

CAPCO

THE CAPCO INSTITUTE JOURNAL OF FINANCIAL TRANSFORMATION

DATA ANALYTICS

Unifying data silos:
How analytics is paving the way

LUIS DEL POZO | PASCAL BAUR

DATA ANALYTICS

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DEAR READER,

Welcome to the milestone 50th edition of the Capco Institute Journal of Financial Transformation.

Launched in 2001, the Journal has covered topics which have charted the evolution of the financial services sector and recorded the fundamental transformation of the industry. Its pages have been filled with invaluable insights covering everything from risk, wealth, and pricing, to digitization, design thinking, automation, and much more.

The Journal has also been privileged to include contributions from some of the world's foremost thinkers from academia and the industry, including 20 Nobel Laureates, and over 200 senior financial executives and regulators, and has been co-published with some of the most prestigious business schools from around the world.

I am proud to celebrate reaching 50 editions of the Journal, and today, the underlying principle of the Journal remains unchanged: to deliver thinking to advance the field of applied finance, looking forward to how we can meet the important challenges of the future.

Data is playing a crucial role in informing decision-making to drive financial institutions forward, and organizations are unlocking hidden value through harvesting, analyzing and managing their data. The papers in this edition demonstrate a growing emphasis on this field, examining such topics as machine learning and AI, regulatory compliance, program implementation, and strategy.

As ever, you can expect the highest caliber of research and practical guidance from our distinguished contributors, and I trust that this will prove useful to your own thinking and decision making. I look forward to sharing future editions of the Journal with you.

A handwritten signature in black ink, appearing to read 'Lance Levy', with a stylized, flowing script.

Lance Levy, Capco CEO

FOREWORD

Since the launch of the Journal of Financial Transformation nearly 20 years ago, we have witnessed a global financial crisis, the re-emergence of regulation as a dominant engine of change, a monumental increase in computer processing power, the emergence of the cloud and other disruptive technologies, and a significant shift in consumer habits and expectations.

Throughout, there has been one constant: the immense volume of data that financial services institutions accumulate through their interactions with their clients and risk management activities. Today, the scale, processing power and opportunities to gather, analyze and deploy that data has grown beyond all recognition.

That is why we are dedicating the 50th issue of the Journal of Financial Transformation to the topic of data, which has the power to change the financial industry just as profoundly over the coming 20 years and 50 issues. The articles gathered in this issue cover a broad spectrum of data-related topics, ranging from the opportunities presented by data analytics to enhance business performance to the challenges inherent in wrestling with legacy information architectures. In many cases, achieving the former is held back by shortcomings around the quality of, and access to, data arising from the latter.

It is these twin pillars of opportunity and challenge that inform the current inflection point at which the financial industry now stands. Whilst there is opportunity to improve user experiences through better customer segmentation or artificial intelligence, for example, there are also fundamental challenges around how organizations achieve this – and if they can, whether they should.

The expanding field of data ethics will consume a great deal of senior executive time as organizations find their feet as they slowly progress forward into this new territory. In my view, it is critical that organizations use this time wisely, and do not just focus on short-term opportunities but rather ground themselves in the practical challenges they face. Financial institutions must invest in the core building blocks of data architecture and management, so that as they innovate, they are not held back, but set up for long-term success.

I hope that you enjoy reading this edition of the Journal and that it helps you in your endeavours to tackle the challenges of today's data environment.

Guest Editor
Chris Probert, **Partner, Capco**

UNIFYING DATA SILOS: HOW ANALYTICS IS PAVING THE WAY

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ABSTRACT

This article looks at the ongoing issues associated with fragmented data silos, a problem exacerbated by the ever-increasing amount of data that enterprises must deal with. We highlight the need for unifying data silos and how analytics could help investment firms transform themselves. To support our propositions, we provide a number of real-world examples from investment firms on such journeys. In addition, we lay out a roadmap for firms currently on a data analytics-driven transformation journey.

