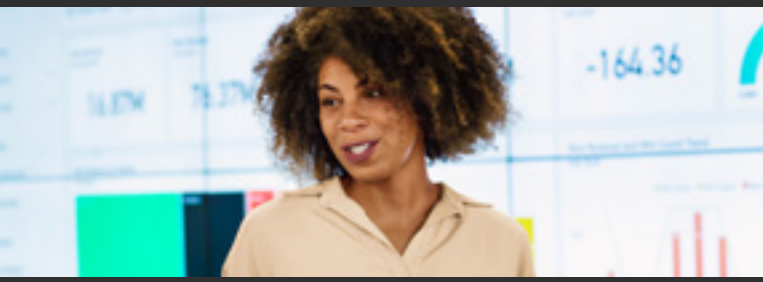


Reshape  
your



# Risk

# Manage

# ment



# Introduction

Technological advancement, peoples' changing behavior and the COVID-19 pandemic have affected all industries in unprecedented ways.<sup>1</sup>



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Financial services firms in particular are dealing with uncharted territory in terms of managing risk, including the physical risk of keeping employees safe, managing business continuity, recovering from the impact on their customer base, and reimagining the blueprint for managing long-term risk in a highly-regulated market.

As a result, market risk decision makers in financial services institutions face a seemingly daunting task.

They must quantify the impact of dynamic shifts with an even broader perspective that factors in environmental, governance, and related impacts on lending and investment portfolios. At the same time, they have to conduct predictive analyses in an environment that is currently defying historical models. In addition, the impact of falling interest rates and spikes in costs from a resourcing and operations stability standpoint makes the situation even more complex.

1 **Redefining Risk  
Management in  
an Era of Data  
and Disruption,**  
Microsoft  
Corporation, 2020

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Innovative technologies can be a critical tool and a key enabler in meeting these challenges. Our clients are reprioritizing projects to recover from the immediate impact of the pandemic and climate change and redefine the long-term strategy to manage risk across the enterprise. Legacy systems hamper the ability to go from risk data to insights in a seamless and timely manner, a requirement that is more critical than ever before<sup>2</sup>.

Financial institutions will need to fundamentally rearchitect their data management techniques and risk methodologies to reflect the new normal<sup>3</sup>.

Adding to these pressures on financial services firms are pending regulatory deadlines, as well as demanding revenue and margin goals, prompting them to reassess their overall approach to manage the complex and interconnected nature of risk<sup>4</sup>.

Microsoft works with customers in transforming their risk environment, centring on two levers:

- The **ability to leverage cloud scale on demand**, particularly high performance computing capabilities. This will enable customers to complete complex risk simulations and to empower risk analysts to experiment while accessing computing resources on demand. This scale is being applied in market risk analysis & reporting, trading strategy and environmental risk analysis. It is also being used to build and operate advanced machine learning models supported by large datasets.

2 **Why Banks Can't Delay Upgrading Core Legacy Banking Platforms**, EY, 2019

3 **Banking Models after COVID-19: Taking Model-Risk Management to the Next Level**, McKinsey & Company, 2020

4 **2019 Global Risk Management Study**, Accenture, 2019

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These models may target evaluating counter-party risks, pricing instruments, identifying anomalous events or activities and much more.

- Secondly – and complementary to the first – is **the ability to use more advanced data management and analytics tools** to improve the productivity of the risk team and enhance the quality of risk insights & reporting. For example, banks are bringing together extended data for loan default prediction, credit decisioning and ESG analyses. New analysts joining the risk team increasingly have the skills to use open data management and analytics tools and have the expectation they will get the opportunity to apply these.
- Additionally collaboration, process automation and security are supporting the transformation of the risk environment.

A large part of effective risk management involves accurate reasoning and decision-making in real-time using extraordinarily large and complex data sets. Risk managers have used a number of risk models in the past to gain necessary insights.

However, these models are insufficient in a post-pandemic world.

