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Executive summary

In the last 20-25 years, credit risk analytics (CRA) used by banks and other financial institutions has greatly improved, evolving from basic credit risk estimates to state-of-the-art analytics driven by stochastic modelling, machine learning and artificial intelligence (AI). Additionally, CRA has been integrated into the modern risk management framework. In fact, for the majority of today's credit institutions, CRA is the central element of the risk management framework and a driver of strategic risk decision-making and business efficiency.

The accelerated development of CRA has been driven by several global trends:

- Digital transformation: The digital transformation of financial services.
- Data and analytics revolution: The revolution in data and analytics techniques which has improved on traditional analytics methods through the use of stochastic modelling, machine learning, AI and other advanced techniques.

Drive for RoE (Return on Equity):

Credit Risk teams are being asks to

Credit Risk teams are being asks to activity manage the portfolios to drive RoE. This drive is pushing teams to look for risk weighted opportunities in the portfolio – all whilst in a low or rising interest rate environment.

- Dynamic market: Changes in credit market structures and industry competition caused by financial innovation and disruptive new entrants (FinTech).
- Changing regulatory environment:
 Increased regulatory scrutiny in terms of conduct towards customer, customer vulnerabilities as well as equal opportunity of credit.

In this paper, we discuss how we have developed a comprehensive methodology to measure the CRA capabilities of banks and other credit institutions which allows for benchmarking of CRA maturity versus peers. By performing CRA assessments on numerous credit institutions across the globe, we have created a unique dataset of information on their CRA competencies.

Using our holistic CRA assessment framework and in-depth qualitative studies tailored specifically to each firm, our highly qualified analytics team can provide a thorough diagnostic of a firm's CRA capabilities and a credible assessment of its CRA maturity level.

Our industry study reveals that the level of CRA maturity varies significantly among credit institutions. Using our unique repository, we have identified emerging trends in CRA, observed a number of industry best practices and provided a reliable and detailed peer comparison and a gap analysis of CRA capabilities. We have also uncovered key characteristics that make some institutions industry leaders and others "laggards".

The growing importance of CRA for decision-making in risk management, product development, and business strategy means that the board and executive committee should regularly review the effectiveness of their organisation's CRA to ensure that it is as good as, and ideally better than, their competitors'.

The Senior Management should therefore obtain a holistic, independent and fact-based assessment of their firm's CRA. This is where EXL can help your organisation. Using our holistic CRA assessment framework and in-depth qualitative studies tailored specifically to each firm, our highly qualified analytics team can provide a thorough diagnostic of a firm's CRA capabilities and a credible assessment of its CRA maturity level. This assessment supplies the vital information that boards, executive committees and CROs need to carry out their CRA review process and stay ahead of the competition.

Credit risk analytics: what are the developments and trends?

Credit risk analytics in banks and other credit institutions has been one of the most dynamic and fast-growing areas of technological innovation in recent years, and has greatly improved credit risk management. What has driven this improvement in CRA capabilities? And how can a firm ensure that its CRA is well advanced and follows industry best practices? We answer those questions below.

The impact of digitalisation on credit risk analytics

The digital transformation of financial services has triggered immense change in the way financial institutions run their business, including accelerating the development of CRA. The arrival

of massive amounts of data at everincreasing velocity a few years ago (something we now call "big data") played a crucial role in improving the capabilities of CRA. Large volumes of customer data and retail credit-related information has become available in digital formats. Another big breakthrough was the emergence of analytical tools like natural language processing (NLP), and the subsequent digitalisation of unstructured information.

The opportunity to aggregate large volumes of structured and unstructured data improved the accuracy and predictive power of traditional credit risk models and tools. It also allowed banks to start using more advanced tools and modelling techniques (e.g. stochastic models, machine learning and AI) which previously was not possible due to a paucity of relevant data. Large volumes of data, faster data extraction and processing, combined with advanced modelling, boosted the

power of CRA and opened new areas of application outside traditional credit risk.

