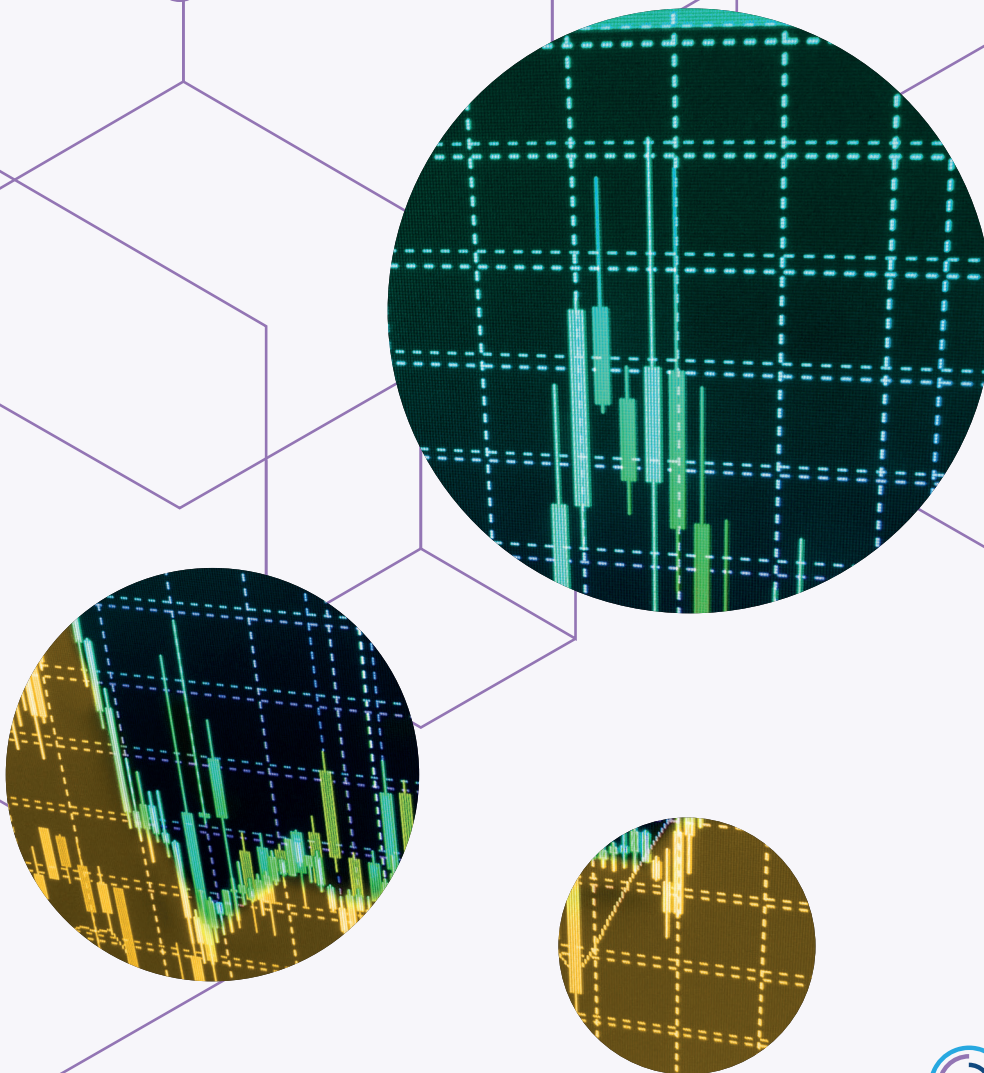


Vendor Analysis: Oracle Financial Services

Insurance Risk Systems for IFRS 17 and LDTI Compliance, 2020





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- Operational risk and governance, risk and compliance (GRC).
- Market risk.
- Asset and liability management (ALM) and liquidity risk.
- Energy and commodity trading risk.
- Financial crime including trader surveillance, anti-fraud and anti-money laundering.
- Cyber risk management.
- Insurance risk.
- Regulatory requirements including Basel 2 and 3, Dodd-Frank, MiFID II and Solvency II.

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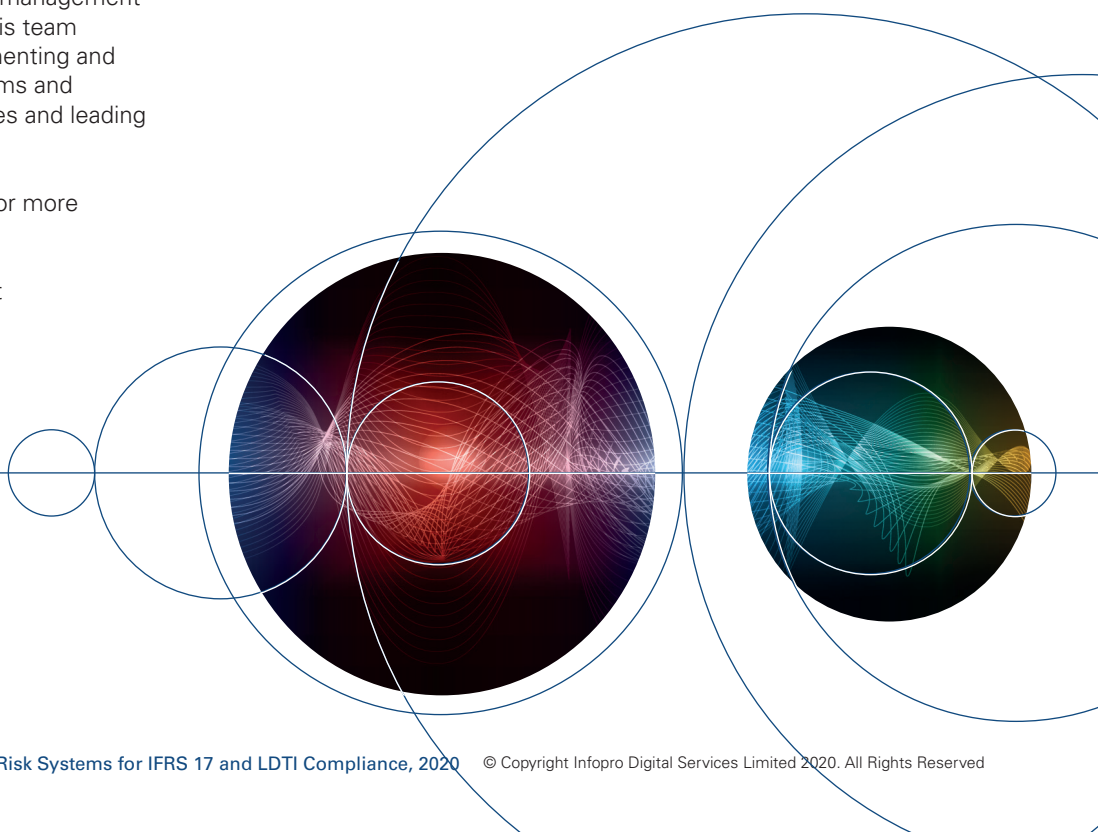


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1. Report context

This Vendor Analysis is based on the Chartis quadrant report *Insurance Risk Systems for IFRS 17 and LDTI Compliance, 2020: Market Update and Vendor Landscape* (published in June 2020). This section summarizes the key theses in that report; subsequent sections take a detailed look at Oracle's quadrant positioning and scoring, and Chartis' underlying opinion and analysis.

Key thesis

Introduction

In 2019 Chartis published a series of research reports on International Financial Reporting Standard (IFRS) 17 compliance². We focused on demand among insurers for IFRS 17 compliance solutions, and considered the technology overlaps between these systems and those for other accounting standards and solvency regimes. We see IFRS 17 as part of a wider regulatory project to integrate risk into accounting practices, in line with other areas of financial services and their accounting regimes (notably IFRS 9 and Current Expected Credit Losses [CECL]).

In our follow-up report³, we considered insurers' evolving technology requirements for compliance with IFRS 17 and its US counterpart LDTI⁴. Insurers' approach to compliance will be shaped largely by the type of product(s) they sell and their existing technology. In addition, since IFRS 17 is a global standard, there are significant regional dynamics at play, and the regulatory and reporting environment in which institutions⁵ operate will have a significant impact on their compliance strategies.

