



Smarter Analytics: Driving Customer Interactions with the IBM Next Best Action Solution



Redguides
for Business Leaders

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- Learn how to enhance your customer relationships across your channels
- Gain insight into the next best action entry points and transformational roadmap
- Review scenarios and case studies across various industries



Introduction

What if your organization could increase customer satisfaction with every customer interaction? What if your customer-facing teams had the information and insight necessary to delight your customers every time they made contact? What if you could proactively provide service to your customers before they even know that they need it?

For many organizations, this dream is far reaching. They know that they are failing to maximize the value of their customer relationships and want to change this situation. They are finding it hard to embrace new channels of interaction, such as mobile devices and social media. The millennial generation favors these channels, and because leading companies across many industries are adopting them, their importance cannot be underestimated.

At the heart of the issue is often the lack of a consistent customer contact strategy that spans both business functions and channels, which has the following results:

- ▶ Companies lack the ability to use knowledge of past, present, and future events that impact customer value.
- ▶ When interacting with a customer, missing information about the customer results in inappropriate or incomplete offers and communication, inconsistent service delivery, and weak customer relationships.
- ▶ The customer receives inconsistent or different treatment from various channels because the lines of business operate in an independent manner. Each line of business develops its own tactical approaches that focus on a single aspect, such as marketing offers, to increase the short-term revenue of each customer. New channels are expensive to adopt.

The *IBM® Smarter Analytics™ Signature Solution - next best action* is a comprehensive approach to creating an exemplary customer experience, with a focus on driving new revenue. This approach provides a coherent customer contact strategy that helps organizations build and develop long-term customer relationships that lead to a lifetime of high customer value.

This IBM Redbooks® publication introduces the IBM Smarter Analytics Signature Solution - next best action and highlights the business value of the solution. It provides a high-level architecture and identifies key components of the architecture. It explains how the IBM next best action solution works and the IBM approach to incrementally roll it out across the various channels that your company supports. This guide also explains how decision models are used and the flow of information that supports their operation. The guide describes example scenarios that use the IBM next best action solution and includes real-world customer case studies of implemented solutions in various industries.

The new era of customer interactions

The 2012 IBM CEO Study highlights the will of CEOs across various industries to engage with their customers as individuals. The study states that, of the CEOs surveyed, 72% want to improve their understanding of individual customer needs.¹ To engage customers as individuals, CEOs are building analytical muscle to respond with relevance and immediacy.² The study highlights how outperforming organizations are differentiated by better data access, insight, and translation of that insight into actions.

To compete for their customers' attention, organizations need to understand and anticipate customer behavior, remembering that modern technology makes individuals much more empowered than they were before:

- ▶ Customers now have unlimited access to information and can instantly share it with the world.
- ▶ Social networking and mobile commerce have changed the dynamic between buyer and seller. Buyers can now exchange information about their experiences and make recommendations to one another.
- ▶ Global sourcing of goods and services is raising people's expectations of product evolution, service, price, delivery, unbiased advice, and convenience.
- ▶ New channels, such as mobile devices and social media, are changing the way organizations interact and engage with their customers, stretching the boundaries of current IT infrastructure and business processes.

To grow, retain, and satisfy customers now and into the future, organizations need to expand their understanding of their customers to include this detail and improve their coordination across channels.

Next best action solution

The IBM next best action solution helps to translate all the information you know about a customer (within and external to the enterprise) into actions or interactions that make sense to the customer, driving long-term customer loyalty and value. It brings together customer care strategies across your business functions such as marketing, customer retention, service, billing, and customer satisfaction. By bringing these strategies together, each strategy acts to maximize the value of the others (Figure 1 on page 3).

¹ *Leading Through Connections - Insights from the Global Chief Executive Officer Study*, page 32:
<http://www.ibm.com/ceostudy2012>

² *Ibid*, page 7.

