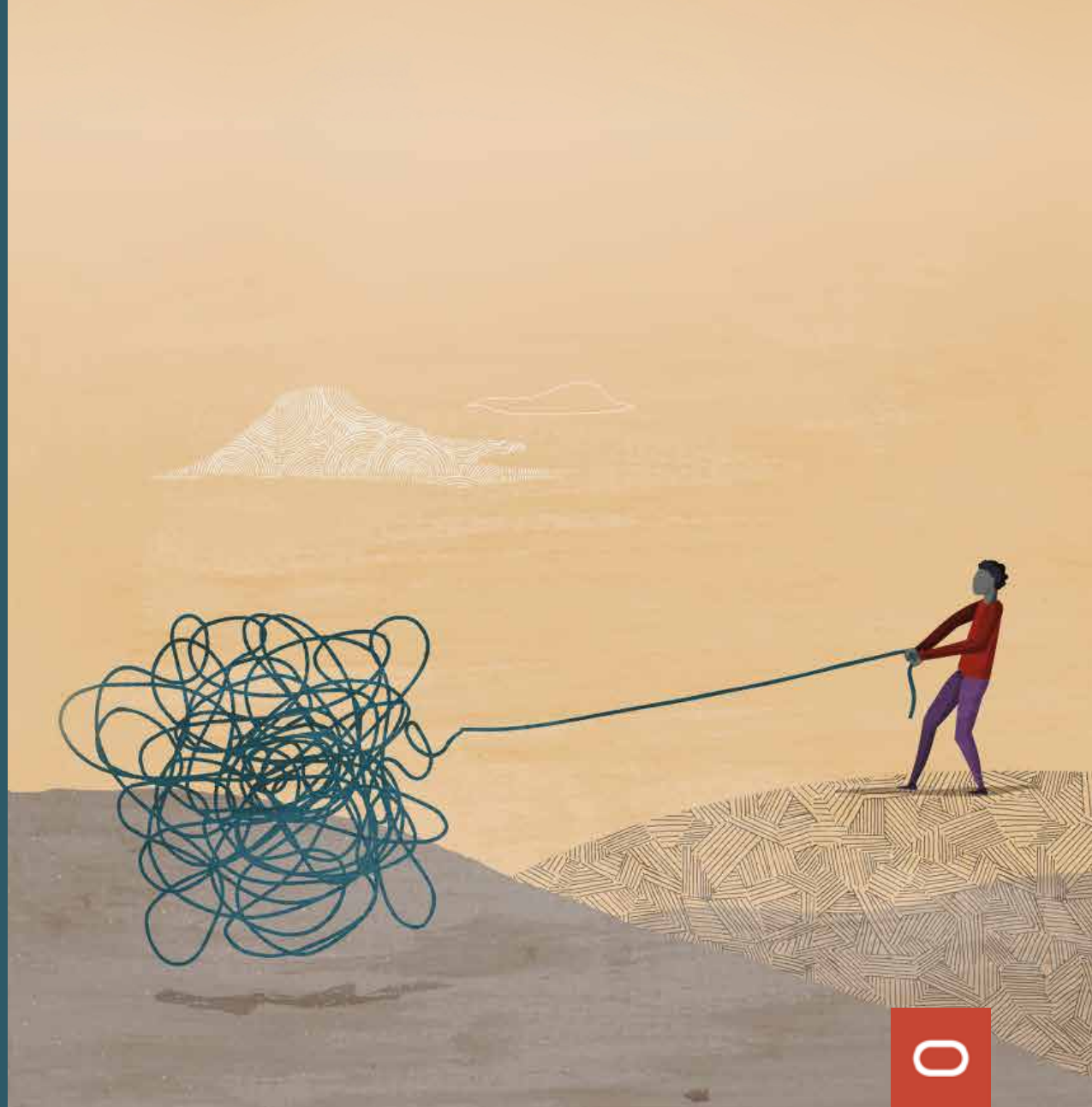


The Hidden Data Economy

How to improve a firm's data liquidity, data productivity and data security

July 2020



About ADAPT

ADAPT's vision is to make Australia & NZ more commercially competitive and productive, for current and for future generations. For nearly 10 years, the company has enabled this by connecting and equipping executives with the knowledge, relationships, inspiration and tools they need to gain advantage. With a deep understanding of modern business challenges, ADAPT delivers unique local research and advisory.

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It will be those who can manage data and extract insights, who will best emerge from a time of unprecedented change.”

- Director, Data Engineering and Architecture, Aviation



Data is the New Capital

The pursuit of a business is to thrive in any environment – improve profitability, diversify revenue streams, develop new products and services, and create value for customers and stakeholders alike. So far, organisations have relied on human skills, technology, and physical infrastructure as the capital to accomplish this pursuit. With the advent of digitalisation, commoditisation of IT and the proliferation of smartphones, data has emerged as a critical business asset. In past few years, evolution in digital technologies, cloud, and big data analytics have made it possible for organisations to gather, analyse and make effective use of data that comes in high volume and variety.

Consequently, data has emerged as a new form of capital, which can be treated at par with traditional financial and human capital, to develop new products and services along with accomplishing other business goals. Organisations must envision data as a core asset that is created once but monetised repeatedly over a longer period with iterations and modifications.

Data capital can be seen as a highly relevant economic concept in which data acts as an intangible asset to generate value for multiple entities in multiple ways. This value creation is not restricted only to the organisation that owns and governs the data but extends to an ecosystem of partners and suppliers who can use the same data to provide a connected experience to the end customer. Within Australia, [NSW's spatial digital twin project](#) is one of the greatest examples of using data as capital.

According to 2019 ADAPT EDGE surveys conducted across CIOs, CDOs, CFOs and CISOs, building a data-driven organisation is one of the top ten strategic business priorities for ANZ businesses. However, about 70% of CIOs have told ADAPT that they are not on top of their data management game. They are struggling to prioritise, store, manage and analyse their data assets, losing new business opportunities and lagging in global competition.

Building a data-driven business requires a unified focus on skills, back-end processes, core IT infrastructure and enterprise data architecture. For the Chief Data Officers, the biggest challenge is to maximise the value created by enterprise data while ensuring compliance, governance, security, and integrity of data for organisational use.

The concept of data capital helps enterprises of all sizes to create an agile, scalable, secure and reliable architecture in which data resides in systems that can hold it for a long-term, is readily available to analysts, data scientists, and developers anywhere, anytime.



3 Focus Areas for Increasing Returns on Data Capital



To bring a firm's hidden data economy into the light and grow its return on data capital, it should focus on improvements in three areas: data liquidity, data productivity, and data security. It is important to note that the framework of data capital treats data governance as a single thread that underpins and contributes to both data security and data productivity. Hence it is necessary to cover the distinct aspects of data governance separately under data productivity and data security.

