Reimagining the data-driven bank

The transformation of mission critical systems is an urgent priority for financial services in 2021

Executive summary

Financial institutions continue to undergo massive organizational change in response to shifting customer demands, declining margins, new competitors, increasingly stringent regulatory oversight, and the continuous threat of cyber disruptions. The data volumes, varieties, and velocity generated by financial transactions further strain these business systems, increasing management complexities that, in turn, can dramatically raise the risk of data loss, breaches, and/or downtime. However, when used strategically, this data is a valuable source of actionable insights to improve customer experiences and internal processes, and reduce risk.

Financial institutions are the largest spenders of technology with a high proportion of that spend going to mission critical systems. They are actively pursuing IT modernization and increasingly embracing disruptive digital technologies to achieve digital transformation and business agility objectives while adhering to strict data compliance requirements.

Cloud is the foundation of this IT modernization, providing the benefits of economies of scale, pay per use, lower costs and increased business agility. For financial institutions specifically, a key consideration for cloud services is a solid data management platform built with security as a priority and built-in machine learning intelligence to reduce risks.

An additional consideration for modernizing IT in this highly regulated sector is a choice of deployment models: on-premises, the public cloud(s), or a combination of both, without sacrificing data governance. Systems with architectural and operational identicality across deployment options could make management much easier and streamline the movement of data and applications when needed. Otherwise, institutions will repeat the current state of forklift retooling every few years, slowing down the ability to adapt to changes in the marketplace.

A possible answer lies in bringing the best of public cloud services to the customer's on-premises data center. Major cloud providers—Oracle, Amazon, and Microsoft— are already providing these service options. Oracle leads the way with its Cloud@ Customer portfolio that brings its Oracle Database cloud service, Exadata Cloud Service, on-premises as Exadata Database Cloud@Customer. Now Oracle is extending its cloud on-premises offerings by bringing the complete portfolio of public cloud services, including Autonomous Database and Oracle Fusion SaaS applications, to the customer's data center as Dedicated Region Cloud@Customer. This enables customers to gain the cloud experience and benefits while retaining control of their data to meet data governance and residency regulations. Oracle is the only vendor that lets its customers choose which cloud services they want to run on-premises and which ones in public cloud.
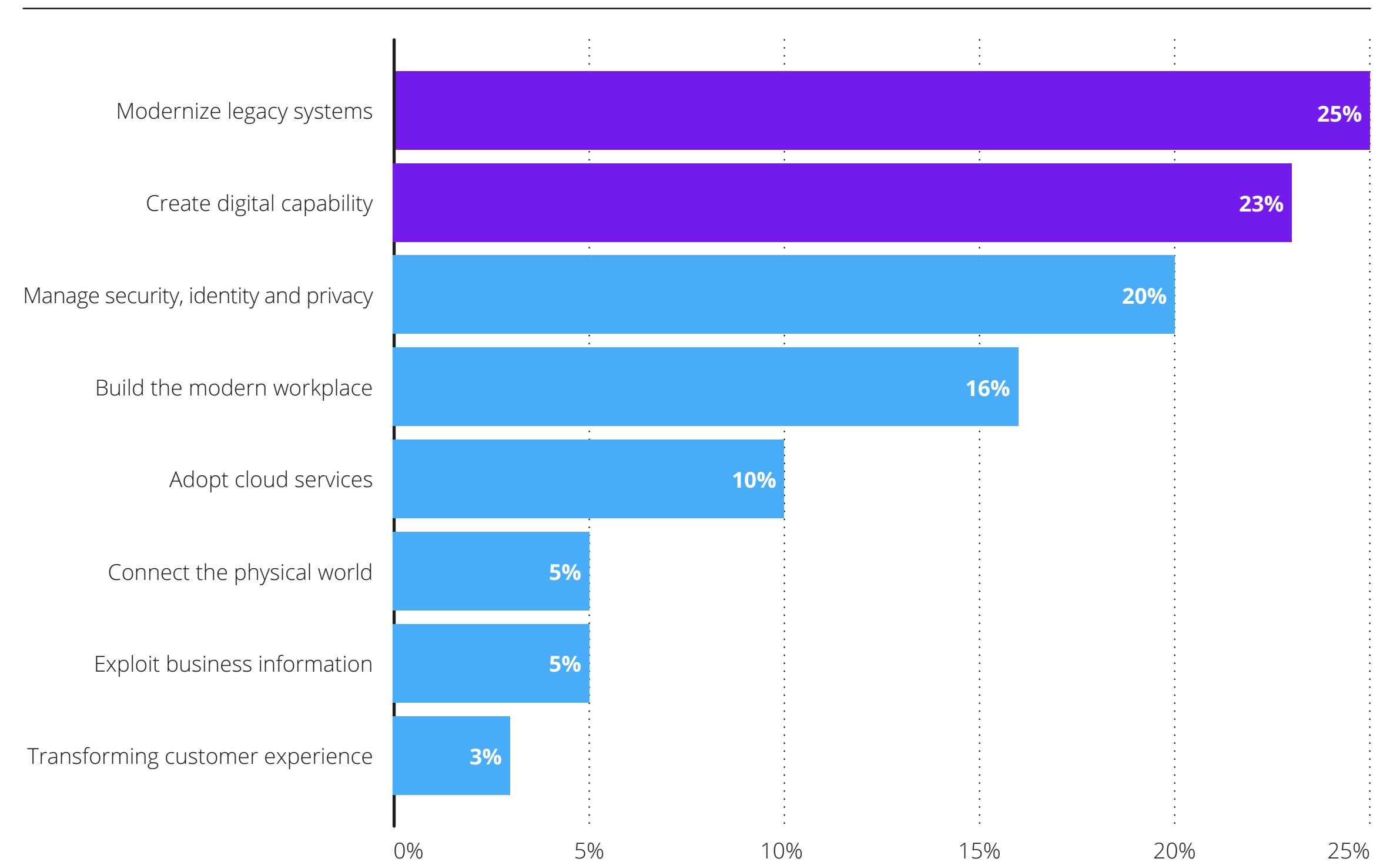
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The challenge of legacy data infrastructure

Today's financial institutions look more like technology firms than banks in the traditional sense. They have evolved as the notion of money has evolved; after all, less than 10% of the global money supply exists in the form of currency and coins—the rest is digital. So, in fact, there are two forms of data at a financial institution: one is money itself, and the second is the data about money. This is financial institutions' continued incumbent advantage.