1. INTRODUCTION

Financial institutions today have more data and analytics choices than ever. The amount of data and the speed with which it is collected have increased exponentially in recent years. The types of data, tools, solutions, and vendors have also changed at a significant rate. All this has added to the overall complexity of the business landscape and has created many fragmented data silos. To make data available for a sustainable period at the right place, the right time, and in the right format remains a challenge for many firms.

In this article we outline the very nature of the problem of fragmented data silos, describe how analytics is helping firms to overcome this problem, and provide a roadmap for firms that want to plan for this data analytics-driven transformation.

2. NEW DATA-DRIVEN WORLD

The amount of data being produced and processed by financial firms daily is increasing exponentially. Financial services firms are buried under petabytes of data. These data pools originate from a variety of sources, come in many different formats, and are subjected to different life cycles. Not only have volume, velocity, and variety of data increased exponentially, but also the very nature of data has changed. There exist big data, structured data, unstructured data, static data, streaming

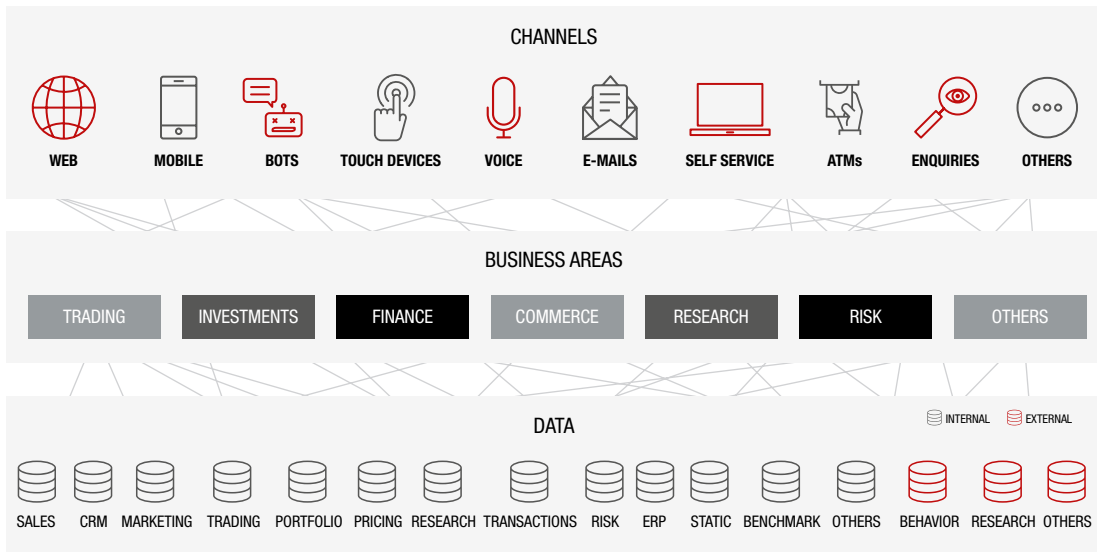
data, vector data, time-series data, and many other data forms. There are also different storage possibilities to consider, such as relational databases, schema-less databases, and various other file formats. Today, financial services firms must cater to all these different data types and formats. But they are inevitably constrained by limited resources and expertise.

Architecture and technology, which are used to manage these data, are evolving at a rapid rate as well. Traditional data management languages, tools, and solutions may find themselves quickly out-of-sync with modern solutions and approaches. Not all systems process all the data in the same manner either. With the move from legacy architecture to cloud services, the very nature of storage, computing, and analytics is being transformed. We live in a world where legacy and modern solutions must live in a hybrid environment and interact with each other in the most efficient way.

3. FRAGMENTED DATA SILOS

Data remains the core asset for all financial services firms, but most of it is deeply siloed in isolated systems, departments, functions, geographies, databases, files, and archives (Figure 1). To service even a simple request from a client or a user, the request is processed through multiple channels, multiple business areas, and accesses multiple data sources (e.g., sales, CRM, financials, transactions, etc.) contained both

Figure 1: Data silos in organizations



within and outside of the financial services firm. There are more and more applications being built to cater for all these service requests and this further increases the complexity of the data environment.

