BRICKENDON
transformational consulting

DATA

TRANSFORMATIONAL DATA ANALYTICS:

TECHNOLOGY & MACHINE LEARNING

The ongoing proliferation of data – total worldwide data is predicted to grow ten-fold over the next seven years - brings a raft of opportunities and challenges. Embraced properly, it will provide immeasurable benefits for companies in multiple markets. In terms of analytics, as it becomes more pervasive in the business world and more people see the opportunity it offers, the potential for transformation is vast.

Fully embracing the possibilities available, in particular in relation to technology and machine learning, requires a series of complex technology decisions built around a comprehensive data management strategy. In this paper, we look at those technology decisions. Our companion paper, Transformational Data Analytics: Governance & Benefits Realisation, explores the creation of the data management strategy.

Data gravity, the term coined by software engineer Dave McCrory in a 2010 blog post, provides a great analogy of the nature of data and its ability to attract additional applications and services. The Law of Gravity states that the attraction between objects is directly proportional to their mass. When applied to data, it describes the way the number of services, applications, and even customers, attracted to data increases as the mass of the data increases. Put simply, applications and data are attracted to each other and the more data there is, the greater the attractive force pulling applications and services to associate with that data.

1 DATA CHALLENGES

The new world of data brings both opportunities and challenges in terms of disruption not only to the existing technology landscape, but also to the organisation itself, its culture, structure and the skills required to succeed going forward. Here we look at the three main developments that have transformed how organisations look and use data:

- the exponential growth of data

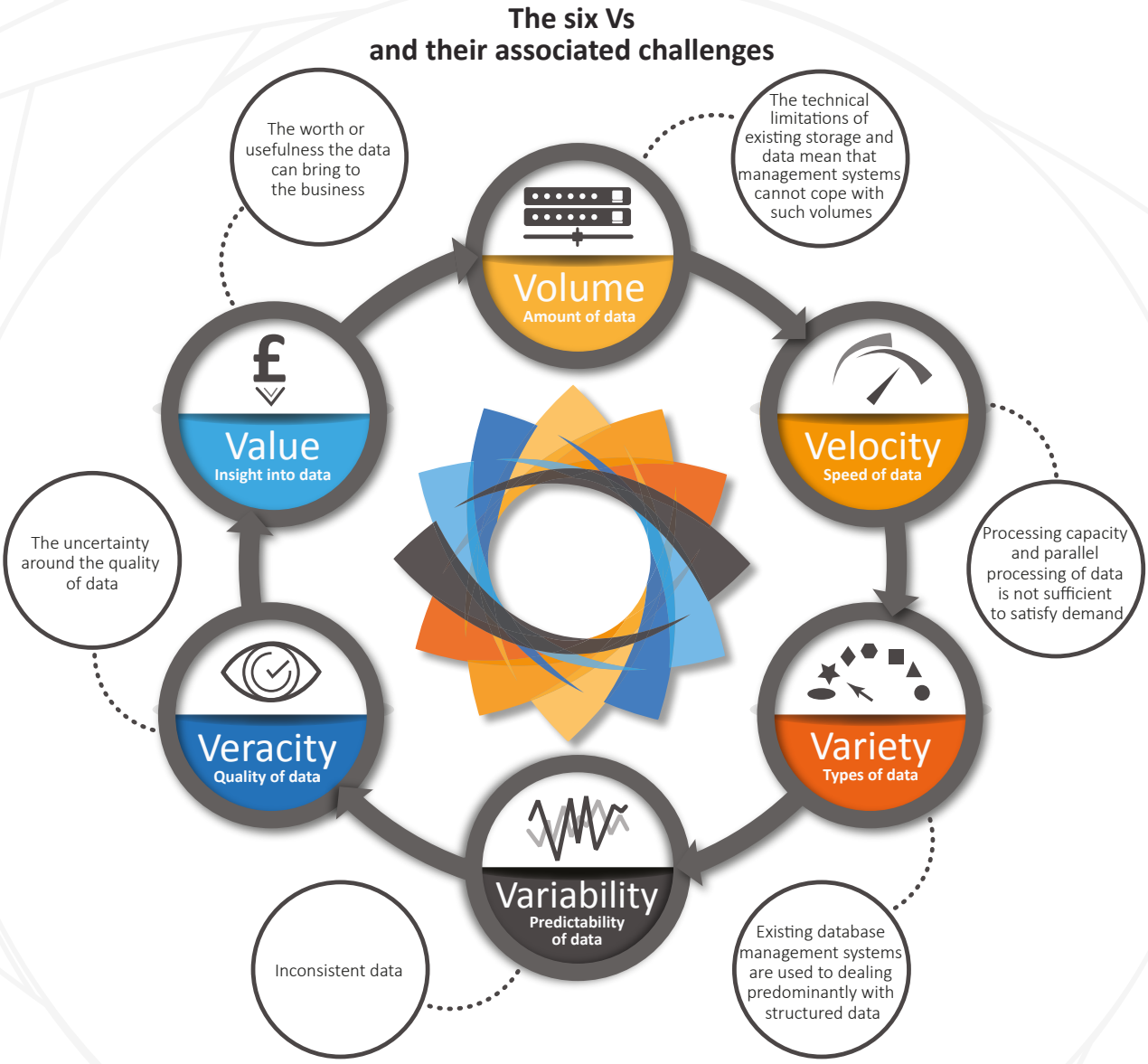
- the proliferation of high-powered analytics tools and machine learning to analyse the data by non-subject matter experts; and