The global COVID pandemic has had an accelerating effect on CRA by boosting the digital transformation of banking. According to a survey of bank senior managers conducted by the European Risk Management Council last year, the majority of banks responded to the COVID crisis by expanding their digital capabilities. This allowed them to make improvements in areas which are crucial for modern CRA, namely:

- · Enhance their IT and risk infrastructure.
- Employ advanced data management tools to extract, filter and aggregate credit related data.
- Make further use of advanced modelling techniques for credit analysis.

What mitigating actions is your organisation taking to address COVID crisis?

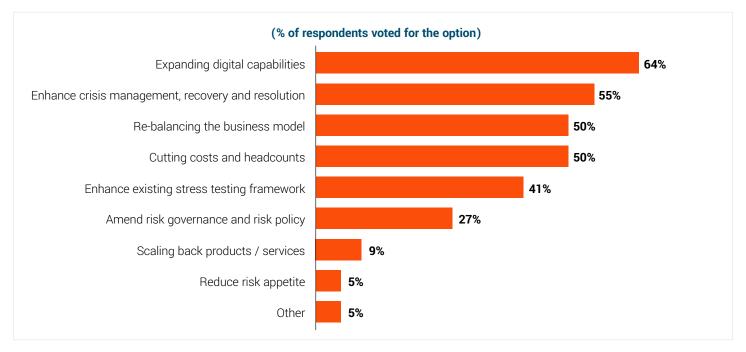


Figure 1 - Source: European risk management council



Data and analytics

Advances in customer intelligence and financial product innovation have driven the development of CRA. Modern CRA aggregates various data sets on customer behaviour and customer preferences, knowledge which is vital for banks if they are to build relationships with current and prospective customers. CRA plays an important role today in helping organisations understand what people want and become more customer oriented.

CRA has also extended beyond traditional credit risk to play a role in financial product innovation. Financial product innovation today is largely driven by two forces – fast-evolving customer needs and digitalisation. Effective CRA can and should provide the vital customer intelligence needed to develop new financial products that appeal to the various target customer groups.

Return on Equity (RoE)

The low interest rate environment that has persisted in financial markets since the global financial crisis has put serious pressure on the profitability of banks. Driven by the need to improve returns on equity, banks are therefore searching for opportunities to cut costs and make their processes and functions more efficient and agile where possible. Risk management is one of the functions where greater agility is being sought, because of its high running costs, the complexity of risk processes and the requirement for highly qualified and paid staff.

A coordinated and programmatic approach to improving CRA can result in improved RoE. This RoE improvement comes in at least two forms, firstly, by a more efficient allocation of capital to the credit portfolio. And secondly, these improvements result in a reduction of running costs, an elimination of low productivity jobs and a much better use of highly qualified risk staff.

How can credit risk analytics create competitive advantage?

The recent developments in CRA and its expansion beyond the traditional boundaries of risk management mentioned above have turned it into a tool that can give banks significant competitive advantage. Advanced and effective CRA has become part of a winning formula. Many banks realised early on how they could significantly strengthen their market positions by developing CRA capabilities. The operational improvements that CRA delivers include:

- More agile and robust credit risk management.
- Better risk-return profiles of new and existing products.
- · Customer-tailored product offerings.
- Effective customer acquisition.
- · Better customer intelligence.
- · Solid and well-diversified credit portfolio.

While improvements in each of the above areas will add significant value, when CRA capabilities are applied holistically, across the entire enterprise, the gains will be much greater and put the organisation in a much stronger position relative to its peers. The ultimate result will be to generate a higher return on capital and equity.

Bank senior management should also consider that weak CRA can seriously affect the bank's competitiveness. In the modern credit business, strong CRA is no longer "nice-to-have" in the risk management framework, it is a "must-have". Growing competition and greater regulatory focus on the risk analytics capabilities of regulated firms have combined to make weak CRA a serious risk factor for banks.