- 01 Introduction** According to a recent McKinsey & Company report, there are three reasons why:
- 02 Risk Management Use Cases
- 03 Risk Management Approach First, model assumptions and boundaries defined at the design stage were developed in a pre-pandemic world.
- 04 Risk Management Solutions Second, most models draw on historical data, without access to the latest data that would enable recalibration.
- Finally, while access to the needed alternative data is theoretically possible, models have been unable to integrate new information in an agile manner, because the systems and infrastructure on which they are built lack the necessary flexibility<sup>5</sup>.
- Banks need to prepare an agile approach for adapting and evolving their risk processes and tools across market and credit risk. We will also begin to see an even greater focus on operational risk and the need to adjust stress testing and prioritize model risk management and redevelopment. The agility to support ongoing changes in an organization's strategic direction, either proactively or reactively<sup>6</sup>.
- 5 **Banking Models After COVID-19: Taking Model Risk Management to the Next Level,** McKinsey & Company, 2020
- 6 **"Accenture Capital Markets Technology 2022,"** Accenture, 2018

# Risk Management Use Cases<sup>7</sup>

The area of Risk Management is one of the top 5 banking scenarios in which Microsoft has focused its resources and products. In this section we are sharing a closer look into selected examples.



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## Reinvent Risk Management

Next generation Risk Management is at the heart of every banking institution and especially investment banking. It is a battleground for competitive differentiation for years to come. Investment banks already have a good baseline, but in a world of bigger data volumes - new data sources and more complex data types (e.g. unstructured data), virtually unlimited computation resources and higher speeds - it is key to accelerate the process from data to insights to actions.

Through a hybrid or a cloud-native, fully scalable compute environment, financial institutions can dramatically improve the speed of the risk calculations in any credit, market or custom scenario - including stress testing and related applications. This extends to actuarial risk, Solvency II, IFRS17 and Machine Learning scenarios for insurance customers as well. Microsoft developed a **Risk Management adoption quadrant** (as explained on page 15 of this eBook) to support organizations in risk modernization, starting from core activities to risk as a business enabler.

7 IPS Uses Cases  
for Banking  
& Insurance,  
Microsoft Western  
Europe Industry  
Team, 2020



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**Next Gen risk platforms can reduce the calculations times and dramatically reduce time-to-risk insights** – from hours to minutes – to continuous monitoring of any risk exposure. In particularly high-volatile markets and with emerging new risk scenarios the Next Gen risk platform is a key enabler for success.

Microsoft Products such as Azure High-Performance Computing, Azure Batch, High Performance Storage and ExpressRoute – in combination with an extensive number of native Azure Services – are a central component to delivering Next Generation risk platforms in the new era. Third party applications such as Milliman, Murex, Numerix, Riskfuel, SAS, Tibco, VectorRisk and Willis Towers Watson can replace a current on-premises set-up partially or completely, to enable banks to have infinite scale and agility without upfront hardware costs.

**Examples of our customers' digital enablement stories include:**

**TD Securities** transform derivatives pricing and client experience using Azure.

**Munich Re** adopts the cloud to improve the analysis of risks resulting from climate change.

**MUFG** decide to embrace the cloud to contain expenses and mitigate potential fines. They are supporting the new regulatory landscape and volume growth – 100 gigabytes of data in less than 12 hours every night and more than twice that volume on weekends.

**UBS** improved calculation times by 100%, saving 40% in infrastructure costs and gaining nearly infinite scale within minutes.

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## Empower Quant-Teams

Financial engineers, risk analysts and other related roles are the backbone of successful trading and risk management teams. These highly trained and specialized roles are continuously exploring how model calculations and general risk models can be improved.

Classical Machine Learning techniques and Artificial Neural Network (ANN) approaches are gaining traction in the domain of these experts.

Using new technologies like Microsoft Artificial Intelligence services, your teams can explore additional ways to develop and implement risk models faster and with deeper insights – thanks to the ingestions of news articles, alternative data and real-time events.

The success of this approach also depends on the availability and quality of training data such as market and reference data.

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Often Quant teams can't implement such models due to limited data and one possible solution is to leverage the cloud to generate synthetic training data by applying ANN techniques. A typical example of ANN in risk is applying this process in the calibration of pricing models for derivative instruments.

The embracement of this new modelling approach requires the implementation of model management, continuous monitoring of model efficiency and explainability. Microsoft's cloud technologies offer a set of services to implement this crucial component without large upfront investments.

## Fast and Efficient Risk Reporting

Today's volatile markets and interconnected global events are exposing challenges to current (on-premises) reporting infrastructures. Risk functions have invested heavily in the past to optimize reporting in one aspect of risk management (i.e. Market-, Credit- or Operational Risk). Interconnected risk events require a new, unified approach in risk reporting which can provide insights across various risk classes to enable well-informed actions.

