

Enabling a Customer Data Platform Using Data Virtualisation

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THE IMPACT OF DIGITAL TRANSFORMATION ON CUSTOMERS

Digital transformation has been underway in companies for a number of years and includes many different initiatives

Mobile applications enable self-service access to enterprise systems

The switch to self-service applications

The corporate social presence

Deploy sensors to instrument business operations and understand product usage

B2B process automation

Data and analytics for a data-driven enterprise

Many companies over the last few years have been investing heavily in digital transformation to improve their operations and create new insights that help identify new revenue and value-producing opportunities. “Digital transformation” is an umbrella term for a multitude of initiatives that include:

- The introduction of mobile applications and front-end web applications integrated with back-end enterprise applications to open up the use of those enterprise systems to more users such as customers, partners, and suppliers, as well as more employees. Examples of this are mobile banking and mobile commerce.
- The adoption of – and migration to – Software-as-a-Service (SaaS) applications on the cloud to enable migration off legacy systems and exploit new business functionality. Good examples of this are reflected in the uptake of applications like Salesforce.com or Workday.
- Creating a digital presence on popular social networks like Facebook, Twitter, Instagram, and Tik-Tok, as well as corporate Facebook pages.
- The adoption of Internet of Things (IoT) technologies with sensors deployed in business operations (e.g., manufacturing lines, distribution networks, Etc.) and consumer products. The former is to capture data to help optimise business operations while the latter is to observe product usage.
- Business-to-business (B2B) process integration to increase automation across companies e.g., in a supply chain.
- The adoption of data and analytics technologies, especially on the cloud, to analyse data from a growing number of new data sources to create new insights and to build machine learning models that can predict, recommend, and automate tasks in business processes.

There is no question that several of these digital transformation initiatives have had a major impact on customers by enabling them to transact business themselves at their convenience. This is particularly true of mobile applications.

WHY HAS CUSTOMER LOYALTY BECOME SO CHEAP?

With the proliferation of mobile applications, customers have had more and more capability made available to them. This extends well beyond the ability to interact with enterprise business applications. So many other mobile applications and Internet services have become available that have made customers all-powerful. This includes the ability to search for and find products and services, find reviews and ratings, find out about alternative products and services via search and social networks, ask questions of others about products and services, and find comparison sites. All of this can be done from a mobile

Customers are becoming much more informed before they buy

Customer loyalty is cheap

Deeper knowledge of customers is needed to keep them loyal

device while on the move. Therefore, customers are far more informed before they buy. In addition, with so many options available to them, they can switch providers at the touch of a mobile phone screen or the click of a mouse. All it takes is hearing about an alternative on a social network, a few checks to understand what is on offer, and they can be gone in an instant. You might say that this trend is just relevant to consumers, but the exact same thing is happening in business-to-business contexts. As a result, customer loyalty is cheap, and we have seen many examples of how quickly customers are prepared to move. In this kind of economy, it is essential to know more about your customers, if you want to keep them.

HOW HAS CUSTOMER INTERACTION CHANGED IN A DIGITAL WORLD?

Given these changes, it is not surprising that we have seen a major change in customer behaviour over the last several years. Traditional channels of doing business such as face-to-face, contact centres, and visiting outlets such as the branches of a bank or retail store have been in decline as customers switch to digital channels to interact with businesses and transact business. Mobile, social, and web channels are now “hot.” However, this presents a problem for companies which is highlighted in Figure 1 below.

In the digital economy, customers are increasingly interacting with applications and not employees

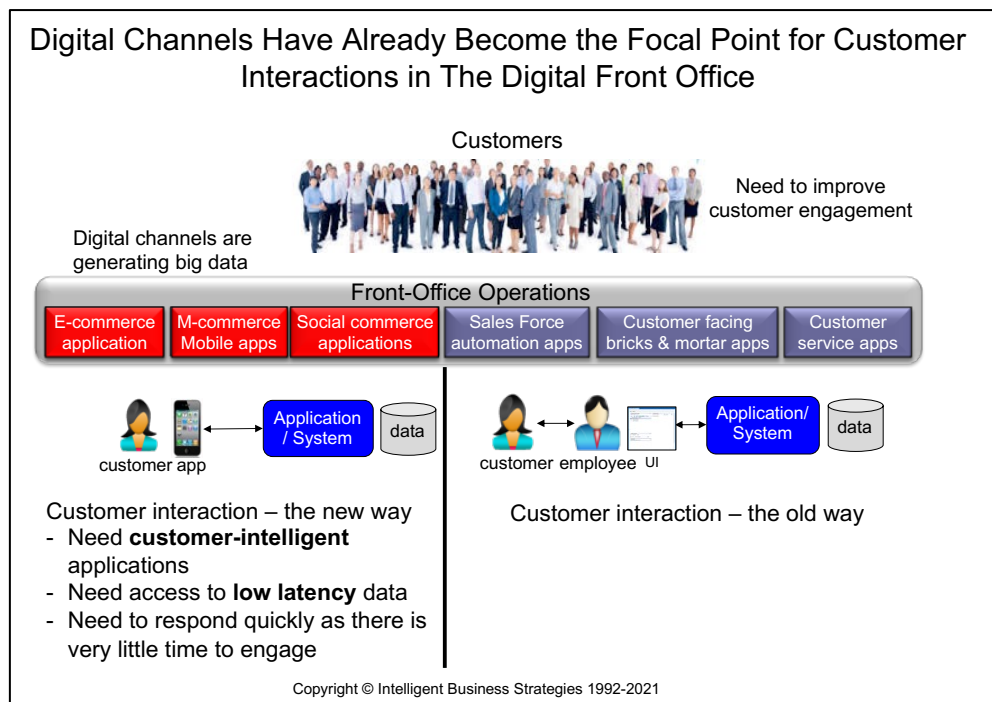


Figure 1

Therefore, applications need to become “customer-intelligent” to personalise customer experience and improve customer engagement

The problem is that in digital channels, customers are no longer interacting with employees to do business as they would in traditional channels. They are interacting *with applications*. That means that there is very little opportunity to interact with customers in person and so it becomes the responsibility of the application to be “customer intelligent” to improve customer engagement and to personalise the customer experience. In order to do this well, customer-facing applications have to have access to as much customer intelligence as possible, preferably in near real time, and they need to be able to use it to respond quickly to customers while they are online. That gives companies very little time and opportunity to engage with customers directly.