On one hand, firms can say that we have more choices and better competition on data and analytics solutions. On the other hand, however, there is the problem of overcomplex business landscapes and future interoperability problems. While there may be numerous technologies, vendors, products, hardware, software, and data providers available for any business or technical problem, each of these has their own stacks, programming languages, and practices that further complicates the environment. Technology is still advancing, products are maturing, and vendors are being consolidated. These developments are all adding new layers that continue to deepen the sea of data silos. The complexity of servicing clients continues to be increasingly challenging. In this environment, financial services firms are always challenged to increase revenue, manage operational costs, address risks such as fraud, and be regulatory compliant.

4. UNIFICATION NEEDS IN THE AGE OF ANALYTICS

The fundamental need remains to make data available at the right place, at the right time, and in the right format. However, today's organizational data workflow involves numerous manual interventions, which complicate the achievement of this fundamental need (Figure 2). Data is being sourced, extracted, cleansed, enriched, and transformed from

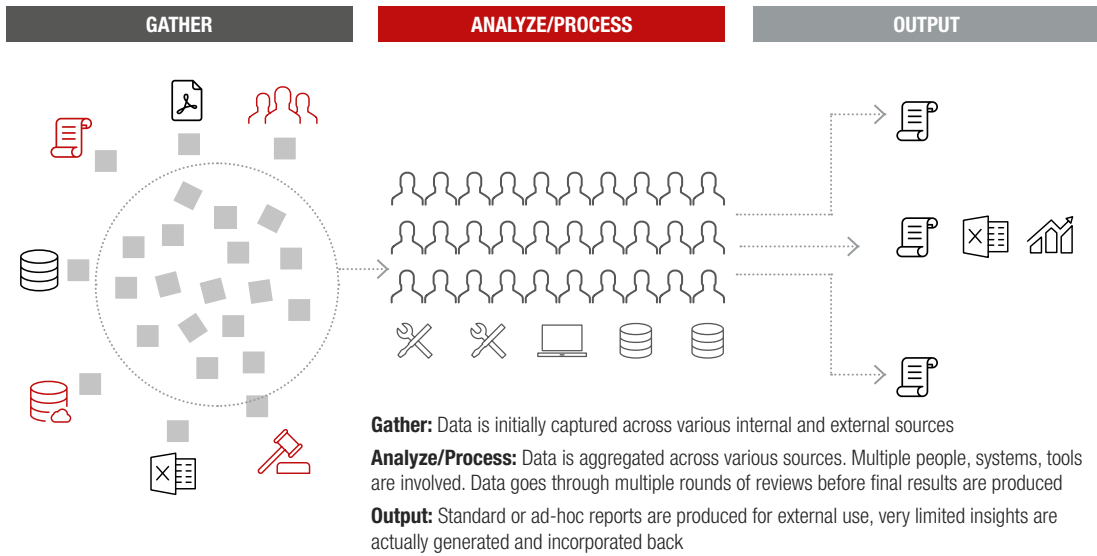
homogeneous or heterogeneous data sources. It goes through multiple transformations, validations, and checks during this process. When the entire end-to-end processing happens in a siloed environment and when too many business groups start intercepting these workflows and manipulating the data without a holistic data strategy, the efficiency and effectiveness of the organization is lost.

Clearly the current model of processing is not scalable because the resources available to firms are not scalable themselves; be it budget, time, or human resources. Firms were once proud to maintain a high-quality of service despite their processes having a high-manual input. However, with complexity intensifying and increasing service requests, they are now struggling to meet even the same standards due to head-count reductions and the ever-increasing number of stricter controls. In short, there is a need to do more with less going forward. Firms need to operationalize processing while transforming at the same time.