For financial institutions, data about money is both the source and the outcome of value creation. Competing in the data economy requires sustained investment in the generation, collection, curation, analysis, and protection of a wide array of structured and unstructured data. The ability for a financial institution to successfully pursue and monetize digitally based business models requires a holistic, homogeneous view of all data both within and beyond the organization.

Financial institutions are actively seeking to modernize their legacy and critical applications as well as underlying data infrastructure investments (see Figure 1). Their challenge? The cost of managing legacy database and data-processing infrastructure increases the operating cost of data storage, processing integration, and analysis. This interplay of IT management costs and ongoing license and maintenance costs in turn inhibits investment, which ultimately constrains the pursuit of innovation (see Figure 2).

Figure 1: Top IT Priorities for financial services institutions

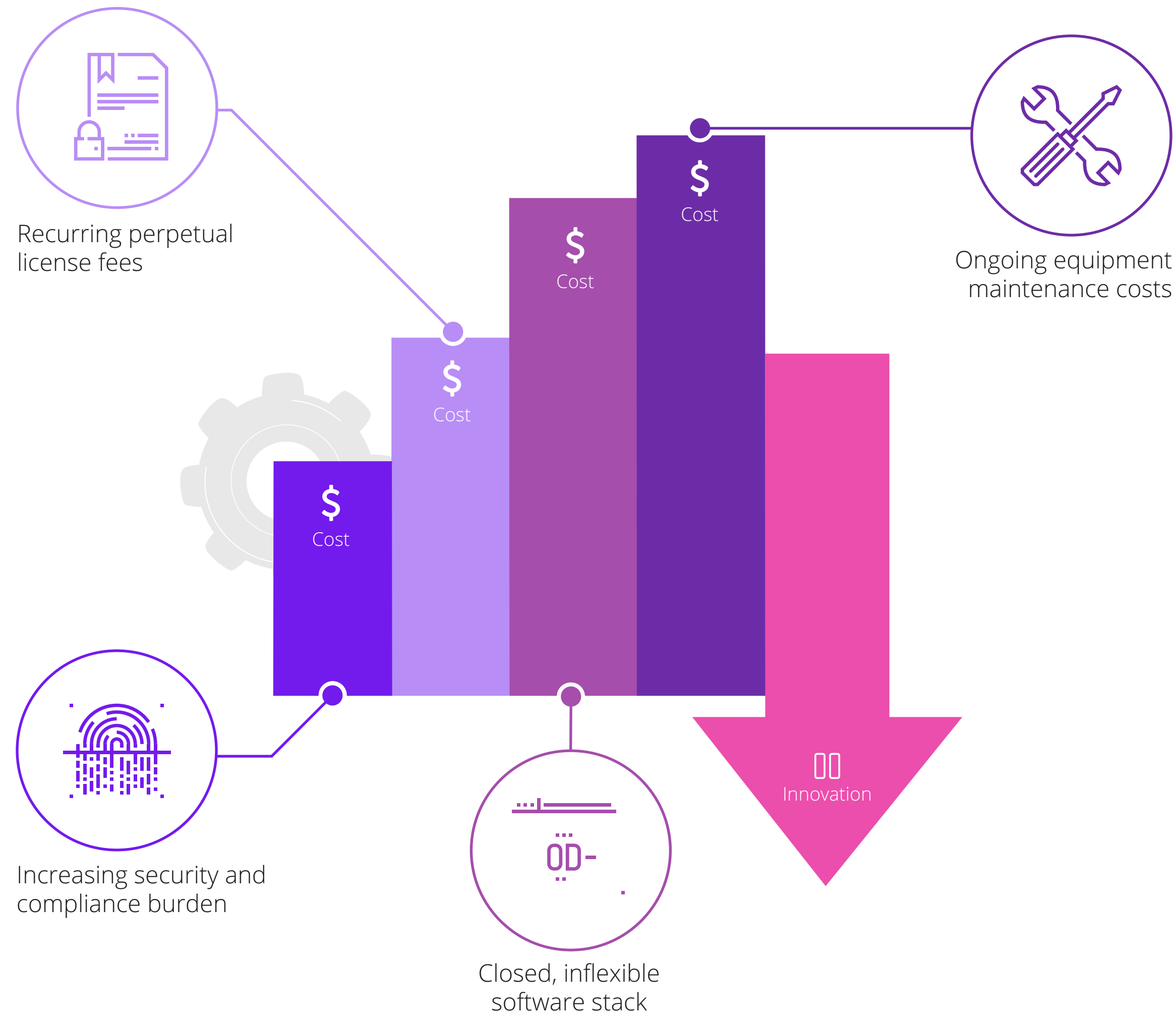| Priority	Value
Modernize legacy systems	25%
Create digital capability	23%
Manage security, identity and privacy	20%
Build the modern workplace	16%
Adopt cloud services	10%
Connect the physical world	5%
Exploit business information	5%
Transforming customer experience	3%

