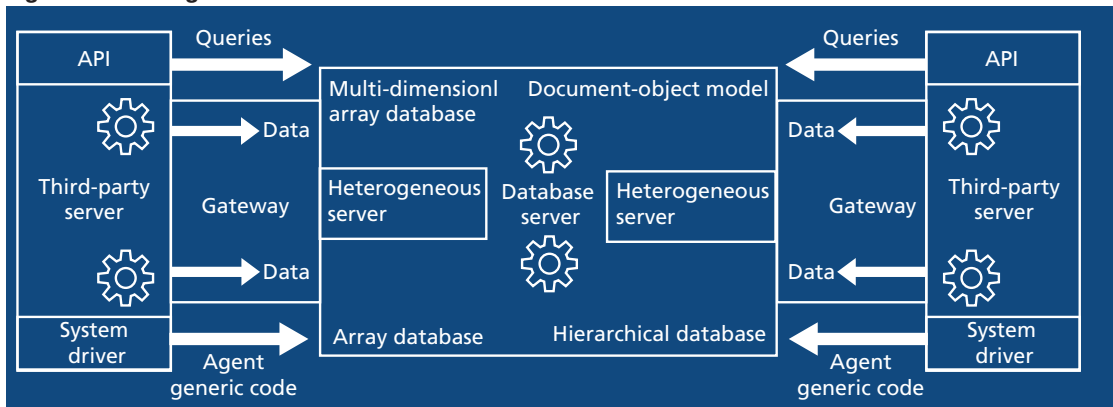**Figure 7: Data types in the IFRS 17 compliance value chain**

Source Chartis Research

can achieve this through their integration capacity. Due to the componentized nature of insurers' IFRS 17 software adoption, integrating third-party data sources is a vital feature of an application. Such

integration can be achieved by implementing a heterogeneous service that can support a multi-database environment (see Figure 8).

Figure 8: Heterogeneous database connections

Source: Chartis Research

Building a data warehouse

The data warehouse is a crucial component of IFRS 17 compliance. It is also a good representation of the complexity that emerges from handling many different types of data and the varying approaches to accommodating that diversity.

Under IFRS 17 and risk-aware accounting regimes more generally, data warehouses need to pack in many more functions than basic data warehouses. Chartis has assessed the ideal components of an effective data warehouse in the context of IFRS 17, which we have termed 'data warehouse++' (see Figure 9).

Data warehouse++ highlights the need for a data lineage and auditability framework to ensure the integrity of stored data. The data warehouse must also be able to handle time-series analysis and data-quality analysis. These functions can help in the provision of data accuracy, auditability and availability, and in the management of historical data.

Although various sources feed into the data warehouse, the data structures they produce may vary. Source systems will require some form

Figure 9: Data warehouse++

Source: Chartis Research

of mapping that feeds into the data warehouse. Legacy system data in particular will be held in formats that are incompatible with the data warehouse model. Users need to use data mapping to separate, organize and restructure the data at this level prior to storage (see Figure 10).
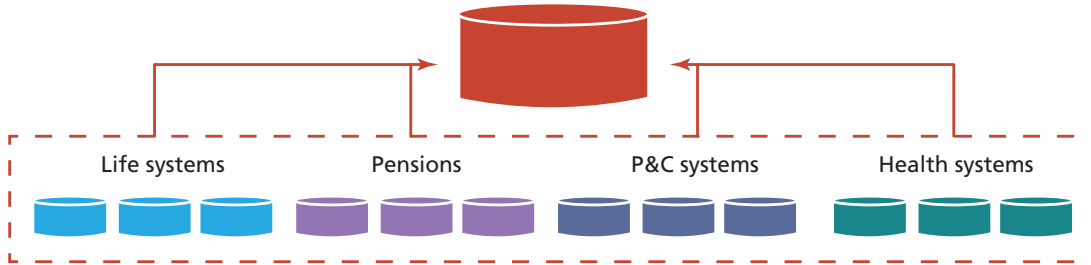
From an architectural standpoint, the need for data mapping and data integrity functionality means that data warehouses should be relational with,

Figure 10: An integrated data warehouse

Source: Chartis Research

Figure 11: Insurance storage systems

Source: Chartis Research

in effect, array-oriented capabilities. Ideally, data warehouse++ should encapsulate multiple styles of storage and management (see Figure 11).

