DESIGNED ANALYTICS

Designed Analytics Report

Innovating With the Cloud

The Starting Point

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Introduction

Innovation has become the most prominent marketing buzzword in this age of exponential technological progress. Undoubtedly, technology has enabled many beautiful innovations during the last decade. However, we tend to forget that we do not always need technology to innovate. Technology is an enabler that brings an innovative idea to fruition where it can. But we need to understand what innovation is, in the context of the world of business.

Innovation is not always about new business models. A prominent type of innovation is operational innovation, which pertains to innovations within your business processes that help you run. In order to incorporate innovation into your organization's DNA, you need to understand innovation sans technology. That understanding will help you leverage technology better to innovate.

Hence, even though the report is focused on cloud-based innovation, we will not list everything you can do with the cloud. Those lists, thousands of them with similar content, flood the internet. In this report, I intend to provide a path to understanding what innovation is and what aspects you need to think about to chart a robust starting point of your cloud-based innovation journey.

Just honest suggestions beyond all the hype!

Kumar singh

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Executive Summary

The last few years have made us believe innovation cannot happen without technology. The majority of innovation we see these days is indeed enabled by technology. And “enabled” is the keyword here. Technology helps translate a great idea into a solution, that addresses a problem and changes the course of “how things are done” into reality. It enables us to turn vision into reality.

Cloud-based technologies provide us with three layers of capabilities: efficiency, transformation, and **innovation**. Efficiency pertains to a scenario where a process or existing capability has become more efficient by migrating to the cloud. Transformation is the scenario where the capability changes significantly from its current state. Innovation is the top layer that pertains to building capabilities that did not exist before, leveraging cloud-based services.

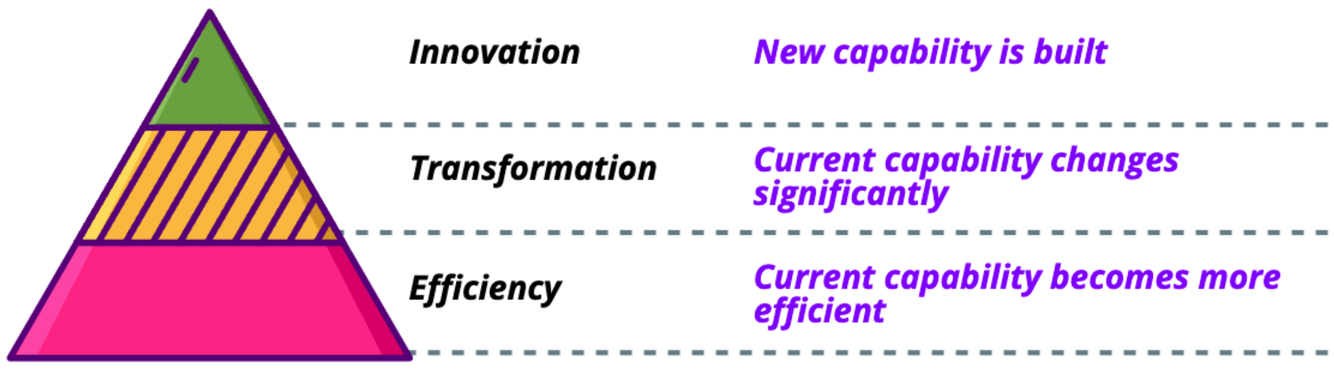
To truly innovate in a way that embeds innovation into how organizations operate, we need first to change how we think about innovation. Not understanding the core theme of innovation means we will fail in our quest to become innovative in the same way we failed to become "data-driven" organizations. We flooded our organizations with a portfolio of data and analytics tools. Yet, I can challenge that I can walk into any team other than your core data science and analytics team that your organization has, and prove that your teams are "tools-driven", not "data-driven".

An innovation-driven organization is one where innovation is generated across multiple layers. Note that these layers do not pertain to organizational hierarchy but are more attuned to the impact level of the innovation. Something as trivial as an individual employee finding a new way to perform a task in a way that did not exist in the organization before is a minuscule form of innovation. And unless we recognize and reward this aspect, we cannot build a genuinely innovation-driven organization.

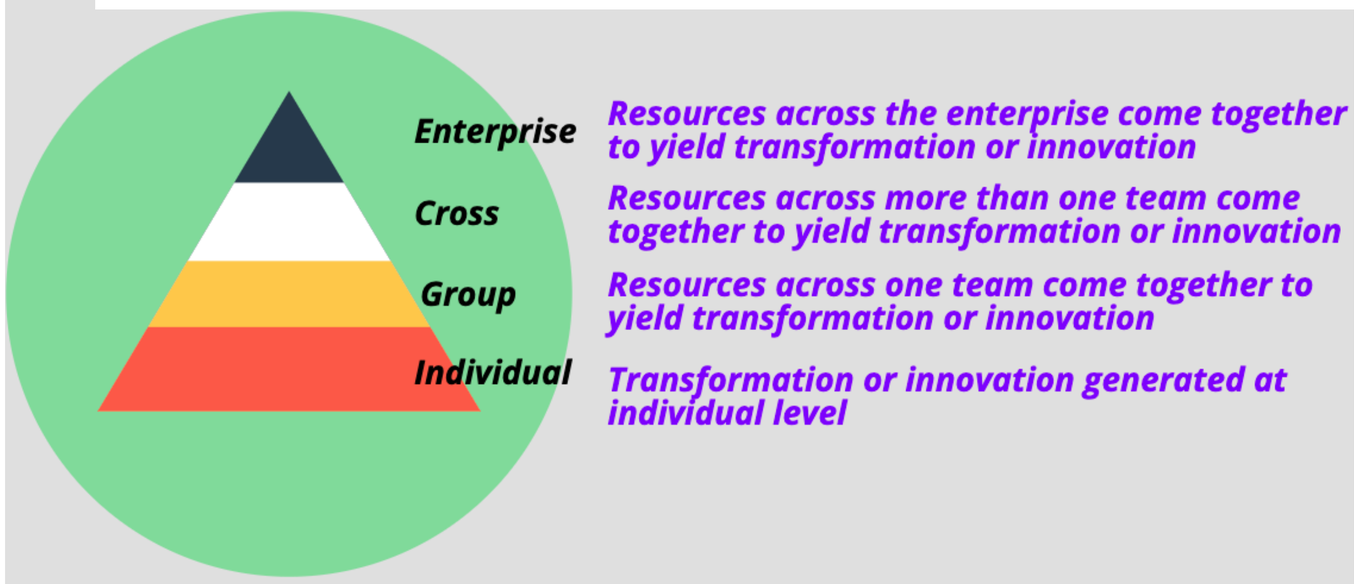
Any form of transformation or innovation, from the perspective of operational innovation, stems from building a capability that erases a current state constraint. And with this perspective, you can develop a methodology, that can provide you a starting point for your cloud-based innovation journey.

Figure 1 : Propagating cloud-based innovation

Hierarchy of cloud-based services impact



Hierarchy of transformation and innovation



Chapter 1

Race to Innovate

Can you define innovation? If you were asked this question, how would you answer? Let me ask you another question: What is the first example of innovation that comes to your mind?

Chances are high that the example that comes to your mind is an example of technology-driven innovation. And therein lies our problem. We generalize innovation in a specific way. In our mind, innovation is always driven by technology. But why is that a problem? That is not a problem, but it hinders us from understanding the core of innovation, thereby hindering us from expanding the gamut of technology-driven innovation.

Let me pose another question: Was the invention of the wheel an innovation? The invention of the wheel changed the course of transportation and, with that, mankind's progress. It was probably one of the most significant innovations in mankind's history, and not even a single iota of technology was involved. The list will continue if you keep adding transformative innovations during human history that accelerated our progress but were not driven by technology.

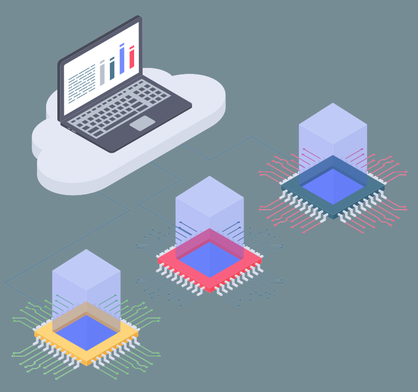
This entire report is focused on how a group of technologies, represented by cloud-based offerings, can help us generate innovation. Hence, the goal is obviously not to undermine the role of technology in generating innovation. But we must understand that the definition or scope of innovation expands beyond technology, which is just an enabler. This view expands the lens of possibilities from which we see technology-driven innovation.

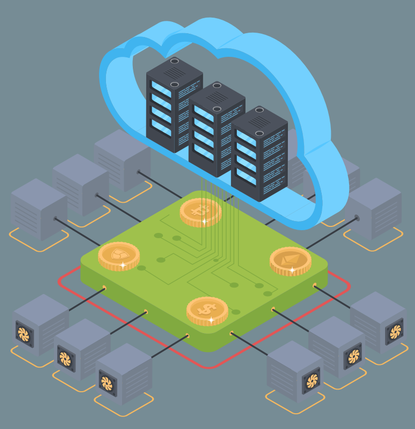
The last few years have made us believe innovation cannot happen without technology. The majority of innovation we see these days is indeed enabled by technology. And “enabled” is the keyword here. Technology helps translate a great idea that addresses a problem and changes the course of “how things are done” into reality. It enables us to turn that vision into reality. And therein lies a critical message. Innovation, too, has types, whether driven by technology or not.