5. MODERN DAY DATA ANALYTICS CAPABILITIES

Firms can use an analytics platform, with its underlying capabilities, to knit data across silos. Analytics platforms are fundamental tools for unifying data. They are built on existing underlying technologies to capture, store, compute, and analyze data from a variety of sources in the most effective and efficient ways. Modern analytics platforms have expanded beyond traditional business intelligence and reporting platforms. Most of the out-of-the-box platforms come with a

Figure 2: Organizational data workflow (illustrative)



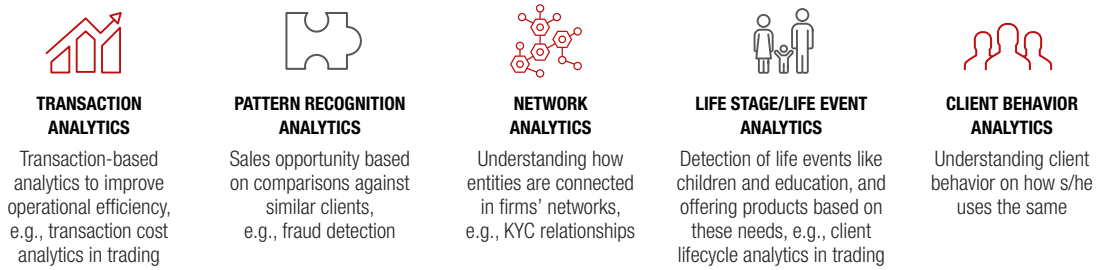
large set of connectors that can source data across multiple applications like CRMs, ERPs, financial systems, order managers, etc. They provide a rich set of functionalities and features, computing, visualization, predictive capabilities, model and insight generations, etc. These platforms appeal to users because of their ease of use, scalability, ease of migration, and security (Table 1).

Many advanced analytical capabilities like machine learning techniques (classification, regression, clustering, etc.) have been in use for decades. Today, users have unprecedented computing and processing power at their disposal to create and deploy models at ease. This has made many more analytical use cases feasible now. Deep learning (using neural

Table 1: Modern analytics platform capabilities

AREA	NATURE OF TASK	HOW IS ANALYTICS AIDING TRANSFORMATION?
DATA INTEGRATION	<ul style="list-style-type: none"> Authentication data shared with the requesting party with the user's approval Alerts users via a push notification when their identity is being used at the time of the transaction 	<ul style="list-style-type: none"> Strong connectors and integration capabilities for different data types Faster ways of processing /computation using wranglers, fabrics and ELT/ETL techniques (extract load/transform)
REAL TIME ANALYTICS	<ul style="list-style-type: none"> Analysis of streaming data to find insights in real time 	<ul style="list-style-type: none"> Continuous real time streams processing like sentiment analytics, trend analytics, etc.
ADVANCED ANALYTICS AND DATA MINING	<ul style="list-style-type: none"> Generate intelligence and advanced insights based on data 	<ul style="list-style-type: none"> Advanced recommendation engines and decision support systems Advanced natural language processing, text analytics capabilities Machine learning (classification, regression, and clustering of data) and deep learning capabilities Descriptive (reporting on the past), diagnostic (using past data to study the present), predictive (using insights based on past data to predict the future), and prescriptive (using various models to provide next best action) capabilities
SELF-SERVICE VISUALIZATION AND SIMULATIONS	<ul style="list-style-type: none"> Loose integration of data sources where analytics can be directly performed by end-users 	<ul style="list-style-type: none"> Automated/tool capabilities for extraction and presentation of data Almost no IT required Complex what-if scenarios handling
DASHBOARDS	<ul style="list-style-type: none"> Present key performance indicators (KPI) with limited drill down capabilities 	<ul style="list-style-type: none"> Feature-rich sophisticated charts, visual aids, and drag-and-drop tools reduce barriers for a non-technical person to present stories

Figure 3: Business capabilities made possible by modern analytics



networks) and transfer learning (aiding edge computing) are areas that are gaining traction and pushing the boundaries in the area of vision, audio, and text analytics. We are already seeing these innovative capabilities in the form of chat-bots, virtual assistants, etc.

Machine learning, combined with other techniques, has the potential to generate an enormous range of analytics use-cases. These model the complex systems and scenarios that financial firms face today (Figure 3). Transaction analytics, pattern recognition, network analytics, client lifecycle, and behavior analytics are some of the specific areas that are possible today due to the advancements of analytical capabilities. With all these capabilities becoming more advanced and automated, it presents an opportunity for combining humans and smart machines to achieve better results for financial services firms. Analytics is truly becoming a competitive differentiator.