- the use of the cloud as a distribution mechanism

> *"One of the key things to note about big data, is that it is continually expanding at an exponential rate, constantly changing and difficult to derive value from."*
>
> **Harpeet Singh**
> Executive Director

BIG DATA

This explosion of data has created new possibilities which impact not only how data is stored and processed, but also the intrinsic value of the data and the insights that can be pulled from this data.



ANALYTICS TOOLS AND MACHINE LEARNING

Traditionally firms have used analytics in the form of summary or descriptive analytics and Business Intelligence (BI)/Management Information (MI) on structured data. However, the challenges faced today mean that traditional analytics would not even be able to scratch the surface of the needs of the modern enterprise. Organisations need to adapt or they will lag behind in competition and innovation.

ANALYTICS CHALLENGES:

- **Lack of key cloud infrastructure providers** - e.g. there are no enterprise-level tools that can deal with all issues, including big data and the cloud challenges
- **Existing solutions focus on Proof of Concepts (POCs) or specialised use-cases** - while some vendors offer solutions that focus on one area, the ability to scale and offer a solution for the whole enterprise has only recently started to mature with big infrastructure names like Amazon, Google and Microsoft (IaaS)
- **Too technical** - even if some of the tool capabilities get close to solving some of the challenges above, they are too technical and too far from the business or operations user to be utilised effectively
- **Poor focus** - the focus has been more on reporting, instead of planning, prediction, calculation and optimisation features available with machine learning