This report is indeed about technology-driven innovation. However, to truly innovate in a way that embeds innovation into how organizations operate, we need first to change how we think about innovation.

You can throw all the key technology terminologies, like cloud, AI, and LLMs, into the mix, but the fact is, we have been doing the same thing repeatedly with each new emerging set of technology. So, despite the hype, we have not seen organizations make as much progress as we would assume when it comes to applied context in business.

Because the problems that organizations face are still a different set that dancing robots can not address.





This report is focused primarily on driving innovation in how businesses run. Hence, dancing robots, flipping robot dogs, and humanoids playing chess are not within the context of this report. Having this in perspective as you go through the report will allow you to grasp the underlying concepts better.

Not understanding the core theme of innovation in business operations means we will fail the quest to become innovative in the same way we failed to become "data-driven" organizations. We flooded our organizations with a portfolio of data and analytics tools. Yet, I can challenge that I can interact with any team other than your core data science and analytics team that your organization has, and prove that your teams are "tools-driven", not "data-driven". And it is never the fault of those who work within the processes. We never designed the "data-driven" revolution optimally.

The” data-driven” quest has existed for decades, but how many organizations have truly become data-driven? The primary reason behind this is the notion that we believe we will become data-driven if we leverage data and analytics technology solutions. As always, though these solutions are enablers, they can do nothing, absolutely nothing, if an organization does not understand how to leverage them to become data-driven.

We are treading the same path with innovation as well. The data-driven quest was not about how fancy the tool was. It was about changing the way we work, the way we define our processes and the way we think. We focused on everything but these aspects. The result is that most organizations are standing where they were a decade ago, with many more data and analytics tools in their portfolio, but far from being data-driven.

This fallacy won’t change with any emerging technology or technologies, like the cloud. This is the crux of this report. This report does not give a crap about what cloud technologies can do. It is about how we prepare ourselves to do things that we want to do, with cloud-based technologies. Innovation does not happen because you are in the cloud. It happens because you know how to innovate, and you have the power of cloud-based technologies to use as an enabler. This report aims to give you a solid starting point in generating innovation leveraging cloud-based technologies.

People try to associate becoming innovative with jargon like vision, purpose, strategic directions, and so on. All these vague terms are behind the uncertainty that masks what innovation exactly is. Specifically in the context of innovation within business processes. This uncertainty serves entities that promise to show a path to innovation to those grappling with the idea, but it muddies the water more. Then, there are interests that want innovation to be always defined as so high-tech and advanced that companies may not dare innovate without external help.

But at the very core, innovation is a mindset acquired through knowledge and experience intertwined with your processes. Innovation can be simple as well as complex. Innovation can happen with or without technology. Any organization can start on the journey of becoming an "innovation-driven" organization and maybe even become one, if they avoid making the same mistakes they made on their path to becoming "data-driven".

Chapter 2

The Innovation-Driven Organization

If I so despise the term "data-driven", why would I use another jargon-like term, "innovation-driven" organization, in this report and in the title of this chapter?

This question may arise from the misconception we touched upon in the last chapter. In my mind, innovation is simply doing something differently and addressing a pressing issue, challenge, or problem. That is why innovation has multiple hierarchies. It is critical to understand this hierarchy.

Let us assume that you work for a pharma company. If you were asked to list one or two innovations your organization has generated recently, your answer would probably be about new drugs or new compound discoveries. And they, indeed, are innovations. However, these innovations sit at the top of the innovation hierarchies. These innovations, though they help businesses generate the money they need to run, do not change the way the business processes of companies run. In this report, we are focused on operational innovation.

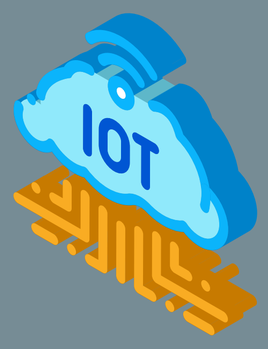
Employees in your organization may be innovating every day. Someone tired of performing a repetitive task may have developed a way to perform it in a whole new way, thereby building a completely new capability. That is innovation, too. While the relation may not be clear, these innovations eventually create the system that leads to broader, strategic-level innovation. The gist is that there is a hierarchy of operational innovation.

It is important to understand this hierarchy since it will help you also understand how to drive innovation with the cloud. I can fill ten pages with definitions of cloud technologies, but the fact is, everyone is already aware of those technologies. Chances are, they are already leveraging them. However, the key question is: Are they generating innovation by leveraging those technologies?

Did you innovate if you were leveraging automation or analytics solutions on-premises and then migrated to the cloud? The answer can be both yes and no. If this migration allowed you to build even one capability that did not exist before, that migration indeed allowed you to innovate.

On the other hand, if the benefits were entirely related to cost reduction, efficiency, and productivity, you have not generated innovation, though you have achieved benefits. The point to note here is that these benefits generally lay the foundation for innovation. The gist of this example is that innovation should not be confused with other benefits of leveraging the cloud. In this report, we are focused on innovation, specifically operational innovation.

Going forward, everywhere you see the term innovation, it represents operational innovation, as defined in this chapter.



An innovation-driven organization is one where innovation is generated across multiple layers. Note that these layers do not pertain to organizational hierarchy but are more attuned to the impact of the innovation. As mentioned, something as trivial as an individual employee finding a new way to perform a task that did not exist in the organization before is a minuscule form of innovation. And unless we recognize and reward this aspect, we will not be able to build a genuinely innovation-driven organization. In a subsequent section, we will understand this innovation hierarchy in detail and explore why knowing how to innovate in the cloud is crucial.

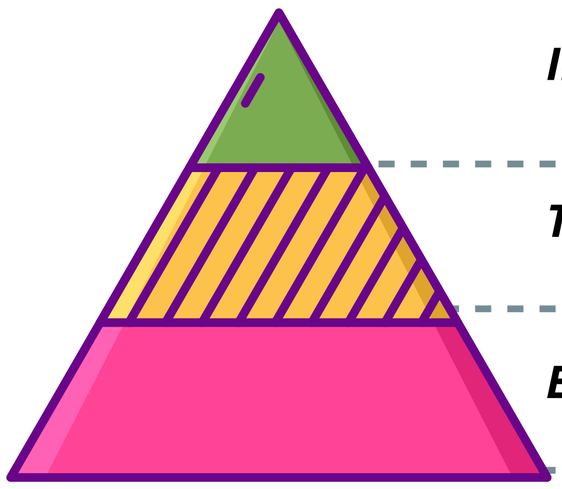
Before we get into the innovation hierarchy, let us understand where innovation sits regarding the three layers of the benefits delivered by the cloud. **Figure 2** provides an overview of the three layers of impact that can be created with the cloud. Please note that this is my perspective, and the definitions may not align with generally agreed definitions. However, these aspects are not science, and we must disagree more with what is "generally agreed" upon.

Efficiency: From cost to labor efficiency, there is no doubt that cloud infrastructure can generate a plethora of efficiencies. That has been the primary driver behind the popularity of the cloud. If an organization meets certain specific criteria, efficiency advantages are plentiful. A concrete example of efficiency will be reduced IT infrastructure expenditure and reduced staff requirements.

Transformation: Transformation pertains to the scenario where your business processes have changed in one or many ways from how they were when you were on-premises. This is the layer that is often confused with innovation. We see the term digital transformation being thrown around in many ways, with multiple interpretations, one of which hints that digital transformation is akin to innovation. That is not the case in my perspective. The simple approach to understanding if a change is a transformation or innovation is to use the "capability filter."

Has the change led to something that can be considered an entirely new capability? If a business process was re-engineered but still delivers the same core capabilities after being transitioned to the cloud, it is a transformation, not an innovation. An example that you can think of from an analytics perspective is transitioning an analytics workload to the cloud. In the cloud infrastructure, you can leverage the infrastructure analytics and machine learning solutions that hyperscalers provide.

Figure 2 : Three types of impacts of cloud-based technologies



Innovation: Innovation is when you build a new capability all together. These include new processes and solutions that did not exist before. This is the category or layer we will harp upon in the remainder of this report.

Let us touch upon an example briefly. In the on-premises model, you had a retail analytics solution that collected data from your vast network of stores and dumped it all on servers that you could access maybe the next day, next week, or next month. Then, you decided to transition to a public cloud. This now allows you to access data with a lag of just a few hours, with better storage and access management, leveraging the solutions supplied by the hyperscalers. You can also leverage analytics solutions from hyperscalers, to minimize your analytics cycle time. The examples so far pertain to the efficiency and transformation layer.

Now that you have the infrastructure and technology to access this data in near-real time, you realize you can leverage an algorithm to shape demand while the foot traffic is still in the store. Essentially, you can extract “trends of the day” and then leverage them to send emails and messages (like today’s deals or trends at your store) to registered users of those respective stores. This new process did not exist before and hence will be considered a new capability. This is innovation!