THE IMPORTANCE OF THE CUSTOMER IN THE BOARDROOM

The COVID-19 pandemic has highlighted the importance of customers

Focusing on customers has always been a top priority in the boardroom and if anything has highlighted the importance of customers, it has been the COVID-19 pandemic at the beginning of 2020.

So many businesses around the world have been impacted by this in the last year, and unfortunately some have simply been unable to survive because of their inability to reach customers due to lockdowns.

THE IMPACT OF COVID-19: FORCING BUSINESSES ONLINE TO SURVIVE

The COVID-19 pandemic is accelerating digital transformation as businesses realise they have to go online to survive

With the exception of grocery stores, COVID-19 has all but shut down all non-digital channels for many businesses. Non-food retail, apparel, and hospitality (particularly bars and restaurants) are prime examples of industries that have been hit. We have even seen major brick-and-mortar apparel retailers go out of business because of the lack of an online presence. In many cases, their brands are being snapped up by online retailers who want the brand but not the stores. This happened in the United Kingdom when several clothing store retailers were all struggling during the pandemic and were bought by an e-business retailer called Boohoo. If ever there were evidence of the rise of the digital channel, surely this is it.

Traditional retailers are being replaced by e-retailers who can demonstrate the importance of customers

Grocery stores are also seeing less footfall due to fears of catching the disease. The only way for businesses in many sectors to reach customers is via digital channels. The pandemic is forcing businesses online to survive. It is not surprising therefore that COVID-19 is accelerating digital transformation in many companies. This is borne out in several recent surveys. In a survey of US CEOs conducted by KPMG in November 2020, 74% of CEOs said that the pandemic has accelerated the digitisation of operations and the creation of next-generation operating models, by months or years.

74% of CEOs say the pandemic has accelerated digitisation

Consumers now regard delivery companies as essential to living

Consumers are already seeing this change, as the likes of Doordash, Postmates, UberEATS, Deliveroo, and Grubhub become essential for our day-to-day lives. Every day, countless products are being delivered to consumers. Business meetings and events have gone online, as so many work from home. The pandemic is changing how we work, and digital channels are now critical to business survival. This has put small and medium size enterprises (SMEs) under pressure as they struggle to compete with online giants.

Business meetings online are happening everywhere

The pandemic has forced businesses online to reach customers. It has also escalated the importance of how well companies understand customers' needs and raises the question of how well companies understand their customers? Are customers treated consistently across all channels? What customer data do companies have, and what problems do they have with it? What customer data do they lack? What customer insights can they use in digital and traditional front-office channels, and how can data virtualisation help speed up their ability to use it to compete in a digital economy?

CURRENT PROBLEMS FACING MANY COMPANIES IN THE FRONT OFFICE

Companies are struggling to create an integrated front office that operates seamlessly across digital and traditional channels

Every company front office includes marketing, sales, and customer service functions that need to operate across all channels to market. However, that is easier said than done, and companies struggle with plenty of problems in their endeavours to improve and optimise these functions and adapt to digital business. Some of these are described below.

MARKETING

Running effective marketing campaigns has always been a challenge, given that there are potentially many channels through which to reach prospects. With so many options to choose from one of the key problems is data.

Multiple Applications and Customer Data Stores Across Traditional and Digital Channels

For example, many companies use different applications for marketing across different channels. If multiple lines of business have their own marketing function, then the number of applications in use could be even larger, especially in highly decentralised organisations.

Many companies are using multiple applications to market their products and services across all channels

Some of these applications may be on-premises and some may be in the cloud. In fact, when you look at the cloud, there are thousands of SaaS marketing applications available as shown in the latest edition of the [Marketing Technology Landscape](#). For this reason, it is often the case that each of the different marketing applications in use may have its own database. This often means it is a challenge to keep customer data consistent across each of these application databases. Any change to customer data in this kind of set-up may mean that there is a need to synchronise all other marketing application databases. However, it may be that only subsets of customer data are kept in each marketing database with partial overlap across them. The problem is that no one is sure exactly what the overlap is, and this makes it even more difficult to maintain consistent customer data across them. The problem is even more challenging if there is no central customer master data management (MDM) system in place. In other words, there is no system with a complete set of clean, integrated master records on customers.

Each application has its own underlying database, which means marketing data is fractured across different systems

Some organisations still lack a central customer master data management system in place

Digital Marketing Overspend

Even within digital marketing this could be the case. There are many applications available to digital marketers that run either on-premises or in the cloud. These applications may cover different aspects of digital marketing, e.g., email, pay-per-click, digital banner advertising, social media advertising etc., or some combination thereof, and it is common to find several of these applications in use in organisations, each with their own databases. In each of these digital areas (e.g., email), you may want to run multiple marketing campaigns aimed at different customer segments and so it is not uncommon to

The inability to share customer data across multiple digital marketing applications is causing problems

Customer segmentation is being repeated in different channels

see customer segmentation repeated on data from different application databases used in these digital channels. With such a potentially complex set-up, the challenge most Chief Marketing Officers (CMOs) face is trying to avoid overspending. This has proven very difficult for several reasons. For example, if serving up digital banner ads is outsourced, CMOs often find it difficult to determine if their ads actually get converted into sales. This is often because of fractured data that may be caused by:

Fractured data is leading to marketing overspend

- Cookies and cookie data being controlled and managed by one or more ad serving companies
- Multiple marketing application databases
- Multiple customer databases being managed in different channels

In digital marketing, the data needed to determine return-on-investment is fractured across internal systems and marketing service providers

In addition, pixels may not be permitted on the ads to send tracking data back to your organisation to determine if ads are being served up in the best places. Also, placing your own cookies on a banner as a tracking mechanism is often useless, because third-party cookies are blocked by many browsers in use by people viewing the ads.