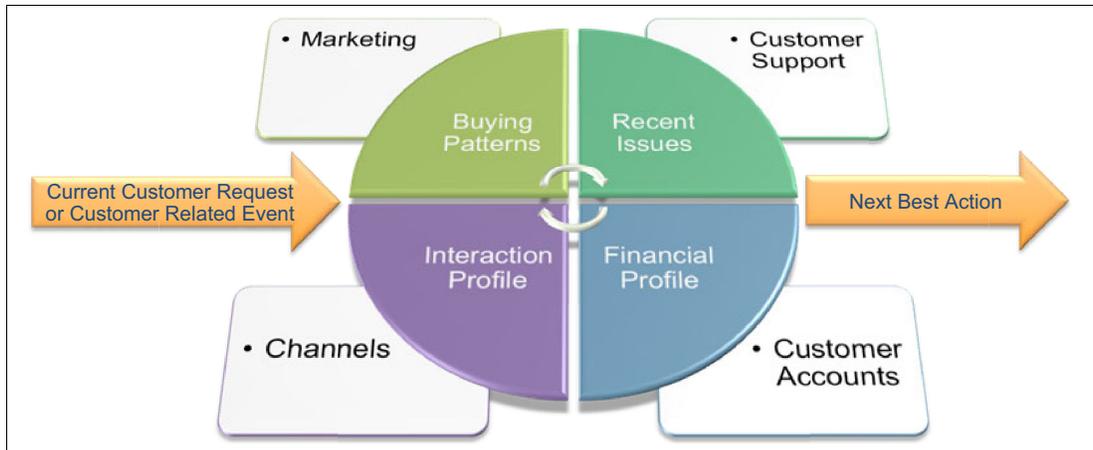


Figure 1 IBM next best action solution working across multiple channels and business units

This IBM solution goes beyond up selling and cross-selling. Customers grow weary of repetitive, untimely, or irrelevant offers. Rather this solution is about drawing information from across your business, analyzing it to proactively guide the action, maximizing customer satisfaction and retention, and optimizing business considerations.

The method behind the IBM next best action solution uses advanced analytics called *decision management*, which is built around a complete and coherent view of each customer. This view of the customer is broader than traditional master data management (MDM). MDM that uses enterprise-owned data is important but is not sufficient. To understand the needs of your customers, you need to take the following approaches:

- ▶ Extend or expand descriptive data that encompasses basic customer contact details and buying patterns.
- ▶ Understand how customers like to interact with you; their preferences, needs, and desires; and the details of their recent experiences in using your products and services.
- ▶ Tap into non-traditional or non-obvious sources of information, such as social media, social networks, Internet forums, mobile devices, equipment usage sensors, and current competitor actions.

Figure 2 on page 4 illustrates a concept referred to as the *360-degree view of the customer*. This view provides the insight needed by analytics to determine the action to take. It also provides insight around who the customer is, how they interact with the business, what business they have done to date, and why they purchase goods or services with the business.

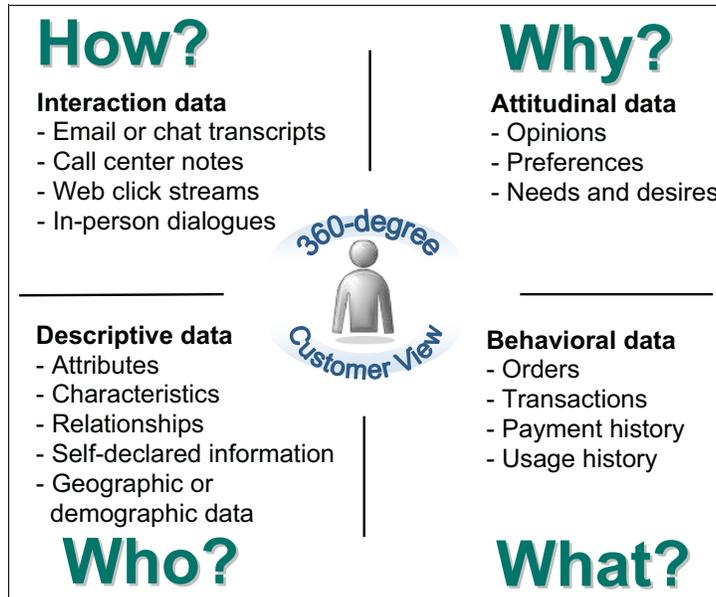


Figure 2 360-degree view of the customer

Decision management determines the right action to take for each customer, not just in the contact center, but also through any customer contact channel, whether inbound or outbound. The inbound channels include contact centers, web access, and chat sessions. The outbound channels include contact centers, messaging, email, or direct mail.