As highlighted earlier, innovation itself has hierarchies and so does transformation. There may be thousands of subtle transformations and innovations happening in your organization every year. This is why we will develop and understand a hierarchy of operational transformations and innovations in this chapter. That hierarchy will help us shape the starting point of our journey of innovating with the cloud.

Let us explore this further with another example. You have a new buyer who joins your procurement organization. This person, fresh out of college, realizes that most buyers are using their “experience” to place orders since the numbers the current procurement planning solution churns out are unreliable gibberish.

The rookie understands that the numbers are indeed gibberish, but they do not have much experience, so they decide to leverage their recent education to make decisions that they can use to explain their choices. Like millions of workers worldwide daily, they export the actual and forecasted data in Excel and then leverage analytics approaches.

None of the methods, formulas, or technologies they use are new to the business world, yet the process they have created is. It did not exist before. No one ever used this type of method before. If it works, though difficult to admit, it is innovation. It is what I like to call **individual innovation**

And that individual innovation, sits at the bottom of the hierarchy of transformation and innovation. The operational innovation and transformation hierarchies are shown in **Figure 3.** We have an understanding of the individual contribution layer from the example we discussed. Let us explore the remaining layers.

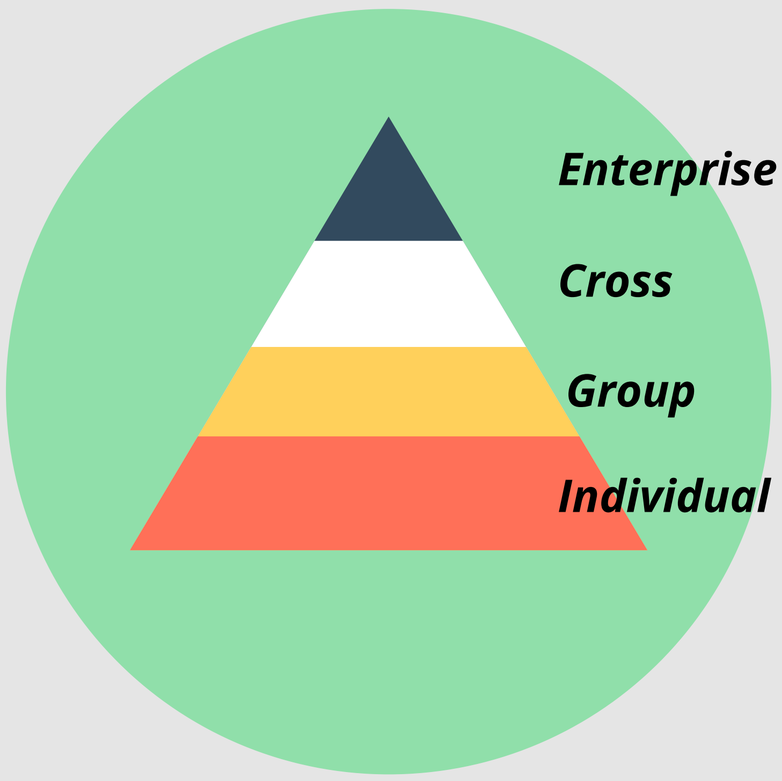
Group innovation occurs when more than one individual belonging to the same team collaborates to build new capabilities. Typically, this type of innovation is not feasible for one individual to accomplish alone.

Cross-innovation is when more than one individual belonging to different teams collaborates to build new capabilities. Typically, this type of innovation will not be feasible to accomplish by individuals belonging to just one team. These transformations and innovations are also not normally identified as innovation. But in the subsequent sections, we will explore why understanding these transformations and innovations is critical to generating true innovation with the cloud.

An example is when two teams collaborate to develop a new data-sharing process, leveraging technologies that already exist. At first glance, this also may not seem like innovation. However, approaches like data Products are based on similar postulates and are considered innovative approaches.

Innovation comes in many shapes and sizes!

Figure 3: Transformation and Innovation hierarchy



The enterprise level is the highest level of hierarchy, as shown in **Figure 3**. This is the level we generally tend to associate with innovation. This is what we generally see in the media. New drugs, compounds, new business models etc. While they may not seem apparent, enterprise level innovation is driven by all the other types of innovation collectively. It is this idea that can help us generate innovation, leveraging cloud technologies across all levels.

With this background, we can start interweaving cloud technologies with innovation.

Chapter 3

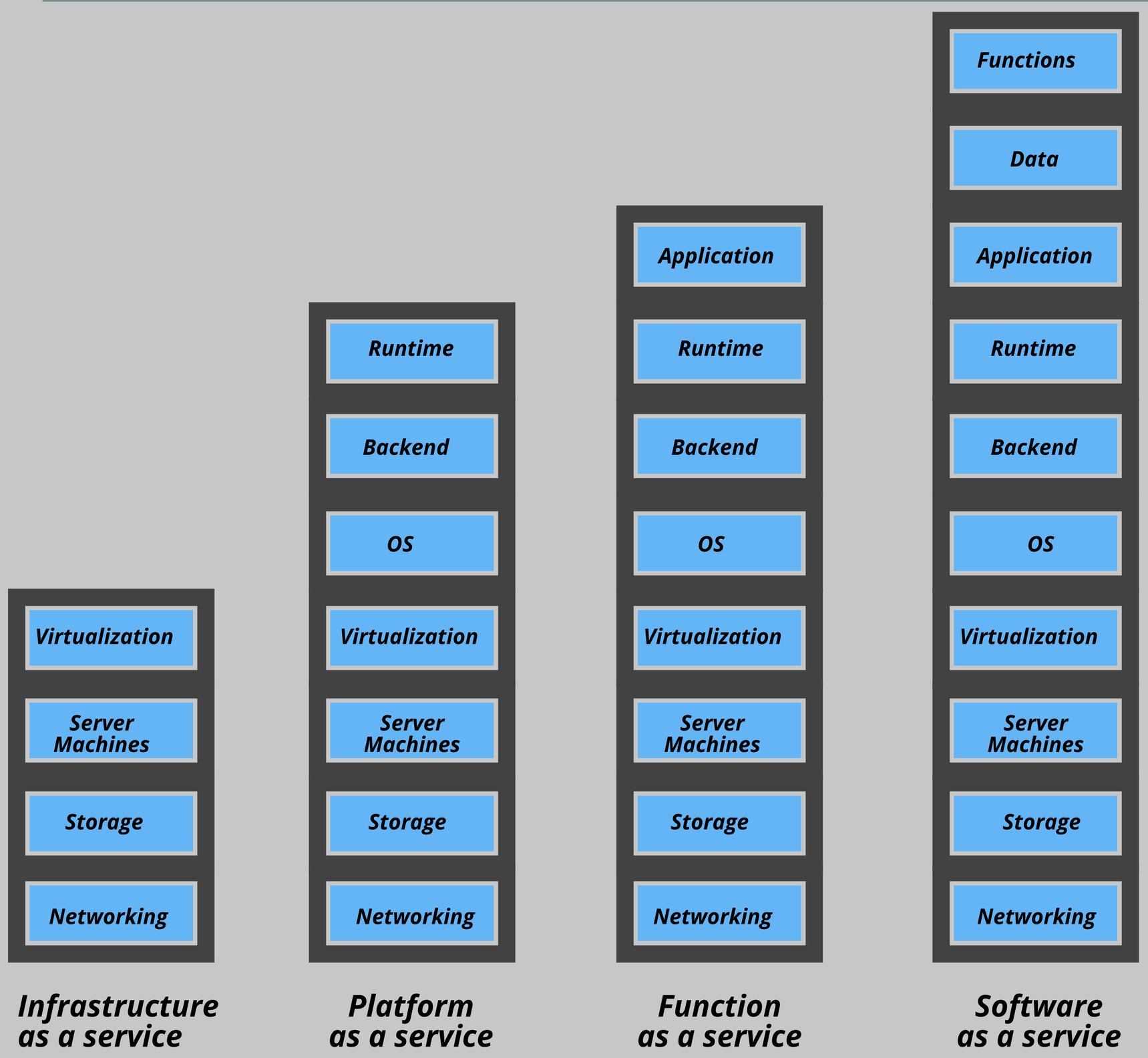
The Cloud Perspective

Just like we did with every other technology that we have ever leveraged, we are looking at cloud technologies from the same siloed lens. IT professionals claim to have generated innovation by migrating to the cloud, data science teams claim that they have generated innovation by building data science solutions in the cloud. The fact is, while these teams may have found a more efficient way, in the cloud, they may not have innovated. We touched upon this when we discussed the three levels of efficiency, transformation and innovation in Chapter 2. Let us review another example to understand this better.

A data science team was developing a real-time sentiment analysis model for a social media website leveraging on-premises resources. Now the team is leveraging cloud infrastructure for the same. The cloud infrastructure definitely provides significant improvements over the constrained, on-premises infrastructure. But if you revisit the three levels in the previous chapter, this transition is not yet innovative.