Data discovery, data quality, data performance and storage affect data productivity and hence, are addressed within that section. Data access and compliance are integral to data security and hence are addressed within that section.

Understanding the connection between different aspects of data governance with data productivity and security is critical for organisations and executive leadership teams when setting up a functional group to build a data strategy and execution plan. Risk management, governance and compliance teams along with cybersecurity professionals must be brought into the data architecture conversation from the beginning to achieve the three characteristics of data capital successfully.



Key Findings

ADAPT, an independent research and advisory firm focussed on Australia and New Zealand market conducted targeted research on the state of data discovery, governance, management, productivity, analytics within 25 leading ANZ organisations. These leaders are responsible for creating data governance policies, architecture, analytics capabilities and helping their organisations to utilise data as a business differentiator.

ADAPT's research from its annual surveys such as CISO EDGE, CIO EDGE and CDO EDGE with more than 150 ANZ organisations have also been used to dive deeper into the state of data security and management.

The study reveals that while ANZ organisations understand the need and importance of using data capital for making business decisions, they are struggling in the areas of the hidden data economy – data liquidity, data productivity, data security and data governance.

Read this report to understand the state of data capital within ANZ organisations, the challenges and the steps you can take to execute on a data-driven business strategy for your organisation.

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We established a Chief Data Officer division in 2019, and our first key deliverable was a data strategy and a roadmap to implement it. This was to promote the mantra that data needs to be the determining factor for critical business decisions. We are now on a multi-year journey to realise this. Trust and partnership are key. Business and ICT need to work in collaboration to enable success.”

- Director, BI Operations, Public Sector

Chapter 2

Data Liquidity

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Data liquidity is the ability to get data from its point of origin to its many points of use efficiently. The point of origin is usually an app, device, or sensor. The point of use is usually AI, analytic, or another app.

Data liquidity gains its relevance from the proliferation of data from multiple devices, sensors, digital channels, and applications. This data is in different formats and not readily available for analytics and other purposes. In order to use all the data coming from multiple devices and channels, the data needs to act as a shapeshifter, implying that it can be converted into different formats and structures for multiple uses. For example, a set of key-values that may be written down as a JSON object through one API, but can be queried with SQL, a language usually reserved only for tabular data, through a different API. The recommendation section will elaborate on how organisations can achieve this level of liquidity without any manual effort.

“Data liquidity lies at the heart of securing ROI on investment in data technologies and capabilities. Unfortunately, all too often strategies in large organisations to centralise curated data are obsolete before they are executed.”

– GM, Big Data Analytics, Telecommunication



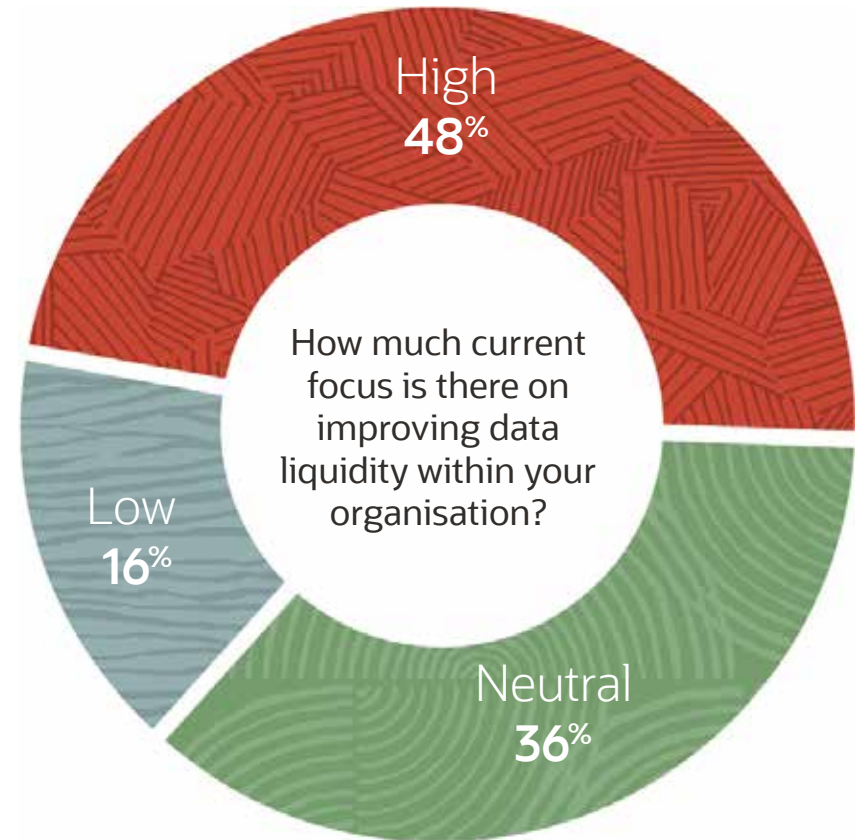
Limited Focus on Data Liquidity

ADAPT research shows that almost 50% of respondent organisations are focusing on data liquidity. The percentage is lower when compared to data productivity and governance.

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The tsunami of data we have at our fingertips needs to be more readily available in real-time, allowing us to prepare for our increased workloads. The current crisis has been a useful catalyst to bring the importance of timely data to the forefront of all.”

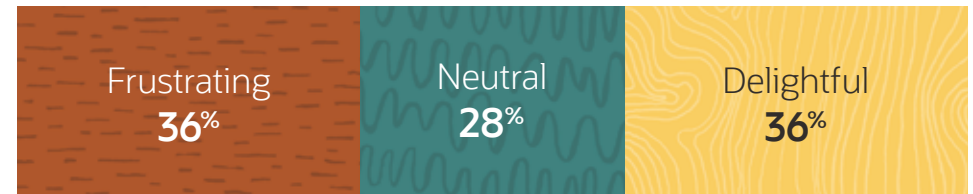
- Senior Director, Business Operations, Public Sector



Data Liquidity Challenges

How effective is your organisation in the following areas?

Repurposing data: Do your systems enable flexibility to repurpose data to put it to new uses?



Converting data into the form that can be used for analysis: Can you convert data into liquid assets from the point of creation to the place it can be used, without complexity?