Regulatory challenges

Regulators are increasingly looking at digital and data driven credit analytics with the lens of customer vulnerabilities, equal opportunity of credit and lenders' conduct towards retail borrowers. These developments have also influenced lenders to build analytic models and strategies in context of regulatory expectations. Some of the primary developments in this direction include:

- Devising payment / forbearance plans to choose keep a track of deep and persistent source of vulnerability (such as age).
- Reworking on segments of prospects which are on margin and actively testing for accuracy of decision making process.
- · Acquisition strategy with careful understanding of price points as well as more frequent performance 'scoring' for vulnerable customers.
- · Upscaling fraud detection capabilities to capture misrepresentation of hardship and vulnerability.

By developing advanced and effective CRA capabilities, credit institutions can substantially reduce their exposure to financial, regulation and reputational risks.

How mature is credit risk analytics across the industry?

The development of CRA capabilities in the financial sector has not been even across banks and geographies. Some banks have progressed quickly and reaped the benefits early; others have lagged behind and failed to seize the full opportunities.

Over the last three years, leveraging our strong presence in banking and fintech analytics, EXL Service has developed a comprehensive methodology to measure the CRA capabilities of banks and other credit institutions, and this allows us to make objective benchmarking of CRA maturity. Our recent benchmark study based on a representative sample of 15 credit institutions confirms that levels of CRA maturity vary significantly. Credit institutions can be divided into three broad groups: leaders, peers and laggards. In the study sample, four organisations have been identified as leaders, three as laggards and the others as peers. The big question is, what are the factors that contribute to such wide variations in CRA maturity across the financial services industry?

Key

- Large Banks (Leaders)
- Large Banks
- Mid-sized Banks
- Mature Start-ups
- Early Stage Start-ups

What drives credit risk analytics maturity?

Our analysis suggests that there is a significant correlation between the analytics maturity level and the size of the organisation. Large banks usually have more advanced credit risk analytics than medium-sized and small banks. This is to be expected as they have more financial resources and more staff with the right skills and experience. This makes them better able to embrace the opportunities provided by digitalisation, which is the main driver of modern CRA. However, the picture is not so simple.

Maturity of credit risk analytics capability V Size of organisation



Source: Credit risk analytics: Shaping the future of the credit business, EXL

#	Organisation	Segment
1	Global Credit Card Issuer	Large Banks (Leaders)
2	Global Bank	Large Banks (Leaders)
3	European Branch of Large Bank	Large Banks
4	Transatlantic Bank	Large Banks
5	Top 10 UK Bank -1	Large Banks
6	Top 10 UK Bank -2	Large Banks
7	US Regional Bank 2	Large Banks
8	Pan-African Bank	Large Banks
9	US Regional Bank 1	Mid-sized Banks
10	Mid-sized UK Society	Mid-sized Banks
11	Mid-sized European Bank	Mid-sized Banks
12	Online Retailer (Issuing Credit for Merchandise Purchase)	Mature Start-ups
13	Card Specialist	Mature Start-ups
14	US Fintech 1	Mature Start-ups
15	US Fintech 2	Early Stage Start-ups
16	US Fintech 3	Early Stage Start-ups

Figure 2 - Source: EXL

Our benchmarking study uncovered an interesting phenomenon – challenger banks and financial start-up do not follow the rule of size. While lacking the vast financial and human resources available to large banks, these newer organisations possess other qualities that allow some of them to successfully build up strong CRA capabilities. They use their strong organisational and system agility to innovate at an accelerated pace. As a result, financial start-ups and certain digital

lending-based organisations rank highly on the depth of their modelling, innovation, robust governance processes and data management capabilities. In terms of their CRA maturity, this puts them ahead of most banks and they rank almost as high as the banking industry's global leaders.

The drivers of CRA maturity revealed in our benchmarking study are closely linked to what is driving digital transformation in all other areas of banking risk management. According to a survey of bank CROs recently conducted by the European Risk Management Council, the main factors constraining digital transformation are availability of financial resources, infrastructure capability, culture and availability of human resources.

What are the biggest constraints facing your organisation in its digital transformation?