Analytics-driven decision management is perhaps the most strategic (transformational) capability within the core of the next best action solution, because it enables an organization to deploy accurate, fact-based, and consistent decisions that directly produce business impact. No longer will an organization be subject to undesired variations across the multiple customer interaction points and the decisions made, the actions proposed. The implication is that a subtle but far-reaching business transformation occurs. The organization can clearly define, maintain and fine-tune the criteria by which customer-facing decisions are made, as often as it needs to, while staying ahead of market changing forces.

In addition, the IBM next best action solution observes each customer's ongoing behavior for triggers or events that initiate a recommendation. For example, customers might experience any of the following situations:

- ▶ Three consecutive dropped calls
- ▶ A bank balance that drops below zero dollars
- ▶ A third insurance claim within 6 months

The solution can be initiated through the most appropriate channel and at the right time for customers to help them and to improve their relationship with your company.

Transformational roadmap and architecture

Every organization has IT systems that support its channels and define its customers, products, and services. The IBM next best action solution recognizes this investment and seeks to capitalize on it.

The solution contains discrete components that are combined with your existing systems by using proven software design patterns. The patterns offer increasing levels of sophistication

that can be deployed over time as your solution matures. Through this approach, your solution develops at the pace needed by the business, focusing on the places where the most value is to be obtained.

Getting started

The IBM next best action solution has three primary goals:

- ▶ Build long-term customer relationships
- ▶ Drive one decision and one interaction at a time
- ▶ Maximize customer lifetime value

Each customer receives exemplary and consistent customer service, regardless of who they talk to and which channel they use. You can think of it as a way to improve the ongoing conversations between each customer and your organization. The result of the solution is increased customer loyalty and increased revenue.

Achieving the desired result is an ongoing effort or program. It typically starts small and grows to incorporate a broader set of channels to the customer and services that are offered by the organization and adopted across lines of business. The solution architecture needs to be flexible to enable continuous improvement so that the customer sees fresh capabilities and value over time.

Your starting point depends on a combination of the following factors:

- ▶ Where the highest impact can be achieved based on business objectives
- ▶ The current level of customer service through each channel
- ▶ The current state of your IT systems that support the channels, including their availability and the quality of the data they support

Designing and implementing the solution typically involves a business change and changes in the IT environment. For example, from a business perspective, customer-facing employees need training to use the service effectively and, at the same time, interact with the customer.

To achieve the highest value, a customer point of view, not an internal line of business view, should drive the roadmap.

For example, consider the following characterization of one of your customers:

- ▶ While a customer is using the products they bought from you, they form an opinion about the value they are receiving from the products.
- ▶ At any time, the customer might be involved in one or more activities with the organization. This interaction can be the process of buying another product, renewing a service, resolving an issue, arranging payments, managing the current products that they purchased, and seeking additional information.
- ▶ The customer can interact with your organization through your various channels. The channel that the customer uses can drive the purchase of products at a store or by an online medium, such as through your website, email, or social media. To the customer, these channels are merely mechanisms for managing their interaction.

Often a problem in customer service occurs when the channels that are used by customers are managed by different departments and are disconnected from one another. Have you been passed from person to person in an organization while you were trying to resolve different parts of an issue? It creates an impression of an inefficient organization that is internally focused rather than customer focused. Customers dread contacting these types of

organizations because they know that they need to coordinate the internal departments to get something to happen.

When the decision is driven from the customer's perspective, it helps link the established division of customer support across the lines of business in your organization.