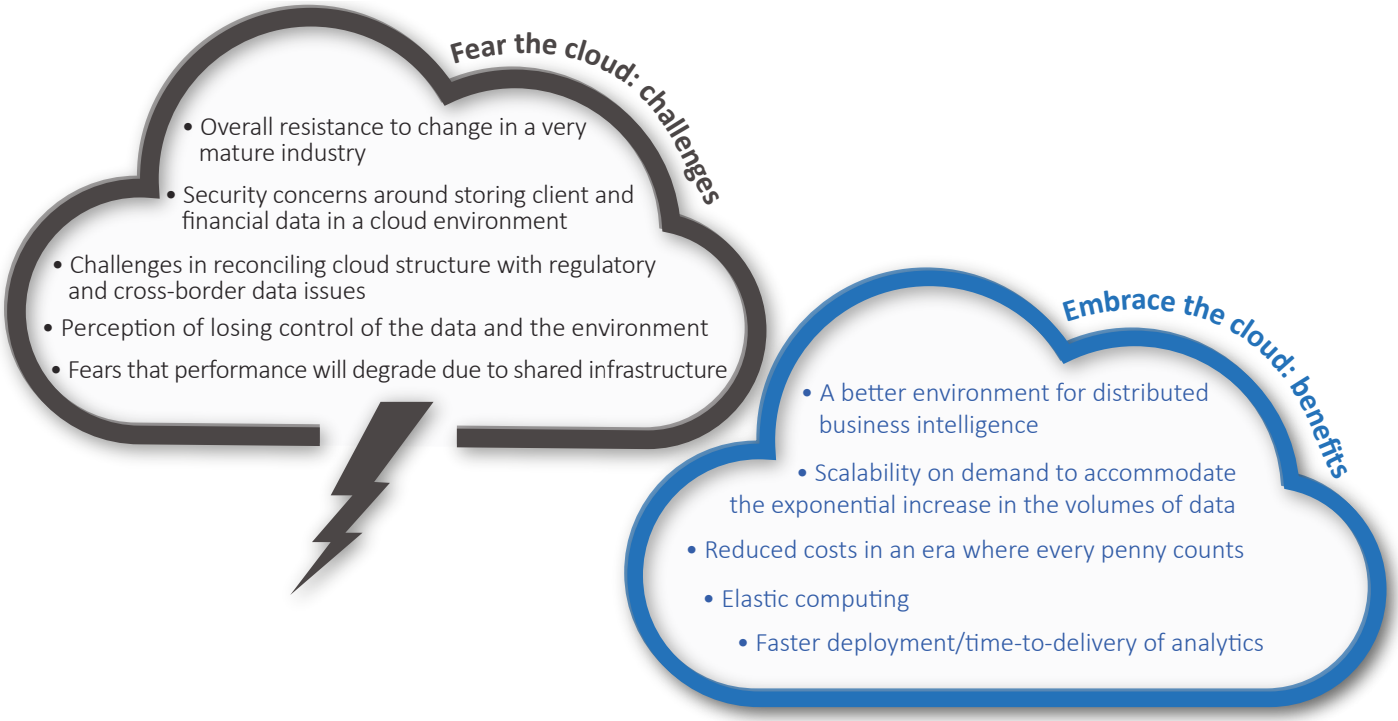
"Analytics tools in a modern financial organisation need to shift from describing what has happened to why things have happened or, even better, what's going to happen. This is the move from explanatory to predictive analytics. To do this, the data analytics tools need to be able to bring in data from structured and unstructured sources."

Evangelos Tzimopoulos
Senior Manager

CLOUD

The cloud is more than just a buzzword dreamed up in the past few years. In computing terms, it is the delivery of hosted services over the internet. While the need for the cloud and the benefits of using it are widely accepted, financial institutions have been relatively slow to truly embrace it.

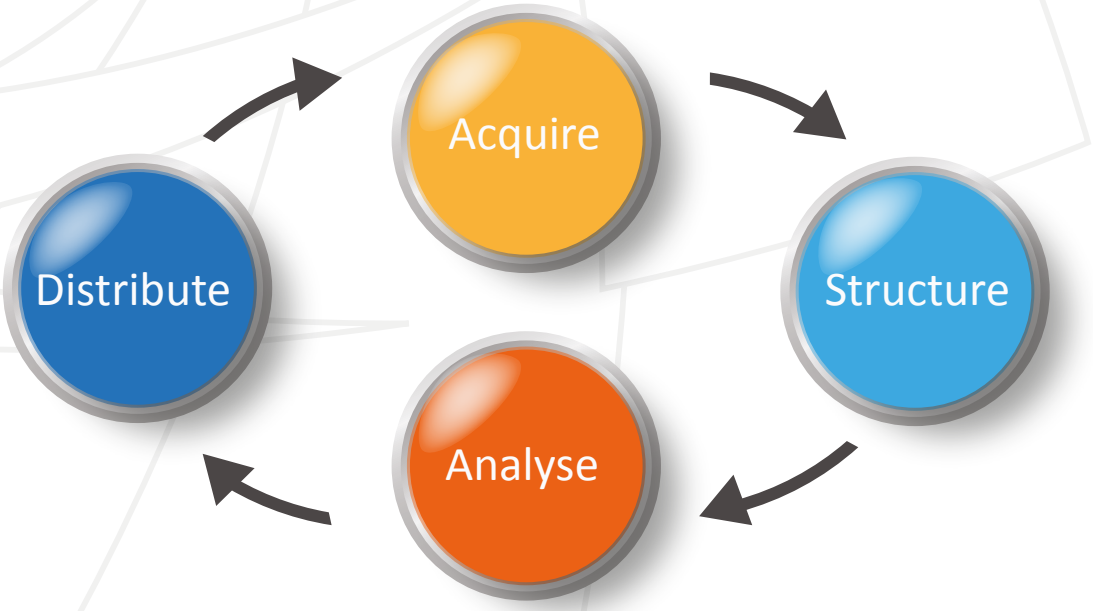
So far, organisations have typically fallen into two camps: fear the cloud and embrace the cloud. There are logical and emotional reasons for both:



Regardless of which camp an organisation falls into there are opportunities to be had. For organisations that are not currently leveraging a cloud environment, the field is wide open to make changes to use a less expensive and more dynamic architecture. For those that are already leveraging a full or partial cloud environment, they can capitalise on, and expand into, this platform to ensure they are prepared for the future.

2 ARCHITECTURE PRINCIPLES

In order to address the challenges surrounding the use of technology in our increasingly data-dominated world, an appropriate architecture ecosystem needs to be created. It should take into account the lifecycle of data from acquisition and structuring, through to analysis and distribution.



The data architecture principles for such an analytics ecosystem should revolve around the following features:

Virtual Data Store or Logical Data Warehouse (LDW)
Design an LDW using a combination of legacy, relational (Relational Database Management System, Data Warehouse), non-relational (Data Lake, Big Data Management System (BDMS) /NoSQL) or In-Memory database systems that can store data from multiple sources (social, corporate, etc.) and can scale up easily. User access to the data is imperative and must be considered during design and implementation

Data gravity vs data portability
Ensure the correct balance between these two features in order to have the right mix of bringing the calculations close to the data (gravity) and moving data closer to calculation engineers or users (portability) depending on your business needs and technology landscape

Data velocity
Develop analytics that respond in real-time either via on-premise or on-cloud infrastructure whether it's incoming data (ingesting raw data or alerts/notifications) or outgoing data (distribution of insights/reports/BI through APIs and UIs)

Data scalability
Regardless of the size of data, enable your ecosystem to scale up both from a storage and velocity perspective. Ensure that as the data volume increases, the real-time response to ingesting, processing and distributing data does not suffer from performance issues

Data science and machine learning
Enable the discovery of insights through analytics, machine learning and data science, and develop advanced capabilities. When doing so, consider which algorithms to choose depending on the type of data (variability), the level of model complexity, and the usability and scalability of the analytics and machine-learning tools

3 ADDRESSING THE CHALLENGES

On page two we laid out the industry developments affecting the implementation of data analytics. Here we seek to address those issues.

BIG DATA

Big data is no longer just a trend and while far from being fully established, it is something that an organisation needs not only to factor into its architecture design, but also to embed into its business model. The key is to embrace the six Vs - volume, velocity, variety, veracity, variability and value (see diagram on page two) – in order to address the challenges and position your business ahead in the digital space.

The final V, value, was not part of the original framework and is often ignored, but over time it has been recognised as equally important in terms of understanding how big data can help a business, and often, even change the business model. Value can be realised by extending the existing analytics system, enabling the organisation to integrate and utilise innovative data management and analytics technologies.

To overcome the challenges related to big data problems, technology firms like Yahoo, Google, Facebook and Amazon had to innovate and break through new barriers, introducing new technologies, most notably Hadoop by Yahoo or MapReduce by Google.