Collecting tracking data is difficult

Digital marketing service provider analytic applications are often not enough to determine return-on-investment in digital channels

In this kind of scenario, it is not surprising that CMOs are concerned about digital marketing overspend, despite the fact that cookie data is collected and reported on by ad-serving companies. This is because, although this intelligence is useful, it is not enough. More data is needed to determine return-on-investments, i.e., the rate at which digital banner ad click throughs are converting to sales. To find out, digital marketing departments need to join this data with their customer data and website web log data.

Fractured data means that the measurement of digital marketing effectiveness lacks detail

Fractured data makes it difficult to track website visitors back to click throughs on a particular banner being served on third-party websites, if the cookie data being collected by the ad-serving companies is stored in the cloud and only available via SaaS analytic application reports, while the customer and web log data that records the online behaviour is stored on-premises. It could be achieved by uploading this on-premises data to the cloud and integrating it there, but that could result in additional unplanned marketing costs. This is frustrating for many CMOs who want more detail than what is provided in SaaS analytical application reports.

Data integration across cloud and on-premises data stores is needed to avoid digital marketing overspend

Limited Success in Implementing Marketing Attribution

Fully weighted marketing attribution to optimise campaign spend by segment across each channel to maximise conversion rates remains an aspiration rather than a reality

It can also be notoriously difficult to correctly implement marketing attribution to work out optimum marketing spend for a particular segment of customers across different channels. This requires you to identify a set of user actions ("events" or "touchpoints") that contribute to a desired outcome (e.g., a sale) so that you weight and spend just the right amount of marketing budget across all channels, to provide maximum value. A key reason as to why marketing attribution is difficult is fractured data held in multiple places and inability to integrate it to run analytics to optimise expenditure for maximum return on investment.

SALES

Similar problems can often be found in managing multi-channel sales.

Multiple Sales Applications

Different applications may be deployed in different sales channels, each with its own underlying database. For example, in traditional channels, different applications may be used to manage sales in outlets, the contact centre, and in face-to-face selling while in digital channels, an e-commerce application may be used with an accompanying mobile application to allow people to make purchases on the move.

Inconsistent Customer Treatment in Different Sales Channels

In addition, there may be inconsistent treatment of customers across different sales channels because data is not integrated. For example, an e-commerce application may be using clickstream data for personalisation while the contact centre or the direct face-to-face selling applications use business intelligence from a data warehouse. That means customers have different experiences when they interact with the company via different channels.

The Need to Improve Personalisation

Many companies are also weak in the area of personalisation. Some do not offer it at all, or it is limited because it relies on a single data source, e.g., live clickstream. For existing customers, personalisation may not consider previous purchasing history, customer opinions about products and brands voiced on social media, emails or in webchat, customer relationships, or even the customer's real-time location. This is because the data needed for a richer understanding of customers is not integrated, and some of that data is not even captured. New sources of customer and machine-generated data have emerged in the digital world, but in many cases they are not yet used to improve personalisation or to make things like next-best-offer recommendations more effective. Also, much of this is not available in traditional channels, let alone digital ones.

Different sales applications may be in use, each with its own database

Customers may be treated differently across channels because data is not integrated and shared

Personalisation is often limited because the data in use is insufficient and the full set of data needed to achieve it is not integrated

SERVICE

No Historical View of Customer Interactions

In customer service, we are now in a world of multiple ways to interact. For example, via email, webchat, or voice. In addition, interaction data is often captured in contact centre transcripts within one or more customer service applications. However, having a historical record of all these interactions, in a timeline, by customer, is often not available to customer service personnel. This would help to provide better context so that companies can provide better customer service.

Customer service may be impacted by the inability to see a history of customer interactions across all customer communication channels

Not Enough Insights

The lack of integrated data and analytics restricts customer service's ability to sell during a customer interaction

Customer segmentation may not be accurate enough to enable customer service to be effective in selling, because the needed data is not fully integrated

Customer service may also be unaware of negative customer sentiment towards a product or service

Fractured front-office data also limits the customer insights that are available to customer service to identify and convert opportunities. For example, a data warehouse or data mart may show a history of customer purchasing activity by sales channel. The same historical data may be used for customer segmentation, which may, in turn, drive selection of segment-based cross-sell or upsell scripts used by service representatives while interacting with customers. However, it does not take into account customer online behaviour described in clickstream data mainly because this data is rarely found in a data warehouse or data mart. If this online behaviour data is combined with historical customer purchasing activity data, it may reveal that customers who are currently in the same segment should in fact be in different segments. Therefore, any cross-sell and up-sell scripts being used in the contact centre may not be anywhere near as effective as they could be, if this additional data was taken into account.

There are also other data sources that can enrich customer insights so that they more accurately spot problems and opportunity. For example, customer generated opinion data can be used to reveal customer sentiment and intent, both of which are important in customer service. If customer sentiment is negative towards a product, for example, customer service representatives should be aware of that. Similarly, insights into consumer product usage, gleaned from IoT data, could help customer service representatives to identify problems and help optimise field service. Yet IoT data is very rarely stored in data warehouses.

The bottom line is that there is a lot more that could be done if fractured data sources and multiple analytical systems were integrated.