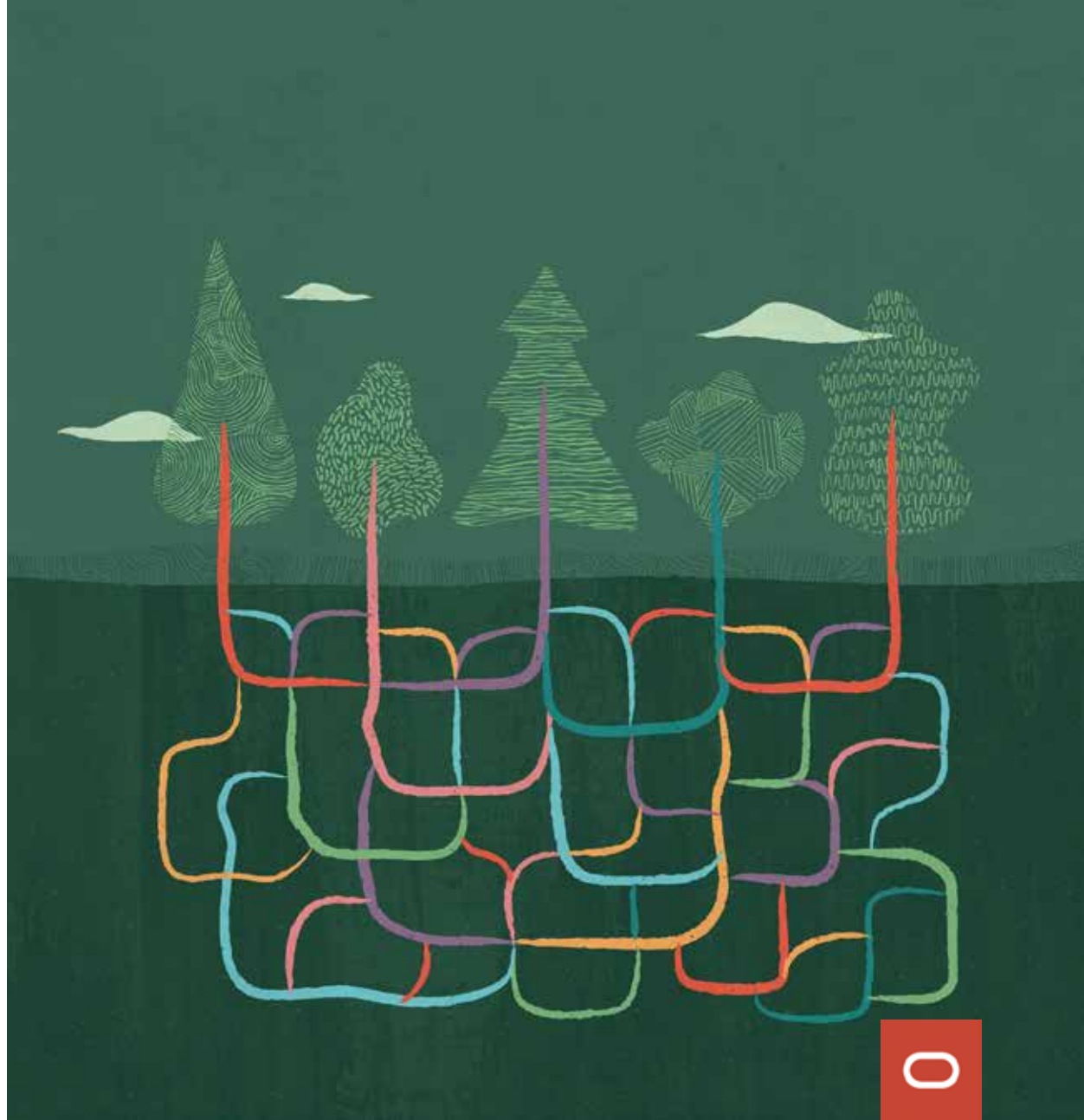
Siloed and complex application development: Do specific data types and specialised databases perpetuate data silos, bespoke security and complex app dependencies?



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We excel in some areas/business units but not others. Our org structure has evolved that will bring a consistent maturity across the business but over time.”

– Director, Open Data and Innovation,
Transportation



ADAPT research revealed the following key trends around data liquidity:

44% of respondents feel frustrated with the existing state of different data types and databases that require bespoke security, complex applications, and perpetuate siloes.

Only **36%** of respondents affirm that converting data for analysis is smooth and requires minimum effort.

Only **36%** of respondents affirmed that existing systems were capable of repurposing data for new uses.

Respondents who have achieved some success in creating data liquidity understand the need to augment traditional data warehousing and a single source of truth concepts. Besides, they use a gated data lake and context-based projections, which are driven by a data engineering and deliver continuous governance that is codified and observable. Increasingly, these two approaches are used together.



“We can apply Big Data and AI/ML/DL concepts far easier by challenging conventional wisdom with modern cloud-native engineering practices.”

– GM of Architecture and Engineering, Financial Services

“Data virtualisation technologies offer the ability to leverage in-place data infrastructure to quickly and cost-effectively improve data liquidity and management.”

– GM, Big Data Analytics, Telecommunications



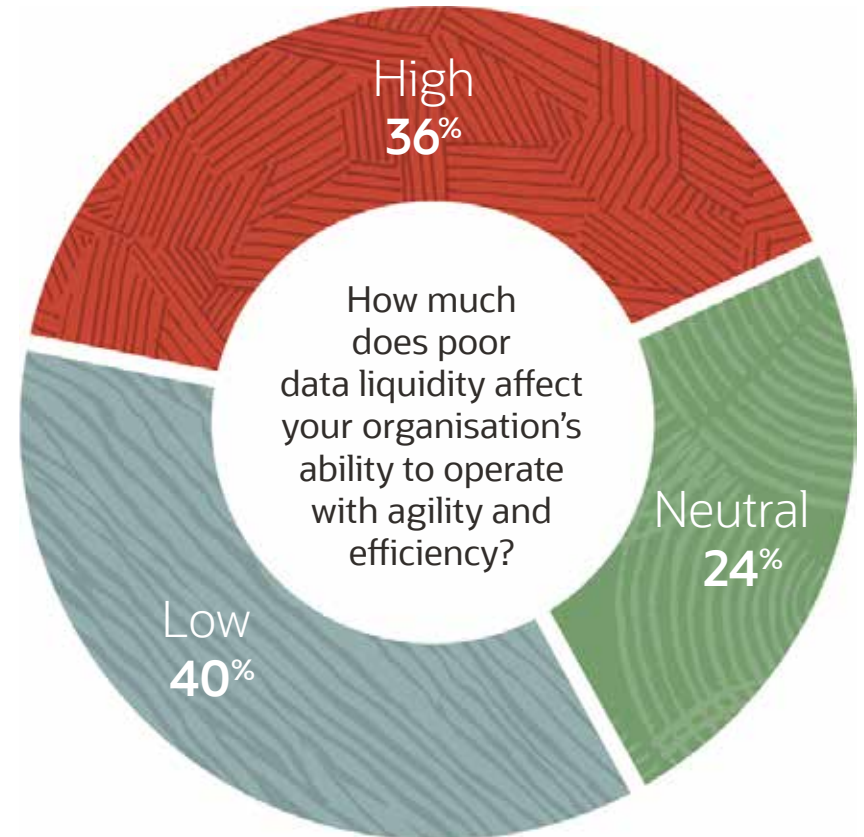
Impact on Agility and Efficiency

There is a little realisation about the impact of data liquidity on the organisation, and this is reflected in the lack of focus from organisations to achieve data liquidity. Only 36% of respondents realise the impact of data liquidity related issues and outcomes on agility and efficiency. Data liquidity is a fundamental pre-requisite to attain data productivity. Organisations will benefit from focussing on data liquidity as a core engine that will fuel the entire organisation to be agile and effective, irrespective of technology and business disruption.