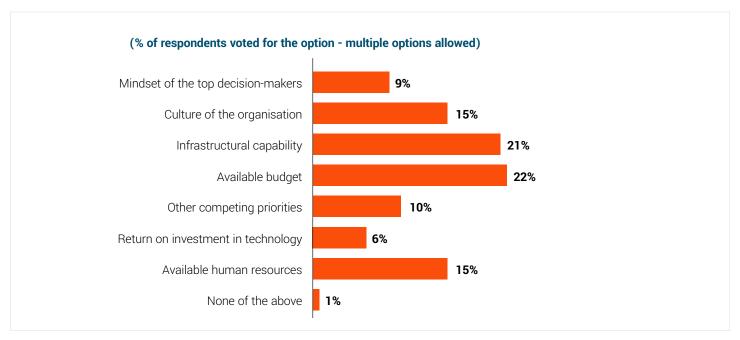


Figure 3 - Source: European risk management council

Our CRA benchmarking study, however, provides significant grounds for optimism for newer, smaller banks: **CRA maturity is not totally predetermined by the size and financial strength of the organisation.** Even a small firm with a limited budget can develop strong CRA capabilities if it has a flexible structure and the right culture to readily embrace innovative ideas and technological changes.

An important conclusion from our study, therefore, is that while the size of the organisation is an important factor, small or medium credit institutions should not use size as an excuse for having relatively poor CRA capabilities.



What makes a credit risk analytics leader?

We have identified and analysed several banks that have managed to develop advanced CRA capabilities and, therefore, can be considered to be industry leaders. They possess some common characteristics that have helped them excel and stand out among the rest:

- Credit data architectures have been designed to be agile, end-user focused and scalable. These architectures are constantly evolving to correct data gaps. External service providers are used extensively to provide an independent, unbiased view.
- Features like a single customer view, actionable management information, risk triggers and data quality control are considered integral parts of credit and data strategies. There is an openness to alternative data sources. All available information, (even at the transactional level), is used to its maximum potential.
- The development of risk models and tools is planned with implementation and business outcomes in mind.
 Multiple models with machine learning techniques are deployed. The tedious journey of model implementation has been completed, and internal and external models have been reviewed and validated
- There is a strong cultural alignment between senior management in credit risk management and the business lines, so that when changes are proposed there is a quick and clear identification of the risks and opportunities.

Which capabilities do laggards usually lack?

On the other end of spectrum, we discovered multiple "laggard" organisations which have certain common weaknesses in their CRA capabilities. These weaknesses create costs for organisations in several ways – higher losses owing to suboptimal risk assessment, growth opportunities lost in terms of preparedness to scale-up in time and many operational risks with data and decisions. The common characteristics of CRA laggards include:

- Legacy data infrastructure. Over time, new data streams are unsystematically accommodated in these legacy systems as the organisation expands its product line or acquires new assets. This leads to a situation where most of the information sits in a "data dump" rather than kept as a systematic record of customer and product lifecycle and risk indicators.
- In the absence of a systematic single customer view of data, it takes longer to manage and analyse, there is a lack of consistency and there is a heightened risk of errors
- Models and tools are developed and implemented in silos and not aligned properly with business requirements. Model development is either too complicated or done without considering how the models will be implemented for regular use in decision making.
- Analytics strategies at times overlap with model priorities creating a stream of ad-hoc analysis. Governance of strategies is overlooked while modelling is scrutinised by internal validation thoroughly.
- Business and risk often end up applying overlays and exceptions given the lack of trust on data quality and insights. Management information lacks preciseness.

How to assess and benchmark the maturity of credit risk analytics capabilities.

What questions do the board and senior decision-makers need to address?

Considering the importance of CRA for gaining a competitive advantage and the different pace of CRA development in different credit institutions, it is crucial for senior decision-makers to have access to CRA peer analysis. However, to obtain this analysis is not so easy.

Few boards and CROs can obtain really objective and comprehensive assessments of the their CRA function and how it compares with their peers. They often struggle to have a clear picture of how mature or immature their analytics function is. When making a judgement on the maturity and sophistication of their CRA function, boards, board risk committees and CROs often have no choice but to rely on assessments provided either by the bank's internal auditors or its credit risk analytics managers.