Before we get into understanding how we can break this siloed view to generate innovation with the cloud, let us review the cloud technologies stack that will be useful when you think about innovating with the cloud. The view in **Figure 4** will help you make sense of the examples that will be leveraged in the report since you can map these services to the capabilities we claim to build by leveraging the cloud.

Figure 4: Cloud technologies stack

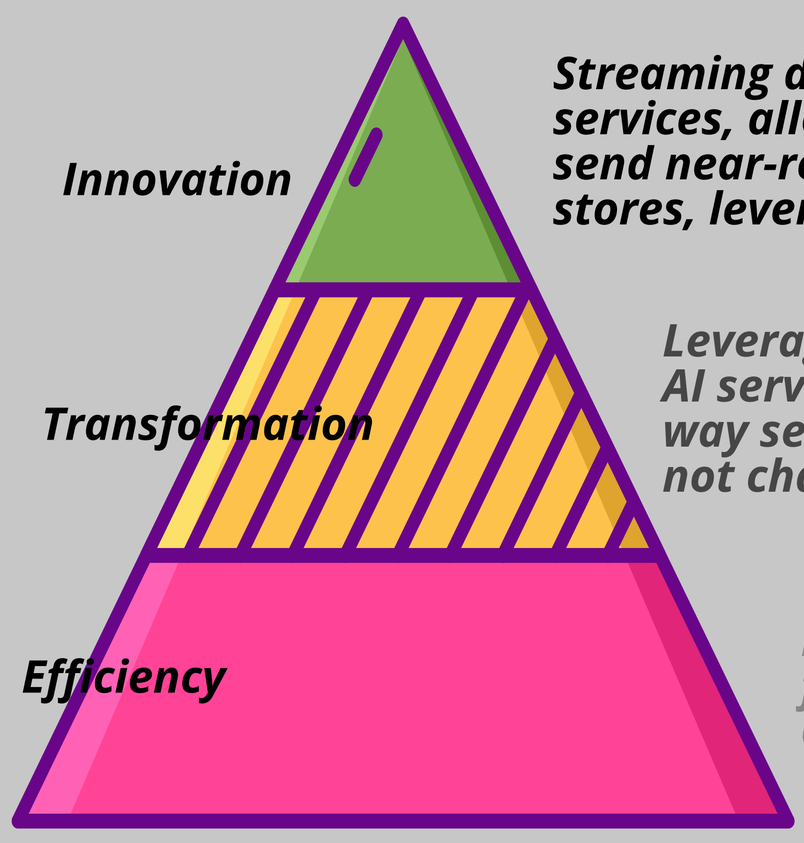


Cloud-based services can be categorized into many different types, as shown in **Figure 4.** The three primary services that are most widely leveraged are IaaS, PaaS, and SaaS. While innovation can be generated within each of these three services, it is when these three are leveraged in tandem that the most powerful aspect of innovation emerges.

Let us revisit our data science team example that we highlighted in the beginning of this chapter. As stated, while transitioning to the cloud-based development provides significant improvements over the constrained, on-premises infrastructure, this transition is not yet innovation. However, it is not difficult to extrapolate the solution by leveraging cloud technology to generate innovation. And for that, we will need to break the siloed view.

If we pick up our sentiment analysis example again, we can leverage it to understand the "extrapolation" approach better. **Figure 5** shows how the same analytics methodology, leveraging the three layers of cloud-based impact that we discussed in the previous chapter, can be extrapolated into an innovative solution.

Figure 5: Analytics: Efficient, transformative and innovative



Streaming data is now being captured leveraging cloud services, allowing the team to develop an algorithm that can send near-real time personalization SMSs to those visiting the stores, leveraging their store activity and sentiment analysis.

Leverage data based service offerings and analytics and AI services offered by the service provider. Changes the way sentiment analysis is done. But the capability does not change at its core.

Move the data science and data pipeline workload for sentiment analysis to the cloud. Powerful VMs, on-demand. Run times reduces significantly.

With this understanding of how cloud and innovation intertwine, we are now ready to understand how all of these concepts we have discussed come together to create innovation across all levels of the enterprise and help build a truly innovation-driven organization.

Before we do that, in the next few chapters, we will overview the data, analytics and process management capabilities that are available within cloud ecosystems for those not familiar.**If you are familiar with cloud-based data and analytics solutions, and fundamentals of process intelligence, you can skip directly to Chapter 7.**

Chapter 4

Data Management in the Cloud

I think this chapter and the two subsequent chapters are relatively less interesting than the previous ones. In these chapters, we will try to understand where the current capabilities in these areas lie from the cloud perspective. Then, in Chapter 7, we will bring it all together to understand how we can break the siloed view to build a unified framework. It is not necessary that when these aspects come together, it will always be followed by innovation. However, it is a given that when you take an integrated view, you will touch upon at least one of the layers of transformation or innovation. **If you are familiar with cloud-based data and analytics solutions, as well as the fundamentals of process intelligence, you can skip directly to Chapter 7.**

Data forms the foundation of any innovation that intends to leverage cloud infrastructure. It, therefore, is the most critical. The good news is that no matter your data needs, leading hyperscalers have every solution and combination of solutions under their belt.

Relational databases

A relational database is a collection of information that organizes data in predefined relationships where data is stored in one or more tables (or "relations") of columns and rows, making it easy to see and understand how different data structures relate to each other. Relationships are logical connections between different tables established based on interaction among these tables.

In-memory databases

An in-memory database is a purpose-built database that relies primarily on internal memory for data storage. It enables minimal response times by eliminating the need to access standard disk drives. In-memory databases are ideal for applications that require minimal latency or experience large spikes in traffic, such as real-time data analytics.

Key-value and document databases

Key-value databases are non-relational databases. These databases use the key-value method to store data. This means that the database stores data in the form of a collection of key-value pairs. The key serves as the unique identifier in the database. There are several possibilities when it comes to the format of keys as well as corresponding values.

On one end of the spectrum, they can be simple objects; on the other, they can be complex compound objects. These databases have some really useful characteristics, like the capability to scale horizontally and the ability to be highly partitionable to levels that other types of databases cannot.

Graph databases

A graph database stores nodes and relationships instead of tables or documents. This database can be thought of as a more “visual” representation of data, very much like the relations and flows that we might sketch on a whiteboard when brainstorming. The data in a graph database is stored without restricting the data to any pre-defined model. This allows us flexibility when we are thinking about data, relations, and interdependencies. In a more formal language, a graph database is a structured collection of data that highlights the relationships between the various data entities.

Time series and ledger databases

As those familiar with finance-related terminologies would know, a ledger is a form of keeping records. Essentially, it records financial transactions are recorded and the concept of ledger or bookkeeping has been around for centuries. A ledger database is a modern version of the same. Ledger databases are a type of database that leverages cryptographic techniques to secure data and allow the capability to develop an immutable ledger. In an immutable ledger, transactions are cryptographically recorded in the database. They are permanently recorded, tamper-resistant, and can't be altered. Immutability plays a critical role in guaranteeing the integrity and transparency of the data within the ledger.

Data lakes

A data lake is a centralized storage repository that can allow you to store all types of data at any scale. These data types can be both structured as well as unstructured. The data can be stored as-is, without any need to structure the data as a pre-processing step. Data lakes can support and run a plethora of analytics—ranging from business intelligence dashboards and visualizations to big data processing, real-time analytics, and machine learning.

Figure 6: Cloud-based database capabilities

Relational databases	**Predefined relationships where data is stored in one or more tables (or "relations") of columns and rows**
In-memory databases	**Database that relies primarily on internal memory for data storage**
Document databases	**Use the key-value method to store data.**
Graph databases	**Stores nodes and relationships instead of tables or documents**
Ledger databases	**Leverages cryptographic techniques to secure data and allow the capability to develop an immutable ledger**
Data lakes	**Centralized repository that allows you to store all your structured and unstructured data at any scale**

Chapter 5

Analytics in The Cloud

Analytics capabilities, irrespective of the type of analytics, require aspects that extend beyond the core analytics tools themselves. The categories of cloud-based services that will fall under analytics are:

Data ingestion and transfer

Simply put, data ingestion is the process of "ingesting," which means importing a variety of data files from multiple sources into cloud-based storage mediums, such as a data warehouse, data mart, or database. The data that can be ingested by cloud-based data processing tools can be categorized into:

- Real-time streaming data
- Bulk data asset batches
- Structured data generated and processed by on-premises platforms.
- Unstructured and semi-structured data like images, text files, videos, etc.

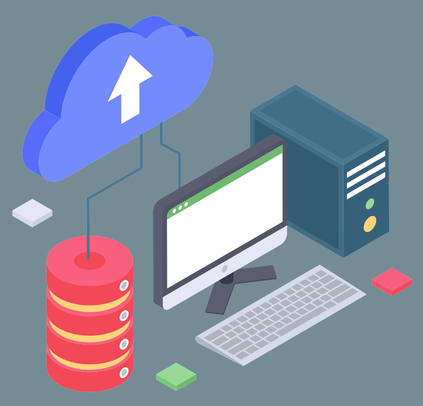
All hyperscalers have services that allow you to collect, process, and analyze real-time streaming data at scale. These services are generally fully managed and designed to deliver real-time streaming data directly to the storage services of these hyperscalers. These services generally scale automatically to match the volume and throughput of streaming data with minimal administration. These services can also convert your input data types to the desired format before storing the data in your storage. Many additional functionalities, like partitioning and grouping are generally also available in streaming data ingestion services.