QUESTION: HOW IMPORTANT ARE THE ABOVE TECHNOLOGY AREAS TO YOUR ORGANIZATION?
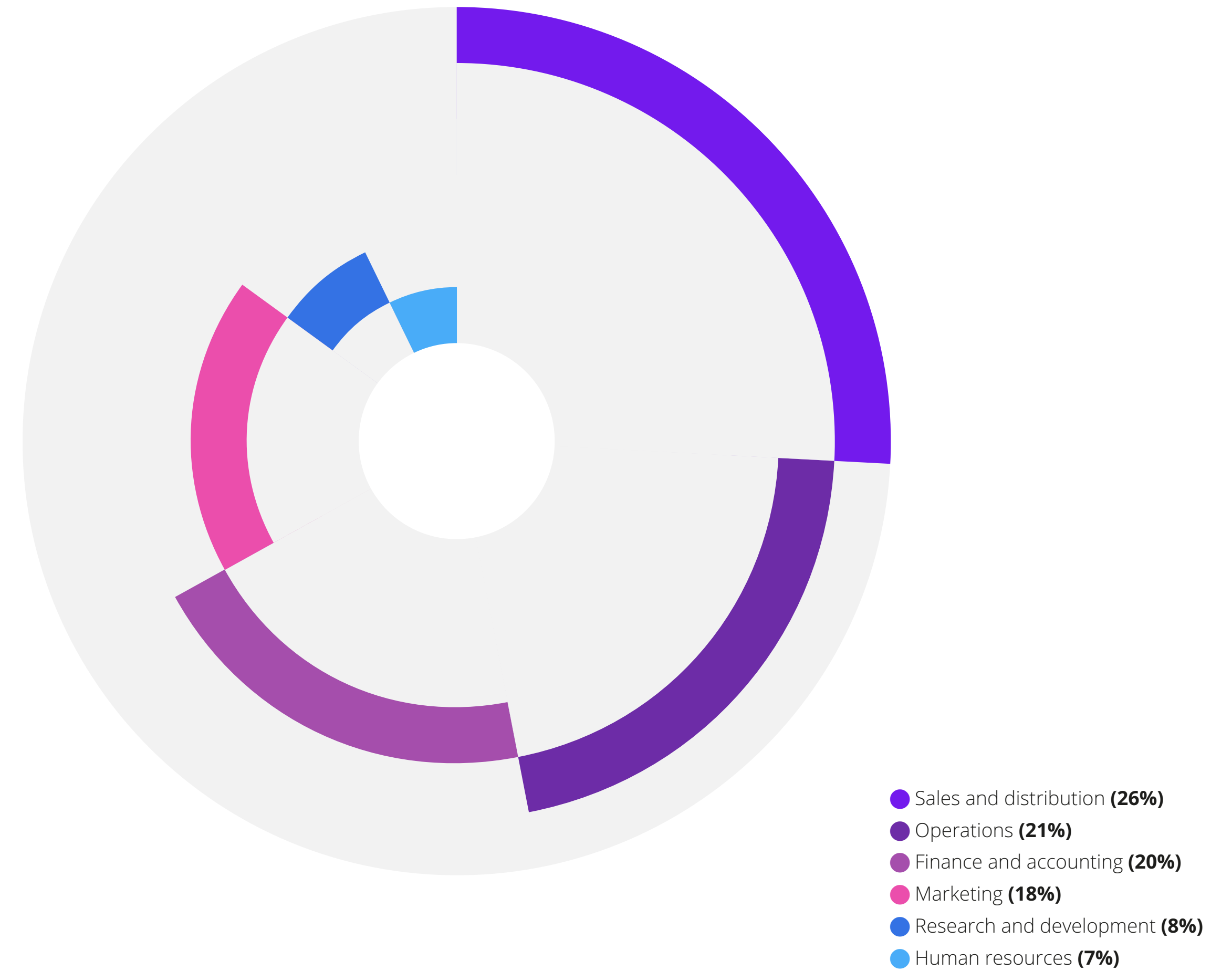SAMPLE: 1,457 RESPONDENTS FROM RETAIL BANKING, CORPORATE BANKING, FINANCIAL MARKETS, AND INSURANCE

SOURCE: OMDIA ICT ENTERPRISE SURVEY, 2019/20

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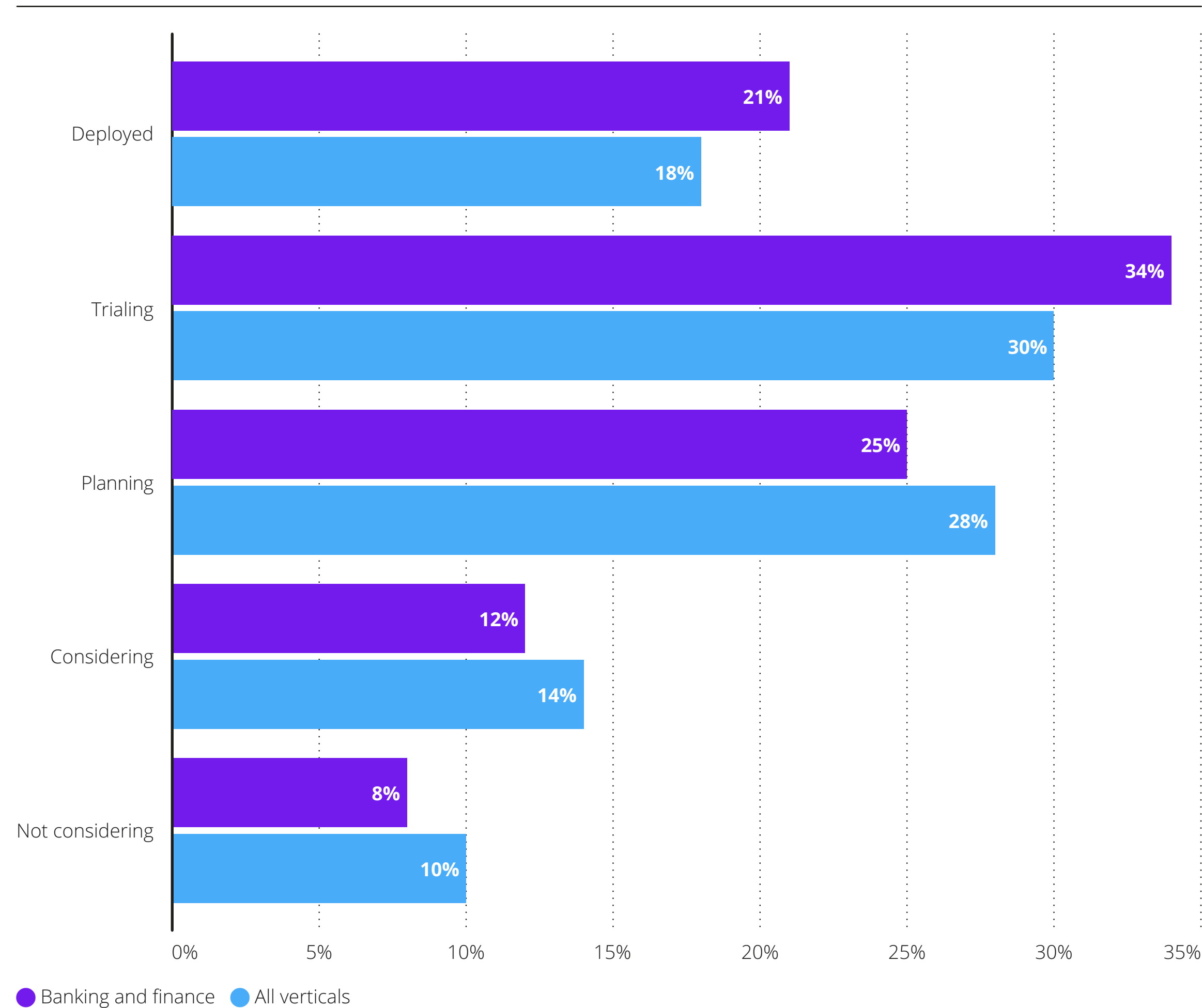**Figure 2:** The impact of increasing IT management costs on innovation spend