CRITICAL SUCCESS FACTORS FOR A CUSTOMER-INTELLIGENT FRONT OFFICE

Having understood covered some of the challenges confronting companies in customer-facing front-office channels, the question is, “What are some of the critical success factors that would help create an omni-channel front-office with consistent customer treatment across all channels so as to improve customer engagement, customer experience and customer retention in a digital economy? These can be broken down into five key areas:

- More data for a better understanding of customers
- Multiple customer oriented analytical workloads
- A customer oriented logical data warehouse
- Customer analytics on integrated customer data
- Integrating common customer data and analytics into all front-office applications

MORE DATA FOR A BETTER UNDERSTANDING OF THE CUSTOMER

To compete in a digital economy, you need a lot more data on customers than that stored in on-premises transaction processing application databases and data warehouses. You also have to know who your customers are, how they interact with your company, what their opinions are, and their behaviour (Figure 2).

Integrated customer data and analytics shared across all front-office functions and channels is critical for success in a digital economy

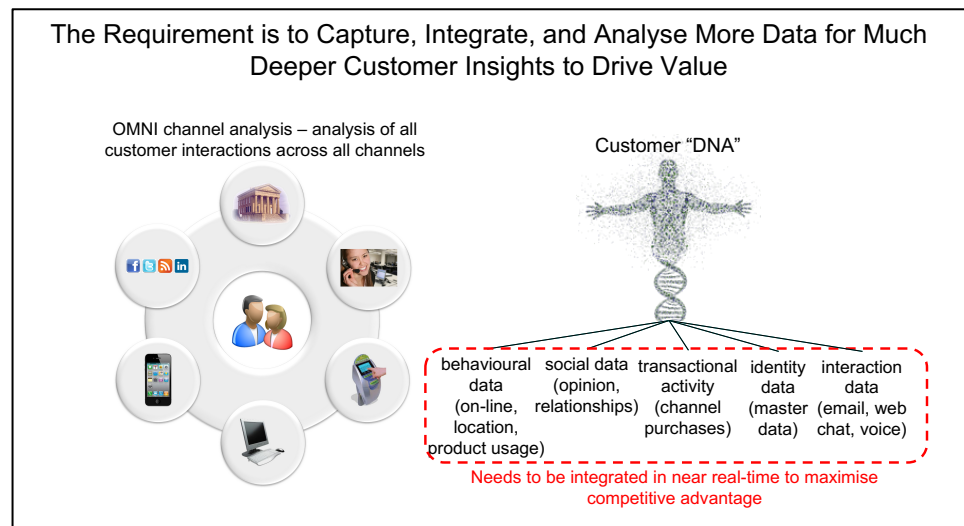


Figure 2

This means that you need more data from both inside and outside the enterprise. For B2C businesses, this may include:

- Customer identity data (customer master data) – e.g., contact details

More data is needed from internal and external sources to get a more comprehensive understanding of customers

This includes customer master data, lifestyle, and interests as well as data about their purchases, opinions, relationships, interactions, and behaviour

New customer analytical workloads are needed to convert voice interactions into text, to analyse opinion and score sentiment, to extract out data of interest from text, to identify customer relationships and understand customer behaviour

These new insights need to be added to the customer purchase history

- Additional customer attributes such as:
 - Customer demographics
 - Customer lifestyle, hobbies, interests, and personality data obtained from social networks
 - Customer professional life data such as job history, education, employers, and certifications obtained from social networks
- Customer purchase history (already in data warehouses)
- Customer generated likes, dislikes, and opinions data, such as those expressed in social network interactions, product review sites, inbound email, web chat, and voice interactions
- Customer relationships data e.g., from social networks
- Machine generated customer behaviour data, e.g., from online clickstream, GPS location, and smart product IoT usage data

MULTIPLE CUSTOMER ANALYTICAL WORKLOADS

Another key requirement is to use analytics to filter out high-value customer data from these new data sources, using analytics.

This new data means that new analytical workloads are likely to exist over and above the classic ad-hoc multi-dimensional analysis and reporting on historical transaction data (e.g., purchase history) that happens every day on data warehouses and data marts. These additional analytical workloads include:

- The development of machine learning to profile customers in order to predict churn and propensity to buy, discover their buying patterns (market basket analysis), recommend next best offers, or segment the customer base
- The development of machine learning models to convert voice to text, cluster customer interactions, and classify sentiment about products or brand using natural language processing on customer interactions captured in phone calls, social networks, emails, web chat, or contact centre transcripts
- Graph analysis to identify customer relationships such as members of the same household
- Real-time streaming analytics to analyse:
 - Customer online behaviour from live clickstream data
 - Customer location and movement patterns using GPS data
 - Customer smart product performance and usage or customer health using IoT sensor data
- Ad-hoc analysis of clickstream data as shown below:

Analysing clickstream to understand online behaviour requires scale to process large volumes of data