Context and trends: actuarial modeling and analytics

In analyzing the market for IFRS 17 and LDTI compliance solutions, we consider them in the broader context of current trends in actuarial modeling and analytics, and in the context of other

regulations, standards and directives. To mirror the diverse and component-based nature of firms' approaches to compliance, our view of the vendor market, and our quadrants, covers three core elements of the technology stack:

- Accounting systems.
- Data management and reporting solutions.
- Actuarial modeling systems.

Each quadrant provides our view of a distinct market landscape, and is accompanied by an examination of the relevant functionality.

Analyzing the impacts

Insurers' efforts to comply with IFRS 17 and LDTI will create varying effects and demands on the three different systems. Insurers under LDTI are likely to feel a greater strain on their existing actuarial systems, creating more demand for model recalibration, while much of the system strain for institutions under IFRS 17 will be in the areas of data management and reporting. Note that we consider accounting systems as they relate specifically to IFRS 17 and LDTI compliance⁶.

Crucially, we believe that there is a broad ongoing transformation in actuarial analytics across different business lines, with new quantitative techniques, greater convergence with modeling approaches from other areas of finance, and a tighter focus on stress testing and risk analysis. We also believe that there is considerable potential for change and modernization in actuarial modeling, including related aspects such as data management (through robotic process automation [RPA], artificial intelligence [AI] and natural language processing [NLP], for example) and governance.

Demand-side takeaways

Comparing IFRS 17 and LDTI

Both IFRS 17 and LDTI have been developed to support the outcome of market-consistent valuations of insurance contracts. While there are

¹ Note that the specific solution assessed for this quadrant is supplied by Oracle Financial Services.

² These were the market quadrant report 'IFRS 17 Technology Solutions: Market and Vendor Landscape 2019'; 'IFRS 17: The Next Stage in Risk-Aware Accounting' (which analyzed the vast and complex compliance requirements for IFRS 17); and 'Mapping Demand for IFRS 17 Solutions' (which analyzed the various dynamics and idiosyncratic approaches for IFRS 17 compliance).

³ 'Insurance Risk Systems for IFRS 17 and LDTI Compliance, 2020: Market Update and Vendor Landscape' (published in June 2020).

⁴ Generally Accepted Accounting Principles (GAAP) ASU 2018-12, Targeted Improvements to the Accounting for Long-Duration Contracts.

⁵ Note that IFRS 17 applies to all institutions that issue insurance contracts, while LDTI applies only to insurers.

⁶ For a more detailed view of the trend toward risk-aware accounting in the context of IFRS 9 and CECL compliance, see the featured article in our 'RiskTech100® 2020' report: 'Making Finance Risk-Aware: Setting the Standard?'

some key areas of overlap between the standards, they also have important differences in their measurement methods and scope.

US insurers are not required to adopt IFRS 17, but some are doing so to align themselves with other insurers in a globalized industry. In a climate of multi-entity reporting, some will have to rely on a flexible technology infrastructure to enable multi-GAAP reporting. And as IFRS 17 and LDTI are part of a wider group of accounting standards affecting insurers, results will have to be reconciled with IFRS 9 and CECL processes and reporting figures.

The impacts of IFRS 17 and LDTI

Overall, while the market for insurance risk-system technology is still developing, a few clear trends have started to emerge. Both standards will have significant impacts on insurers – on their operations, resource allocation, technology budgets and infrastructure, and possibly even their business models. In particular, the new rules mean that some products on an institution's balance sheet may now seem less attractive. Under IFRS 17, for example, deposit components and embedded derivative cash flows can no longer be classified as insurance revenue.

Operationally, firms will have to prepare for more collaboration between the actuarial and finance functions – particularly in the exchange of data. Although IFRS 17 and LDTI are accounting standards, a significant part of the compliance process will lie with a firm's actuarial function. Instead of allocating actuarial resources to the purchase of new models, firms may allocate them to other areas, notably recalibration, increased methodology reporting, adapting to the new frequency of assumption modeling, and setting new discount-rate methodologies.

Despite the transformation taking place in actuarial modeling, however, few insurers are overhauling their functionality to comply specifically with IFRS 17. There is still much work to be done on actuarial processes, especially for LDTI; however, these shifts are featuring less in the drive for compliance. This will be a process of improvement, evolution and development rather than system replacement.

Although IFRS 17 and LDTI have similar aims, the standards diverge thematically in a number of key areas (such as variable annuity recognition). They also apply pressure to different elements of insurance risk systems, and this will inform not only how solutions are tailored, but also the compliance approach an insurer takes. Compliance

processes for both standards have many moving parts; to reflect this, technology solutions are similarly componentized.

While both standards are designed largely to focus on market-adjusted liability measurement, they have direct and indirect consequences for a firm's asset management. Depending on the particular region in which insurers operate, any compliance strategy they adopt will have to align with IFRS 9 or CECL, and compliance may also trigger a review among insurers of asset management and hedging strategies.

Supply-side takeaways

While we have examined IFRS 17/LDTI and how they overlap, we appreciate that there are vast differences between the two that affect vendors' compliance solutions. In particular, we note that actuarial systems may differ significantly by region and reporting regime, and that the market for IFRS 17/LDTI solutions is very componentized, with a broad range of vendor strategies.

By taking this view we have contextualized the market for IFRS 17/LDTI solutions more generally as 'insurance risk systems'. Although comprehensive compliance solutions are available, many insurers also take a componentized approach. And because IFRS 17/LDTI functionality can be considered part of wider accounting risk-management projects, our assessment is split into three core segments: accounting systems, data management and reporting systems, and actuarial modeling systems.

Vendors employ a variety of strategies when providing compliance functionality. Some approaches include:

- Leveraging existing expertise in actuarial modeling and integrating IFRS 17/LDTI systems with existing actuarial platforms.
- Taking an accounting systems approach. These solutions focus on creating detailed and integrated sub-ledgers for IFRS 17 or LDTI. Vendors leverage their expertise in preconfigured rules; their offerings can often be implemented as multi-GAAP solutions. Some vendors provide largely pre-configured packaged solutions, while others provide extendable frameworks that can be configured and tailored to specific contexts during implementation.

- Extensive functionality in data integrity and control. These vendors have leveraged their expertise to create specific IFRS 17 and LDTI compliance solutions.

These market strategies are generally based on a 'bottom-up' approach to developing IFRS 17/LDTI compliance solutions from an existing foundation of expertise. In contrast, some vendors have taken a 'top-down' approach to developing IFRS 17 and LDTI solutions, creating discrete solutions that leverage expertise from other compliance areas (such as IFRS 9 and Solvency II). Some vendors provide different levels of offering, to accommodate the varying maturity of firms' technology stacks, and to enable different levels of functionality.

The IFRS 17 and LDTI vendor markets continue to evolve, and since our last industry report there has been significant development in response to industry feedback, with consolidation, changes of approach, and a focus on specialties. What is clear is that there are no overall winners. Different vendors have played to different strengths, and in an industry as diverse as insurance, and with standards as extensive as IFRS 17, there is no single optimal strategy for compliance.

2. Quadrant context

Introducing the Chartis RiskTech Quadrant®

This section of the report contains:

- The Chartis RiskTech Quadrants® for IFRS 17/LDTI accounting systems solutions & data management and reporting solutions.
- An examination of Oracle's positioning and its scores as part of Chartis' analysis.
- A consideration of how the quadrants reflect the broader vendor landscape.

Summary information

What does the Chartis quadrant show?

The RiskTech Quadrant® uses a comprehensive methodology that involves in-depth independent research and a clear scoring system to explain which technology solutions meet an organization's needs. The RiskTech Quadrant® does not simply describe one technology option as the best IFRS 17/LDTI compliance solution; rather it has a sophisticated ranking methodology to explain which solutions are best for specific buyers, depending on their implementation strategies.

The RiskTech Quadrant® is a proprietary methodology developed specifically for the risk technology marketplace. It takes into account vendors' product, technology and organizational capabilities. Section 4 of this report sets out the generic methodology and criteria used for the RiskTech Quadrant®.

How are quadrants used by technology buyers?

Chartis' RiskTech and FinTech quadrants provide a view of the vendor landscape in a specific area of risk, financial and/or regulatory technology. We monitor the market to identify the strengths and weaknesses of different solutions, and track the post-sales performance of companies selling and implementing these systems. Users and buyers can consult the quadrants as part of their wider research when considering the most appropriate solution for their needs.