To understand where the IBM next best action solution can help, first perform this analysis:

- ▶ Audit the products and services that you offer.
- ▶ Determine which business lever (or levers) you are trying to affect (for example, attrition).
- ▶ Identify the channels that customers use to understand what you offer.
- ▶ Validate the experience your customers receive, for example, through the use of customer surveys.

Through this process, create a prioritized list of products, activities, and channels to focus on. Look for the following key items:

- ▶ Major disconnects in service due to poor communication between internal departments
- ▶ Revenue generating activities that cross lines of business
- ▶ Ways to make the products and related services even better
- ▶ Customer perceptions and experiences that do not match expected or desired customer experiences

Next consider the customer impact on improving these items. Through this process, create a set of business priorities around your customer. Consider that focusing on what your customers love about your organization, rather than improving the aspects that customers complain about, often has a greater impact on customer satisfaction.

This analysis builds up a prioritized list of the following items that support the strategic direction of the organization:

- ▶ The types of customer activities that need attention
- ▶ The lines of business and channels that must be enabled
- ▶ The types of actions that you want to offer through this capability

As a result, the analysis helps you assemble a business use case that becomes the foundation and framework for organizing and advancing next best action capabilities.

Fundamentals of predictive analytics

A key component of the IBM next best action solution is state-of-the-art predictive analytics. Predictive analytics uses historical information to predict what might happen in a future real-time activity. It is encoded in a decision model that is trained by using your organization's data.

Figure 3 on page 7 shows the three basic processes within predictive analytics. The information pattern discovery process and the information decision definition process are both run offline. They create the executable decision model that determines the right action during each selected customer activity.

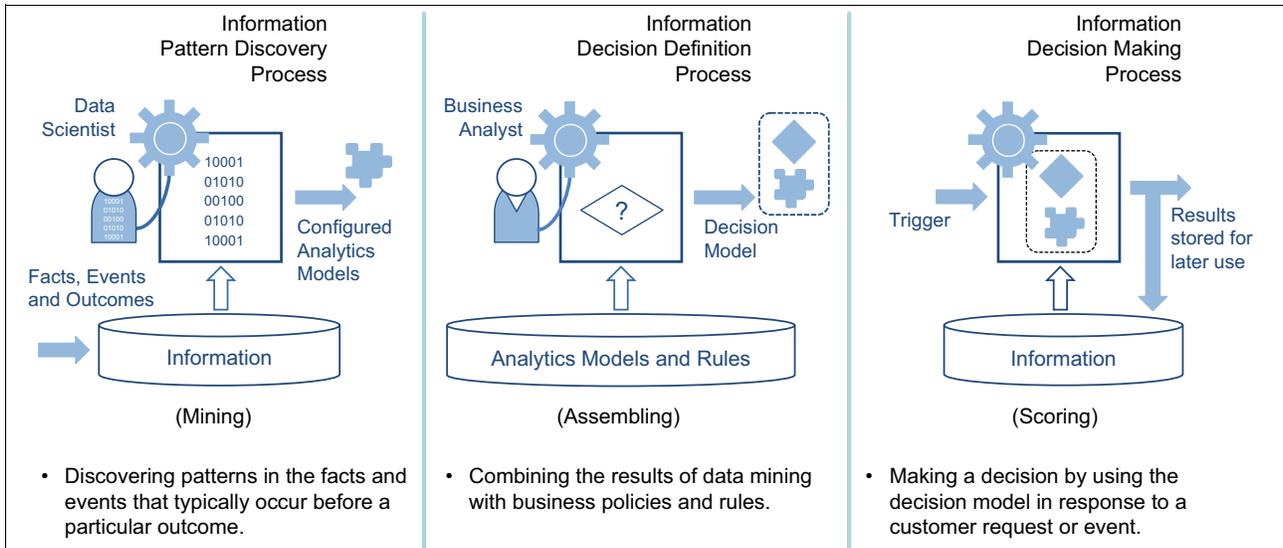


Figure 3 Three basic processes for predictive analytics

The pattern discovery process (left side of Figure 3) is where data profiling and data mining techniques are used to understand and encode the patterns that are found in a representative sample of your organization’s information. The result is a configured analytics model that defines the data attributes that it needs to define the action.