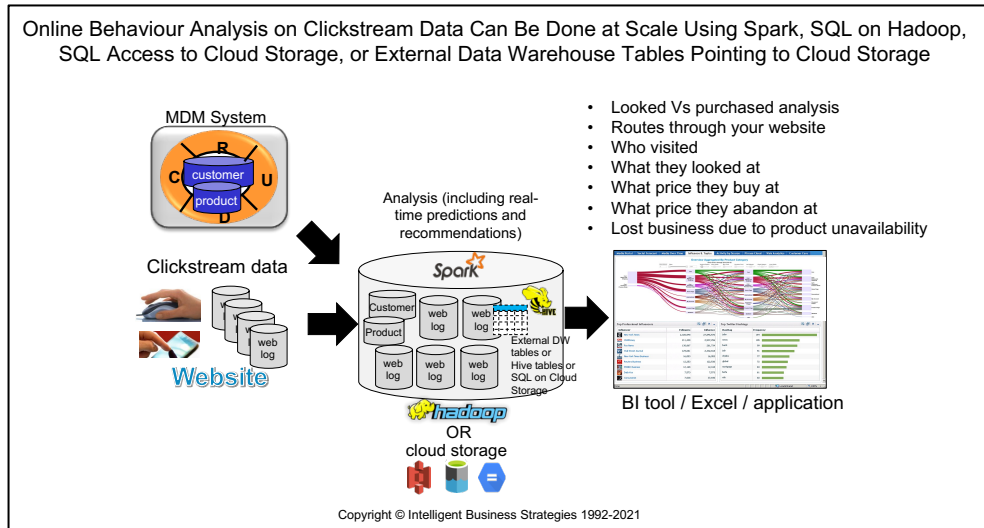


Figure 3

These workloads may be running on different platforms, such as cloud storage or Hadoop using Spark, graph databases, and streaming platforms (e.g., Kafka) or some combination thereof, with some also running on existing data warehouses and data marts. This is shown in Figure 4.

Multiple analytical workloads could be running on different analytical platforms to determine everything you need to know about customers

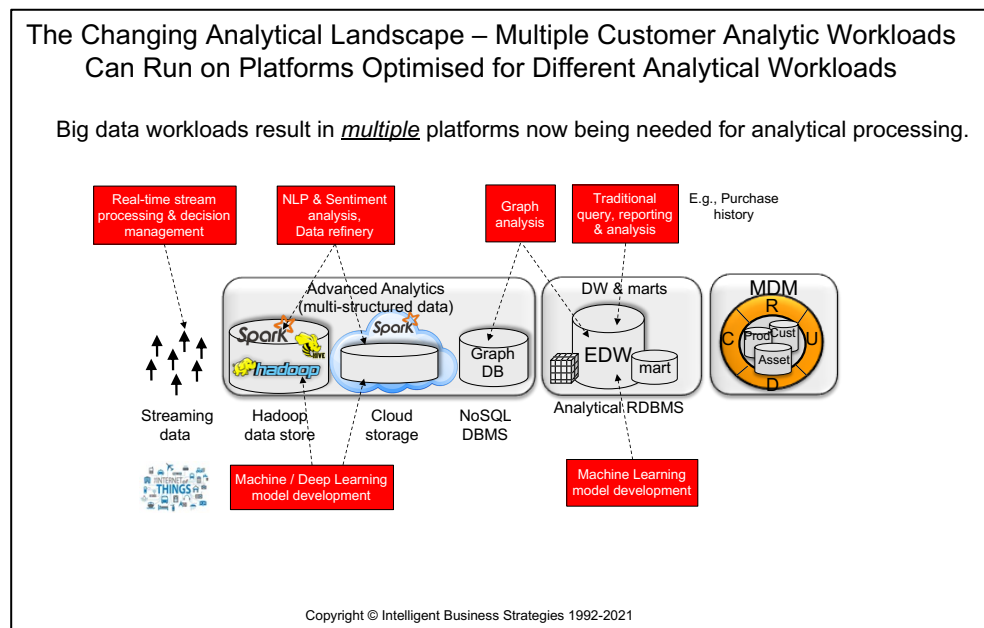
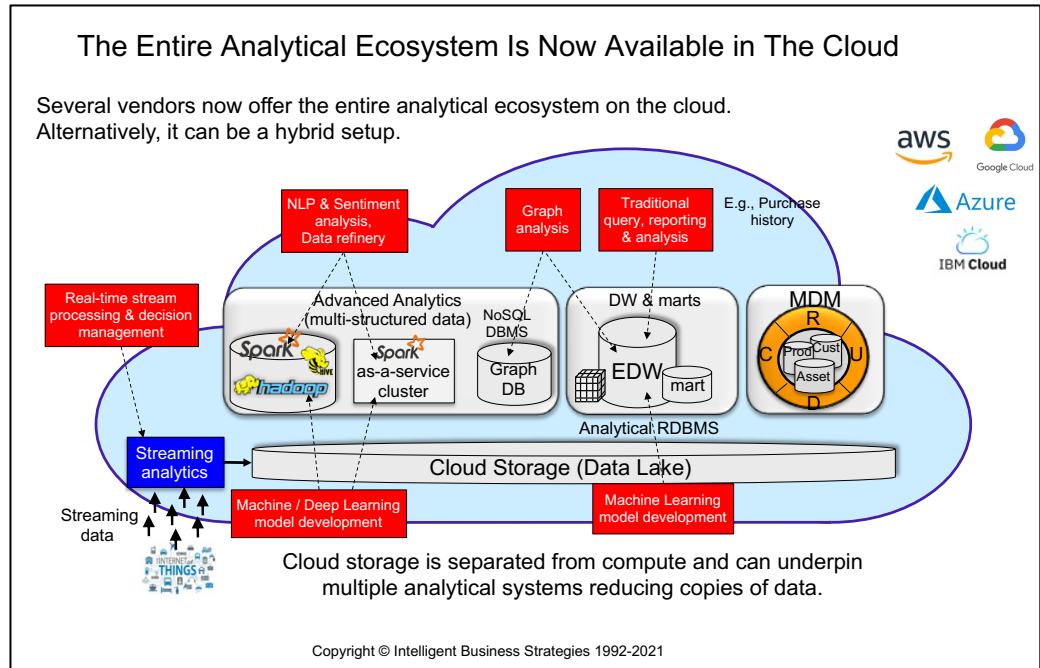


Figure 4

These analytical workloads may run on the cloud, on-premises, at the edge, or all of these environments. If on the cloud, it may be possible to produce trusted data in a centralised data lake for (re)use in several of these analytical workloads.