Note, however, that Chartis Research does not endorse any vendor, product or service depicted in its research publications, and does not advise

technology users to select only those vendors with the highest ratings or other designation. Chartis Research's publications consist of the opinions of its research analysts and should not be construed as statements of fact.

How are quadrants used by technology vendors?

Technology vendors can use Chartis' quadrants to achieve several goals:

- Gain an independent analysis and view of the provider landscape in a specific area of risk, financial and/or regulatory technology.
- Assess their capabilities and market positioning against their competitors and other players in the space.
- Enhance their positioning with actual and potential clients, and develop their go-to-market strategies.

In addition, Chartis' Vendor Analysis reports, like this one, offer detailed insight into specific vendors and their capabilities, with further analysis of their quadrant positioning and scoring.

Chartis Research RiskTech Quadrants® for IFRS 17/LDTI compliance – accounting systems & data management and reporting solutions, 2020

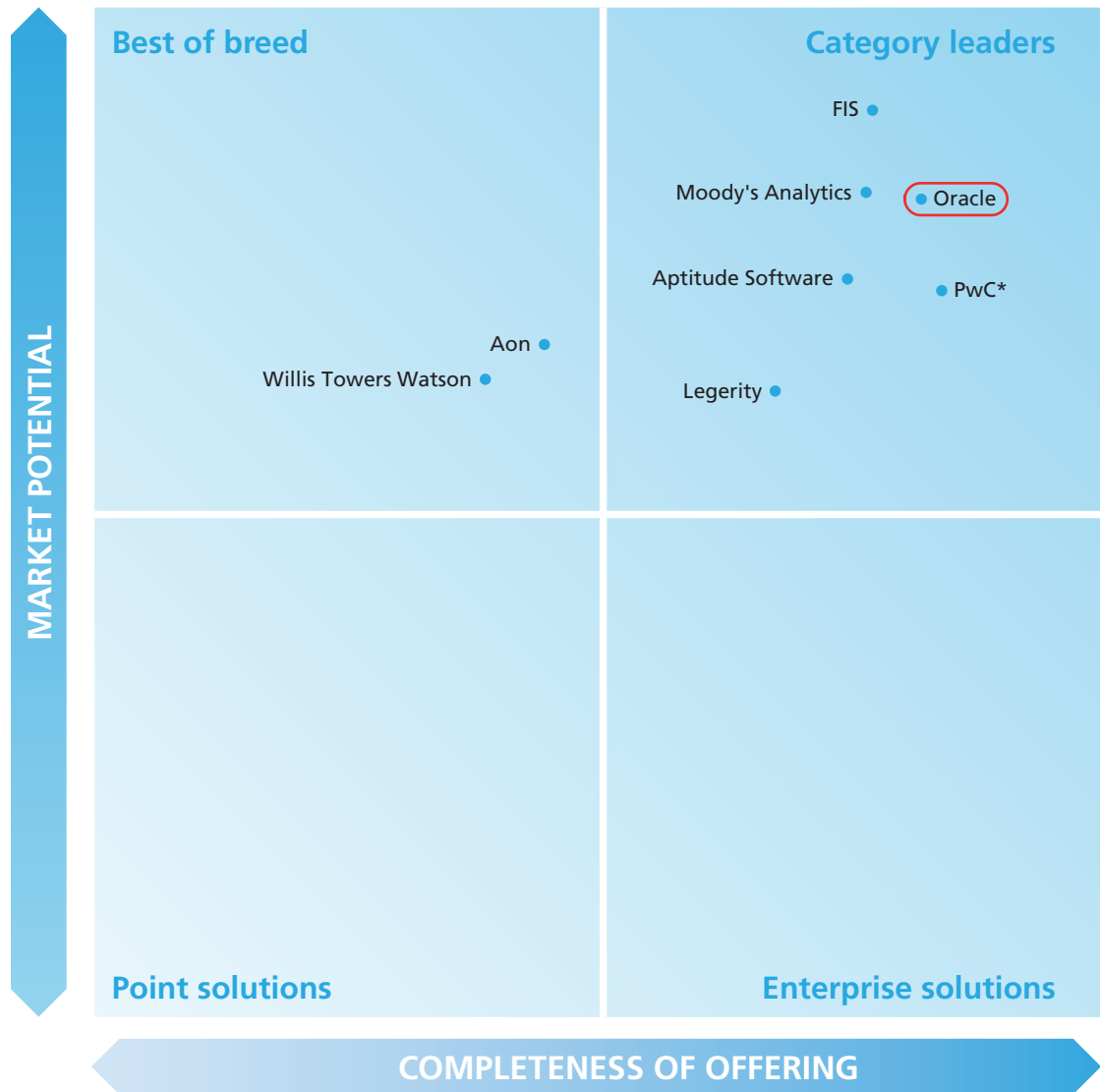
Figure 1 illustrates Chartis' view of the vendor landscape for IFRS 17/LDTI compliance – accounting systems solutions, highlighting Oracle's position. Figure 2 illustrates Chartis' view of the vendor landscape for IFRS 17/LDTI compliance – data management and reporting solutions, highlighting Oracle's position.

Quadrant dynamics

General quadrant takeaways

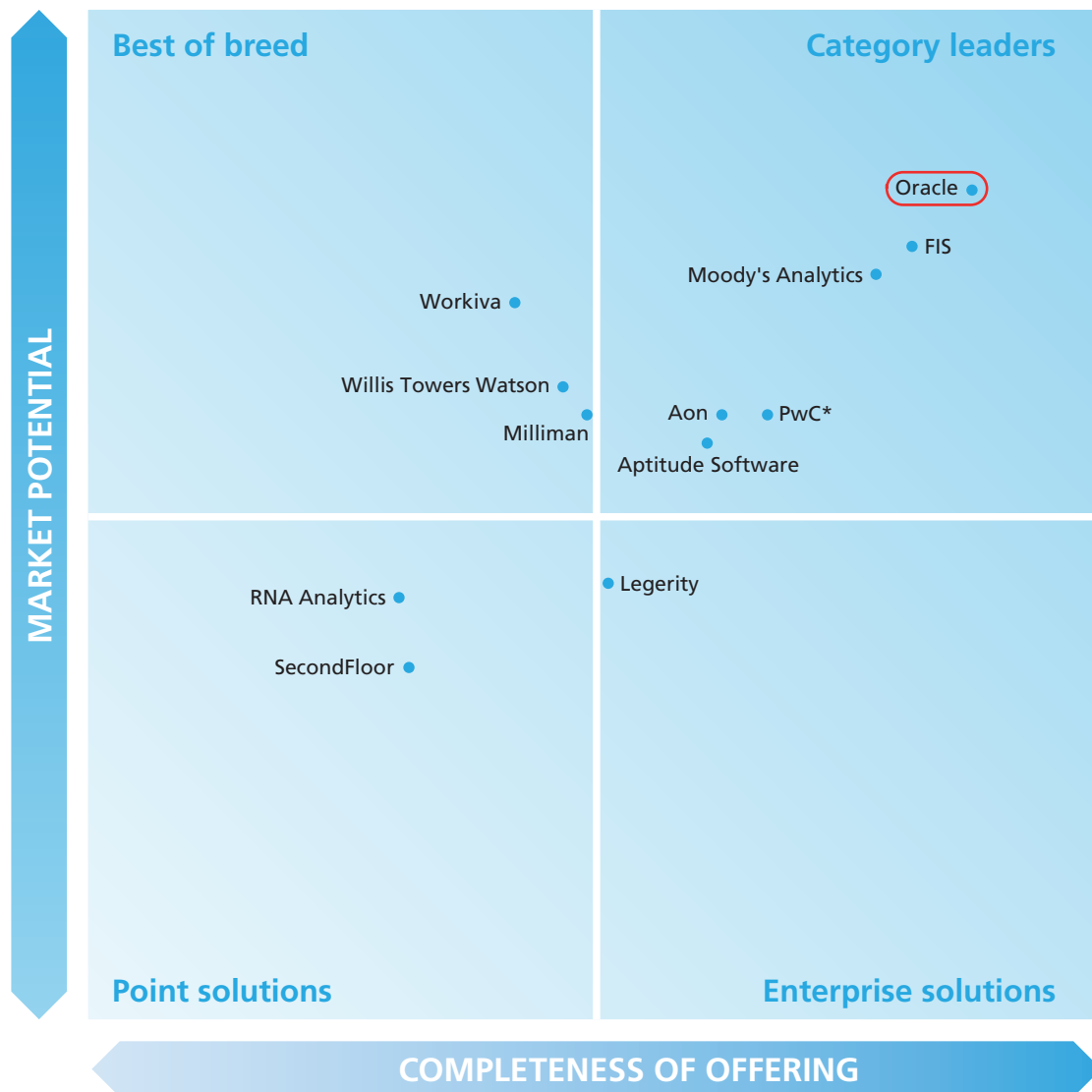
Vendors that provide technology solutions for IFRS 17/LDTI compliance generally approach the market from a position of distinct expertise. Financial firms are adopting diverse and component-based approaches to compliance, and the vendor landscape reflects this, with many vendors approaching it from distinct areas of historical strength.