When it comes to capturing data from on-premises sources, cloud-based services allow you to establish a dedicated network connection between your on-premises internal network and your cloud storage capabilities, slowing you to securely transfer your data. In addition to the direct link, various other types of services exist, often based on the volume and frequency of data movement. The gist is that when it comes to capturing and collecting data and moving it into cloud-based storage, there are plenty of options.

Data processing

Data processing encompasses the processes and technologies that pertain to the collection and transformation of raw data into a state where it can be leveraged for various analytics purposes. Sometimes, the data processing step may directly yield some basic insights and visualizations. Due to this aspect, the output from data preprocessing can be leveraged for various purposes, and by various stakeholders, ranging from data scientists and business analysts to C-suite decision-makers.

When it comes to data preprocessing, cloud-based services generally also provide a fully managed serverless ETL service that makes it easier to categorize, clean, transform, and reliably transfer data between different data stores in a simple and cost-effective way. An example of such a service can be a cloud-based service where the core components consist of a central metadata repository (data catalog) and an extract, transfer, and load job system that automatically generates code and manages ETL jobs.



Data Analytics

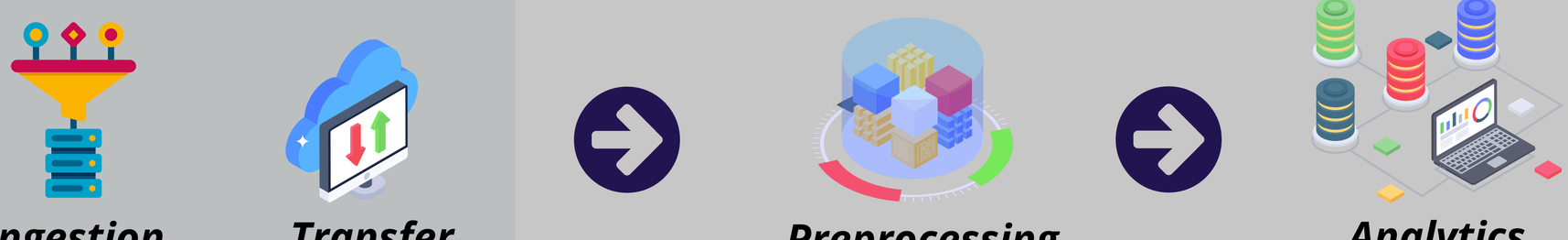
When it comes to core analytics tools themselves, options galore ! These range from SQL based business intelligence tools to advanced AI and ML tools that provides you the capability to build any solution you can envision.

For SQL-based analytics, all hyperscalers provide some kind of serverless, interactive analytics service that leverages open-source frameworks and hence supports open-table and file formats. These services provides an efficient and flexible way to analyze any volume of data, right at the data source. You can not only analyze data but can also build data applications from a plethora of data sources, including on-premises data sources or other cloud systems.

Plenty of options exist for business intelligence as well. These services can allow organizations to build integrated business intelligence capabilities at hyperscale.

These services can allow users across the enterprise to fulfill a plethora of business intelligence needs, leveraging the same source of truth. Often, these tools have advanced features like embedded analytics that allow modern interactive dashboards and queries based on natural languages to be made available. Then you have distributed search and analytics engines. Because of the distributed nature of these services, you can process large volumes of data in parallel, thereby finding the best matches more efficiently.

Figure 7: Cloud-based analytics flow



Data ingestion is the process of “ingesting,” which means importing a variety of data files from multiple sources into cloud-based storage mediums

Data processing describes the collection and transformation of raw data into meaningful information.

There are plenty of options available when it comes to advanced analytics as well.

All leading cloud service providers have cloud-based machine learning platforms. These platforms allows users to build, train, and deploy machine-learning models on the cloud. These platforms can be leveraged to deploy machine learning models on embedded systems and edge devices as well.

In addition to the capabilities to build your own models and algorithms, there are a plethora of services that you can leverage to build your unique solutions, ranging from natural language processing, image recognition, and conversational AI all the way to Generative AI. In essence, if you have a feasible vision of an analytics solution, a portfolio of cloud-based service offerings probably exists to make that vision a reality.

In the current Generative AI boom, parent companies of hyperscalers are leading the race. In fact, they are the ones pioneering some of the leading Generative AI capabilities available today. While not all of that has been fully integrated into their services, there is no doubt that we will be seeing an explosion in Generative AI-powered cloud-based service offerings in the next few years.

Chapter 6

Process Management in The Cloud

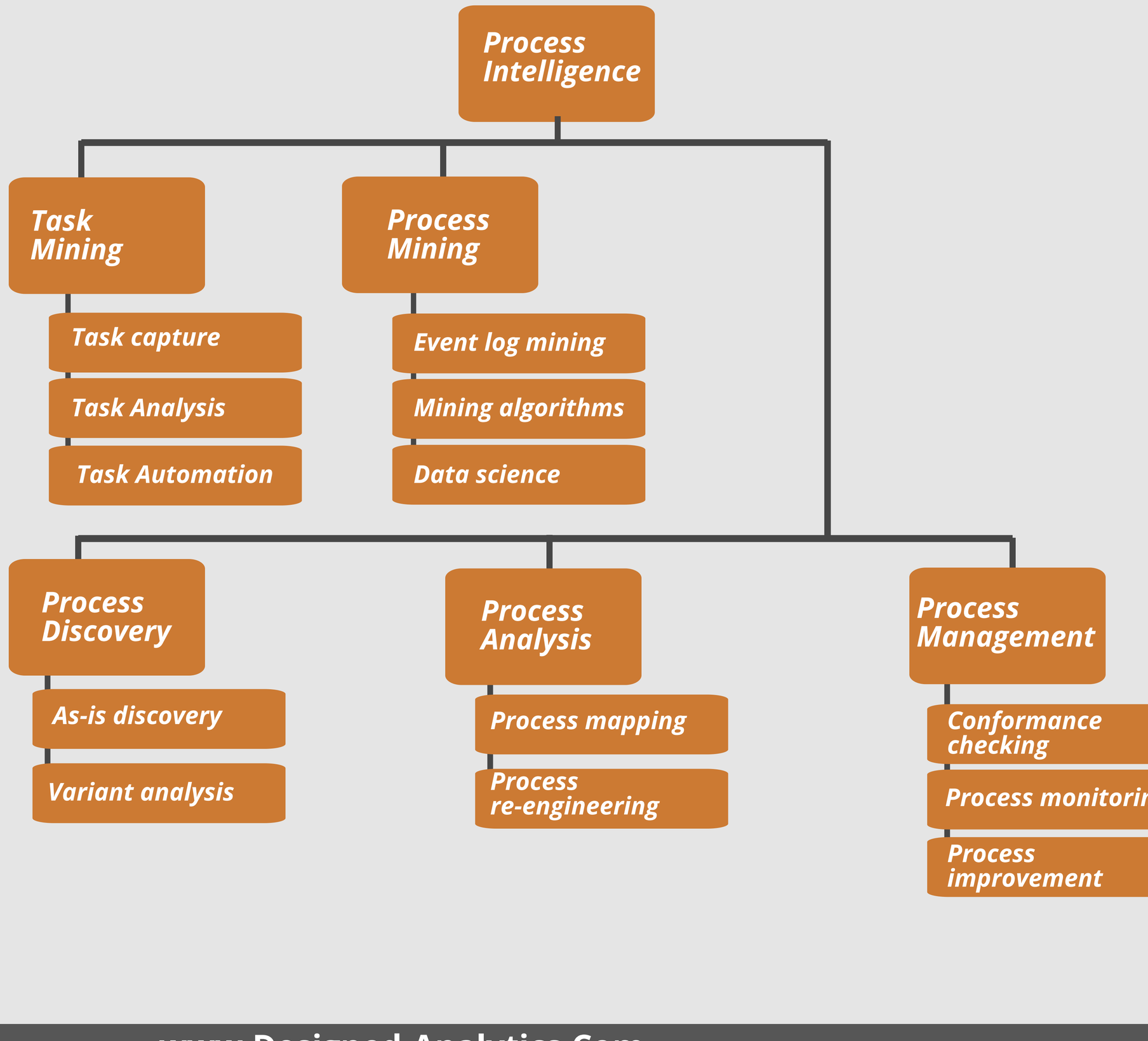
There are plenty of terminologies when it comes to business process management (BPM). From a cloud perspective, though not all cloud providers may have their own offerings related to BPM, the ecosystem will have plenty. Some cloud companies have acquired companies that provide end-to-end business process management capabilities.

For our purposes, we will be focused on process intelligence. This is a critical capability since all innovations, from a business context, pertain to processes. Let us explore some key jargon in the domain that is important from a transformation and innovation perspective. **Figure 8** captures the process intelligence capabilities tree.