“

This is not so much of a technical problem for my organisation, being the federal government. However, we are bound by legislation for what data we can obtain and use. We cannot, as a general principle, use data obtained under one set of legislation, for a programme that is administered under different legislation.”

- CIO, Australian Defence





Across surveys and conversations, ANZ executives have told ADAPT that lack of clarity at the top makes it difficult to implement an overall data architecture. Business leaders have conflicting priorities and do not understand the importance of investing in a data architecture that enables a unified, connected enterprise. Also, recent investments in cloud platforms and applications have caused application and data sprawl.

The ethos of new app development and data usage is decentralisation. Enterprises need to move away from command-and-control structures. They need a data architecture that reduces the time, cost, and effort of getting data from its point of origin to its many points of use; data liquidity without violating policy.

Data Productivity

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We value data and what can be achieved although our ability to share developments across 28,000 staff is a challenge that means the benefits are lost due to poor visibility.”

– Director, Open Data and Innovation, Transport for NSW

Data productivity is the value created by data, in the form of incremental revenue, cost savings or improving operational excellence. It translates into the dollar output per data input of an action or decision. This happens when an organisation can embed AI and analytics into data to make into business decisions.

While some point solutions have been successful in helping organisations to cater to customers quickly; the HR, Finance, R&D, supply chain, and other functions are unable to use data productively. Also, since data resides separately in different departments within their systems, the vision of a connected enterprise remains a dream for many businesses.

It is essential to discuss data governance here as certain aspects of data governance underpin data productivity. The processes and frameworks that clearly define rules and guidelines around data discovery, data quality, data performance and storage must be considered while strategising data productivity.



High Focus on Data Productivity

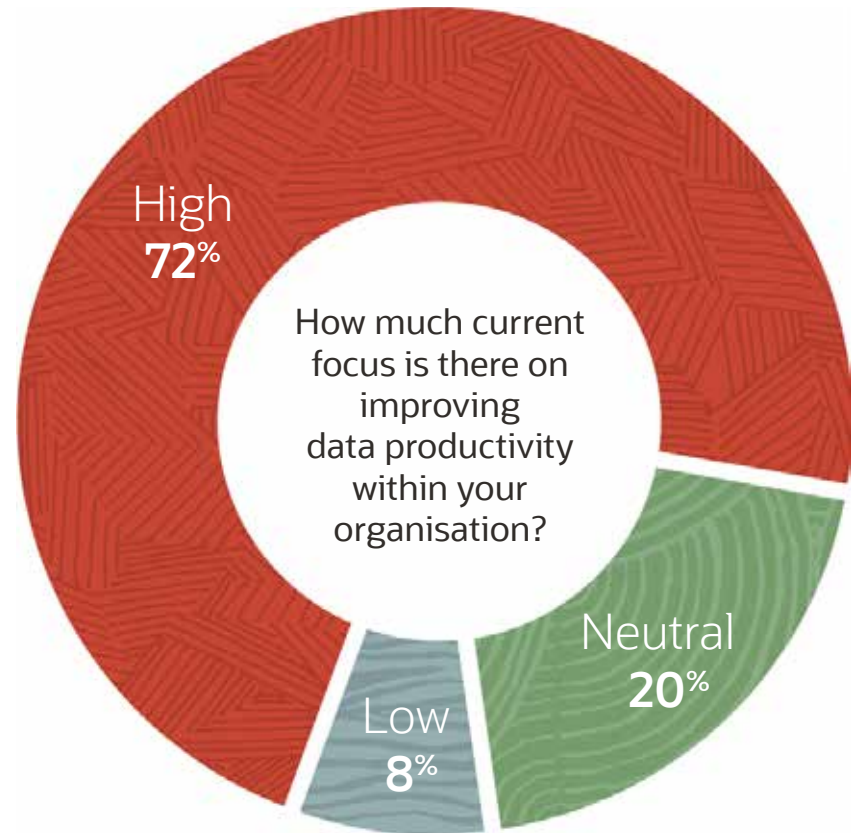
Overall, there is a high focus on improving data productivity within organisations.

- 72% of respondents said that their organisations are focussing on improving data productivity.
- Much of this is done by setting up a data division and hiring data science and analytics professionals.

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We receive rather than generate most of our data. Dealing with the multitude of formats and different linkage data is a challenge.”

- Senior Adviser, Central Analytics Hub, Government

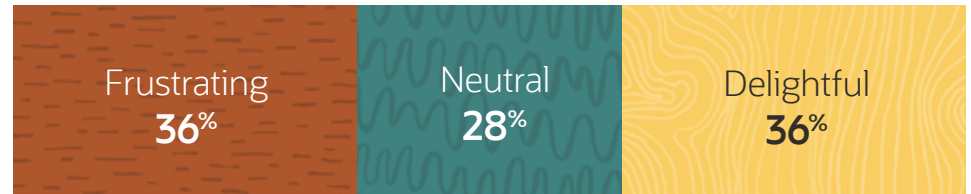


Data Productivity Challenges

A unified data vision requires asking the right questions. Majority of organisations do not understand the value that can be created by the data. These organisations are still solving their business problems with legacy systems, processes, and mindsets. This is apparent from the following key findings around data productivity.

How effective is your organisation in the following areas?

Data Integration: Does your organisation handle a lot of data from disparate and fragmented systems, with a growing variety of information?



Productivity of Skills and Resources: Does maintaining large database environments and multiple data management technologies often require multiple skills to perform the same core operation?



Data Augmentation: Does your organisation spend too much time on determining which data to use, how to source it and how to find insights from it?