In the context of analytics and the models behind the data (data science), for an organisation to be able to make best use of the abundance of data, it needs to be able to do the following:

- build models fast and accurately
- respond in real-time for streaming data
- use techniques for visualising data in the right context
- utilise data from various sources like social media or news using Natural Language Processing (NLP) in combination with corporate-structure data
- create a Virtual Data Store that combines traditional BDMS capabilities with disparate data sources under a Logical Data Warehouse

ADVANCED ANALYTICS AND MACHINE LEARNING

The need for innovation and differentiation has led firms to become insight-driven rather than data-driven.

A key enabler for this has been the application of advanced analytics and use of machine learning techniques that can understand huge amounts of data. As a result, a combination of methodologies, tools and domains, all coined under the label of data science, have been developed.

Data science as a principle has existed for years, but many techniques such as machine learning, neural networks and deep learning, have only recently been propelled to the forefront. Analytics has also been extensively used for decades, but the ceiling has always been the ability to predict and go further than summary and descriptive analytics. The advance of modern computing, the inexpensive hardware, and the availability of low cost and distributed storage (the cloud) has allowed the development of data engineering tools and advanced analytics platforms that bring all capabilities together to provide an all-inclusive ecosystem that can host, process and extract value from (big) data.

Larger organisations like Microsoft and Amazon, offer a full range of tools across the data lifecycle to acquire, structure, analyse and distribute data. Some of these tools are used on-premise, in the cloud, or both.

Small vendors or tech start-ups tend to focus on one or more of these phases, providing a vertical specialisation on:

- Infrastructure and storage
- Integration with open APIs and open source Python and R libraries for advanced modelling and analytics
- Distribution and visualisations

There has been plenty of movement in the advanced analytics and data science spaces over the last few years as more banks use the domains for strategic decision making. While Artificial Intelligence (AI) and Blockchain feel like the flavour of the month, the data analytics domain is where a significant amount of research and new technology is being produced and is an area to watch.

CLOUD

Moving data into the cloud has a huge impact on the organisation and the enterprise architecture. Traditionally, there has been a three-tier approach to the services offered by the cloud, which covers the capabilities of firms with different business models and size.

Software as a service (SaaS): Software licensed as a subscription and centrally hosted e.g. Dropbox

Platform as a service (PaaS): Develop, run and manage applications in a cloud setting e.g. Windows Azure

Infrastructure as a service (IaaS): Virtualised computing services provided via the Internet e.g. Amazon Web Services

Over the next several years, many financial institutions will invest significant portions of their IT budgets in data and analytics resources as the need to improve these capabilities increases. More compellingly, advanced analytics are increasingly being used to overhaul business strategies and determine how firms can compete in global markets. On-premises data centres cannot always provide the resources necessary to power these analytics engines, but the cloud can.

Merging the increased appetite to use the cloud with the inherent need for better analytics with shorter cycle times, is resulting in the proliferation of new cloud-based analytics tools. For analytics, the cloud can be used to:

- Connect applications' dependencies across complex IT environments
- Monitor network performance from public cloud service to on-premises endpoints; and
- Analyse data at the scale required with powerful computer and high storage capacity.