6. ANALYTICS OPPORTUNITIES

Analytics opportunities are transformational or operational in nature. Transformational opportunities require a higher integration of data but retain the potential to impact the top or bottom line significantly. Examples are new product offerings, segmentation analytics, fraud analytics, behavior analytics, life cycle analytics, risk analytics, etc. Operational opportunities focus on automating or servicing day-to-day tasks better, like report generation, risk management, benchmarking, etc.

Analytics-driven workflow can not only automate tasks and produce standard deliverables but also produce advanced insights and reports without significant effort (Figure 4). Insights can be gathered, acted upon, and integrated back to the business for better decision making. It also provides new ways of monetizing and servicing clients. In doing this, firms remain efficient going forward and can have an edge over competitors.

Figure 4: Analytics-driven flows

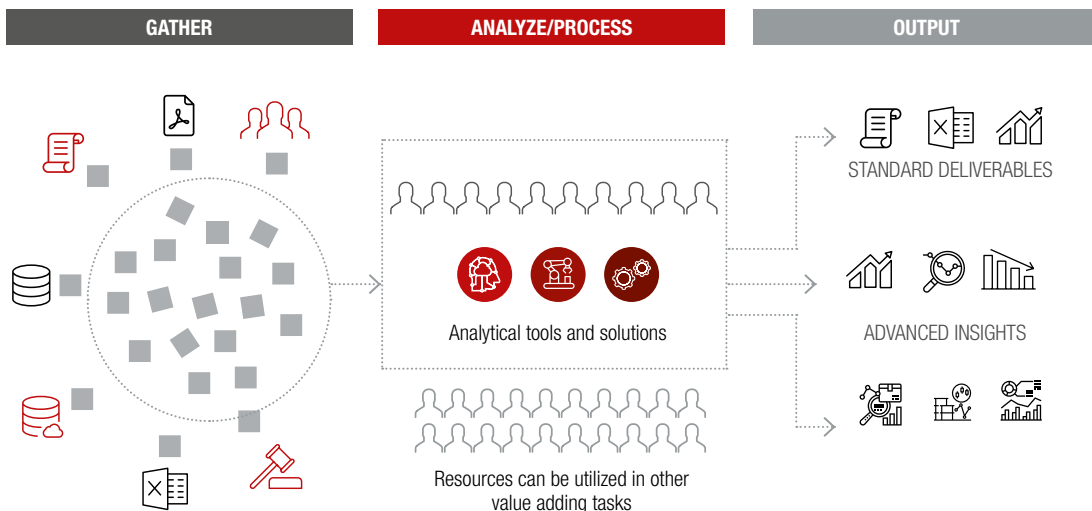
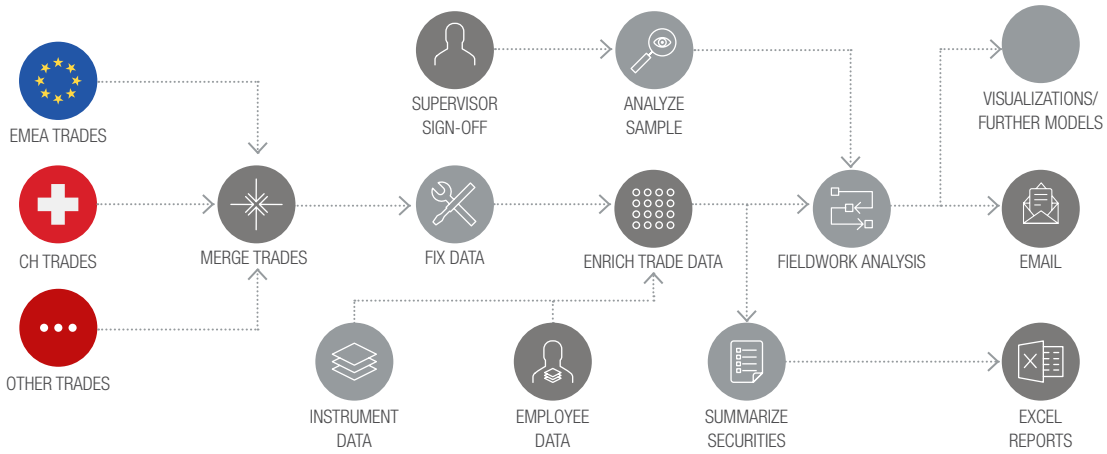