That is understandable, but it is not sufficient in the current situation when CRA is undergoing rapid transformation and becoming more complex and specialised. Moreover, an in-house assessment potentially undermines the rigour, independence and breadth of perspective expected of the board and CROs.

A bank's internal auditors do not always have enough industry-wide information to allow them to credibly benchmark their bank's CRA capabilities against that of their peers. As for the bank's credit risk analytics managers, if they produce the CRA assessment themselves, the question of potential conflict of interest emerges. It is difficult for managers who are responsible for running and developing the bank's CRA to remain unbiased when they need to compare their CRA's maturity, weaknesses and "blind spots" with that of others.

Nevertheless, the board and executive committee should periodically discuss the state of their CRA. During these conversations, the decision-makers should seek clear answers to the following questions:

- What capabilities are required to operate effective CRA?
- How advanced are our CRA capabilities compared to those of our peers?
- How are improvements we have made, or plan to make, to CRA aligned with the recent industry trends and best practices?
- What CRA blind spots and weaknesses need to be urgently addressed?
- How do we create a road map for addressing those blind spots and key weaknesses?

To have a meaningful conversation about the current state of a bank's CRA and what improvements need to be made, the board, executive committee and CRO must obtain a holistic, independent and fact-based assessment of it. Such an assessment is important, considering the role that CRA plays in providing vital intelligence for strategic risk and business decision-making, as well as for daily risk and capital management.

What does a credit risk analytics assessment framework look like?

At EXL, we have developed a comprehensive framework for assessing and benchmarking CRA capabilities to provide objective and indepth information for bank boards and CROs. Our framework is based on the division of CRA into three layers and seven credit risk analytics areas. The three layers are the operating model, process specific analytical capabilities and analytics support capabilities.

Credit risk analytics capability - Key themes

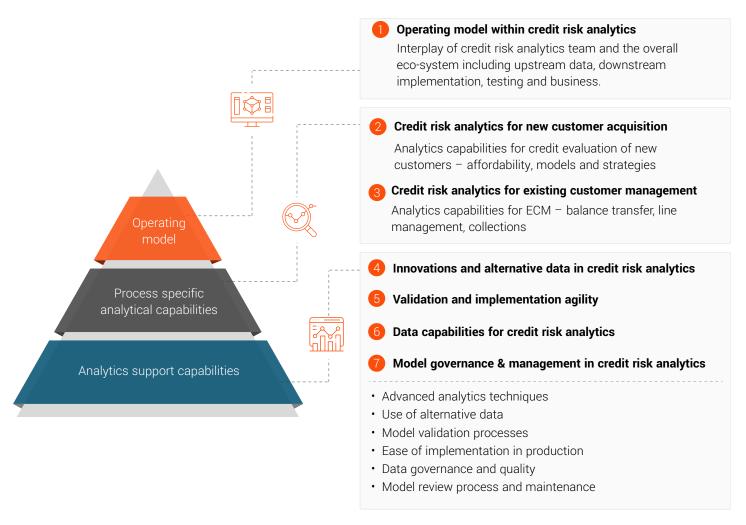


Figure 4 - Source: EXL

The assessment of the CRA operating model focuses on how the model is organised in the bank and to what extent decision-making processes are driven or supported by information generated by CRA.

The assessment of process specific analytical capabilities includes an in-depth study of how the bank generates analytics for new customer acquisition as well as for its credit back books. This involves looking at the types of models and tools used by CRA, the model coverage and model development approach, the granularity of the product and customer segmentation, the frequency of customer risk monitoring and reporting and more.

Finally, the assessment of analytics support capabilities concentrates on how sophisticated the bank's CRA is in using innovative digital methods (such as process automation, machine learning and artificial intelligence) and alternative data (such as unstructured data), how thorough the model validation and periodic reviews are, the bank's data capabilities and the robustness of model governance and management.