Figure 1: RiskTech Quadrant® for IFRS 17/LDTI compliance – accounting systems solutions, 2020



* PwC's specific solution is 'PwC's IFRS 17 In A Box'
Source: Chartis Research

Figure 2: RiskTech Quadrant® for IFRS 17/LDTI compliance – data management and reporting solutions, 2020



* PwC's specific solution is 'PwC's IFRS 17 In A Box'
Source: Chartis Research

Oracle is a category leader in two quadrants: accounting systems solutions and data management and reporting solutions. The distribution of vendors in the accounting systems solutions quadrant – either category leaders or best-of-breed – reflects the relative maturity of providers in this space. The market is a mix of accounting-focused solutions, and offerings from vendors that come from a tradition of actuarial modeling for insurance. The relative sparsity of the quadrant, with only a few key players, also emphasizes the lack of point and enterprise solutions in this space.

By comparison, the data management and reporting quadrant contains significantly more vendors, with a wider distribution across the landscape. This market is well-established, but it is still undergoing substantial shifts as vendors adapt their offerings in response to market feedback. Generally, accounting-focused vendors have more complete offerings that tend to display relatively stronger functionality in this area.

Vendor positioning in context – completeness of offering (accounting systems solutions)

Oracle, a category leader, scored well in both the completeness of offering and market potential categories, with a compliance solution based on its integrated risk and finance architecture. The vendor's considerable experience and expertise in providing general ledger functionality as an accounting infrastructure correlates with its high score for general ledger integration. Its solution can export journal entries into any general ledger, and reconciles the sub-ledger outputs. The solution also scored well for its custom-built integrated sub-ledger, which records the detailed results of IFRS 17/LDTI liability measurements. These are then mapped using pre-configured compliance-accounting event information. The sub-ledger gives users drill-down capabilities, enabling them to view the detailed and complex accounting information created by IFRS 17/LDTI calculations.

Oracle also scored well for its multi-standard support, the result of its structural approach to developing an IFRS 17 solution. The company has used data from Oracle Financials to create a common data system that integrates with different solutions designed to ensure accounting-standard compliance. These solutions not only include IFRS 17/LDTI, which focus on the liability side, but also IFRS 9/CECL, which largely cover the asset side of the balance sheet.

Table 1 shows Chartis' rankings for Oracle's coverage against each of the relevant completeness of offering criteria.

Table 1: Completeness of offering – Oracle (accounting system solutions, 2020)

Completeness of offering criterion	Coverage
General ledger integration	High
Sub-ledger	High
Multi-standard support	High
Insurance contract qualification	Medium
Accounting recognition	High
IFRS 17	High
LDTI	Medium

Source: Chartis Research

Vendor positioning in context – completeness of offering (data management and reporting solutions)

Data management is at the core of IFRS 17 compliance and, to a lesser extent, LDTI. The heterogeneous data model that supports Oracle Financial Services' IFRS 17/LDTI solution provides a firm foundation for the vendor's category leader position. Oracle scored well for its data model, which supports different types of data in various formats. A key challenge of IFRS 17 compliance is extracting and reconciling actuarial, financial and market data from internal and external sources. Oracle's solution processes cover interest rate/yield-curve data, cash flows, policy and administrative data, dimensional data and actuarial data. The vendor's data integration capabilities support diverse data types, and the solution enables users to preserve granular accounting data, and group granular financial data into the necessary cohort aggregations.

The solution's integration and staging layer includes data quality assurance and validation, adjustment and reconciliation, and metadata management. As this is a compliance solution, data integrity is crucial, and Oracle's offering maintains multiple assumption sets, including discount-rate curves. The solution also provides a

'single version of the truth', by providing a central unified data model.

Oracle's solution supports various requirements across the entire IFRS 17 reporting cycle, including attribution reporting. It also includes aggregation functionality, so users can analyze IFRS 17 outputs at customized levels. They can then gain a comprehensive forward-looking view of their P&L.

Table 2 shows Chartis' rankings for Oracle's coverage against each of the relevant completeness of offering criteria.

Vendor positioning in context – market potential

Since our previous IFRS 17 industry report, Oracle Financial Services has made major developments to its IFRS 17 strategy and solution. By leveraging its position as a large provider of general ledger and financials solutions, it has developed a focused IFRS 17 compliance solution that has continued to gain customers in several regions. Oracle's strong market potential score reflects the strength of its business model and deep market penetration. By approaching IFRS 17/LDTI as part of a wider compliance and balance-sheet modernization project, the vendor has created a competitive solution that integrates well with its other offerings.

Tables 3 and 4 show Chartis' rankings for Oracle's coverage against each of the relevant market potential criteria.

Table 2: Completeness of offering – Oracle (data management and reporting solutions, 2020)

Completeness of offering criterion	Coverage
Data integration	Medium
Data model	High
Data lineage and tagging	High
Reporting and visualization	Medium
Data storage	High
IFRS 17	High
LDTI	Medium

Source: Chartis Research

Table 3: Market potential – Oracle (accounting systems, 2020)

Market potential criterion	Coverage
Customer satisfaction	Medium
Market penetration	High
Growth strategy	High
Financials	High
Business model	High

Source: Chartis Research

Table 4: Market potential – Oracle (data management and reporting solutions, 2020)

Market potential criterion	Coverage
Customer satisfaction	High
Market penetration	High
Growth strategy	High
Financials	High
Business model	High

Source: Chartis Research

3. Vendor context

Overview of relevant solutions/capabilities

Table 5 gives an overview of Oracle/Oracle Financial Services and its IFRS 17/LDTI compliance solutions.

Oracle Financial Services' IFRS 17 and LDTI Analyzer solutions deliver out-of-the-box calculations and analytical capabilities that comply with the new accounting requirements and interpretations, and which are designed to address subsequent updates from the International Accounting Standards Board (IASB), Financial Accounting Standards Board (FASB) and local supervisors. Its cloud-enabled, scalable, modular technology is designed to address users' demanding requirements around data volume and performance. It can also integrate with insurers' existing systems to help boost return on investment in existing actuarial models, accounting systems and processes, unified by a robust data model.

Key capabilities

Insurance data model

The solution can consolidate data from various source systems (including customer relationship management [CRM], policy administration, claims management, actuarial systems, market data

providers, and enterprise data) and standardize it for CSM and liability measurement. The model can also be extended for the sourcing and provisioning of insurance-related risk, finance and actuarial data. It can be applied to business use cases including policy, claims, transactions, reinsurance, own funds, Solvency II, assets/liabilities, products, actuarial, market data, cash flows, and reporting.

Data quality and reconciliation

Input data can be validated through pre-configured, business-contextualized data quality checks and a reconciliation framework. This can help users ensure that balances between transaction and analytical systems match before data is utilized for computing and reporting.

Portfolio aggregation

Contracts can be aggregated into portfolio(s) based on multiple dimensions, including product, geography, currency, origination date, policy term and coverage type. Users can build cohorts to determine manageable IFRS 17 groups for risk-adjustment allocations, fulfilment cash flows and onerous identification.

Yield curve adjustment (IFRS 17)

Users can upload rate curves and define lock-in rates for financial assumptions and interest accretion. Rates can be adjusted based on bottom-up and top-down approaches for the analysis of insurance contracts, and can be derived from market data on similar instruments.