Breaking down reporting silos and providing a holistic view, based on close to real-time data, is a crucial element of a risk reporting platform.

Banks need a "factory" approach with a "risk reporting engine" which is capable of integrating information from various risk sources and alternative data (structured and unstructured) to achieve this goal.

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Automated reporting with minimal manual intervention and the ability to re-create reports/dashboards with consistent figures on an ad-hoc basis should be extended to risk functions, like front and back office risk. Moreover, responsibility should be shared with Risk IT teams. This automation is not limited to the described scenarios but can be extended to automated regulatory documentation too. For example, SPIN Analytics provides a solution in the credit risk to deliver regulatory model documentation in minutes, instead of weeks or months.

Combining unified taxonomies, curated and certified data from a central data lake with cloud based no-code tools like Microsoft's Power Platform and Power BI banks will enable the risk functions to successfully react and respond to emerging market events. Democratizing risk analytics and sharing reporting and insights with the whole organization is an additional ingredient to achieve the goal of a holistic risk view across the enterprise.

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With the Power BI platform all dashboards are interactive and at any user's fingertips so they can easily view market volatility, exceptional market event, intra-day movements etc. The integration of such reports in Microsoft Teams, a solution for remote communication, is in today's world even more important than ever - allowing real-time interaction and collaboration related to new risk insights. Ecosystem solutions from partners like CubeLogic, Numerix and ScaledRisk are available for internal and external risk reporting too.

## Managing Consumer Loans and Mortgages

Banks are looking for a strong credit risk system based on AI (Cognitive Services and Machine Learning) and automation to manage loan request in an efficient way since they can't afford to lose business with outdated models and/or solutions.

Replying to a loan application in minutes, identify fraudulent requests early and reduce false positives earlier while delivering a high-end user-experience is key.

By utilizing Machine Learning, internal- and external data and/or partner applications such as AdviceRobo, Altilia and SparkBeyond, retail banks can automatically test millions of scenarios per minute to calculate the credit risk scoring of individuals and organizations.

# Risk Management Approach

Microsoft's Azure platform offers maximum flexibility in the risk platform implementation approach and in the Azure service offering. We propose to structure the risk transformation journey along the following 4 quadrants:



Better risk decisions  
& capital calculations



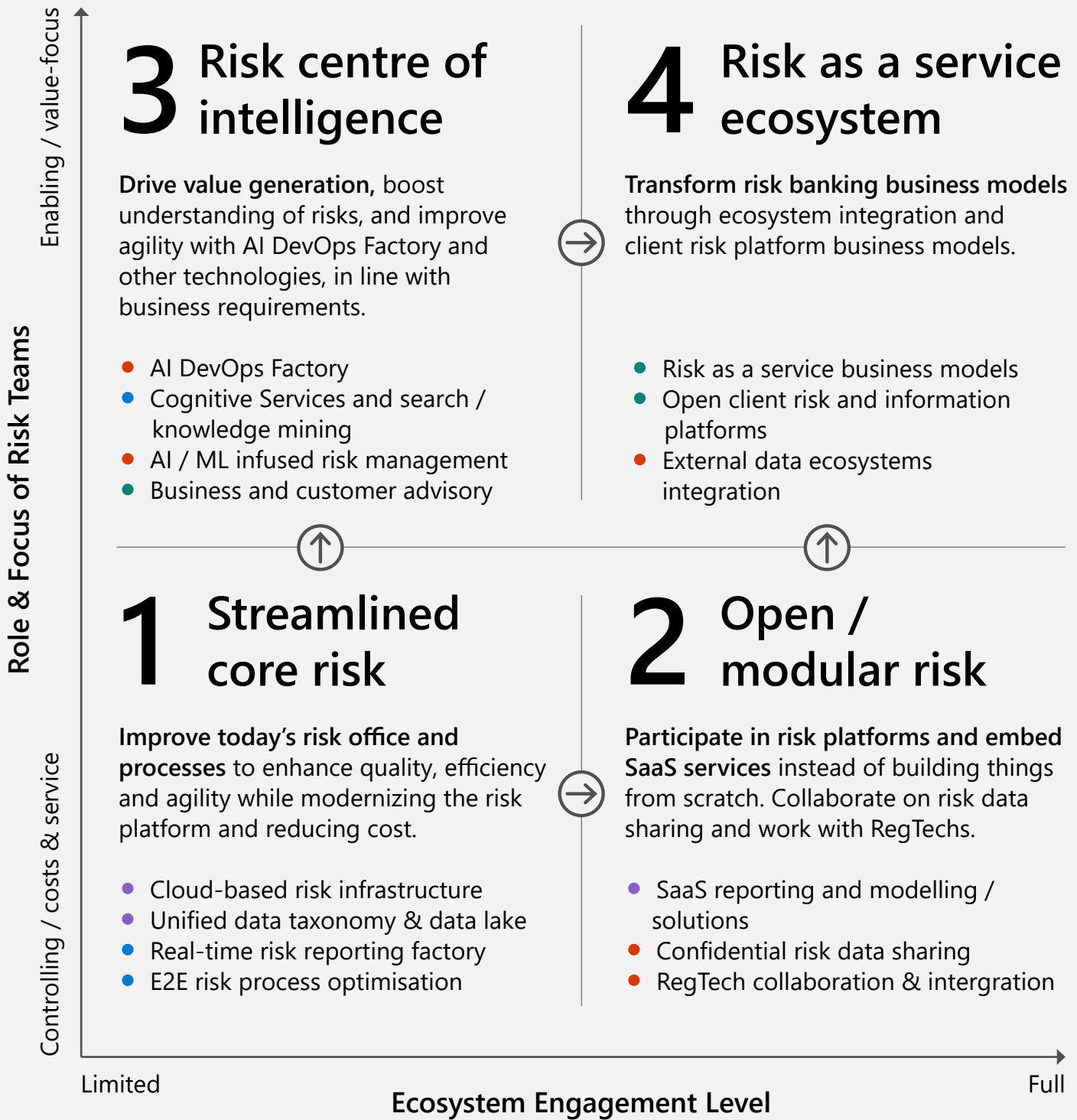
More agility  
& speed



Empowered  
employees



Improved efficiency  
& operations



# Risk Management Solutions

In this section we are showcasing risk solutions based on Microsoft's market-leading first-party services and third-party solutions – all built on Azure, the most compliant and trusted cloud for Financial Services. Banks and insurances can choose from a variety of operational models (IaaS, PaaS and SaaS) and adopt the deployment models to their platform strategy and business needs.





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## **1** Streamlined Core Risk

Streamlining an on-premises risk platform often starts with the modernization of a High-Performance Computing (HPC) backbone – sometimes simply called the compute grid. The modernization can include a hybrid approach, in which part of the calculation grid(s) are migrated to the cloud while the rest stays on-premises, or a cloud-only approach where the cloud benefits are fully embraced. By focusing on the grid component to streamline the core risk platform, the cloud deployment model offers a huge flexibility to accommodate a variety of technological requirements for infinite compute and scalability, imposed by running modern risk-model calculations on a state-of-the-art core risk platform.

Risk calculations might have different needs for memory, CPU types, number of cores etc. Microsoft is addressing these needs by providing a variety of specialized compute instances, which can cover the full spectrum of various risk-modeling

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approaches. Dedicated Compute Services like H-Series Virtual Machines (VMs), Compute- and Memory-optimized F- and D-Series VMs along with GPU accelerated compute instances like the N-Series, cover a broad range of today's compute requirements. Paired with high-performance storage services like Azure NetApp Files (ANF), Azure HPC Cache and related Azure storage services (Data Lake, Blob Storage), we can address the technological challenges.

The ability to run native and containerized risk model PaaS services like Azure Functions, Azure Container Instances and Azure Kubernetes Services – along with PaaS services for grid schedulers like Azure Batch, Cycle Cloud and third-party grid schedulers – makes Microsoft Azure an ideal platform to transform on-premises risk grids.

Key platform offerings in this quadrant:

- High Performance Computing services for infinite compute and scalability
- A huge spectrum of suitable Virtual Machines families (CPU/GPU) for risk management workloads (H-, N-, D- F- and E-Series VM Families)
- High-Performance Storage offerings like HPC Cache, ANF, Azure Data Lake, Azure Blog Storage

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- PaaS services for grid scheduling like Azure Batch, Azure Cycle
- Support for a variety of third-party grid schedulers like Tibco GridServer and IBM Symphony

## 2 Open/Modular Risk

As part of the transformational journey of the risk management offering, we see a bigger appetite for risk functions to collaborate with other financial institutions, external ecosystems or third-party service providers. One driver of this development is certainly the need for data to fuel the new risk modelling approaches. Alternative data (weather, social, satellite images, etc.) or any other relevant data that is not available in-house has to be obtained from external data providers or leveraged from dedicated partner networks. Microsoft Azure is providing services to securely share, consume and leverage alternative data streams in state-of-the-art risk models. Concepts like confidential compute are adding another trusted security layer when working with third-party data.