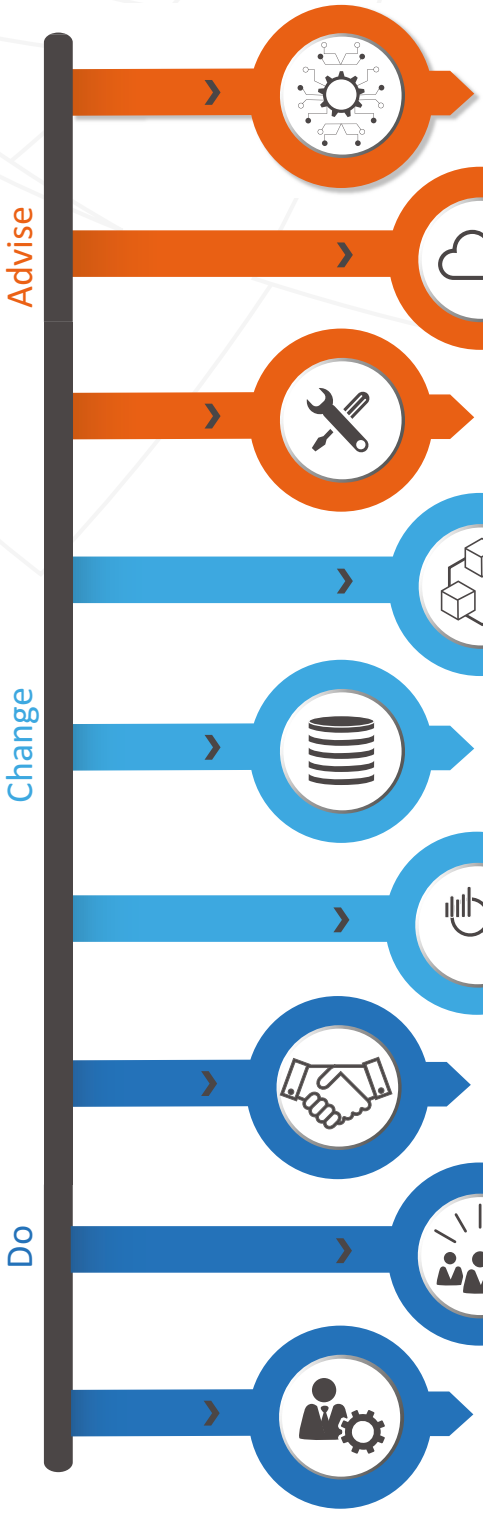
From an analytics perspective, using the cloud as a distribution tool makes total sense. Rather than keep powerful data analytics tools in the hands of a few experts, cloud platforms unlock data to empower an entire organisation. Tools that bring data directly to the people who run businesses enable them to find the insights that create value.

Finally, the performance of cloud-based tools is changing how to analyse and use data. Queries that used to take hours and use significant processing resources can now be completed in a fraction of the time using centralised processors. The result is that more insights and value are realised by more people throughout the organisation.

4 THE BRICKENDON SOLUTION

The Brickendon solution for a transformational analytics programme consists of a two-pronged approach featuring technology and governance. By bringing together these two dimensions, you will be able to establish a sound programme and ensure that it runs smoothly for years to come. This paper addresses the technology leg using the following approach:

APPROACH



TECHNOLOGY STRATEGY
Create an overarching technology strategy that balances the needs of the organisation with the needs of the users

CLOUD
Determine the overall cloud strategy for the company and the business. Factor in the architecture and infrastructure and ensure that all analytics applications are compatible with the cloud

TOOLS
Perform a vendor analysis to choose the right software which optimises the organisation's strategy and architecture

ARCHITECTURE
Develop an analytics ecosystem that can capture, store and structure the data in a way that makes the data easily accessible to analytics users

BIG DATA
Design the technical architecture to optimise big data capabilities which address the 6 Vs to allow analytics users to have full (when appropriate) access to the unstructured data

ANALYTICS
Enable self-service analytics (where possible) and user interfaces on top of big data and cloud infrastructure

IMPLEMENTATION
Ensure buy-in from across the business to ensure there are no surprises at the end of the implementation

EMPOWER TEAMS
Make the end-to-end data technology stack more consistent and efficient to reduce costs and risks

MANAGEMENT
Manage the technology stack through policies, procedures and controls to better address user and regulatory requirements

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ABOUT US

Brickendon is an award-winning global transformational and technology consultancy specialising in innovative solutions that save our clients time and money. Our aim is to deliver transformational change across our three key offerings of Advise, Change and Do, through our five practice areas: Data, Quality & Testing, Risk & Regulation, Strategy and Digital. This helps our clients see positive results in weeks, not months or years.

Employing domain experts with over 10 years' respective experience in specialist sectors, Brickendon is built on providing lasting, cutting-edge solutions designed to improve profitability, efficiency, competitiveness and innovation across the financial services sector. We are passionate about what we do and thrive on transforming companies to increase their competitive edge.

Started in London in 2010, the driving force behind Brickendon's global strategy is transforming the traditional consultancy model. We now have multiple offices across Europe and the US, including London and New York.

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