Recurring perpetual license fees

Ongoing equipment maintenance costs

Increasing security and compliance burden

Closed, inflexible software stack

Cost

Cost

Cost

Cost

Innovation

Figure 3: Financial services institutions IT spend by department

- Sales and distribution **(26%)**
- Operations **(21%)**
- Finance and accounting **(20%)**
- Marketing **(18%)**
- Research and development **(8%)**
- Human resources **(7%)**

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Figure 4: Cross sector machine learning investment plans, 2020/21

Banking and finance   All verticals

How widespread is this problem? A recent Omdia survey of nearly 500 financial services IT stakeholders ranked operations (in other words, keeping the lights on) as one of the costliest areas of IT spend, outweighing research and development by more than a factor of two (see Figure 3).

And yet, with ML, financial institutions see an opportunity to take charge of their own destiny, reducing IT management costs and discovering new, differentiated business models. Implementing ML across applications requires a significant investment in the data management software, processing infrastructure, and personnel skilled in these areas. This level of commitment is reflected in Omdia's recent research, which shows that when compared to other sectors, banking and financial institutions are more committed to ML and more likely to trial new ML projects (see Figure 4).

This is yet another reason why a solid, innovative data management platform is foundational to the success of financial institutions. A large percentage of ML projects never make it to production due to disjointed analytics processes, which create operational hurdles to move ML projects from sandboxes into production deployments. Distributed databases and microservice data stores are initially appealing to facilitate growth of new business projects across the organization. Over time the resulting data sprawl, security and compliance gaps, and fragmented data stores increase operational and infrastructure costs. Using a converged database and consolidating databases onto an optimized platform standardizes operations, improving compliance, security, and availability, and lowering total cost of ownership.

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High-speed transactional workloads or highly sensitive advanced analytics and ML workloads require an underlying database infrastructure that delivers extreme performance, maximum availability, and security with scale. Without meeting these data management foundational requirements, business applications will ultimately be throttled due to performance or availability issues, not to mention the risk of data breaches or data loss even as demand for services grows.

Data management is another area where Oracle leads the industry in delivering the most comprehensive solution. The Oracle Database is the de facto standard in financial services for mission-critical OLTP, data warehousing, and converged and mixed workload core business applications. With an advanced multi-model architecture, Oracle Database can converge specialized technology data models and core transactional applications into a single data management system.

Leveraging the Oracle Database as the converged data management backbone, microservices developers can build applications in their preferred language (e.g. JSON etc.) with flexible data models or use Oracle APEX for low-code application development. Developers can also embed Oracle advanced analytical capabilities within their applications, adding a level of built-in intelligence for increased actionable data insights.

The Oracle Database provides over 50 in-database parallel ML algorithms including deep-learning for real-time recommendations, fraud-detection, and sentiment analysis. Graph algorithms enable the exploration and discovery of relationships in social networks, IoT, big data, data warehouses, and complex transaction data for applications such as fraud detection in banking, and customer 360. Core business

applications or microservices developers can harness the power of machine learning and advanced spatial/graphs.

As part of digital initiatives, financial institutions are also seeking ways to control costs and allocate budget dollars in areas that maximize near- and longer-term results. By consolidating on-premises Oracle Databases on Oracle Exadata, customers gain higher performance, higher availability, and improved security at lower cost than DIY infrastructures.

For most companies, moving to public cloud services and cloud-native hardware/software architectures makes solid business sense. Doing so reduces data center space, management, and maintenance overhead. It also moves expenses from capex to opex, making room for a more flexible, responsive approach to IT investment.

Experienced financial services enterprise IT practitioners are taking a broader holistic approach to IT modernization versus a singular public cloud-first mindset by creating an effective roadmap to choose the most appropriate path based on business and application requirements. A one-size-fits-all cloud-native strategy of deployment venue doesn't address the challenges of meeting performance expectations, disentangling tightly woven on-premises applications, and data sovereignty/data residency requirements.

The key is architectural and operational identicality across cloud and on-premises deployment models to deliver the benefits of cloud in both deployment models.

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Regardless of data residence, whether on-premises, a cloud on-premises, or public cloud, an effective modernization framework must include the following:

- Automated maintenance and management to keep systems up to date

- Rapid response times to make quick, informed, data-driven decisions

- Seamless interoperability and migration across chosen deployment models

- True scale out with predictable performance

- Hardened data security, ensuring privacy and regulatory compliance

- Nimble application design/implementation of new services or products within the corporate data governance framework

- A pay-for-use consumption model, avoiding the cost burden of idle resources

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Adopting cloud-native data infrastructure services on-premises

Assembling the data-centric, cloud-native infrastructure capable of automated functions is certainly within the grasp of finance organizations. Enterprise practitioners looking to create data-centric services on-premises have a number of available routes at their disposal.

- Bespoke, do-it-yourself, on-premises conversion to cloud technologies to provide cloud-like services to employees and customers
  - Organizations deploy cloud technologies in their own data centers and manage those resources themselves
  - Organizations deploy cloud technologies in their own data centers but outsource their management to systems integrators (SIs)
- Vendors deploy cloud services in their own data centers, and banks' IT systems in the same (or close by) data centers connect directly to those services
- Cloud on-premises offerings from public cloud service providers
  - Banks subscribe to managed public cloud services deployed on-premises in their own data centers

Public cloud approaches proposed by some cloud service providers to address the concerns of the financial services industry are still unproven—or have proven to be inadequate. Yet, the benefits of cloud-native development practices, data storage, and data processing architectures continue to command attention. Such practices promise to lower operating costs, increase agility, and attract talent. Even regulators have come to understand that lowering the cost of computing and increasing the banking industry's security, resilience, and adaptability is essential to the safety and soundness of the system as a whole.