Centralized versus distributed data frameworks

Another core consideration when implementing a data framework is the level of centralization versus distribution. The optimal balance between centralized and distributed will vary by organization, and there are benefits and downsides to each. Generally, an approach that involves a high level of centralization and lower levels of distributed data frameworks is an effective one for controlling IFRS 17 compliance data.

Centralization has several advantages, but in the main it enables a single view of the entire firm. From an integrity standpoint, users can make translations in one place, without creating a convoluted sprawl of formatting changes over time. Auditability and data quality are held in a centralized sphere, allowing users to log and manage data journeys. However, centralization comes with a serious disadvantage – by centralizing input data mapping, organizations also centralize output mapping. Different data verticals (such as market data, yield curves and cash flows) are also pushed together. By pushing distinct components together, centralized data frameworks can create points of intense complexity. A centralized approach will also require analysts from different domains to contribute to the same central data model. Data analysts are not necessarily suited to working across different verticals, and this can cause operational tensions.

Distributed data frameworks reduce the complexity of each individual data store, because they are not shoehorned together. By implementing a distributed framework, firms can save a significant amount of design time,

Business as usual: what happens when the data framework is wrong?

If a firm lacks a core data architecture, what challenges might it face? Chartis makes the case that, for insurers, IFRS 17 necessitates a detailed look at the underpinnings of their data architecture (see Figure 12). Firms must ensure that they align their business requirements with technical criteria such as flexibility, scalability and the ability to handle vast amounts of heterogeneous data. An architecture that supports flexibility and scalability is crucial for insurers managing a range of activities. These include: effective reporting, merger and acquisition activity, risk and finance integration, adapting to changing IFRS 17 specifics and shifting interpretations, and product design.

Figure 12: Data context

Data context	Issues
Historical data is stored in relational stores	Inefficient and low performance
Yield curve data is in simple array format	Inefficient and low performance. Yield curves are complex arrays. Structured-index array databases are more suitable
All data is array database	Creating complex queries is very challenging
No encapsulation layer above hierarchical data in accounting platforms	High query type, low flexibility
Only hierarchical database	Challenging query programming. No flexibility. The management of complex relationships is very challenging

Source: Chartis Research

and the side effects of the data model are less of a concern. Distributed frameworks, therefore, enable rapid, easier development that allows multiple firms to participate in the development. However, the complexity of a distributed

framework can intensify quickly, and can be difficult to manage. To create many sub-models and sub-data frameworks, organizations must have some kind of central framework as a planning element. Essentially, having centralization and distribution in binary opposition exacerbates the negative aspects of both approaches.

A combination of both approaches – ideally centralization at a high level and distribution at a low level – is the most effective strategy. Insurers are at an advantage compared with banks, because it is relatively easier for insurers to build single-jurisdiction software platforms from a data standpoint.

6. Conclusion

As insurers get to grips with the IASB's detailed new accounting rules, they also need to reassess how they manage the data that comes with the standard. We have analyzed IFRS 17 compliance, its challenges and opportunities, through the lens of data management. The highly fragmented nature of implementations, as well as regional trends, support our view that compliance requires a custom approach.

Nevertheless, there are some broad commonalities and key components of effective data management for IFRS 17 compliance. We have identified two concurrent approaches that broadly encompass effective data management:

- From an operational standpoint, the *enhanced coordination of risk and finance*.

- In terms of technology implementation, meanwhile, the key elements are *flexibility*, *versatility* and *scalability*, fostered at the design stage.

7. How to use research and services from Chartis

In addition to our industry reports, Chartis offers customized information and consulting services. Our in-depth knowledge of the risk technology market and best practice allows us to provide high-quality and cost-effective advice to our clients. If you found this report informative and useful, you may be interested in the following services from Chartis.

Advisory services

Advisory services and tailored research provide a powerful way for Chartis clients to leverage our independent thinking to create and enhance their market positioning in critical areas.