ADAPT research revealed the following key trends around data productivity:

- Only 20% of respondents report a delightful experience when it comes to knowing, accessing, and analysing the right data for business insights.
- About 44% of respondents are highly dissatisfied with the above process.
- When asked about productively maintaining large data environment with multiple technologies and resultant skilled resources, about 48% of respondents showed frustration with the existing state of data productivity and scale.
- Similarly, data integration is being done well only by 36% of respondent organisations.

The overall focus around data productivity seems to be limited to reporting and basic analytics, using cloud-based operating systems and SaaS-based data visualisation and analytics tools. Having a cloud infrastructure has enabled some respondents in successfully running big data analytics and achieving greater data productivity.

One respondent emphasised that data literacy within the organisation was critical, even if it is at different degrees, from the CEO to the data scientists.

From a resource point of view, some respondents identified the need for data scientists to be flexible enough in adapting to different business requirements. If the business situation requires them to move from “high end” machine learning and data science models to developing dashboards and data visualisation for the organisation to make decisions, then they must be open to such possibilities. This will be crucial in the initial stages of creating data productivity.

Data Governance as a Factor of Data Productivity

Data discovery, quality, performance, and storage play a critical role in ensuring data productivity. However, these are the areas where respondents are struggling, especially when it comes to access and storage.

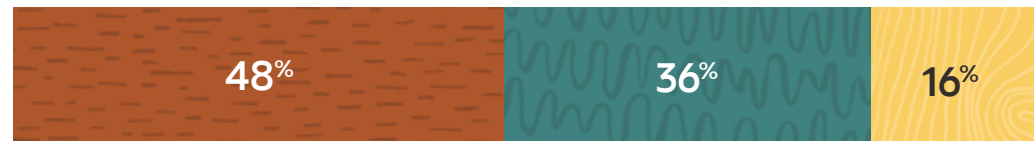
Data Discovery: Does your organisation know what it has, and where?



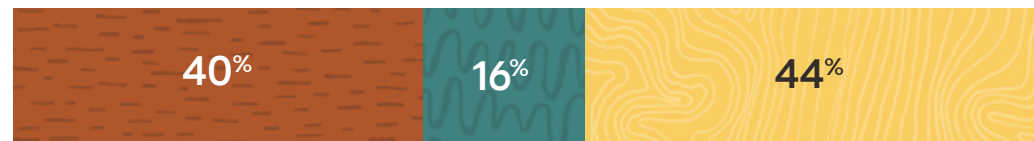
Data Quality & Standardisation: Are decisions often made with inaccurate or incomplete data?



Storage: If your data is stored in multiple systems, can your scientists quickly and efficiently transform varying formats for common query analysis?



Performance & Scale: Is your organisation able to perform analysis at scale when the data tier expands?





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We currently pool all our source data from our proprietary operating systems, and our SaaS tools into big data analytics tools, and most reporting and analysis are performed in that environment.”

– Director, Digital Technology, Healthcare

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Our strategy has been to streamline and simplify reporting and analytics as much as possible, which for us has meant consolidating data in a big data platform and facilitate easy access.”

– Director, Digital Technologies, Education Sector

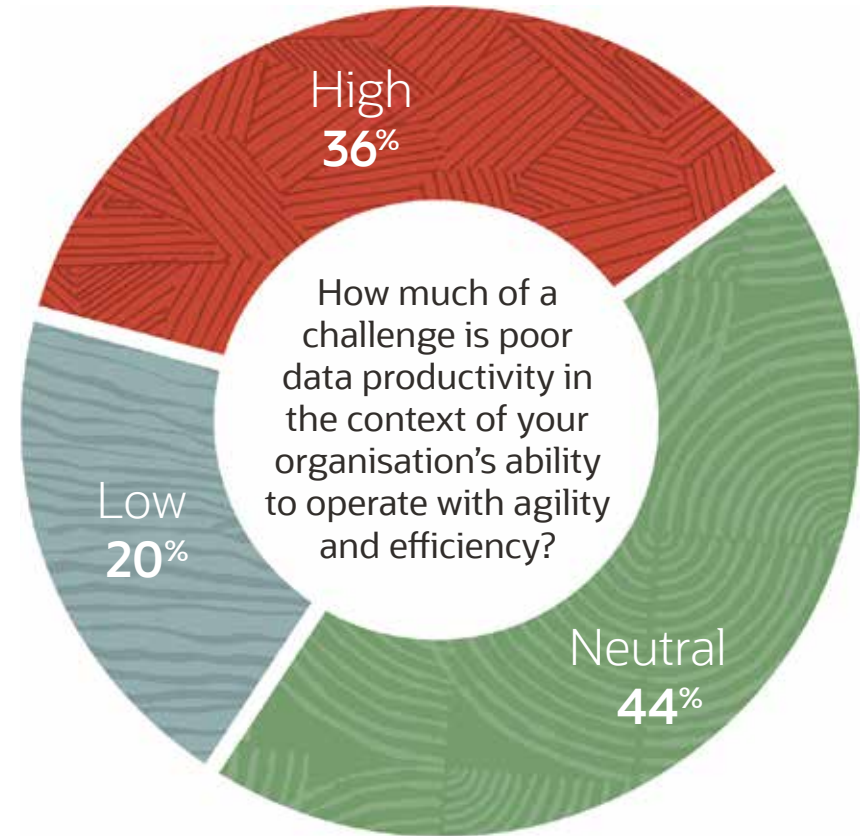


Impact on Agility and Efficiency

There is a clear gap in understanding how lack of data productivity impacts business agility and efficiency.

- Only 36% of respondents acknowledge that lack of data productivity negatively affects agility and efficiency.
- 44% of respondents have a neutral view about the impact, while 20% think that low data productivity has minimum impact on organisational agility and efficiency.

A key reason for the lack of awareness is the traditional ways of making business decisions. One respondent revealed that there was a narrow focus on gaining insights and patterns through trendline graphs on isolated issues, rather than focusing on the interactions and inter-connectedness within the business.



Chapter 4

Data Security

4

Data security takes a holistic approach of providing protection for the observer and the observed over observations about them.

The future world will be built on the foundation of connected smart devices, high-speed networks and autonomous systems that will track and analyse the behaviour of humans and machines, pre-empting decisions based on desired outcomes. These systems will have continuous access to sensitive levels of personal data that will be increasingly lucrative for hackers.

Given that today's security measures struggle to prevent data and privacy attacks in the current world, these future environments will demand new approaches and awareness initiatives that incorporate whole-of-life, company, cross-industry, and government strategies.