All of these workloads can run on the cloud with data being ingested into cloud storage for analysis in different analytical systems

Figure 5

A CUSTOMER-ORIENTED LOGICAL DATA WAREHOUSE

The customer insights revealed by different customer analytical workloads need to be integrated with customer master data to provide a single view of the customer shared by all front-office functions

To exploit the insights produced by these different customer analytical workloads, in addition to those already produced in data warehouses and data marts, organizations will need to simplify access to multiple platforms to create an integrated, richer set of customer data in a single customer view. To achieve this, data from existing data warehouses and data marts needs to be integrated with data in other analytical platforms in a 'logical data warehouse' made possible by data virtualisation. Doing this would accelerate the use of customer analytics and insights across both digital and traditional front-office channels to help improve the customer experience, anchor customer retention, and drive new growth. Doing this lays the foundation for enabling a single Customer Data Platform for the enterprise. Data virtualisation software makes this possible.

Data virtualisation makes this possible

CUSTOMER ANALYTICS ON INTEGRATED CUSTOMER DATA

Once a richer set of customer data has been made available in a single view of the customer, customer machine learning models can analyse this data to improve customer segmentation and personalisation

In addition to multiple customer oriented analytic workloads, it is also a critical success factor to re-run some customer analytics on the richer single integrated view of customer data and insights made available via a logical data warehouse and not just on a traditional data warehouse or data mart.

More accurate customer segmentation and personalisation will help drive new value and improve the customer experience

By taking into account customer online behaviour, purchase activity, additional demographics and lifestyle, personality and professional life data, etc., organisations will be able to produce more accurate customer segmentation, which should lead to more effective marketing campaigns. The same is true for re-running prescriptive analytics that predict the propensity to churn and the propensity to buy, because greater accuracy here will help to provide better personalisation to improve customer engagement, the customer experience, and customer lifetime value.

INTEGRATING COMMON CUSTOMER DATA AND INSIGHTS INTO ALL FRONT-OFFICE APPLICATIONS

A single view of the customer, together with sharper analytics integrated into front-office applications, will result in customer-intelligent applications and consistent customer treatment across all channels (omni-channel)

Finally, organizations need to make this common integrated customer data (single view of the customer) together with more accurate segmentation, personalisation, and recommendation analytics, available to all front-office applications to drive consistency everywhere. This creates a customer data platform whereby organizations can create multiple weighted marketing campaigns, each aimed at a different customer segment, taken from a common single view of the customer, and delivered through multiple channels. In addition, common customer analytics can be integrated into all front-office applications in all channels to create an omni-channel experience with more precise marketing and consistent customer treatment across all channels.

THE ROLE OF DATA VIRTUALISATION AS A FOUNDATION FOR A CUSTOMER-INTELLIGENT FRONT OFFICE

Given these critical success factors, how can an organisation lay the foundation for a customer-intelligent front office?

THE CUSTOMER ORIENTED LOGICAL DATA WAREHOUSE

Data virtualisation enables new customer insights created in different underlying analytical data stores to be presented as if it were all in one database, using virtual views. This is known as a logical data warehouse, whereby data in a traditional data warehouse (e.g., purchase history) is combined with insights from other data stores including a Hadoop system, cloud storage, a graph database, and a master data management system. Even new insights produced from streaming data analytics can be included. Therefore, a complete view of each customer, together with all of their interactions, relationships, and opinions, could be brought together in a logical data warehouse to create a 360° single, integrated customer view of all insights for use in all front-office applications (see Figure 6).

Data virtualisation can be used to create a logical data warehouse that provides a 360-degree view of the customer for use by all front-office functions across all channels

As new insights and data become available, the single virtual customer view remains up to date

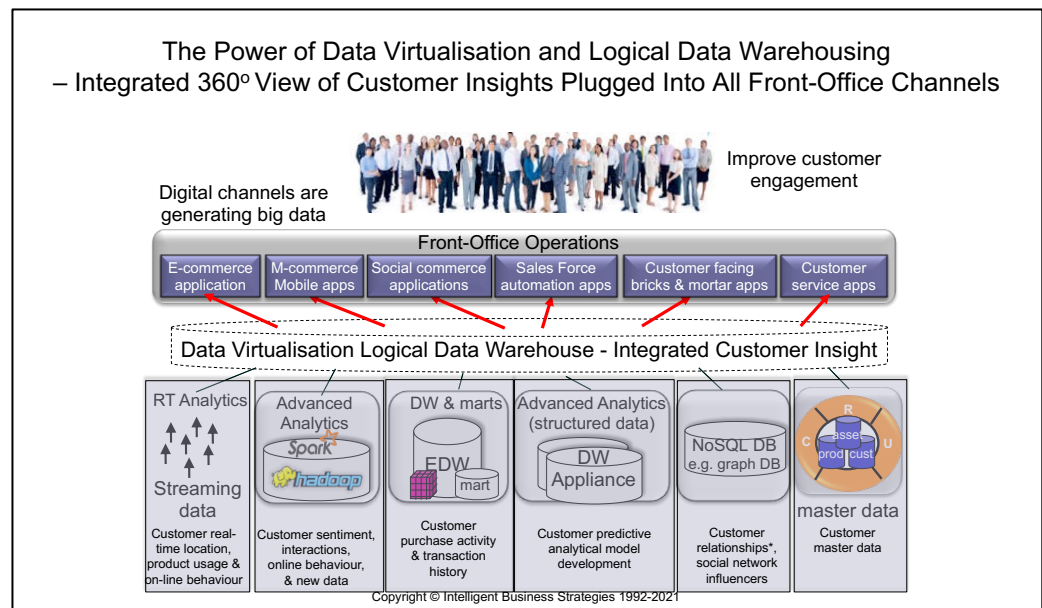


Figure 6

USING A CUSTOMER ORIENTED LOGICAL DATA WAREHOUSE FOR OMNI-CHANNEL CUSTOMER SEGMENTATION

The value of using data virtualisation to create a single integrated view of customer data and insights in a logical data warehouse is that it enables a much richer set of customer data to be used as a source to machine learning models. This in turn can produce more accurate insights for use in marketing, sales, and customer service. Analysis of this data using k-means clustering, for example, will result in a larger number of smaller customer segments compared to what is possible when a clustering machine learning model is restricted to just customer purchase history data in a data warehouse. This means improved

A customer oriented logical data warehouse enables more accurate customer segmentation to be done once and used by everyone who needs it

customer segmentation, leading to a larger number of more precise multi-channel marketing campaigns, each one aimed at a different customer segment targeted via different channels (figure 7).