For budget holders, this notion of cloud on-premises computing has already had a positive impact, helping to balance the scale between operating cost and innovation. Even with most cloud on-premises solutions, where the service provider manages the infrastructure, banks still have to maintain teams of skilled professionals to manage their databases and applications, tune and optimize their systems, and secure their sensitive data.

They also need to continually improve and update those systems so that they don't lose the ability to experiment with and deploy emerging technologies that arrive with increasing frequency. This constant chase is even worse for do-it-yourself solutions to keep up.

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But what if there is another way?

Given the speed and agility required, a do-it-yourself approach is no longer viable. It takes too much time and resources to build. Once built, it's labor-intensive and expensive to operate and maintain, as well as to keep up with new technologies and applications. Cloud on-premises solutions are a better alternative. While many public cloud providers have sought to extend their services architectures to the on-premises world, they cannot completely free customers from management complexities or grant complete control to IT practitioners. For this reason, many enterprise buyers have chosen to adopt dedicated, engineered hardware that's equipped with fully automated cloud operations and management.

Financial services institutions continue to view Oracle as the partner of choice for deploying dedicated engineered hardware both in the public cloud and on-premises, or a combination of the two, with operational consistency across the deployment options.

And because these systems can directly mirror public cloud service architectures, they have the potential to bring together the best of both worlds, cloud and on-premises (see Figure 6). With a control plane connected to the public cloud, they can provide a truly seamless experience.

Figure 5: Characteristics of cloud-on-premises

1. A matching architectural identity between the public cloud and private cloud that allows for seamless movement of workloads between locations and private cloud or cloud on-premises

2. Location-agnostic services that can be deployed anywhere based on business requirements and optimal economics

3. Identical application development and database services for both cloud and on-premises to streamline resource requirements and staffing

4. An on-premises data plane and cloud control plane to support operations for the most demanding compliance and latency requirements

5. Fully automated services on-premises and in the public cloud that maximize uptime

6. A fully open architecture that supports multicloud deployment scenarios

SOURCE: OMDIA

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Figure 6: Benefits of cloud-on-premises

1	Standardize data so that it can be leveraged across lines of business
2	Speed time to market for new projects
3	Ability to more dynamically meet compute needs
4	Allocating equity spend more precisely
5	Attract and retain top talent
6	Reskill and upskill existing IT departments
7	Move between public and on-premises to optimize spend and performance

SOURCE: OMDIA

Engineered systems promise a significant and positive knock-on effect beyond the back office, enabling companies to reallocate funds within high-value areas such as risk management, fraud detection, and customer relationship management—areas that collectively receive less funding than operations alone.
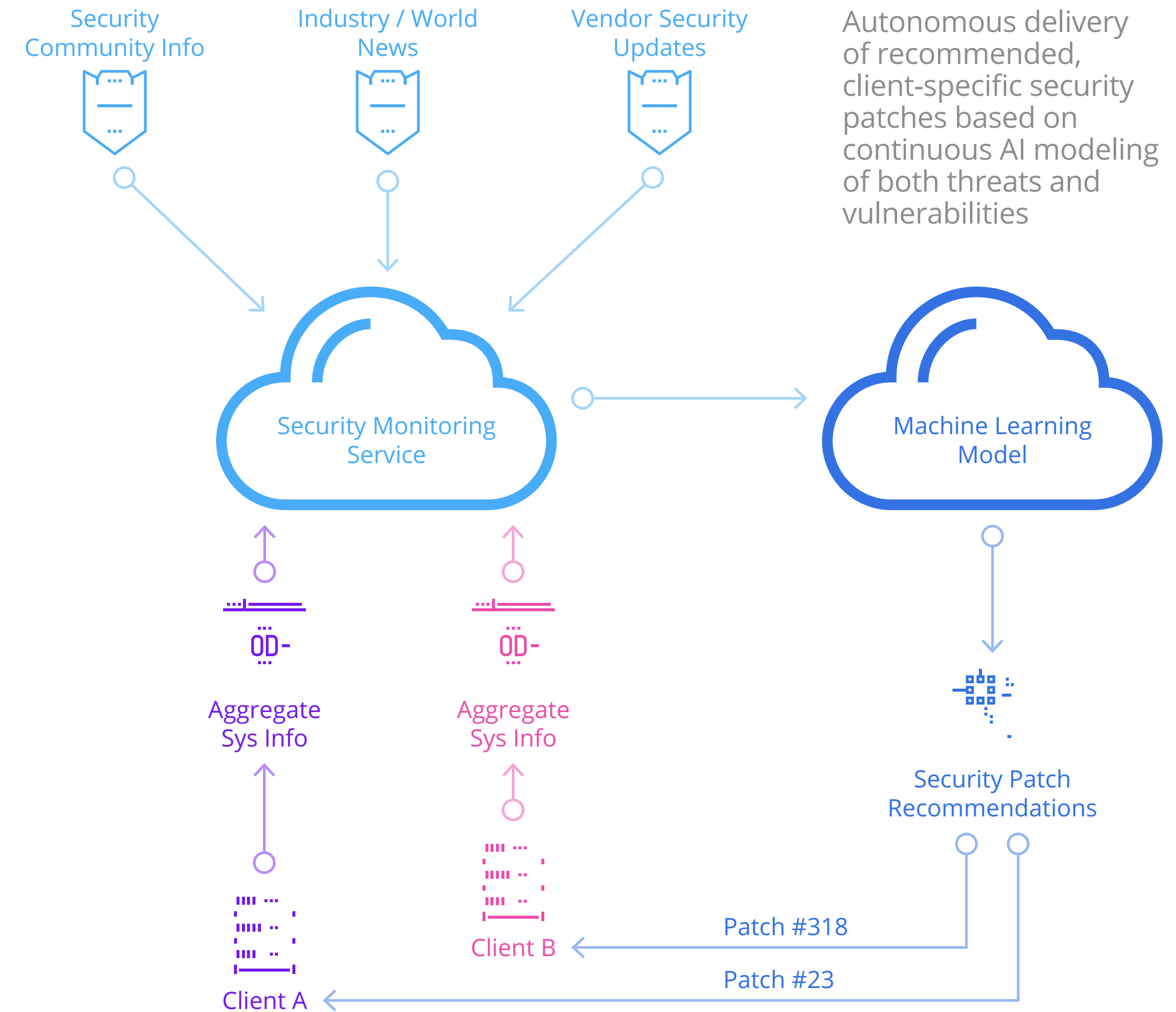
Do banks simply need to invest in cloud-native converged system architectures in order to bring managed/hosted public cloud services in-house? Yes, but an architecture can only go so far. It is not enough to simply establish architectural parity between cloud and on-premises via similar services, APIs, CLIs, or SDKs. Banks will continue to rely on internal resources to retain complete control of data on-premises. Banks will still have to rely on IT and database administrators (DBAs) to rapidly and reliably respond to critical, ongoing daily demands such as:

- Provisioning, deprovisioning, and cloning databases
- Troubleshooting, accommodating growth, and maintaining indexes for changing workloads
- Managing, tuning, patching, backing up, and securing databases
- Ensuring that high availability system failover routines operate reliably
- Configuring and then monitoring data privacy and security settings

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To address these needs, technology providers are using ML to automate these mundane, manual tasks. Some providers, like Oracle, have fully embraced machine learning innovation to deliver the industry's first (and to date only) fully autonomous self-driving database—in the public cloud and now available on Cloud@Customer deployments. Oracle's portfolio continues to expand with Autonomous JSON, Linux, and Data Guard.

For banks seeking to lower operational costs without slowing innovation or compromising resiliency, such intelligent automation for data-centric tasks would be game changing. For example, what if a company could use ML to augment and automate high-risk, error-prone tasks such as identifying vulnerabilities and prioritizing corresponding patches without human intervention or downtime? (See Figure 7.)

Figure 7: Lifecycle for AI-driven security patches

Security Community Info

Industry / World News

Vendor Security Updates

Autonomous delivery of recommended, client-specific security patches based on continuous AI modeling of both threats and vulnerabilities

Security Monitoring Service

Machine Learning Model

Aggregate Sys Info

Aggregate Sys Info

Security Patch Recommendations

Patch #318

Client B

Patch #23

Client A

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Oracle's cloud on-premises solutions are the better way for financial services institutions

Oracle was the first cloud provider to introduce and ship a cloud on-premises product in 2017, Exadata Cloud@Customer, bringing the outstanding performance and reliability of Exadata as a managed cloud service in the customer's data center. Large banks and insurance companies can modernize their data infrastructure using an opex model, reduce maintenance overhead, and improve total cost of ownership (TCO) by up to 50%, all while keeping data on-premises to comply with regulation and internal policies.

Now, with the launch of Oracle Dedicated Region Cloud@Customer, Oracle is the only provider to make the full capabilities of Oracle Cloud Infrastructure, including Autonomous Database and Fusion SaaS services available inside the customer's data center. Oracle Dedicated Region Cloud@Customer is designed for enterprises that need to keep certain applications on-premises for data residency or stringent latency requirements, while using the public cloud for everything else.

Financial institutions can now run mission-critical trading and exchange platforms at single-digit-millisecond latencies using a fully managed cloud region on-premises that gives them access to the same SLAs, APIs, and tools available in Oracle's public cloud. This provides a truly consistent experience across all the cloud and on-premises deployments without the need of moving applications and data outside