Table 5: Oracle – company information

Company	Oracle Corporation
Headquarters	Redwood City, CA, US
Description	Oracle Corporation is a US multinational computer technology firm that develops and provides database software and technology, cloud-engineered systems, and enterprise software products – particularly its own brands of database management systems – for a wide variety of industries worldwide.
Solution	Oracle Financial Services provides a comprehensive solution to address the financial accounting requirements of IFRS 17 and LDTI, enabling users to measure and report liabilities and unearned profit as per the new standards. Built on Oracle's integrated risk and finance architecture, its IFRS 17 and LDTI solutions deliver out-of-the-box capabilities for data aggregation and contractual service margin (CSM) calculations, while integrating with finance and actuarial applications to enable accounting, performance management, risk management and reporting from one single platform.

Source: Oracle

Contractual service margin and liability measurement

Users can leverage pre-configured business rules for the general measurement model (GMM), premium allocation approach (PAA), variable fee approach (VFA) and reinsurance calculations. The measurement techniques and associated variables can be easily modified for changes in rules or methodology, and can be defined as per the granularity of data from source systems. Portfolios can be mapped to and analyzed by one or more measurement techniques for comparative and 'what-if' analysis.

Movement analysis and liability reconciliation

Users can analyze changes in fulfilment cash flows and policy experience (related to current and future service), expenses, claims and premiums into CSM or liability, by reporting period and contract groups. They can also reconcile liability for incurred claims and liability for remaining coverage (including loss components), and analyze the impact on service results and finance P&L to provide complete insight into revenue. New reports and dashboards can also be built for analysis and financial or management reporting.

Measure liability for future policy benefits

The liability for changes to future policy benefits can be determined by reporting period and contract groups, by leveraging the modified net premium ratio. Users can also accommodate the disaggregated roll-forward of cash-flow liabilities, and can use current best estimates without diverse deviation provisions for cash-flow assumptions that are leveraged for expected policy benefits and gross premiums. They can also enable accounting changes for the split between P&L and other comprehensive income (OCI), for changes in the liability due to modifications in financial assumptions. The impact on insurance service results and insurance finance P&L can be analyzed to provide insight into insurance revenue. Finally, users can easily build new reports and dashboards for analysis and financial or management reporting.

Deferred acquisition costs (LDTI)

Users can amortize deferred acquisition costs (DAC) on a constant-level basis for contracts over the term(s) of the expected policy period(s). These costs include unearned revenue liabilities and deferred sales inducement costs. Users can also enable other amortization methods, such as using the face value of underlying contracts and

taking the persistency of risk into consideration, as well as the roll-forward of DAC. They can also ensure that the amortization is consistent with the assumptions used to measure the liability for future policyholder benefits.

Market risk benefits (LDTI)

The system can enable measurements at fair value for contracts that expose insurers but not the insured, for other-than-nominal capital market risk without protection. Users can recognize changes in fair value in income, or in OCI if the change was the result of the entity's own credit risk. The system can also derecognize the market risk benefit (MRB) at the time of annuitization, or when the policy account balance is withdrawn or extinguished. It will also show the MRB liability on the balance sheet, as well as changes to MRB amounts in the income statement.

Accounting enablement

Users can enable downstream accounting by defining consistent posting rules, events and charts of accounts for revenue and P&L. The system will maintain IFRS 17 and LDTI sub-ledgers for reconciliation and transition, and achieve compliant and auditable accounting, reporting and consolidation. Users can gain visibility into the journal entries resulting from the accounting process, reconcile to source, and then carry out any exceptions that require action before they are exported to any general ledger system of record (Oracle or non-Oracle). They can also gain further insight by using business dimensions and transaction attributes that are outside the chart of accounts to build reports and analysis.

Workflow and controls

The system can support the visual orchestration of workflows to view and control processes, input/outputs, mappings and calculation logic.

Extensibility to IFRS 9

This enables the use of Oracle Financial Services' integrated analytical applications infrastructure for IFRS 9 impairment, on the same platform, and without the need to build integrations between various point solutions. Data, results and analytical capabilities are shared across applications, enabling users to scale up the same platform for other business use cases, while reducing incremental effort.

Table 6: Oracle Financial Services' IFRS 17 and LDTI Analyzer – calculation engine

Calculate key metrics	Pre-built calculation templates	Workflows	Analytics and reporting
<ul style="list-style-type: none"> Contractual service margin (and its projection) Insurance revenue Insurance service result Insurance finance expense Other comprehensive income (due to change in financial risk) 	<ul style="list-style-type: none"> General measurement model (GMM) Variable fee approach (VFA) Premium allocation approach (PAA) liability measurement methods 	<ul style="list-style-type: none"> Calculation template definition Calculation-run Accounting rule definition Generation of accounting entries Manual adjustment for accounting posting, etc. 	<ul style="list-style-type: none"> Management reporting of CSM projection trends Summary of profitable vs. onerous contracts in a portfolio Comparative analysis of CSM and insurance liabilities

Source: Oracle

Cloud deployment

Users can explore multiple deployment options, ranging from on-premise, Cloud@Customer and private and public cloud.

Vendor leading practices

The Oracle Financial Services IFRS 17 Analyzer solution is designed to take data from a staging area common across all Oracle applications and enable its reuse for deeper analytical insight. Clients gain a proven framework for the ingestion of data from source systems, as well as a portfolio setup with business rules and disaggregation into groups, and sub-ledger accounting to ensure ongoing effectiveness.

Calculation engine

The solution can either consume the present value of future cash flows directly, or it can consume the estimated future cash flows. These are then used to compute insurance liabilities disaggregated into the required components, and then to discount them to the present value.

Users can configure business rules for portfolio set-up, and disaggregate the portfolio into groups and cohorts. They can also enable disclosure reporting of liability analysis for all the three measurement methods (see Table 6 and Figure 3).

Key features

Portfolio Set-up

Users can identify and group insurance contracts that share similar risk profiles. Contracts can be grouped within a legal entity and line of business, based on other parameters such as geography, year of inception, and data (see Figure 4). Users can:

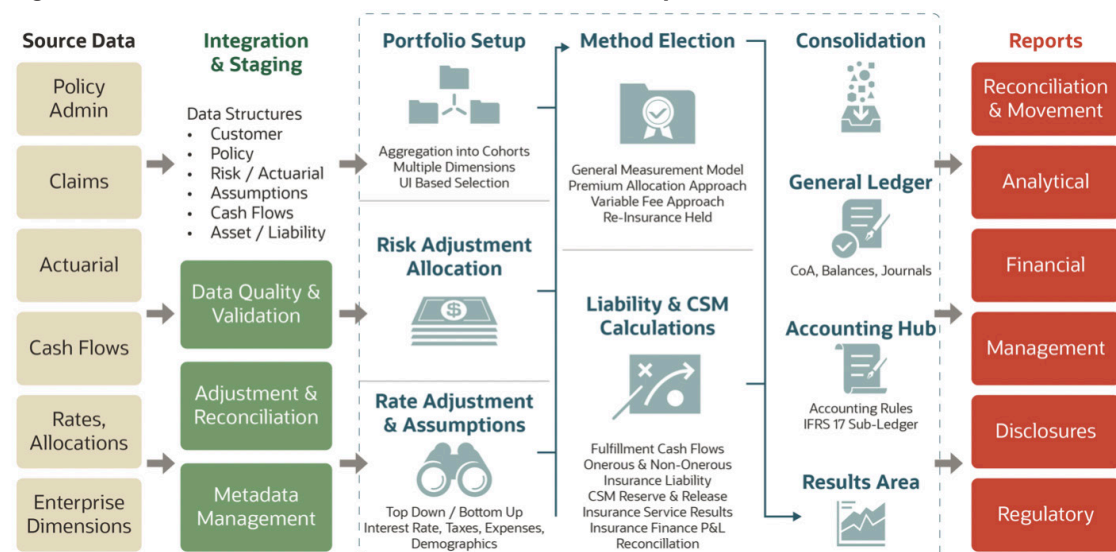
- Group contracts at initial recognition based on expected profitability and year of inception.
- Store the dimensional data for cohorts even when such cohorts are created in another application.
- Execute and report results at different granularities for analytics and management reporting purposes.

Risk adjustment and cost allocation

The system can allocate different estimates, including risk adjustments, to enable allocation to the level at which the IFRS 17 calculations will be executed. Users can:

- Allocate estimates calculated at a higher granularity.
- Employ user-defined rules for allocation, to bring transparency and auditability.