Figure 5: Example – MiFID II controls workbench



In order to implement this, firms must select the right use-cases that are scalable and that can be industrialized. The challenge for today's investment firms is which use-cases should be considered for building analytics capabilities? Should firms consider small use-cases with large transformational potential? Or should they consider thousands of use-cases with a likely small 1% potential? In the end, there is no magic formula. When you make thousands of small things better, it can lead to a potentially large transformation overall.

7. UNIFICATION EXAMPLES

As systems become more complex and data volumes grow firms have started using self-services tools to not only do their work but to also identify new risks more efficiently. In January 2018, MiFID II (Markets in Financial Instruments Directive) came into effect, requiring firms to provide reports

based on various trading, client, employee, and market data. For example, best execution requirements (RTS 27 and 28) are specific reports produced by firms that indicate quality of execution and top five venue/brokers information. An investment firm used data science workbenches to provide a central solution across locations. By doing so it was able to automate various tasks, perform field analysis, and visualize various metrics for controlling purposes. At the same time the reports were being produced for regulatory purposes.

Another investment firm is trying to unify client information across locations to have a single view of all their assets and portfolios across locations and branches. This was partially driven by regulatory requirements but also to satisfy clients' underlying needs. This is helping the firm in assessing client risks, transactions, and behaviors across all channels (Figure 6).

Figure 6: Example – single client view

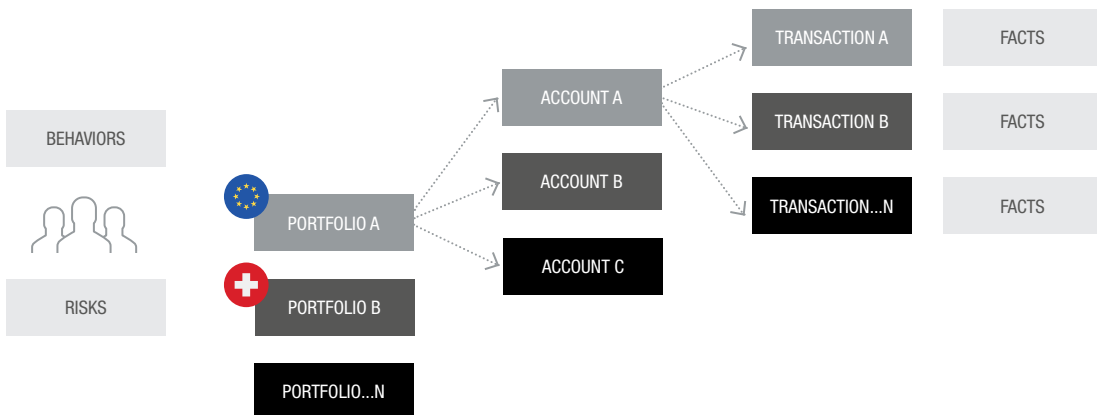
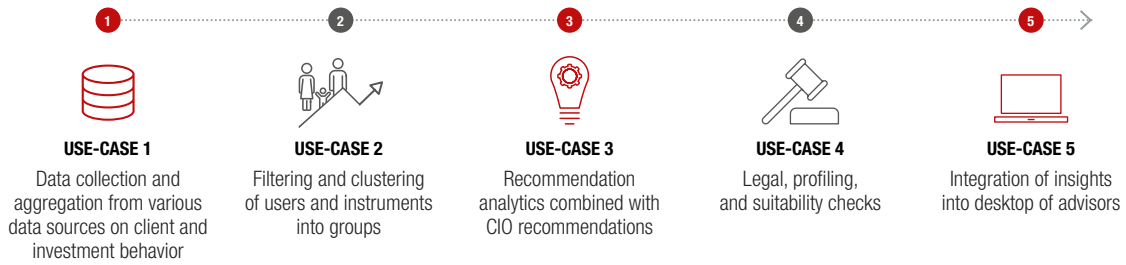