More accurate customer segmentation, produced from a richer set of integrated customer data, enables more effective multi-channel marketing campaigns, each aimed at a smaller segment

This should yield a better sales conversion rate

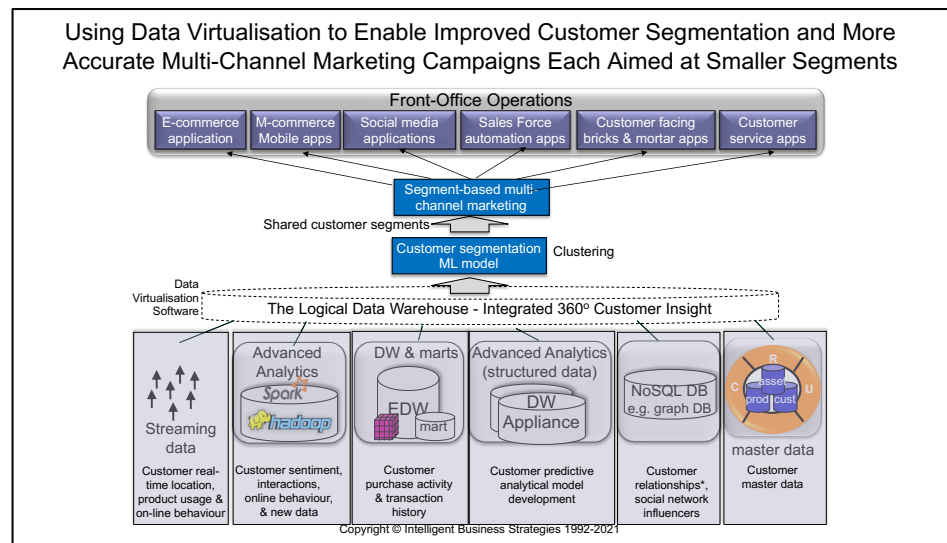


Figure 7

The segments produced by clustering data from a logical data warehouse can then be added back into the physical data warehouse to analyse sales and buying patterns by customer segment over time. This is shown in Figure 8.

More accurate customer segmentation can be fed back into data warehouses to provide better intelligence on customer buying patterns

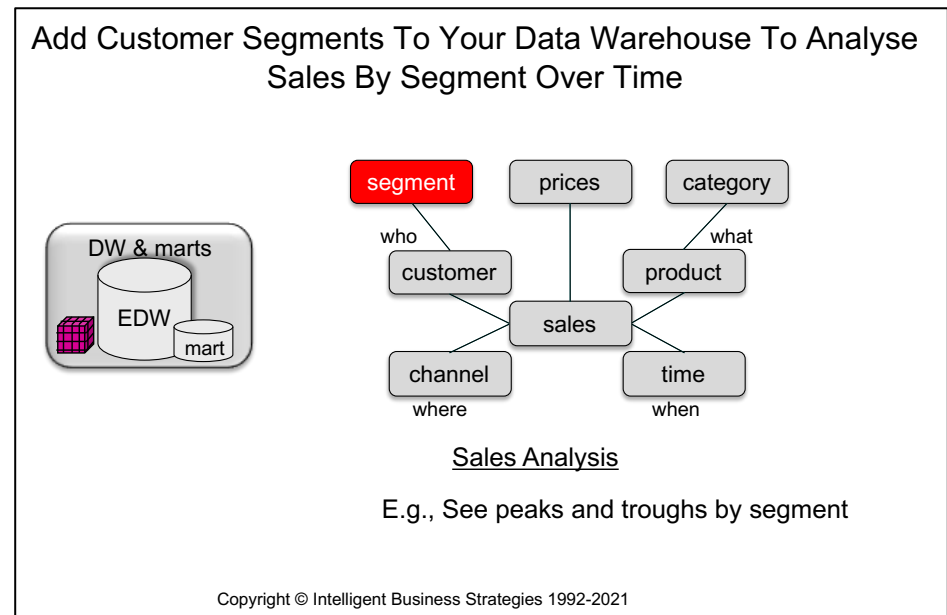


Figure 8

USING A CUSTOMER ORIENTED LOGICAL DATA WAREHOUSE AND RECOMMENDATION ENGINE FOR BETTER PERSONALISATION

In a similar way to the technique shown in Figure 6, the richer set of customer data made available as a single customer view via data virtualisation in a logical data warehouse can be used as a data source to front-office prescriptive machine learning models. This makes it possible to deploy trained, common customer recommendation services that make use of integrated, trusted customer data to make the same recommendations available across all

traditional and digital front-office channels. This is shown in Figure 9. Here, trained prescriptive recommendation models are published as services with an API.