Figure 3: Oracle Financial Services' IFRS 17 and LDTI Analyzer – workflow



Source: Oracle

Figure 4: Oracle Financial Services' IFRS 17 and LDTI Analyzer – portfolio set-up

Aggregation Level

Name *
HealthCareLoa

Description
Health care policies

Folder *
IIA80SEG

Legal Entity *
Healthcare Ltd

Line of Business *
Health Insurance

Code *
96002

Portfolio Dimensions

Geography
☒ AUTOD_LOC

Currency *
☒ US Dollar

Policy Term
☒ POLICY_TERM2
☒ POLICY_TERM3

Reinsurance Held
☒

Product *
☒ Level Term Life Insurance

Coverage Type
☒ Accidental Coverage

Cohort Period *
☒ Annually

Audit Trail

Source: Oracle

- Define the risk adjustment as some variable proportion of other estimates of best estimate liability (BEL).

Rate adjustment and assumptions

Users can easily maintain the transparency of assumption sets as an input. The system features a user-friendly interface to access assumption sets, while ensuring the traceability of changing assumptions over different time periods (see Figure 5). Users can:

- Build rate curves using different methodologies.

- Use rate curves as an input for discounting and interest accretion.
- Maintain different assumption sets with complete auditability and traceability, for tracking changes in liability estimates over different reporting periods.

Method election

Multiple calculation templates can be created for specific business needs. Disaggregated roll-forward liability estimates can be configured based

Figure 5: Oracle Financial Services' Insurance Accounting Analyzer

Source: Oracle

on IFRS 17 and LDTI, targeting diverse insurance products (see Figure 6). Users can:

- Access all three IFRS 17 approaches; GMM, VFA and PAA methods; and LDTI computes under US GAAP.
- Conduct parallel runs for direct insurance and reinsurance-held computations, and check for inter-relation computation based on the onerousness of the underlying contracts.
- Test the same set of cohorts/portfolios using different runs, for the purposes of analysis.

Liability and CSM calculations

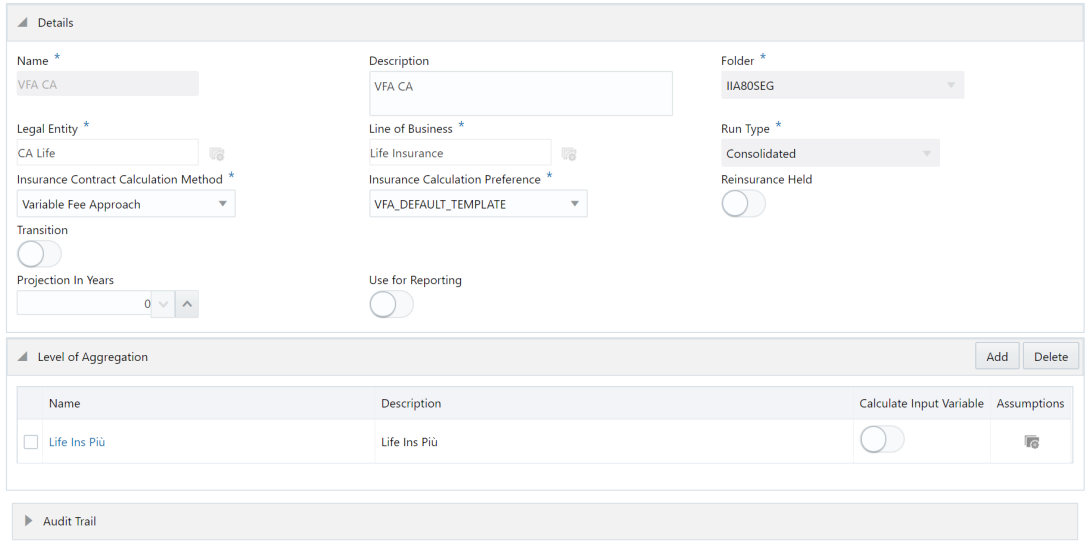
Users can calculate the net liability of each contract by using the present value of the cash flows, risk adjustments, and assumptions. They can also set up the level of aggregations, assumptions, and the method considered for liability calculations (see Figure 7). They can:

- Use pre-configured calculation logics for different methods, with the possibility of modifying the default logics to accommodate amendments and business-specific use cases.


Figure 6: Oracle Financial Services' IFRS 17 and LDTI Analyzer – method election

Source: Oracle

Figure 7: Oracle Financial Services' IFRS 17 and LDTI Analyzer – liability and CSM calculations



The screenshot shows the 'Details' section of the Oracle Financial Services' IFRS 17 and LDTI Analyzer. It includes fields for Name (VFA CA), Description (VFA CA), Folder (IIA80SEG), Legal Entity (CA Life), Line of Business (Life Insurance), Run Type (Consolidated), Insurance Contract Calculation Method (Variable Fee Approach), Insurance Calculation Preference (VFA_DEFAULT_TEMPLATE), Reinsurance Held (toggle), Transition (toggle), Projection In Years (0), and Use for Reporting (toggle). Below this is the 'Level of Aggregation' section with a table showing 'Life Ins Più' and its associated 'Calculate Input Variable' and 'Assumptions'.

Name	Description	Calculate Input Variable	Assumptions
<input type="checkbox"/> Life Ins Più	Life Ins Più	<input type="checkbox"/>	

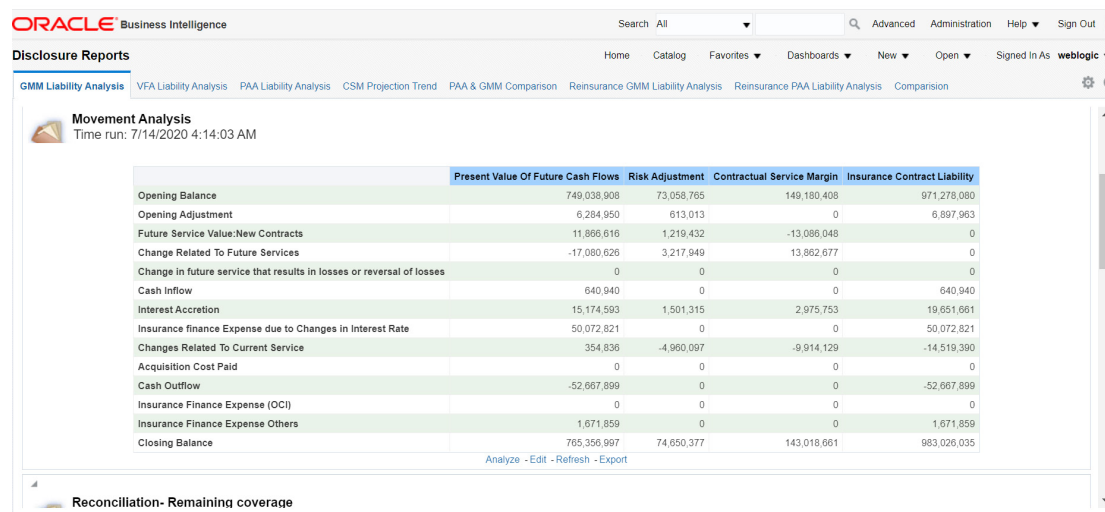
Source: Oracle

- Use prebuilt logics for disaggregated roll-forwards of liability estimates, including change in financial and non-financial assumptions.
- Compare results produced by different assumptions, and perform projections using scenario analysis.
- Use pre-built disclosure reports as required by the standard.
- Employ a drill-down capability to analyze disclosures further at a lower granularity.
- Perform attribution analysis using the diverse results stored.

Results area

Stores the calculated results of IFRS 17 and LDTI runs, and maintains data relations between contracts and user-defined cohorts, along with

Figure 8: Oracle Financial Services' IFRS 17 and LDTI Analyzer – disclosure reports (movement analysis)



The screenshot shows the 'Disclosure Reports' section of the Oracle Financial Services' IFRS 17 and LDTI Analyzer. It includes a 'Movement Analysis' table with columns for Opening Balance, Opening Adjustment, Future Service Value: New Contracts, Change Related To Future Services, Change in future service that results in losses or reversal of losses, Cash Inflow, Interest Accretion, Insurance finance Expense due to Changes in Interest Rate, Changes Related To Current Service, Acquisition Cost Paid, Cash Outflow, Insurance Finance Expense (OCI), Insurance Finance Expense Others, and Closing Balance. The table also includes columns for Present Value Of Future Cash Flows, Risk Adjustment, Contractual Service Margin, and Insurance Contract Liability.