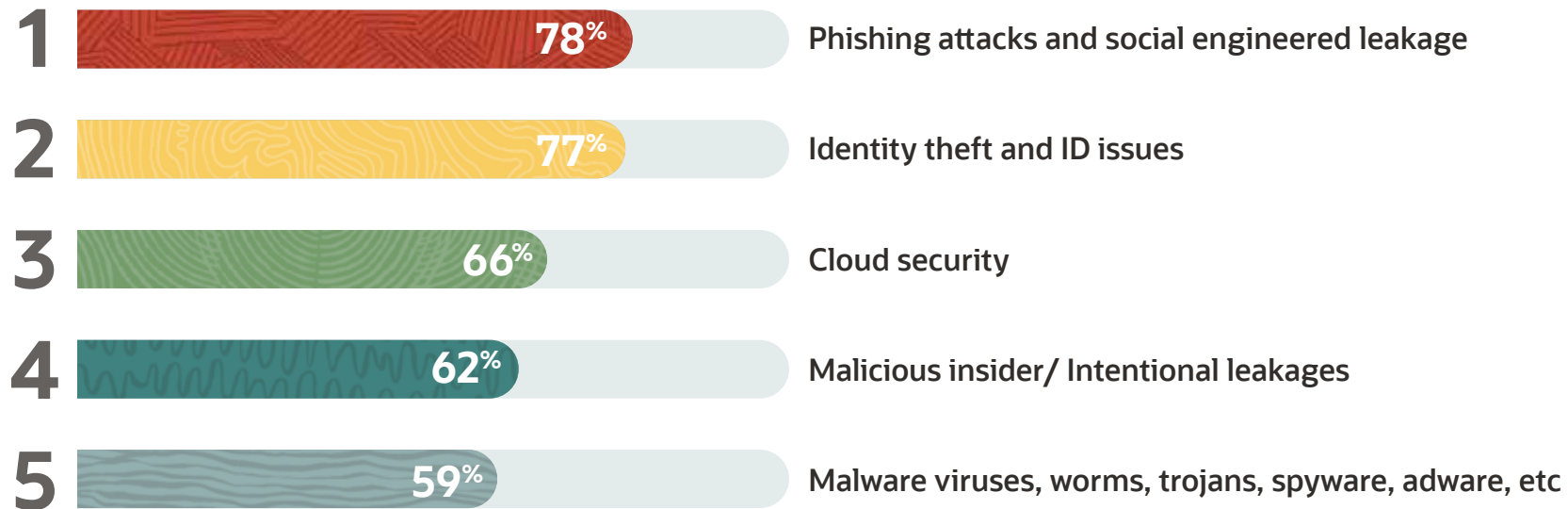
Security will be a core component of brand trust and differentiation. Underpinning this security layer must be robust data governance frameworks and policies.



Keeping data secure through authorisation, access, encryption, and auditing is not adequate. Transparency and upholding data property rights declared in a patchwork of overlapping global regulations is imperative.

In the 2019 ADAPT CISO Edge survey, Australian CISOs told ADAPT that the top three drivers for adopting security initiatives are brand damage (90%), data privacy (85%) and financial loss (73%).

The ADAPT CISO EDGE survey also delved into the top cybersecurity threats –



Data Governance as a Factor of Security

Data governance contributes significantly to security by ensuring privacy and compliance and enabling brand trust. This includes the processes and frameworks that ensure data access, compliance, data residency, and privacy.

According to the ADAPT Security Deep Dive report - [Architecting a Secure and Resilient Organisation](#), adhering to compliance regulations will be of prime importance. ADAPT has identified the following regulatory responsibilities for Australian businesses to pay attention to:

- The Privacy Act (1988) governs the management, storing, access and correction of personal information about individuals. The Act defines 13 Australian Privacy Principles (APP) that need to be followed. Organisations with an annual turnover of more than \$3 million must comply with these regulations.
- The Notifiable Data Breaches (NDB) scheme introduced in 2018 is an extension to the Privacy Act. Under this legislation, it is compulsory for companies that suffer data breaches to notify the Office of the Australian Information Commissioner (OAIC). They are also obligated to inform the people whose information is exposed.

- The Office of the Australian Information Commissioner (OAIC) recommends that organisations establish a data breach response plan. In instances of cyber-attacks or data theft, if the board can demonstrate that it was aware of cybersecurity risk, and used a framework to mitigate that risk, it is less likely to risk breaching its duties.
- The Australian Institute of Company Directors recently released 'A Director's Guide to Governing Information Technology and Cybersecurity' report. This informs company directors that they must act with due care and diligence in good faith and the best interest of the organisation and its clients.

The research revealed that there is a high focus within the organisations on creating robust data governance. However, there are significant gaps when measuring the above goals and their perceived impact.



“Despite the fairly high focus upon data governance and management in ERP Program and more broadly the recognition of it as a significant issue in senior leadership, there is a lack of recognition and will to make the cultural change to value data where and as it is created. It is assumed that we can just buy a person or an app to make the issue go away, and thereby avoid having to embrace genuine change and improvement.”

– Director, Data Analytics and ERP programs

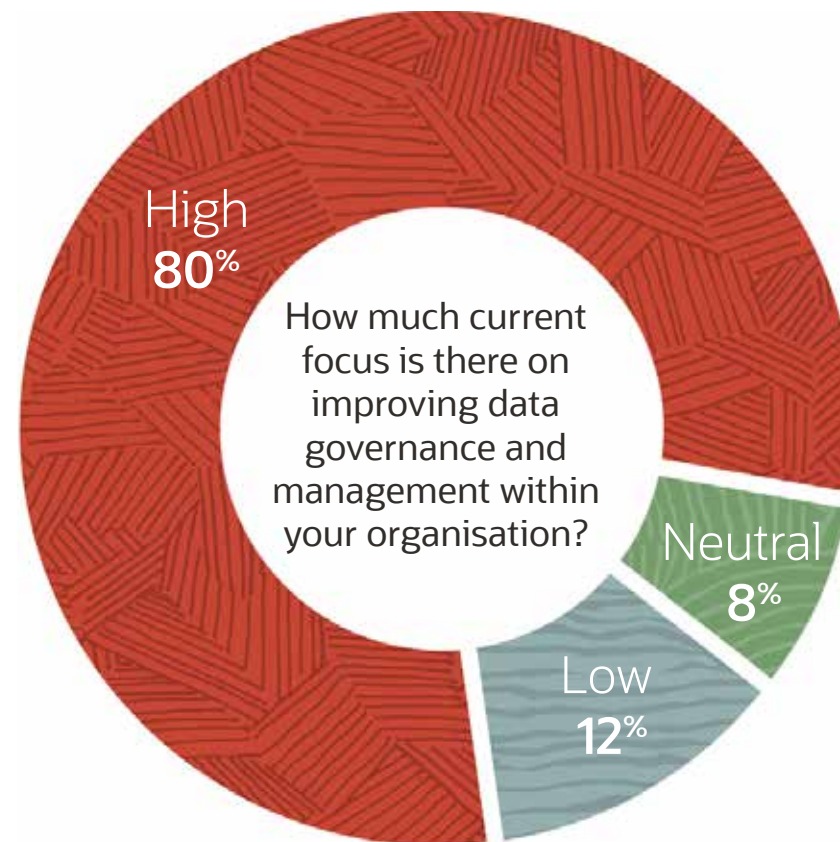
High Focus on Data Governance

The need for data governance is well established at different levels, and executives recognise the need for IT and business to work closely to achieve data governance goals.