Another form of embracing external ecosystems is the possibility to integrate external solutions that are offered through the Microsoft partner channel on Azure as SaaS services. Such services are quite interesting in terms of time-to-production and ease of integration into existing risk

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platforms, if a dedicated business need can be mapped to a partner offering. Specialized partner solutions on Azure can address a variety of aspects in the risk management space. For instance, solutions to manage credit and market risk are provided by Murex, Numerix or for example Vector Risk. Offerings in Liquidity Risk or even in the regulatory space – like Fundamental Review of the trading book (FRTB) – can be implemented by a SaaS partner solution on Azure. Vector Risk, Numerix and Cubelogic are partners providing services in these areas.

Key platform offerings in this quadrant:

- Azure Data Share
- Confidential Compute with specialized Virtual Machines (DCsv2, DC-Series) and Confidential Containers
- Specialized third-party risk solutions:  
Credit and Market Risk: Murex, Vector Risk, Numerix etc.
- Liquidity Risk: Numerix, Cubelogic etc.
- Regulatory Workloads (FRTB): Vector Risk, Numerix etc.
- Actuary Risk: Milliman, Willis Towers Watson etc.
- Accelerate Risk Model Calculations and throughput by leveraging ANN networks: Riskfuel

## 3 Risk Centre of Intelligence

Risk teams and especially quantitative risk modelers and financial engineers are augmenting traditional modelling approaches with Machine Learning (ML) and Artificial Neural Network (ANN) techniques. Embracing such an approach often comes with the need to modernize the risk modeling lifecycle and apply DevOps best practices along the whole risk modeling lifecycle. Improved agility, faster model delivery and improved governance are key if the augmented ML/ANN approach is part of the next generation risk modeling roadmap of the organization.

Access to state-of-the art compute services like specialized GPU nodes, support for modern Quant tooling, ANN frameworks and ML/ANN services like Azure Machine Learning Services are a big accelerator in this endeavor. The application of ANN in the risk modeling process often requires a substantial amount of data that is leveraged to train the ANN models. Access to high-performance storage and distributed ANN training modes – fueled by accelerated InfiniBand inter-node network communications – makes the ANN approach accessible for any bank or insurance. Services like Azure Purview and Azure ML Ops add an additional component to unified data governance and model risk management.

Key platform offerings in this quadrant:

- Azure ML Services (model, tooling compute platform), Machine Learning Operationalization (MLOps), Model management and operationalization

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- Support for a variety of ANN frameworks and components
- Specialized, GPU-enabled Virtual Machines without (NC-Series) and with (ND-Series) enabled inter-node network acceleration (InfiniBand) to improve model training times
- DevOps tooling (Azure DevOps, GitHub)
- Azure Purview, Azure ML Ops, Immutable Storage to address data governance aspects

## **4 Risk as a Service/Ecosystem**

The incremental approach to risk transformation inspires financial institutions to start the transformational journey in one of the three previously mentioned quadrants: Streamlining Core Risk, Risk Center of Intelligence and Open Modular risk. Depending on the transformational roadmap and business priorities, risk teams start with one quadrant and explore the adjacent areas along their journey.

As part of the long-term business strategy, financial institutions are considering leveraging long-term investments into a modernized risk platform and also continuously built-up expertise in areas like risk modeling, integration of alternative data, curating and enriching of reference and market data. Risk “marketplaces”, where such services are offered to other financial institutions, and a deeper integration

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with FinTechs are top of mind for participants who are willing to include all four quadrants as part of their transformational journey. Microsoft is offering the cloud platform that is supporting this endeavor in all aspects.

Key platform offerings in this quadrant:

- All technology offerings from the previous three quadrants plus
- Azure Market Place
- Azure API Management
- Azure Confidential Compute
- Azure Data Share

For further information and to learn more about Microsoft's risk management offering, please contact Microsoft or follow the links below.

[Azure for Financial Services | Microsoft Azure](#)

[High-Performance Computing – HPC | Microsoft Azure](#)

[High-Performance Computing for Financial Services | Microsoft Azure](#)

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