	Present Value Of Future Cash Flows	Risk Adjustment	Contractual Service Margin	Insurance Contract Liability
Opening Balance	749,038,908	73,058,765	149,180,408	971,278,080
Opening Adjustment	6,284,950	613,013	0	6,897,963
Future Service Value: New Contracts	11,866,616	1,219,432	-13,086,048	0
Change Related To Future Services	-17,080,626	3,217,949	13,862,677	0
Change in future service that results in losses or reversal of losses	0	0	0	0
Cash Inflow	640,940	0	0	640,940
Interest Accretion	15,174,593	1,501,315	2,975,753	19,651,661
Insurance finance Expense due to Changes in Interest Rate	50,072,821	0	0	50,072,821
Changes Related To Current Service	354,836	-4,960,097	-9,914,129	-14,519,390
Acquisition Cost Paid	0	0	0	0
Cash Outflow	-52,667,899	0	0	-52,667,899
Insurance Finance Expense (OCI)	0	0	0	0
Insurance Finance Expense Others	1,671,859	0	0	1,671,859
Closing Balance	765,356,997	74,650,377	143,018,661	983,026,035

Source: Oracle

Figure 9: Oracle Financial Services' IFRS 17 and LDTI Analyzer – disclosure reports (reconciliation)

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Disclosure Reports

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GMM Liability Analysis VFA Liability Analysis PAA Liability Analysis CSM Projection Trend PAA & GMM Comparison Reinsurance GMM Liability Analysis Reinsurance PAA Liability Analysis Comparison

Reconciliation- Remaining coverage
Time run: 7/14/2020 4:14:03 AM

	Liability For Remaining Coverage	Loss Component Of The Liability For Remaining Coverage	Insurance Contract Liability
Opening Balance	971,278,080	0	971,278,080
Opening Adjustment	6,897,963	0	6,897,963
Cash Inflow	640,940	0	640,940
Insurance Revenue	-67,187,289	0	-67,187,289
Insurance Acquisition Cashflow	0	0	0
Insurance Service Expenses: Loss On New Contract	0	0	0
Insurance Service Expenses: Loss On Ongoing Contract	0	0	0
Insurance Service Expenses: Incurred Expenses	0	0	0
Insurance Service Expenses: Reversal Of Loss On Onerous Contract	0	0	0
Investment Component	0	0	0
Insurance Finance Expense (OCI)	0	0	0
Insurance Finance Expense	71,396,341	0	71,396,341
Cash Outflows	0	0	0
Closing Balance	983,026,035	0	983,026,035

Analyze - Edit - Refresh - Export

Source: Oracle

Sub-ledger

This is designed to take the stress off general ledgers. Users can generate standard accounting events and bookings specifically designed for IFRS 17 and LDTI, with reports that feed out to general ledgers, management reporting and analysis tools (see Figure 10). Users can:

- Maintain detailed data for accuracy and suitability.
- Use pre-configured accounting events that are available based on the diverse results generated from the analyzer.

- Use a productized connector for the Oracle Accounting Hub.

General ledger

Users can ensure that flow is seamless between the results generated from the IFRS 17 sub-ledger and the general ledger, whether they are using an Oracle GL or another GL. They can:

- Realize the impact on their balance sheet and income statement with pre-configured integration between Oracle Financial Services' IFRS 17 Analyzer solution and Oracle GL.
- Aggregate journal entries, amendments, provisions, run revaluations, and intercompany

Figure 10: Oracle Financial Services' IFRS 17 and LDTI Analyzer – sub-ledger

Subledger Process

Definition Details Accounting Rules Aggregation Logic

Accounting Rules

Copy Accounting Rules

Search:

	Accounting Attributes	Debit Account	Debit Source Column	Credit Account	Credit Source Column
1	First Premium Receipt	Cash	Cash Inflow At inception	Premium Received	Cash Inflow
2	Subsequent other premiums related amortisable expenses (actual) during Reporting Period	Deferred Acquisition Cost	Formula of subsequent other premiums related amortisable expenses (actual) during reporting period	Cash	Formula of : related amc during repo
3	Insurance Revenue Recognition - Claims Unwind - Insurance Component	Insurance Contract Liabilities - PV of Outflow - Insurance Component	Assumed Claims Expenses In Reporting Period	Insurance Service Revenue - Insurance Component release	Assumed CI Period
4	Insurance Revenue Recognition - CoG Unwind	Insurance Contract Liabilities - PV of Outflow - CoG	Assumed Cost of Guarantee And Option In Report Period	Insurance Service Revenue - CoG release	Assumed Co In Report Pe
5	Insurance Revenue Recognition - Expenses	Insurance Contract Liabilities - PV of Outflow - Expenses	Assumed Insurance Expenses For Reporting Period	Insurance Service Revenue - Expense Release	Assumed In Reporting P
6	Insurance Revenue Recognition - Withdrawals	Insurance Contract Liabilities - PV of Outflow - Withdrawals	Assumed Insurance Expenses For Reporting Period	Withdrawals Payable (Expected)	Liability For Insurance S Component

Source: Oracle

eliminations to generate P&L, balance sheets, and other aggregate financial statements.

- Employ an open architecture to extract results that can then flow seamlessly into a third-party GL.

- **Risk-focused.** A key focus is to attack and reduce the most significant project risks. This can help project teams address the most critical risks as early as possible in the project lifecycle.

Consolidation

Users can conduct a faster close and consolidation process, ensuring an efficient and accurate close. They can:

- Ensure auditability and traceability in the financial close and consolidation process, ensuring full visibility to the underlying logic.
- Employ a control framework to ensure that approvals and controls for any financial adjustments are done in an automated way.
- Use a comprehensive reporting process that includes electronic submission and disclosure methodologies.

An effective implementation framework

Implementing IFRS 17 and LDTI is a complex affair, as it needs to be coordinated across the actuarial, risk, finance, IT and business functions. It requires subject-matter expertise in each of these areas, as well as experienced input from technical architects, product experts and engagement managers. Oracle Financial Services has an effective agile approach for IFRS 17 and LDTI implementation that includes guidance on knowledge transition, and which holds the following principles.

- **Iterative and incremental.** There are advantages in an iterative and incremental approach to developing and deploying information systems.
- **Business-process and use-case-driven.** Business processes and use cases are used as the primary artefacts, if applicable.
- **Architecture-centric.** The system is architected as a 'living environment' that is equipped to accommodate changes at multiple levels.
- **Flexible and scalable.** This principle is extended to refer to the execution of the method processes themselves. Project managers and practitioners are encouraged to scale method processes to be fit for purpose for a given situation.

4. Methodology

Overview

Chartis is a research and advisory firm that provides technology and business advice to the global financial services industry. Chartis provides independent market intelligence regarding market dynamics, regulatory trends, technology trends, best practices, competitive landscapes, market sizes, expenditure priorities, and mergers and acquisitions. Chartis' RiskTech and FinTech Quadrants™ reports are written by experienced analysts with hands-on experience of selecting, developing and implementing financial technology solutions for a variety of international companies in a range of industries including banking, insurance and capital markets. The findings and analyses in our quadrant reports reflect our analysts' considered opinions, along with research into market trends, participants, expenditure patterns, and best practices.

Chartis seeks to include RiskTech and FinTech vendors that have a significant presence in a given target market. The significance may be due to market penetration (e.g., a large client base) or innovative solutions. Chartis uses detailed 'vendor evaluation forms' and briefing sessions to collect information about each vendor. If a vendor chooses not to respond to a Chartis request for information, Chartis may still include the vendor in the report. Should this happen, Chartis will base its opinion on direct data collated from technology buyers and users, and from publicly available sources.

Chartis' research clients include leading financial services firms and Fortune 500 companies, leading consulting firms and financial technology vendors. The vendors evaluated in our quadrant reports can be Chartis clients or firms with whom Chartis has no relationship.

Chartis evaluates all vendors using consistent and objective criteria, regardless of whether or not they are Chartis clients. Chartis does not give preference to its own clients and does not request compensation for inclusion in a quadrant report, nor can vendors influence Chartis' opinion.

Selection criteria

Due to the componentized nature of vendors' compliance technology solutions, we have scored

their capabilities in accounting systems and data management and reporting for both IFRS 17 and LDTI functionality. We have included separate specific scores for IFRS 17 and LDTI application and component capabilities to reflect differences in the coverage of compliance areas.