Process Intelligence

The highest level in the hierarchy tree in **Figure 8**, process intelligence, pertains to the data that, once collected and processed, helps analyze the steps of a business process or operational workflow. As evident from the illustration, process intelligence is a combination of capabilities like process mining, task mining, process discovery, analysis, and management.

Figure 8: Process intelligence capabilities



From a process perspective, there are two key sources of data involved:

- Business data
- User interaction data

Process Mining

Process mining extracts business data, which resides in your transactional systems as timed event logs. It captures this data in real time and helps uncover opportunities to gain more insights and value from business processes based on the event logs.

Task Mining

Task mining, on the other hand, leverages user interaction data, which is essentially a double click in terms of granularity. For example, if you submitted a purchase order, the event log of its creation is relevant data for process mining. On the other hand, everything you did to complete the PO, like filling out all fields, clicking the required fields, and typing becomes relevant data for task mining.

Process Discovery

Process discovery, as highlighted in **Figure 8**, combines different techniques, including advanced methodologies like machine learning and deep learning to map the current state of the processes. This current state, or the "as-is" state, is then used as a prerequisite for a plethora of initiatives. Variation analysis allows you to understand how your current state process will behave in various scenarios, which again provides valuable insights for initiatives like process re-engineering. Capabilities like **process analysis** build upon process discovery.

Chapter 7

From Constraints to Innovation

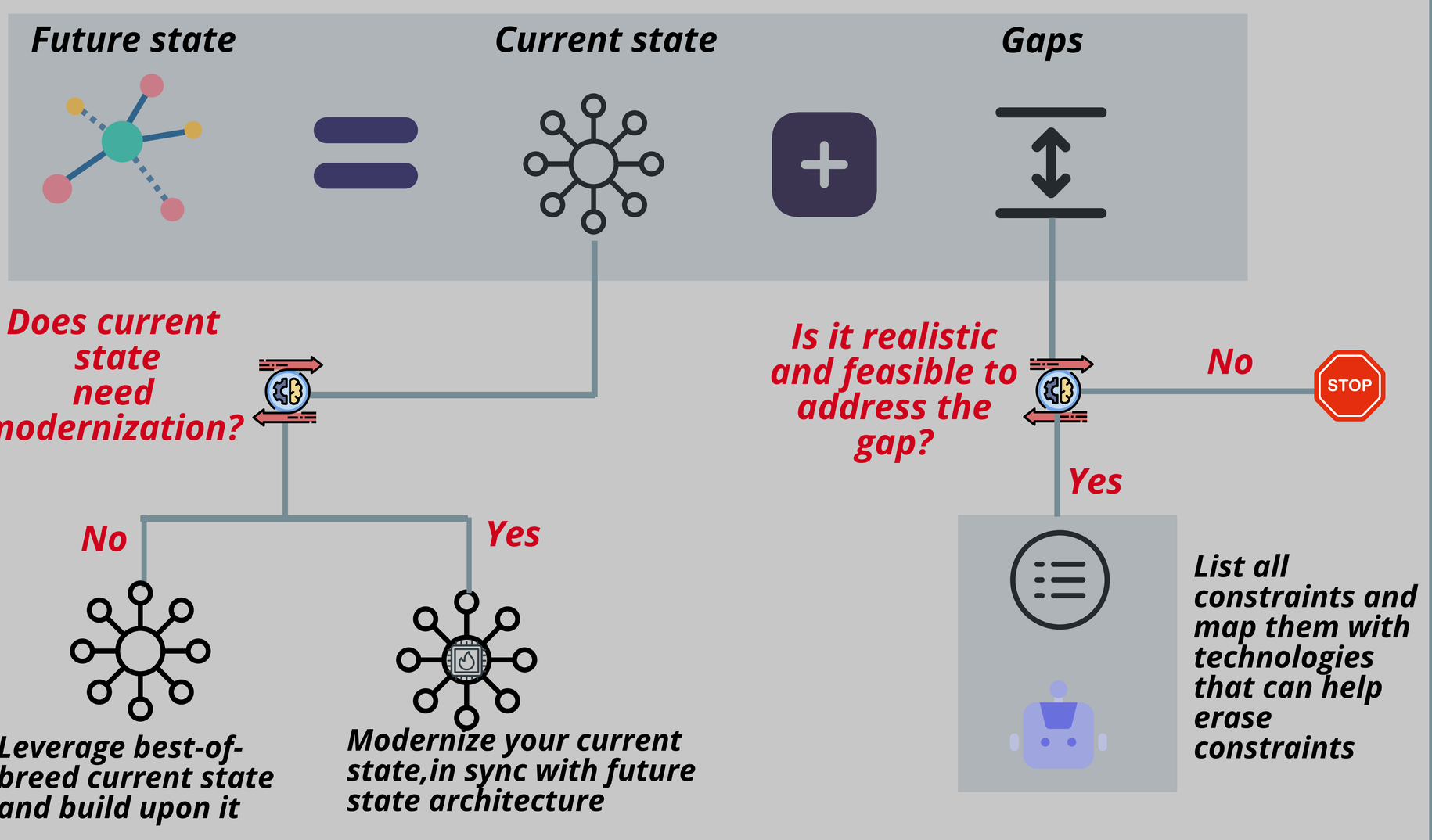
The last three chapters covered the capabilities that cloud and cloud-based solutions provide. They were primarily focused in the areas of data, analytics, and process management because if you dissect all possibilities of transformation and innovation that you can generate leveraging the cloud, these three will form the core enablers of that transformation or innovation. Also, just to reiterate, we are talking about innovation that leverages technology. In this case, cloud-based services are the enabler we are focused on. And within cloud-based services, these are the three categories that will be leveraged the most.

Pick any capability that you believe is an operational innovation fueled by the cloud. At its core, it is powered by at least two of these capabilities. That is the reason I decided to include those topics in the report.

So now we can start getting into understanding what the key essential steps to innovating with cloud. We have all the fundamentals we need. We explored the true meaning of innovation; hierarchies of innovation and the three types of impact cloud offerings can make. We overviewed the fundamentals of the three core areas of data, analytics, and process management. Now is the time to start putting all this together.

The report assumes that you already have a cloud strategy in place. If not, you need to first formulate one. Do not pursue a cloud strategy because everyone else has one. Do not use a template that was used by some other company in your industry. Your cloud strategy must be extremely tailored to your specific nuances. This will help you make the right choices in designing the right portfolio. We will proceed with the understanding that you already have a prudently designed cloud strategy. Also, you have hence invested in an optimal portfolio of cloud-based services, based on your cloud strategy. That becomes our starting point from a perspective on technology capabilities.

Figure 9: Generic steps of identifying transformation and innovation opportunities



There is a generic high-level, common sense process that you take whenever you want to build a technology-enabled future state capability. **Figure 9** captures the high level flow of that thought process. This also forms the basis of how you start formulating the roadmap of your cloud-based transformation and innovation journey.

It should not be difficult to understand from **Figure 9** why you need a robust, and customized cloud strategy to become a truly innovation-driven organization that leverages cloud to innovate at all layers. When you developed your cloud strategy, you envisioned a roadmap of progressive capabilities, something along the lines of the layers of efficiency, transformation, and innovation that we have discussed before. The cloud strategy bakes in the future state you want to build with the cloud, and hence you have good documentation of the details of every node of the process diagram of the process flow.

At a high-level, you start by understanding which current state capabilities currently can be leveraged into your future state. While you will be able to use components of your current state, often they may need some enhancements. In some cases, the current state components that can be used with the future state may not need enhancement but you may still want to upgrade so that it syncs perfectly with your modernized future state. If your current state is already best-of-breed, you obviously leave it as-is.

Then, you evaluate the gaps. There are a few different elements of this gap analysis. There are gaps that you can address with your on-premises capabilities. The other branch is where you can not address the gap areas with those current state capabilities. The reasons could be a couple. Either a mature technology does not exist or you do not have access to that technology. If you can build or buy access to technology, you need to do a feasibility and effectiveness analysis to make sure that it is worthwhile to move ahead. **Figure 10** in chapter 8 illustrates this approach further.

And when you decide to move ahead, you build a business case in terms of what new capabilities that investment can help build, how it will do so, the timeline, ROI and other jazz. While this flow was generic, it will form a critical basis of our methodology to plan and start cloud-based innovation. We will leverage this, in tandem with other concepts we have introduced earlier in the report, with an example, to understand the methodology.

Chapter 8

Bringing It All Together

The process flow covered in **Figure 9** will form a critical basis of our methodology to plan and start cloud-based innovation. We will leverage this, in tandem with other concepts we have introduced earlier in the report, in an example, to understand the journey. In this chapter, we start by exploring how the process flow from **Figure 9** can be leveraged to start the cloud-based innovation journey.