their data centers. Moreover, organizations can also deliver banking, payments processing, and risk management services to customers and financial clients from in-country locations, leveraging Oracle products such as FLEXCUBE and Oracle Financial Services Analytical Applications. They can easily apply machine learning services for real-time insights and get all the benefits of public cloud while retaining control of their data and physical security and getting access to all new features and updates the moment they are made available in Oracle's public cloud regions without ever moving their data or applications.
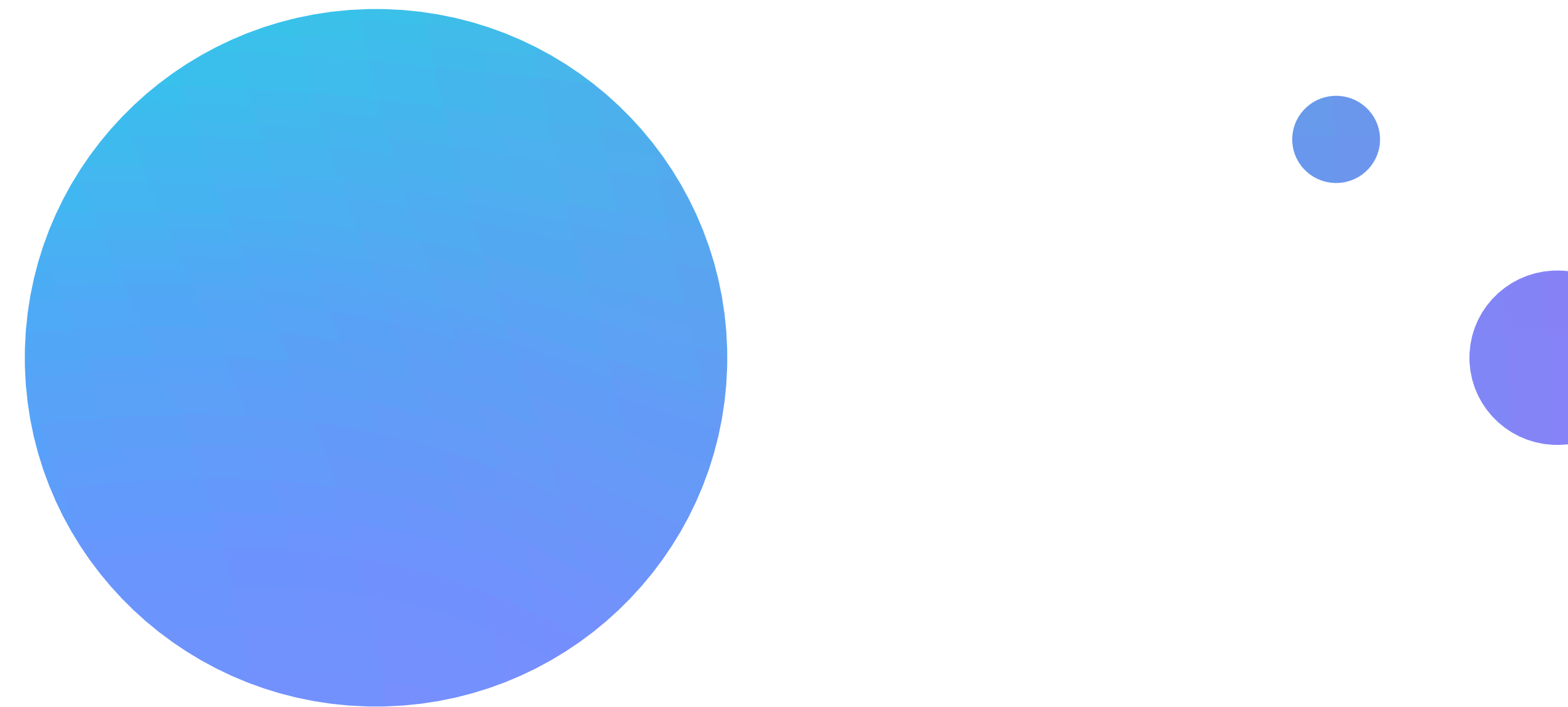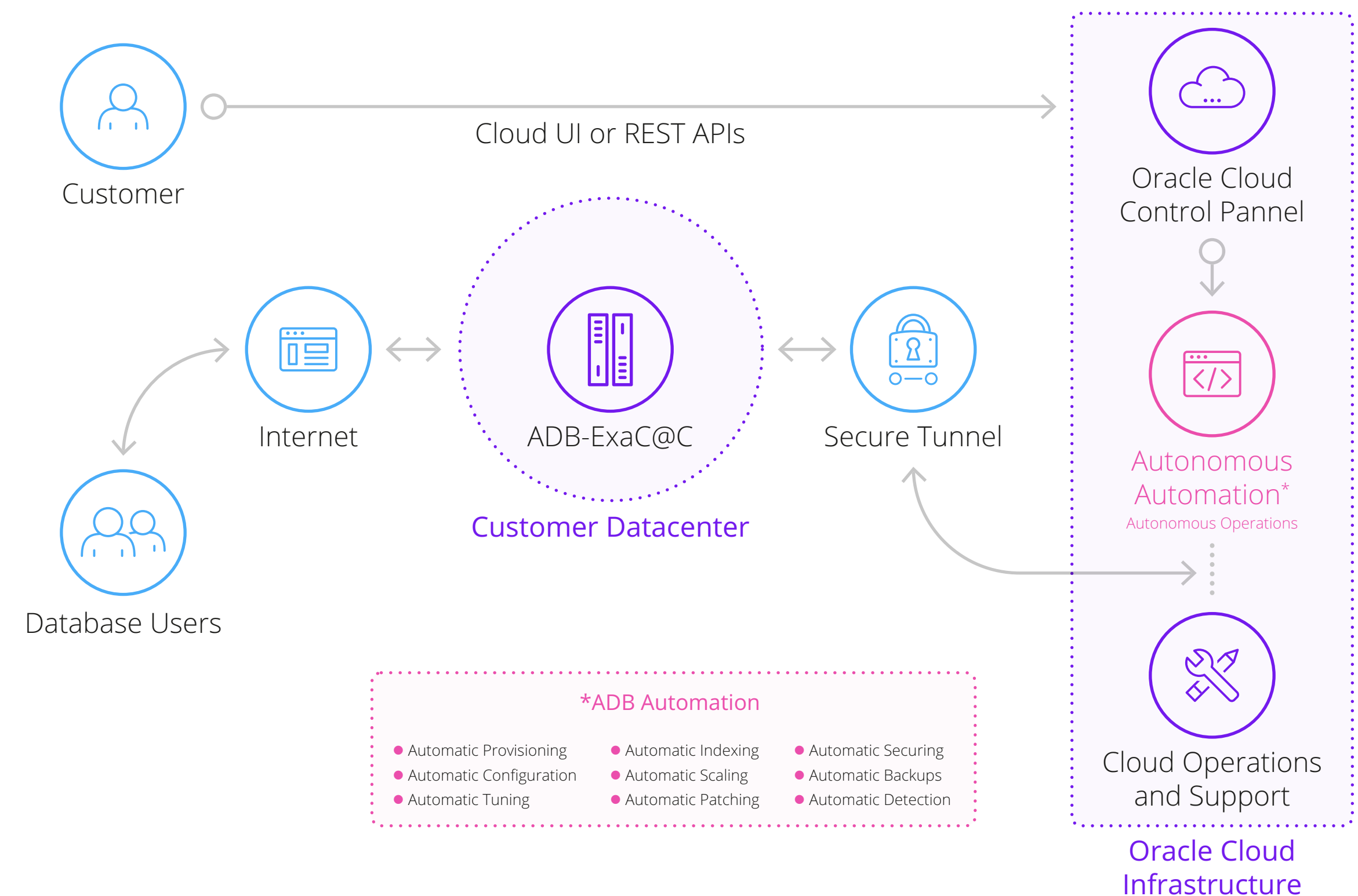
Oracle Autonomous Database inside your data center

Oracle also announced the *Autonomous Database on Exadata Cloud@Customer*, which brings Oracle Autonomous Database's self-driving, self-securing, and self-repairing capabilities to the customer's data center. It is also available via Oracle Dedicated Region Cloud@Customer and as a stand-alone offering. This makes Oracle the only vendor to provide autonomous database operations, a pay-per-use model, dynamic scaling, and reduced TCO in the customer data center without moving your data or applications.

Oracle *Autonomous Database* is a cloud database that provides OLTP, real-time analytics, and data warehousing optimized services while eliminating the complexity of operating and securing databases. The service uses machine learning to automate provisioning, configuring, tuning, scaling, patching, encrypting, backing-up, and repairing databases reducing operational costs by up to 90%. Machine learning–based automations eliminate human error and ensure the database is always available. Customers can benefit from the built-in best practices that Oracle has accrued, based on its extensive experience in building and operating databases for the world's most critical and complex applications.