Prescriptive analytics can be developed to analyse a rich integrated set of customer data provided by data virtualisation

These models can be made available as recommendation services that can receive on-demand requests from any application and return personalised customer recommendations such as next-best offer and dynamic pricing

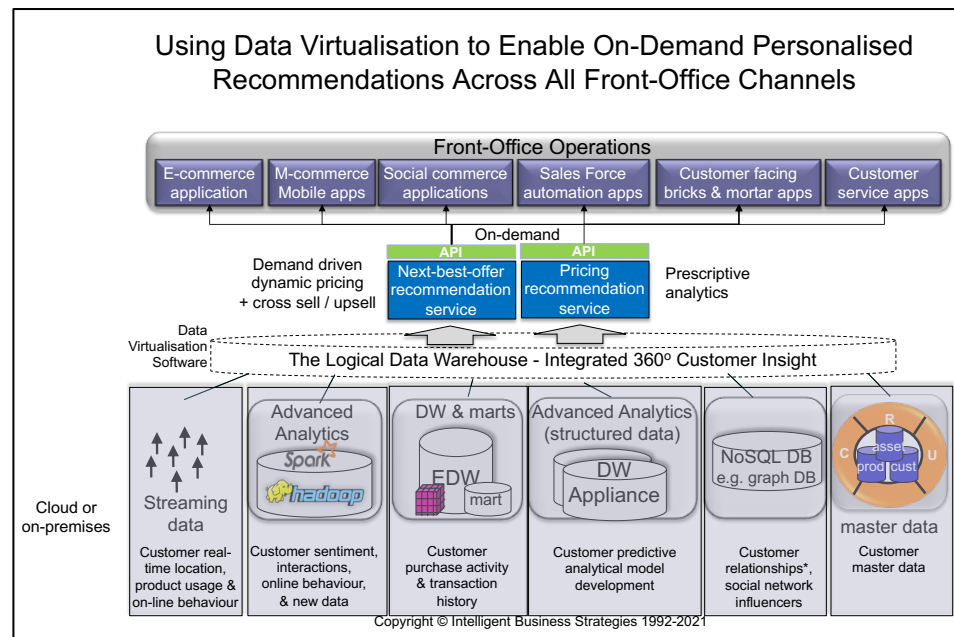


Figure 9

INTEGRATING COMMON CUSTOMER DATA AND ANALYTICAL SERVICES INTO FRONT-OFFICE APPLICATIONS

Integrating customer intelligence and on-demand customer recommendation services into front-office applications makes these applications customer aware and customer intelligent

Once common customer data and analytical services are deployed and available as services with an API, they can be integrated with any and all front-office applications. In other words, every customer-facing application, whether it be used by a customer directly via a digital channel or by an employee interacting with a customer in a traditional channel, can make use of these customer-centric recommendation services by calling them on-demand. That means that any application needing a recommendation about a customer they are interacting with simply calls the appropriate recommendation service with customer details and gets back a personalised recommendation. This could include a recommendation service for personalised dynamic pricing, personalised next-best offers either to increase customer value or to prevent churn.

The same personalised customer recommendations can be served up to all front-office applications involved in live interactions with a customer, regardless of whether the application is being used by a customer-facing employee, a partner, or customers themselves

There are endless possibilities. The key point is that the trained prescriptive models receive a request for a recommendation for a customer, retrieve the customer's data from the single view in the data virtualisation server, and based on these details, make a personalised recommendation. That means that all front-office applications will receive the same recommendation for the same customer, making it possible to treat the customer consistently across all channels. It is this capability that creates what is known as an omni-channel front-office, which many companies strive to create. In a digital economy in which customers are increasingly interacting with applications and not employees, this capability is critical to both survival and success.

CONCLUSIONS

As companies accelerate digital transformation and move to digital channels, the time available to engage with customers is being eroded

In the digital economy, loyalty is cheap, so a deeper understanding of customers is required to avoid churn

More data and insights are needed to do this

Companies need to create a single view of the customer that can be shared across marketing, sales, and customer service

Data virtualisation is a key technology to making this possible

The single view of the customer should become the data source to customer analytics to improve customer segmentation for more precise multi-channel marketing

Create personalised customer recommendation services and make them available to all channels to create the omni-channel front office

As digital transformation accelerates, fuelled by the impact of COVID-19, companies have realised that they have to move online to survive, but in doing so, the time they have to interact with customers in person is being eroded. They also realise that customers have a lot of choice online, and they can be lost in an instant, as loyalty becomes cheap. So, if companies want to keep them, they need to raise the bar and collect all the data they can for a much better understanding of their customers. This includes gaining a full understanding of purchase history, online behaviour, opinions, and relationships, as well as all customer interactions.

In addition, they need to analyse different types of customer data and create a rich set of integrated customer data and insights that can be shared across marketing, sales, and customer service functions so that they can solve the front office data problems highlighted earlier. This includes being able to bring together cloud and on-premises data to better understand the effectiveness of digital marketing efforts. We also don't want multiple, overlapping subsets of customer data in different marketing applications used to run single-channel marketing campaigns. The same is true in sales and customer service. Companies need to share a rich set of trusted, integrated customer data that they can use to compete. That means that businesses must find a way to create a common customer data platform – a single view of the customer.

They then need to use this as the data source for analytics to improve customer segmentation, and to use these segments to create targeted, more precise marketing campaigns aimed at different segments of customers and executed across multiple channels. In addition, they also need to use a single view of the customer with machine learning, to create common recommendation services that enable personalised next-best offers and personalised customer service across all channels. The objective is to create an omni-channel front-office with consistent personalised customer recommendations and treatment across all points of customer interaction. Given that companies are now running multiple customer related analytic workloads on different platforms, the obvious choice of technology to simplify access to an integrated single view of the customer is data virtualisation software, with its ability to create a customer oriented logical data warehouse. Denodo's data virtualisation software provides this capability and should be a strong candidate for creating a single integrated view of customer data and insights that provide the foundation for a customer data platform and a customer-intelligent front office.

About Intelligent Business Strategies

Intelligent Business Strategies is an independent research, education, and consulting company whose goal is to help companies understand and exploit new developments in business intelligence, machine learning, advanced analytics, data management, big data, and enterprise business integration. Together, these technologies help an organisation become an *intelligent business*.

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Enabling a Customer Data Platform Using Data Virtualisation

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