Figure 7: Example – investment behavior based advisory ideas



Furthermore, a different investment firm is working on integrating the data insights end-to-end on the client advisor’s desktop. All portfolios from different users are analyzed. Users trading similar products are clustered. With the Chief Information Officer’s (CIO) suggestions, new portfolios are being suggested after running through all suitability and product checks. In the end, the insight generated through the process goes back to the client advisor workbenches where they can leverage the same information for client conversations (Figure 7).

8. THE ROAD AHEAD – HOW TO PROCEED

In a technology driven world, it is quite possible we may be hijacked by various buzzwords and upcoming technology. It is imperative that one starts with business objectives first and in areas where maximum value can be provided for the most urgent needs. Firms need to run different kinds of use-cases to build-up the overall business and technical capabilities of an organization.

Firms that are planning on an analytics transformation must architect their data landscape for analytics purposes. Data governance provides a much-needed overarching direction to the analytics program to start with. The team here formalizes overall tasks and roles needed for overall data management (Table 2).

Table 2: Data governance

FORMALIZE DATA ROLES AND OWNERSHIPS, GOVERN DATA PROGRAMS		
DATA DISCOVERY	DATA MANAGEMENT	DATA CURATION
<ul style="list-style-type: none"> • Data profiling • Lineage • Classification • Preparation 	<ul style="list-style-type: none"> • Data catalogue • Metadata • Data retention • Data quality 	<ul style="list-style-type: none"> • Storage • Security and encryption • Access and authentication • Audit capability

- Data discovery teams collect and analyze data to determine various underlying patterns.
 - **Profiling:** build up a true understanding of the dataset, its strengths and limitations, and understand various data quality issues. Analytics are based on having a variety of high-quality data in hand.
 - **Lineage:** map out key dataset to their origins and understand how they are moving over time. Many regulations, especially the likes of BCBS (Basel Committee on Banking Supervision) make this mandatory. However, fundamental principles must be replicated across organizations and projects.
 - **Classification:** sort out and categorize data into various domains, forms, or any other distinct classes so that users can use it later. This helps in the latter stages in running very domain specific requirements based on a cluster of data.
 - **Preparation:** internal data preparations or any external data procurements need to be done centrally. Identification of golden sources of data inside the organization and through various public data sources (e.g., Amazon’s open data repository, government websites, trends, etc.) must be considered while preparing the data for analytics purposes. Time spent preparing data upstream helps the team get a variety of outputs later.
- Data management teams focus on data catalogues and metadata management.
 - **Catalogue:** offer various catalogues to business and IT domains defining what data is available, in which format, and how it should be used or accessed. This helps when trying to integrate data across the organization.

Table 3: Building analytics capability

ANALYTICS CAPABILITY			
STRATEGY	DESIGN	EXECUTE	OPTIMIZE
<ul style="list-style-type: none"> • Business use-cases • Overarching strategy 	<ul style="list-style-type: none"> • Architecture • End-to-end channel design • Dataset identification and procurement 	<ul style="list-style-type: none"> • Build analytics solutions • Modernize platforms 	<ul style="list-style-type: none"> • Metrics improvement • Service models
Center of excellence SMEs and capabilities			
Tools and solutions Analytics solutions, sandboxing			