Figure 8: Oracle Autonomous Database on Exadata Cloud@Customer

Customer

Cloud UI or REST APIs

Oracle Cloud Control Pannel

Internet

Database Users

ADB-ExaC@C

Customer Datacenter

Secure Tunnel

Autonomous Automation*
Autonomous Operations

Cloud Operations and Support

Oracle Cloud Infrastructure

*ADB Automation

- Automatic Provisioning
- Automatic Configuration
- Automatic Tuning
- Automatic Indexing
- Automatic Scaling
- Automatic Patching
- Automatic Securing
- Automatic Backups
- Automatic Detection

SOURCE: ORACLE

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Built on Oracle's Maximum Availability Architecture (MAA) and always-on encryption, Oracle Autonomous Database delivers the highest levels of availability, business continuity, and data protection. Financial institutions can:

- Eliminate concerns around database lifecycle management, with fully autonomous operations

- Gain easy-to-understand and predictable costs with consumption-based, pay-per-use pricing

- Get deployment flexibility and predictability across cloud and on-premises databases with the identical functionality, operational model, SLAs, and subscription pricing as Oracle Cloud Infrastructure in your data center

- Eliminate manual, mundane database management tasks so resources can work on more strategic, revenue-generating projects

- Increase database security and get protection against malware and hacks with a self-securing solution

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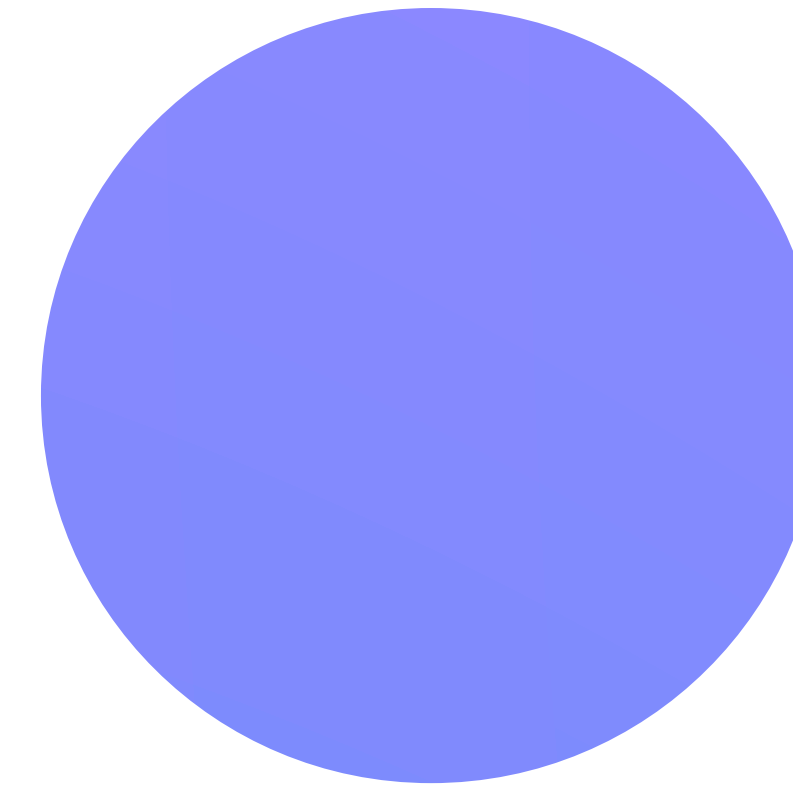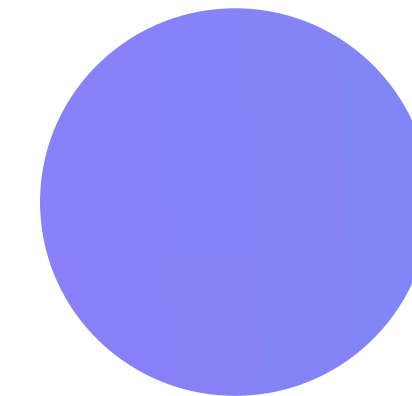
Conclusion

Oracle provides the most optimal and cost-effective solutions for financial services institutions spanning from on-premises to cloud and hybrid deployment options. The case for financial institutions to modernize IT by consolidating on-premises environments and taking advantage of the cloud model is clear and urgent. The situation and requirements of every financial institution are unique, and the process of deciding when to migrate toward a cloud model will differ for each. However, all should adhere to the following guiding principles:

- Adopt a data-first and cloud-native transformation strategy to eliminate data silos, lower costs, and improve the security, performance, and monetization of the institution's data.

- Data architectures and operational models should be consistent and identical across the organization from on-premises to the cloud to facilitate the most advantageous deployment of core processing, data analytics, and ML workloads, dictated by performance, security, or regulatory needs.

- Machine learning should be an embedded and integral element within the systems management environment, enabling the automation of inefficient and error-prone tasks such as security patching, optimizing performance with query and index tuning, system monitoring and alerting, and auto-repairing.

- Programmatically shift requirements toward an on-premises cloud-native infrastructure that can quickly deploy regulatory compliant data, analytics,

and machine learning services based on business requirements and economic demands

For those financial services institutions that are considering taking advantage of the cloud benefits, but can't move due to regulatory or business reasons, Oracle's cloud on-premises options provide an optimal solution and clearly address all of the guiding principles listed above.

Oracle provides the most optimal and cost-effective solutions for financial services institutions spanning from on-premises to cloud and hybrid deployment options. You can choose Exadata Cloud@Customer or Autonomous Database on Exadata Cloud@Customer to move your Oracle Databases to your cloud in your data center or Dedicated Region Cloud@Customer for a full Oracle Cloud experience in your data center. Regardless, you get the full cloud benefits: infrastructure management by Oracle, pay-for-use, scale up and down as needed, and of course, full automation with Autonomous Database. With these options, you can reduce costs and improve performance, availability, security, and efficiency in your data center. For financial services institutions, the Oracle Cloud@Customer portfolio is the leading choice to meet all of their business and technology objectives for an on-premises database cloud deployment.

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Integrated Cloud Applications & Platform Services

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About

Omdia

Omdia is a global technology research powerhouse, established following the merger of the research division of Informa Tech (Ovum, Heavy Reading, and Tractica) and the acquired IHS Markit technology research portfolio*.

We combine the expertise of more than 400 analysts across the entire technology spectrum, covering 150 markets. We publish over 3,000 research reports annually, reaching more than 14,000 subscribers, and cover thousands of technology, media, and telecommunications companies.

Our exhaustive intelligence and deep technology expertise enable us to uncover actionable insights that help our customers connect the dots in today's constantly evolving technology environment and empower them to improve their businesses – today and tomorrow.

*The majority of IHS Markit technology research products and solutions were acquired by Informa in August 2019 and are now part of Omdia.

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