We have named the actuarial modeling quadrant in line with standard industry terminology. However, note that the quadrant covers broader functionality than that associated with traditional 'actuarial' modeling, and it includes an expansive view of modeling and analytics frameworks. The vendor capabilities for actuarial modeling do not include IFRS 17 and LDTI application-specific scores, although they do include a 'breadth of coverage' score that covers regional strengths.

Briefing process

We conducted face-to-face and/or web-based briefings with each vendor⁷. During these sessions, Chartis experts asked in-depth, challenging questions to establish the real strengths and weaknesses of each vendor. Vendors provided Chartis with:

- A business update – an overview of solution sales and client satisfaction.
- A product update – an overview of relevant solutions and R&D roadmaps.
- A product demonstration – key differentiators of their solutions relative to those of their competitors.

In addition to briefings, Chartis used other third-party sources of data, such as conferences, academic and regulatory studies, and publically available information.

Evaluation criteria

We develop specific evaluation criteria for each piece of quadrant research from a broad range of overarching criteria, outlined below. By using domain-specific criteria relevant to each individual risk, we can ensure transparency in our methodology, and allow readers to fully appreciate the rationale for our analysis.

⁷ Note that vendors do not always respond to requests for briefings; they may also choose not to participate in the briefings for a particular report.

Completeness of offering

- **Depth of functionality.** The level of sophistication and amount of detailed features in the software product (e.g., advanced risk models, detailed and flexible workflow, domain-specific content). Aspects assessed include: innovative functionality, practical relevance of features, user-friendliness, flexibility, and embedded intellectual property. High scores are given to those firms that achieve an appropriate balance between sophistication and user-friendliness. In addition, functionality linking risk to performance is given a positive score.
- **Breadth of functionality.** The spectrum of requirements covered as part of an enterprise risk management system. This will vary for each subject area, but special attention will be given to functionality covering regulatory requirements, multiple risk classes, multiple asset classes, multiple business lines, and multiple user types (e.g. risk analyst, business manager, CRO, CFO, Compliance Officer). Functionality within risk management systems and integration between front-office (customer-facing) and middle/back office (compliance, supervisory and governance) risk management systems are also considered.
- **Data management and technology infrastructure.** The ability of risk management systems to interact with other systems and handle large volumes of data is considered to be very important. Data quality is often cited as a critical success factor and ease of data access, data integration, data storage, and data movement capabilities are all important factors. Particular attention is given to the use of modern data management technologies, architectures and delivery methods relevant to risk management (e.g., in-memory databases, complex event processing, component-based architectures, cloud technology, and Software as a Service). Performance, scalability, security and data governance are also important factors.
- **Risk analytics.** The computational power of the core system, the ability to analyze large amounts of complex data in a timely manner (where relevant in real time), and the ability to improve analytical performance are all important factors. Particular attention is given to the difference between 'risk' analytics and standard 'business' analytics. Risk analysis requires such capabilities as non-linear calculations, predictive modeling, simulations, scenario analysis, etc.

- **Reporting and presentation layer.** The ability to present information in a timely manner, the quality and flexibility of reporting tools, and ease of use, are important for all risk management systems. Particular attention is given to the ability to do ad-hoc 'on-the-fly' queries (e.g., 'what-if' analysis), as well as the range of 'out of the box' risk reports and dashboards.

Market potential

- **Business model.** Includes implementation and support and innovation (product, business model and organizational). Important factors include size and quality of implementation team, approach to software implementation, and post-sales support and training. Particular attention is given to 'rapid' implementation methodologies and 'packaged' services offerings. Also evaluated are new ideas, functionality and technologies to solve specific risk management problems. Speed to market, positioning, and translation into incremental revenues are also important success factors in launching new products.
- **Market penetration.** Volume (i.e. number of customers) and value (i.e. average deal size) are considered important. Rates of growth relative to sector growth rates are also evaluated. Also covers brand awareness, reputation, and the ability to leverage current market position to expand horizontally (with new offerings) or vertically (into new sectors).
- **Financials.** Revenue growth, profitability, sustainability, and financial backing (e.g. the ratio of license to consulting revenues) are considered key to scalability of the business model for risk technology vendors.
- **Customer satisfaction.** Feedback from customers is evaluated, regarding after-sales support and service (e.g. training and ease of implementation), value for money (e.g. price to functionality ratio) and product updates (e.g. speed and process for keeping up to date with regulatory changes).
- **Growth strategy.** Recent performance is evaluated, including financial performance, new product releases, quantity and quality of contract wins, and market expansion moves. Also considered are the size and quality of the sales force, sales distribution channels, global presence, focus on risk management, messaging, and positioning. Finally, business insight and understanding, new thinking,

formulation and execution of best practices, and intellectual rigor are considered important.

together with specific product or 'go-to-market' capabilities needed to deliver a competitive advantage.

Quadrant construction process

Chartis constructs its quadrants after assigning scores to vendors for each component of the Completeness of Offering and Market Potential criteria. By aggregating these values, we produce total scores for each vendor on both axes, which are used to place the vendor on the quadrant.

Definition of quadrant boxes

Chartis' quadrant reports do not simply describe one technology option as the best solution in a particular area. Our ranking methodology is designed to highlight which solutions are best for specific buyers, depending on the technology they need and the implementation strategy they plan to adopt. Vendors that appear in each quadrant have characteristics and strengths that make them especially suited to that particular category, and by extension to particular users' needs.

Point solutions

- Point solutions providers focus on a small number of component technology capabilities, meeting a critical need in the risk technology market by solving specific risk management problems with domain-specific software applications and technologies.
- They are often strong engines for innovation, as their deep focus on a relatively narrow area generates thought leadership and intellectual capital.
- By growing their enterprise functionality and utilizing integrated data management, analytics and Business Intelligence (BI) capabilities, vendors in the point solutions category can expand their completeness of offering, market potential and market share.

Best-of-breed

- Best-of-breed providers have best-in-class point solutions and the ability to capture significant market share in their chosen markets.
- They are often distinguished by a growing client base, superior sales and marketing execution, and a clear strategy for sustainable, profitable growth. High performers also have a demonstrable track record of R&D investment,

- Because of their focused functionality, best-of-breed solutions will often be packaged together as part of a comprehensive enterprise risk technology architecture, co-existing with other solutions.

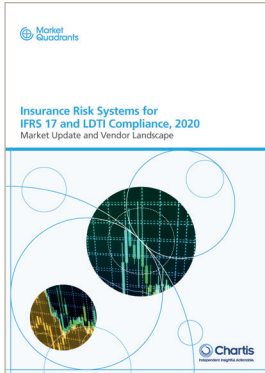
Enterprise solutions

- Enterprise solution providers typically offer risk management technology platforms, combining functionally rich risk applications with comprehensive data management, analytics and BI.
- A key differentiator in this category is the openness and flexibility of the technology architecture and a 'toolkit' approach to risk analytics and reporting, which attracts larger clients.
- Enterprise solutions are typically supported with comprehensive infrastructure and service capabilities, and best-in-class technology delivery. They also combine risk management content, data and software to provide an integrated 'one stop shop' for buyers.

Category leaders

- Category leaders combine depth and breadth of functionality, technology and content with the required organizational characteristics to capture significant share in their market.
- They demonstrate a clear strategy for sustainable, profitable growth, matched with best-in-class solutions and the range and diversity of offerings, sector coverage and financial strength to absorb demand volatility in specific industry sectors or geographic regions.
- They will typically benefit from strong brand awareness, a global reach, and strong alliance strategies with leading consulting firms and systems integrators.

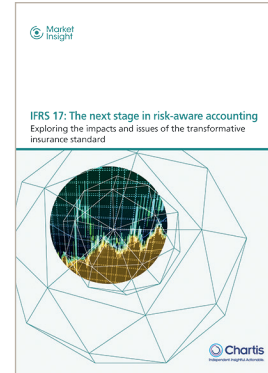
5. Further reading



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



IFRS 17 Technology Solutions, 2019: Market and Vendor Landscape



IFRS 17: The Next Stage in Risk-Aware Accounting



IFRS 9 Technology Solutions: Market Update 2017



CECL Technology Solutions, 2018



Model Validation Solutions, 2019: Overview and Market Landscape

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