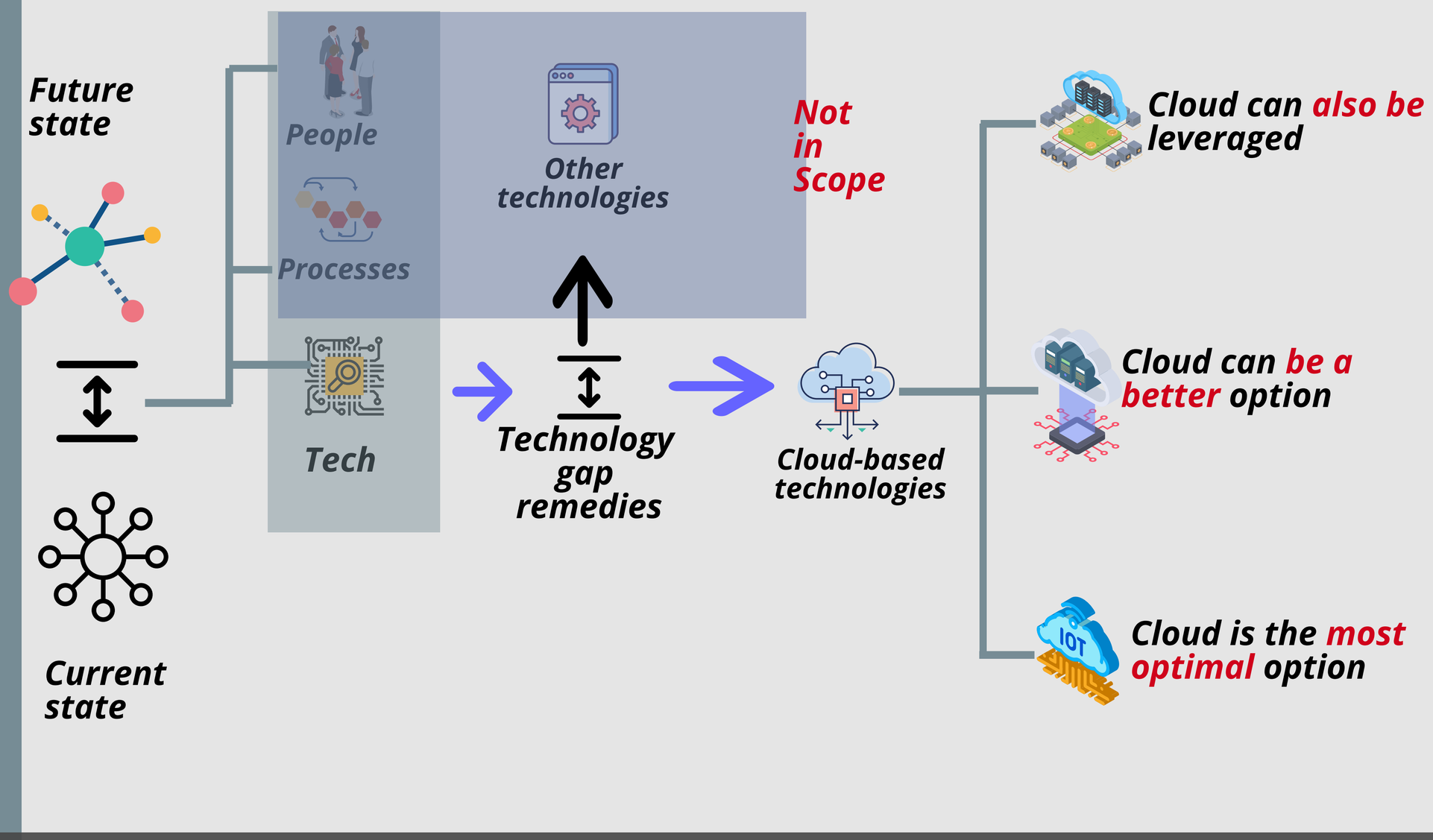
Starting with the constraints

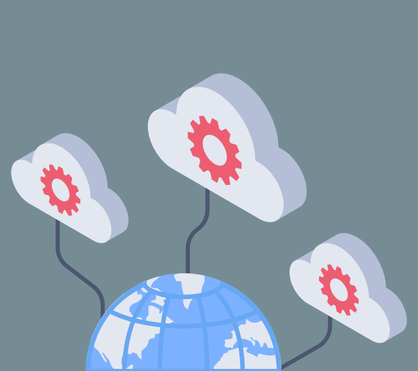
The fundamental question that you need to ask, even if you have already made a move to the cloud, is-"Other than cost, what are the key constraints we are looking to overcome with the cloud"? This is a fundamental question that probably is already embedded in your cloud strategy. But these questions also act as groundwork for generating transformation and innovation. If you were not constrained by the capabilities of your on-premises infrastructure but made the move because the cloud was cost-efficient, you are on the efficiency layer of the cloud-based capabilities hierarchy. Transformation and innovation happen when constraints are erased.

Only when you realize that you are currently constrained in some form and that constrain can be addressed by cloud-based capabilities can you progress to transformative and innovative layers of the capability. But the question is, how do you identify these constraints? It can be done by following a simple yet powerful process. We will review that process at a high-level and then dissect it more later.

The figure below shows the gap analysis portion revised from the cloud context. You will eventually come across three different decision nodes. While a couple may be easy from a decision-making perspective, the one where cloud can also be leveraged but does not have a significant edge is a bit tricky.

Figure 10: Understanding cloud-based opportunities to eliminate constraints





Let us explore the three options illustrated in **Figure 10**.

Cloud can also be leveraged: This is the path that needs a careful analysis to understand if cloud is the best options. An example could be a need for a point analytics solution. Your cloud provider may be offering this service as well but then you believe a specialized software vendor offers the best solution. The software needs to be installed on-premises.

Cloud can be a better option: This is where facts already lean in favor of cloud-based offering to some extent. An example in this case can be a specific software vendor that you prefer over the same service that your cloud provider offers, but in this case, the vendor offers a SaaS version and is in the ecosystem of your service provider.

Cloud is the most optimal option: This is the simplest decision making node where you know that the capabilities can not be met by your on-premise capabilities and expanding on-premise capability to accomodate this new technology is not cost effective.

But what is the most critical pre-cursor aspect of analyzing all these three nodes? It is to understand what type of capability that technology will help build and where it sits within your organization. And that is where our previous frameworks come into play.

Let us revisit our point-based solution example. This type of software brings more agility and efficiency into how your specific team performs analytics. The analytics capability already exists; the tool will turbocharge how it is done. This capability is transformative and, within the hierarchies of transformation and innovation, sits in the "group" category. As we will see in a subsequent section, this information will help you make your roadmap planning decisions.

This aspect is illustrated in **Figure 11**.

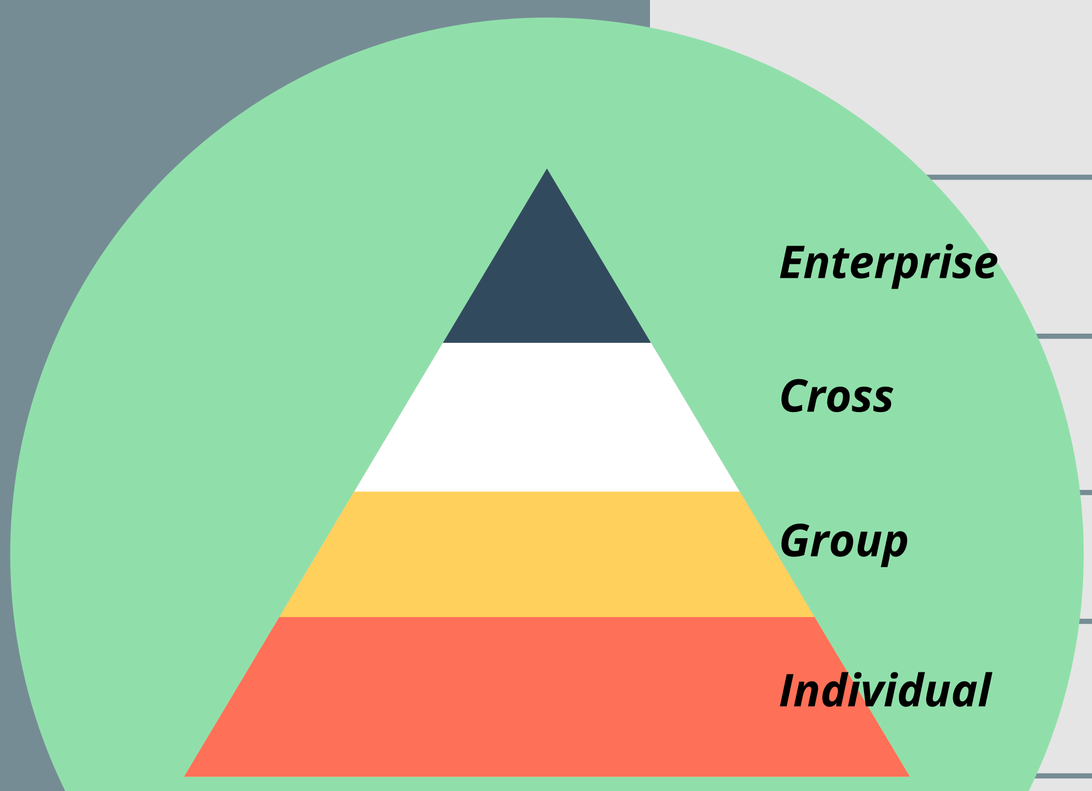
Figure: 11: Understanding the placement of the new capability

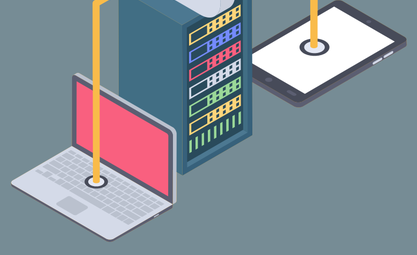
Now that you have an understanding of how you end up defining the granular details of innovation capabilities, this is the stage where all our concepts come together.