In polling data captured from a webinar we hosted in partnership with <u>UK Finance</u> and at RiskMinds conference late in 2021, participants highlighted that they feel investing in CRA is "Extremely Important" (48%) to their organisations proper functioning¹.

The participants ranked data capabilities² as the most important capability. The participants also highlighted that they expect to invest in data capabilities through 2022. Participants also highlighted that an important area for immediate focus and investment should be the operating model.

While at first glance these two responses could be seen as inconsistent (data capabilities and operating model both being prioritised), it actually reflects EXL's experience that piecemeal approaches to CRA development often prevent organisations from embracing the full potential. The right model is a balanced, strategic and programmatic approach to CRA development.

An effective CRA operating model is a mechanism that links all CRA areas to the single analytics operating model that generates real insights from solid data capabilities. That is why our assessment of CRA capabilities stretches beyond an assessment of credit risk models and data to provide holistic coverage of the entire CRA eco-system.

Assessment approach

Instead of using a simplistic checklist approach to assessment, our methodology relies on a framework-driven qualitative study of all seven CRA areas described above conducted by EXL's risk analytics experts. Depending on the chosen assessment package (see.4.5), the qualitative study of a bank's CRA can take from four weeks for a participant package, and several weeks longer for a subscribed or customised assessment.

Our approach includes in-person interviews with risk, data and analytics senior managers across various bank departments, conducted by EXL's credit risk subject matter experts. The interview questions are tailored to each organisation depending on its size, business model, product mix and CRA function structure. In addition, the assessment includes an examination of CRA documentation.

Collected data, interview materials and observation done by EXL's experts for each CRA capability area are analysed and compared with relevant industry benchmarks to identify the maturity level, areas of strength and scope for improvement.

A framework-driven qualitative study for each organisation and conducted by EXL's highly qualified SMEs ensures a thorough diagnostic of CRA capabilities and assessment of the CRA maturity level.

Industry-wide data base for benchmarking

As a leading solutions provider in data and credit risk analytics, EXL has developed an industry-wide CRA benchmarking standard covering a wide variety of retail lenders. EXL's CRA studies have broad geographical coverage across UK, European, US and African financial institutions, and cover a wide range of credit institutions, ranging from global banks to specialist lenders and FinTech start-ups.

By performing CRA assessments on numerous credit institutions, EXL has collected a large amount of industry-wide data and built a unique data-base on CRA capabilities in a variety of organisations Our repository of CRA benchmark data includes information on 15 institutions across the globe.

Using our unique repository, EXL Service can credibly identify emerging trends in CRA, industry best practices and provide a reliable and detailed peer comparison and gap analysis of CRA capabilities.

^{1 48%} of the RiskMind participants

² See definition in Fig 4.

Three-tier assessment and deliverables

To provide maximum choice to our clients, we offer three different tiers of CRA assessment, depending on the depth of study required.

Tiers of credit risk analytics assessment

Participant

Available to all lenders willing to contribute to the benchmarking.

- Deliverables: Deanonymized for the client, focused presentation.
 Provides views on overall position in credit risk analytics - rating for each capability.
- How clients use it: Directional inputs with respect to specific areas to invest. Provides a clear view of level of maturity overall against peers.

No Cost - subject to voluntary participation for qualifying institutions

Subscribed

Benchmark with detailed analysis against each capability.

- Deliverables: Detailed feedback around each capabilities. Description of characteristics of the Leaders, Peers and Laggards. Recommendations on steps to increase maturity.
- How clients use it: Identify specifics on each capability, providing clear input to a roadmap of works to increase maturity. Prioritise investment and capability improvement programmes.

POA - Usually costs tens of thousands of pounds

Custom

A complete custom solution with detailed study - across departments and across decision level (strategic to operational). Encompassing all steps in tier three.

- **Deliverables**: In depth study of areas like lending frameworks, non-scoring models, data efficiencies etc.
- How clients use it: Clear and detailed road maps and solutions across each of the decision areas.