Our offering is grounded in our market-leading research, which focuses on the industry and regulatory issues and drivers, critical risk technologies and leading market practices impacting our sector. We use our deep insight and expertise to provide our clients with targeted market and industry analysis, tailoring content to assess the impact and potential of relevant regulatory and business issues, and highlighting potential solutions and approaches.

Chartis' advisory services include:

Market dynamics

The markets that our clients – vendors, institutions and consultants – address are changing at an ever-increasing pace. Understanding the market dynamics is a critical component of success, and Chartis uses its deep industry and technical knowledge to provide customized analysis of the specific issues and concerns our clients are facing.

Market positioning

In today's highly competitive market, it is no longer enough to simply have a leading product or solution. Buyers must be able to appreciate the differentiating capabilities of your brand and solutions, and understand your ability to help them solve their issues.

Working with our clients, we generate compelling, independent co-branded research, targeting critical business issues. This helps our clients to position their solutions effectively, 'own' key issues, and stand out from the crowd.

Collaborating closely with our clients, we develop pragmatic, resonant thought-leadership papers with immediate industry relevance and impact.

Our offering includes:

- **Co-branded research** on key market topics to provide a unique and compelling point of view that addresses a key industry driver and highlights the relevant issues. Reports can be tailored to varying levels of depth and can be powered by quantitative survey fieldwork, qualitative industry interviews, our deep domain expertise, or a blend of all three.

- **Chairing roundtables and/or facilitating events and workshops**, to support clients in hosting compelling events that put them at the heart of the discussion.

- **Targeted marketing through our sister brands**, leveraging the power of our parent group – Infopro Digital – to reach across leading brands such as Risk.net, WatersTechnology, FX Week and Central Banking.
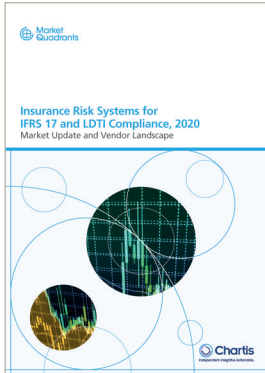
Competitor analysis

Our unique focus on risk technology gives us unrivalled knowledge of the institutions and vendors in the sector, as well as those looking to enter it. Through our industry experts, Chartis clients can tap our insights to gain a much deeper understanding of their competitors and the strategies they should pursue to better position themselves for success.
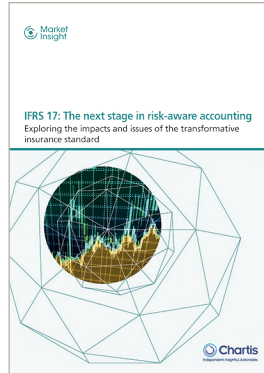
Regulatory impact analysis

The analysis and assessment of regulatory change and implementation is one of Chartis' core strengths. We can apply our insights to assess the impact of change on the market – both as it applies to vendors and the institutions they serve, or on a client's specific product and customer base. We can also provide insights to guide product strategy and associated go-to-market activities, which we can execute for internal use to drive our clients' strategy, or as a co-branded positioning paper to raise market awareness and 'noise' around a particular issue.
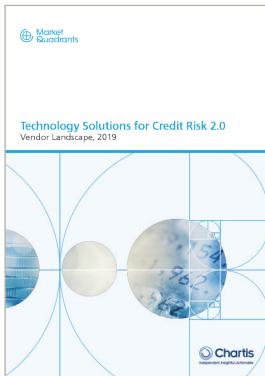
8. Further reading

Insurance Risk Systems for IFRS 17 and LDTI Compliance, 2020: Market Update and Vendor Landscape
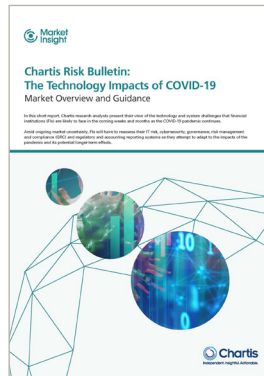

IFRS 17: The Next Stage in Risk-Aware Accounting

IFRS 17 Technology Solutions, 2019: Market and Vendor Landscape

Technology Solutions for Credit Risk 2.0: Vendor Landscape, 2019

Chartis Risk Bulletin: The Technology Impacts of COVID-19

RiskTech100® 2021

For all these reports, see **www.chartis-research.com**