- **Metadata:** describes the content about the main data itself. It captures information on who created the data, when was it created, where was it created, and the other keywords associated with it. These are useful for various optimizations, search, and classification purposes.
 - **Retention:** any data used in production has its own legal requirements around recordkeeping, generally for five to seven years. After this period, the data needs to be deleted. Regulations like GDPR (General Data Protection Regulation) also advocate strict requirements with regards to how long data should be retained.
 - **Quality:** monitoring and measurement of data points must be executed at key lifecycle phases. Data quality should be used as key metrics to incentivize data owners.
 - Data curation team formalizes requirements on data throughout its lifecycle, from creation and initial storage to the time when it is archived or becomes obsolete.
 - a) **Storage:** this includes any local storage, physical storage, or even cloud storage used to save files and perform the necessary computations. As the size of data starts increasing, storage and computation must be addressed in a different manner.
 - b) **Security and encryption:** security by design is quite essential across analytics projects and tools.
 - c) **Access and authentication:** any datasets being accessed and analyzed must be based on key legal guidelines and access must be restricted wherever possible. Analytics are done with a set of core principles and data ethics must be respected.
 - d) **Audit capability:** even when experimenting, auditability must be ensured. It is easy to get lost in the world of algorithms. If one cannot explain an algorithm and clearly enumerate and explain the results, then it could become problematic.
- Data analytics implementation remains a journey where one needs to strategize, design, execute, and optimize. Tools, products, and people are added as one advances. As requirements become advanced, there may be a need to adopt a different solution or even different vendor products. Mostly, it is never one-size-fits-all, however certain key points need to be considered (Table 3):
- **Strategy:** the strategy addresses the key business objectives. The business and correspondent IT capabilities need to be defined for the next three to five years. The use-cases that are required need to be defined in detail with their proper justifications and actual needs. There should also be a boundary set stating what is, and what is not, possible with the available datasets.
 - **Design:** with so many complex datasets available and so many choices to execute, the designing phase makes it clear how data will be managed and how analytics will be performed. The architecture and infrastructure blueprints to be used for the next phases are defined here. Data breaches, privacy, execution principles, tool, and platform selections need to be considered with the business objective in mind. With strict compliance regulations, such as GDPR, there should be a renewed focus on handling sensitive data. Designs must consider end-to-end channel integration and make data readily available to the team for execution.

- **Execute:** each firm follows its own execution methodology. Be it agile or waterfall, the firm must determine the best way to execute. The execution phase is where results drive the modern analytics platforms forward. Analytics changes tend to become expensive. Small changes may trigger other changes across multiple areas. It is essential that firms start managing all costs across lifecycle for these changes.
- **Optimize:** no perfect dataset and solution combination ever exists. Analytics can always improve upon an existing situation. Many companies are also working on cleaning and aggregating data. However, the real transformation happens when the results and insights are integrated back into business systems. The results of execution must flow back to systems where they can be checked as to how their metrics have improved overall.
- **Center of excellence:** as solutions start maturing and require higher levels of customization, there are specialists who can serve these unique areas far better. Firms can achieve their various specializations with just a few dedicated people and offer tailored and targeted solutions.
- **Tools and solutions:** there is no one-size-fits-all standard tool available. Organizations tend to adapt to hybrid solutions and designs for different purposes. It is wise to focus on just a few tools, libraries, products, techniques, and frameworks based on the strengths and business domains. These must evolve and scale up while one progresses.

9. CONCLUSION

Data silos in the modern world will continue to increase. The types of data, tools, solutions, and the vendors will evolve and consolidate. To make data available at the right time, at the right place, and in the right format should be the key focus for financial services firms. To achieve this, firms should start unifying their data silos. They must glean advanced insights from their data and integrate the results back to the business for better decision making. By doing this, it will improve their ability to anticipate and quickly respond to evolving demands, be it revenue generation, customer servicing, operational costs, risk monitoring, or meeting various regulatory requirements themselves. To conclude, we also summarize key dos and don'ts that one must consider while driving analytics programs:

1. Do start with clear business case in mind.
2. Analytics may not be a mega IT project. Do demonstrate values in quick sprints.
3. Data driven culture requires new ways of working and delivery. Do drive change management around analytics programs.
4. Do not experiment with random use-cases based on some buzzwords. Always build a specific analytic capability.
5. Do not wait for end-to-end infrastructures, solutions, tools to be ready before launching analytics projects. Start with a small business case where value can be demonstrated.

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