- About 80% of respondents are heavily focussing on data governance within their organisations.
- Some of these organisations have a clear data strategy, a dedicated team, and effective data governance policies.

“
Merger of multiple organisations into a single department makes data governance and management even more challenging.”

- Senior Manager - Transport Architecture

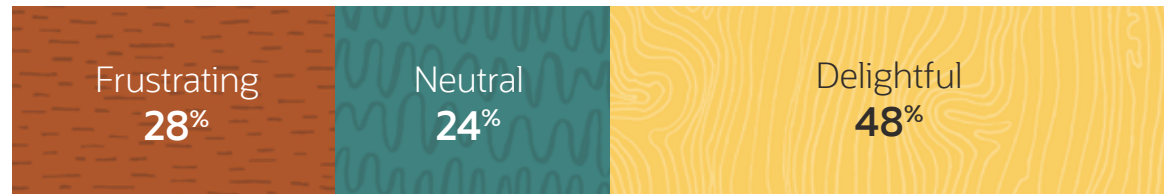


Data Governance Remains a Challenge

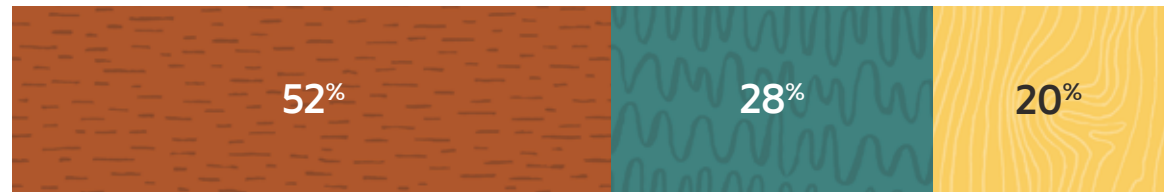
Despite the intent for creating a data-driven business and having data governance policies in place, organisations are grappling with executing on the following issues:

- Compliance - 48% of organisations are confident about tracking, monitoring, and complying with ever-changing data regulations and requirements.
- Common access - 52% of organisations feel frustrated about fragmented data access that causes delays in decision making. Fragmented data access is a considerable risk for organisations in terms of governance as well as securing the data.

Compliance: How good is your organisation at tracking, monitoring and meeting constantly changing requirements?



Common Access: Do disparate and specialised data access languages create fragmentation and delays?

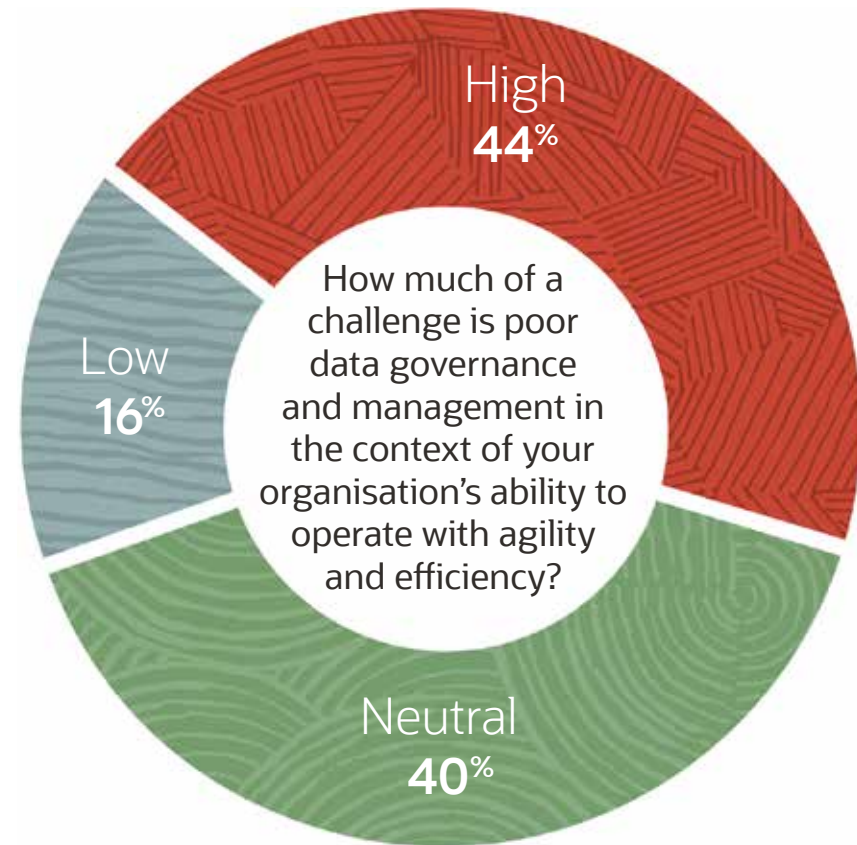


Impact on Agility and Efficiency

Being agile, scalable, and efficient are pre-requisites for organisations to operate in an ever-changing world. Data governance is a core foundation for an agile enterprise. However, when asked about the impact of the above struggles on the organisation's agility, executives were unsure about the extent of the impact.

- 44% of respondents acknowledged that lack of data governance would profoundly impact organisational agility and efficiency.
- However, about 40% of respondents are unsure of the impact.
- 16% of respondents are confident that data governance will not impact the agility and efficiency of their organisations.

Some executives have identified that creating a consumable data governance policy and converting it into real action is a challenge. In contrast, others feel that the overall data governance is maturing at a steady pace.



Organisations need to understand that data governance is not only a set of rules to follow but a core foundation that will help them build scalable and flexible data architecture resulting in creating a connected enterprise. The processes and frameworks are set up at a conceptual level. However, the tools, processes and technologies required to underpin data governance are lacking, resulting in diminished results from data governance initiatives.

To truly uncover the hidden data within an organisation, data liquidity, productivity and security need to be embedded within the data architecture.



How to Grow Your Data Economy

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Increasing an organisation's data liquidity means making it easier, faster, and cheaper to get data from its point of origin to its many points of use.