POA - Based on span, products and business segments under consideration

Source: Credit risk analytics: Shaping the future of the credit business, EXL

Participant tier is an entry-level service that we provide to credit institutions wishing to assess their CRA capabilities, and it is free for qualifying institutions. The study includes assessment of all seven CRA capabilities. The customer receives a rating for each capability as well as an overall benchmarking of CRA maturity against peers.

Subscribed tier represents a full-scale assessment of CRA capabilities, for which subscription fees are charged. After an indepth study, EXL's expert team produces a detailed CRA capability diagnostic report. The main deliverables included in the subscribed service are:

 Assessment of the overall level of CRA maturity, and the position across each

- capability measured versus the industry average and industry best practices.
- Detailed diagnostics of key strengths, weaknesses and blind spots discovered for each CRA capability
- For each CRA capability, an analysis of each component of the capability (e.g. efficiency of technology, agility of processes, the use of resources and data).
- For each CRA capability, how it compares with that of industry leaders, peers and laggards.
- A peer group analysis of CRA capabilities, identifying scope for improvements and practical recommendations on how improvements can be achieved.

Custom tier represents a bespoke CRA assessment service which addresses the customer's precise requirements. The list of deliverables can include those in the subscribed tier but also additional diagnostics and analysis such as an analysis of the lending frameworks, nonscoring models, data efficiencies and data strategy. Also, the assessment report can include clear and detailed plans for upgrading each CRA capability based on industry best practices.

Credit risk analytics: An industry view

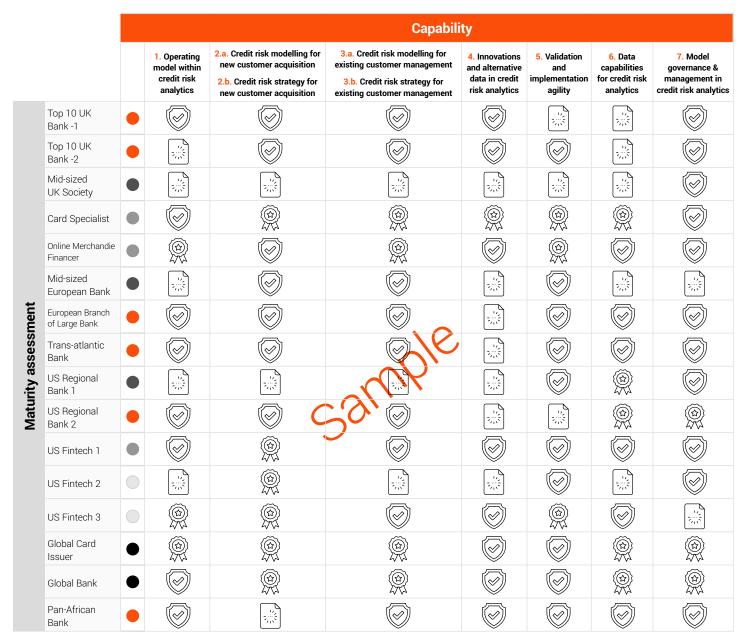


Figure 6 - Source: EXL







Conclusion

Global trends in banking have accelerated the development of CRA capabilities. Today, it is imperative that banks excel in this area, especially when the use of data and the ability to distinguish and price risk is a key market differentiator. With growing competition and relatively easy access of capital to financial technology lenders, a robust approach to CRA has become an important competitive advantage, as well as a way of managing exposures to financial, regulation and reputational risks.

The CRO and Senior Management need to ensure they obtain a holistic, independent and fact-based assessment of their firm's CRA capabilities. While large banks need to make processes nimbler, use internal data to full potential and look towards more data driven testing, smaller and fast growing lenders should look at strengthening governance and building a scalable analytics and risk data function. The extent and pace of these changes will significantly influence the success of leaders globally over the next few years.

We would like to thank the European Risk Management Council for their contribution and insights.

If you would like to discuss any of the issues raised in the report and how we can help your organisation please contact us: www.exlservice.com/credit-risk-analytics



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