You will realize that to build this high-level innovation, you need to innovate at different levels of the innovation hierarchy. Once you have this view, you can start understanding how cloud-based service offerings, specifically the three categories of data, analytics, and automation we discussed, come into play to make this solution a reality.

Figures in the previous stages are then translated into a grid of granular components of the high-level capability. This grid is represented in **Figure 12**.

Figure 12: Cloud-based transformation and innovation matrix





As discussed previously, transformation and innovation happens when you erase constraints on your path. As you identify constraints, and then decipher which technology can help erase those constraints, you are essentially listing capabilities that these technologies will help build. Each capability will fall in one of the grids in the matrix highlighted in **Figure 12**.

This grid is your starting point. Based on this grid, you not only understand the levels where you need to focus, but you can also create a hierarchy to understand how progressive capabilities at each layer will eventually translate into a higher-level capability. The crux is that your innovation planning should start with data or insights that are similar to this view.

Let us now conclude the methodology journey with an example. You want to automate your distribution centers in a way so that there are minimal manual touch points.

Note that this is not the cosmetic type of automation that most companies engage in these days, where a section of the warehouse is automated. That section becomes a showcase for “innovation” and is in fact highly inefficient and unreliable for normal day-to-day high-volume operations.

We are talking about warehouse automation for day-to-day operations. That is your goal. Assuming you are a large company, achieving that automation is indeed an innovation. To attain that, you need to re-engineer and restructure all three elements: people, processes, and technology.

There are a plethora of innovative components that are baked into your overall smart automation capability. We will pick one example to understand how you can envision constraints and the role of cloud in helping you innovate.

Let us assume that you want to develop a capability that allows you to start planning the movement of products as soon as a customer has started adding products to their carts, even though they have not placed a formal order yet (they might not end up placing the order). Using this example, we will understand not only how you can identify the constraints but we will also see how different concepts that we have discussed so far will come together.

Figure 13: Example future state capability

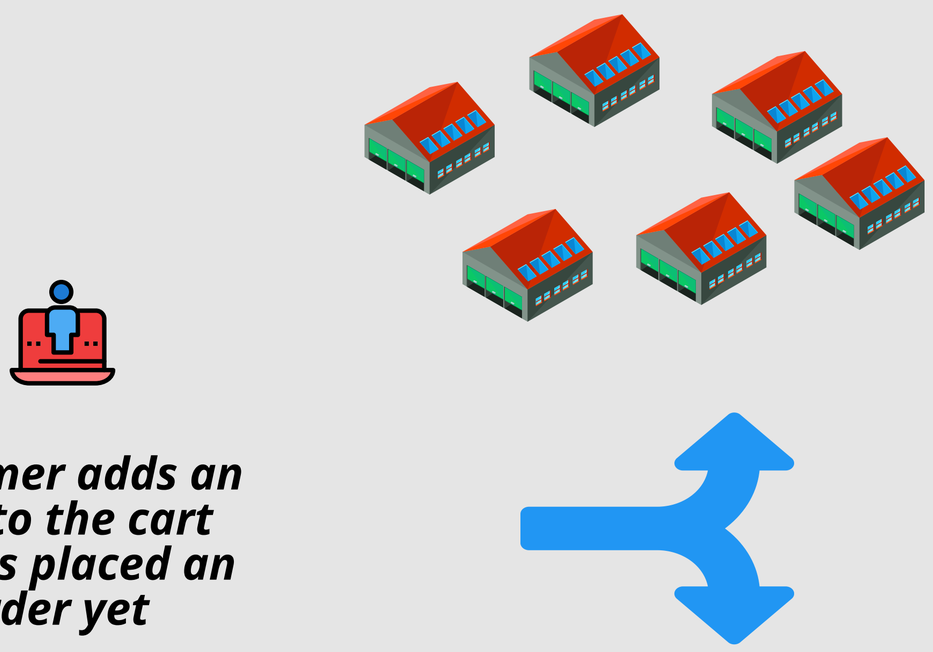


Figure 13 captures what this capability entails. Remember that this roadmap is the future state. The objective is that if there is a certain level of certainty that an order will be placed, which has already been calculated beforehand for a customer, the product starts moving in the warehouse or in the network. This leads to both operational and cost efficiencies.

You can imagine the many benefits of proactiveness. It allows you to shape your flows, whether it is the inter-DC transportation or flows within the warehouse, more efficiently. For example, if the product is not at DC A, which is nearest to the customer, then the product needs to move from DC B, the DC nearest to A, where the product is available. If a shuttle already moves between these DCs, it is a matter of tossing that product on a truck, utilizing a resource that is already available and will be consumed.

The same rationale holds for shop floor movement. If you know information about future orders that are not orders yet, it allows you to shape your flows in a much better way. A picker that is anyways traveling in aisle xyz, will pickup that product and put away in holding bins near the outbound docks.

However, all this can yield exactly opposite result, which is inefficiency, if there is no science involved. You can't start moving products every time a customer adds a product to the cart. It depends on the customer, product and other aspects. If you don't have this capability already, this is innovation. And we will understand how cloud can help build this capability.

Using the future state in **Figure 13** as the canvas, you can start exploring the current constraints that need to be addressed to help you build this capability. But before that, let us understand why developing the grid in **Figure 12** is an important starting point.

Figure 14: Leveraging the methodology: an example

Capability being analyzed: Real-time data visibility into 100+ stores. This capability currently does not exist.

	Efficiency	Transformation	Innovation
Enterprise			✓
Cross			✓
Group			✓
Individual			✓

Roadmap elements examples

Evaluate the impact areas. In this case we know its an innovative operational capability. This information will mean that you should plan for a more detailed and longer implementation timeline

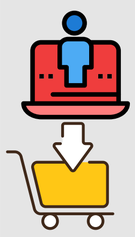
The lower layers of innovation support the layers above them. In this case, the planning needs to factor how all elements of hierarchy will be touched. What will this mean for an individual like a merchandizer, all the way to the C-suite. What will they need to leverage this new capability?

Why is the grid in **Figure 12** useful? First of all, by the time you reach this stage, where you have created this grid, you have already developed a robust understanding of many different aspects of your processes. You understand the constraints that you need to erase and the technologies that you need to leverage to erase those constraints. With this matrix, you then build a view of various levels of impact and the hierarchy of that impact in your organization.

This matrix then helps you translate it into a roadmap that is not based onology some high-level gibberish but a concrete method that leverages unique nuances of your core business processes. An example of how you can translate this matrix into actionable roadmap inputs has been shown in **Figure 14**.

Now let us revisit the example we touched upon in **Figure 13** and overview the methodology by going through one small capability area that we know we need to build to make the solution a reality. The flow has been summarized in **Figure 15**.

Figure 15: Leveraging the methodology



Develop an analytics approach to understand the customer segment and product types for which we can leverage this approach effectively

On-premise capability exists?

On-premise capability does not exist

Will on-premise capability, if developed, will address the need

On-premise can not be leveraged to build an efficient solution

What are the constraints that on-premise can not address? An example

Need to build a real-time pipeline of customer activit that integrates with a machine learning offering WMS,WES and distribution network systems. A distributed architecture is needed to integrate all thes aspects, across multiple locations.

Which capabilities will then help address the constraints? An example

A streaming data pipeline and federated learning architecture powered by ML algorithms at the nodes

Which cloud-based capabilities are needed for these capabilities? Examples

Streaming data pipelines Distributed cloud architecture ML studio offering

Which grids will these capabilities touch in our framework?

	Efficiency	Transformation	Innovation
Enterprise			
Cross			
Group			
Individual			

Design a roadmap

Chapter 9

Conclusion

The methodology presented here is not a magic formula. The fact is, for that matter, no methodology or framework exists in this world. The goal of sharing the methodology was to help us understand that developing a starting point of building your cloud-based innovation roadmap.

Remember that at the very core, innovation is a mindset acquired through knowledge and experience intertwined with your processes. Innovation can be simple as well as complex. Innovation can happen with or without technology. However, having an understanding of what innovation is at its core helps to plan operational innovation better since it needs a different perspective from the innovation that we are currently being bombarded with in our day-to-day lives.

The objective of this report was to help you with a methodology for developing a roadmap that is not based on some high-level gibberish but a concrete methodology that leverages unique nuances of your core business processes. This methodology can not exist or will never be successful in silo. Many other aspects must interact in tandem to bring out the best of this approach. Examples are your operations, technology, and cloud strategy. Your current state of people, processes, and technologies is critical as well. The gist is, use this as a starting point for your strategic journey but do not treat it as something cast in stone. The world of technology is fluid and needs fluid thinking and a fluid approach as well.

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