To do this:

Use converged databases to build new apps and modern data warehouses

Many cloud-native apps split their functions into separate services, each with a dedicated data tier. While this increases developer flexibility, it comes at the price of fragmenting data across different kinds of repositories, hampering data liquidity. Similarly, data lakes separate diverse data sets from carefully modelled data in enterprise data warehouses even though analysts and data scientists often need to use them together.

A converged database, which is a multi-model, multi-workload, multi-tenant database, where each instance is automatically configured to the workload at hand, solves these problems. Oracle's Autonomous Database can be used as a document, graph, spatial, or relational database - or in any combination. This allows an app to create data in the structure it prefers, such as JSON, and let other services query it using the methods they prefer, such as SQL which usually is compatible only with relational data or PGQL which works with graph data. This improves data liquidity.



Reduce network barriers between new and existing data workloads

Enterprises face a fundamental challenge compared to start-ups when embracing the cloud. The majority of valuable data for enterprises come from existing back-office applications. For example, to analyse brick-and-mortar transaction history alongside new mobile browsing data, a retailer will need datasets from its legacy enterprise app and cloud-native mobile app to reside in the same network. However, differing security protocols, application architectures, and performance needs of enterprise and cloud-native apps create problems unless they are running on a second-generation cloud environment.

To avoid these challenges, data architects need a platform such as the Oracle Cloud which uses a flat network where any two nodes are no more than two hops away from each other. It also employs a hardware-based approach to network security which controls access through a purpose-built module attached to each server that runs client workloads, whether virtual machines or bare metal. The result is a highly secure, fast network with predictable performance. This is the ideal substrate for creating

software-defined networks which provide interoperability between legacy and cloud-native workloads by running them on the same physical network worldwide.

Reduce transformation barriers between new and existing data workloads

An additional complication in making enterprise data readily available across a company's data economy is the kind of access legacy relational databases provide. Upgrading to a modern converged database like the latest version of the Oracle database solves this problem by making the data it holds just another internet-accessible resource through simple APIs automatically derived from database tables. Besides, a converged database will allow non-relational access methods on tabular data, such as graph queries. It will return results as JSON objects, the lingua franca of data exchange for cloud-native apps.

Increasing data liquidity is just the first step. This reduces the transaction costs between the supply and demand sides of a firm's hidden data economy.



The next step is to increase data productivity - the value created by that data by using it in multiple business processes and decision points.

To do this:

Establish a data catalogue.

Analysts and data scientists cannot create new analytics and train AIs if they do not know what data is available to them. Enterprises need a catalogue of available datasets. This catalogue, based on metadata harvested from datasets held in object stores, databases, and file servers is central to data governance. The catalogue should work in conjunction with services that clean and augment datasets to improve their fidelity to the outside world. It should also incorporate official glossaries of business concepts like profitability, and hierarchies like product ranges or sales territories that are necessary for creating analyses that incorporate company practices and policies. Oracle Cloud Infrastructure Data Catalogue provides these abilities, offering a centralised point for analysts and data scientists to search and discover datasets for their next project.

Embed AIs and analytics in enterprise applications.

For data to create value, it must be put to work in business processes and decision points. The more, the better. However, each of these process junctures and decision points requires a different combination of data and a different algorithm model to be productive. Firms with deep pools of development and data science talent may choose to build all of these AIs themselves. Firms looking to streamline these efforts can turn to Oracle's Adaptive Intelligent Apps, using their proprietary data to fuel pre-built AIs for specific decision points. For example, Oracle AI Apps for ERP includes a supplier categorisation AI that uses data such as invoices, payables, and purchase orders to optimise the procure-to-pay process by augmenting choices that affect negotiations on discount rates as well as procurement policy compliance.



Put self-service analytics and data science tools on modernised enterprise data warehouses.

There is an inherent conflict in corporate analytics: analysts and data scientists want to work with gold-standard data from corporate systems but without the constraints of the systems themselves. This has led to a bifurcation between traditional analytics on curated data warehouses and self-service activity on data lakes. This need not be the case. Modern cloud data warehouses, like Oracle's Autonomous Data Warehouse, let analysts and data scientists have their data cake and eat it too. They can use familiar SQL-based BI tools like Oracle Cloud Analytics or other third-party technologies and data science toolsets like Oracle Cloud Infrastructure Data Science on both data in enterprise data warehouses and data lakes simultaneously.



To create more value from data without increasing the risk of misuse or abuse, firms must expand focus on data security – the approach to protecting data through data-, user-, and app-centric security methods.

To do this:

Profile data to get a better understanding of possible compliance issues.

Legislations such as Europe's GDPR and Australian privacy regulations make unique distinctions for data which can be tied back to a specific individual including government identification numbers, biometric attributes, as well as unique identifiers for hardware such as IMEI numbers on mobiles. Finding all instances of such data across all repositories is a daunting task. To streamline this process, firms should look for services like Oracle Data Safe, which automatically detects over 125 different types of sensitive data. While this ability applies only to Oracle databases at the moment, it should give firms a significant head start.

Divide data access and database privilege rights into two distinct features

The people who set up a database should not necessarily have access to the data it contains. In many cases, such as with personally identifiable information, there are policy and legal reasons why they must not. Companies can address this in multiple ways, including masking data so that administrators cannot see the values of individual fields in the data. A more rigorous approach is available with capabilities such as Oracle Data Vault which establishes a set of roles and data access permissions separate from admin privileges. This allows the firm to establish access based on business needs and compliance requirements, rather than technological considerations.



Control each app's ability to invoke other resources with ever-vigilant AI.

One of the virtues of the internet is that anything can be a remote resource invoked from a distance. However, this is also a vulnerability. Cloud services that pass credentials to one another in order to communicate can open backdoor methods to reach otherwise inaccessible data. Companies need help analysing vulnerabilities and monitoring activity across these interconnections. Tools like Oracle Cloud Access Security Broker (CASB) use machine learning algorithms to spot anomalous behaviour, bringing automated defences to fend off frequently automated attacks.



About the Authors



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Aparna leads the digital technologies research agenda within ADAPT's strategic advisory team. As Senior Research Strategist, she creates independent research and advice

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Aparna has worked 12 years in the IT sector, much of it with Gartner, where she developed independent advice for Chief Digital Officers, Chief Data Officers, and CIOs around emerging digital technologies, digital business models and business transformation.



Paul Sonderegger
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direction. Paul speaks frequently on the rise of data capital, and is a contributing author at Forbes.com.

Prior to joining Oracle, Paul was Chief Strategist at Endeca, a discovery analytics company. Before Endeca, Paul was a Principal Analyst at Forrester Research, specializing in search and user experience design. Paul has a Bachelor of Arts degree from Wake Forest University.

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