In the second process (middle of Figure 3), the configured analytics models are assembled with business rules that define the policies and regulations for the organization. The result is a configured decision model that can be deployed into real-time channels.

The final process (right side of Figure 3) is running the decision model in real-time channels as part of a customer-focused activity. This decision model is deployed as part of a decision loop (Figure 4 on page 8), which is how the solution service is used as part of a customer activity.

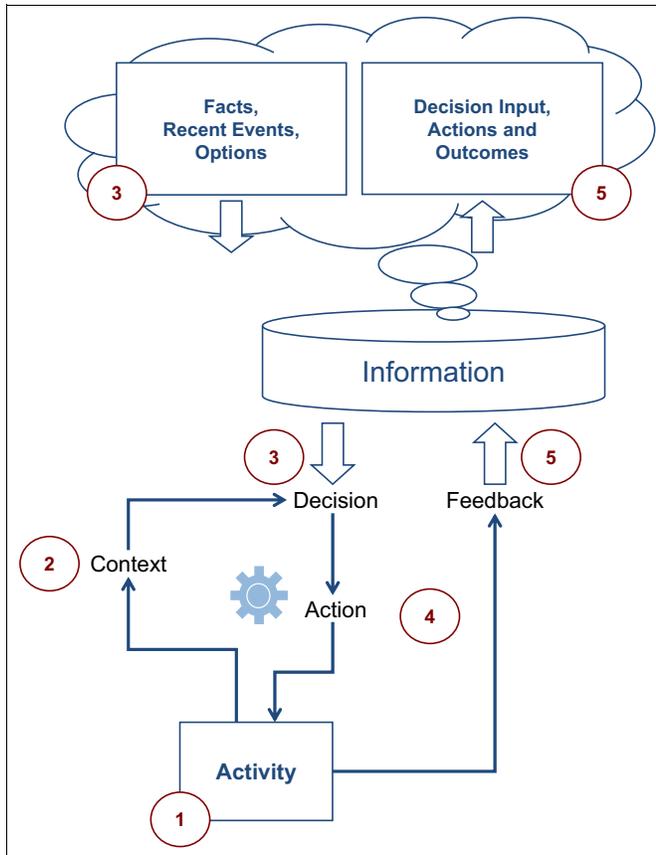


Figure 4 The decision loop

The decision loop is run in real time as part of the business operations. It is triggered by an event or a customer request and operates as follows, where the numbers correspond to the numbers in Figure 4:

1. A customer request or event occurs that calls for a decision.
2. The context from the activity is passed to the decision process. The context can include the identity of the customer, the type of request or event, the channel, the employee involved, and other values.
3. The decision process augments the context with stored information and runs the decision model.
4. One or more recommendations are made to the activity. The activity uses them in its work.
5. The results of using a recommendation are captured and stored. This feedback is used to measure the effectiveness of the analytics and to tune the decision model over time.

The solution defines the architecture that surrounds the predictive analytics. It considers the development of the decision models, how you supply information to each of the predictive analytics processes, and where you should place the decision loop.

Solution overview

The IBM next best action solution has the following major parts:

- ▶ Decision management

This subsystem is responsible for developing the decision models for the solution. It is supplied with information about the customers, the products, and services that can be offered, in addition to historical information about the customer's activity. The customer's activity includes the interactions that they have with the organization *directly* through its products and channels and *indirectly* through shared experiences such as social media.

► Real-time decisions

This subsystem contains the execution of the decision loop of the solution. This subsystem is where the action is calculated for a customer and delivered to them and then the outcome is captured.

► Capture of a customer's activity

This subsystem gathers information about the customer's activity, including the outcomes of the recommendations offered by this solution. This subsystem collects information about customer activity that occurs *directly* through its products and channels or *indirectly* through shared experiences such as social media. It might detect significant events that trigger actions asynchronously from the customer's interaction with a channel.

Figure 5 shows the major subsystems of the IBM next best action solution and its relationship to existing systems.

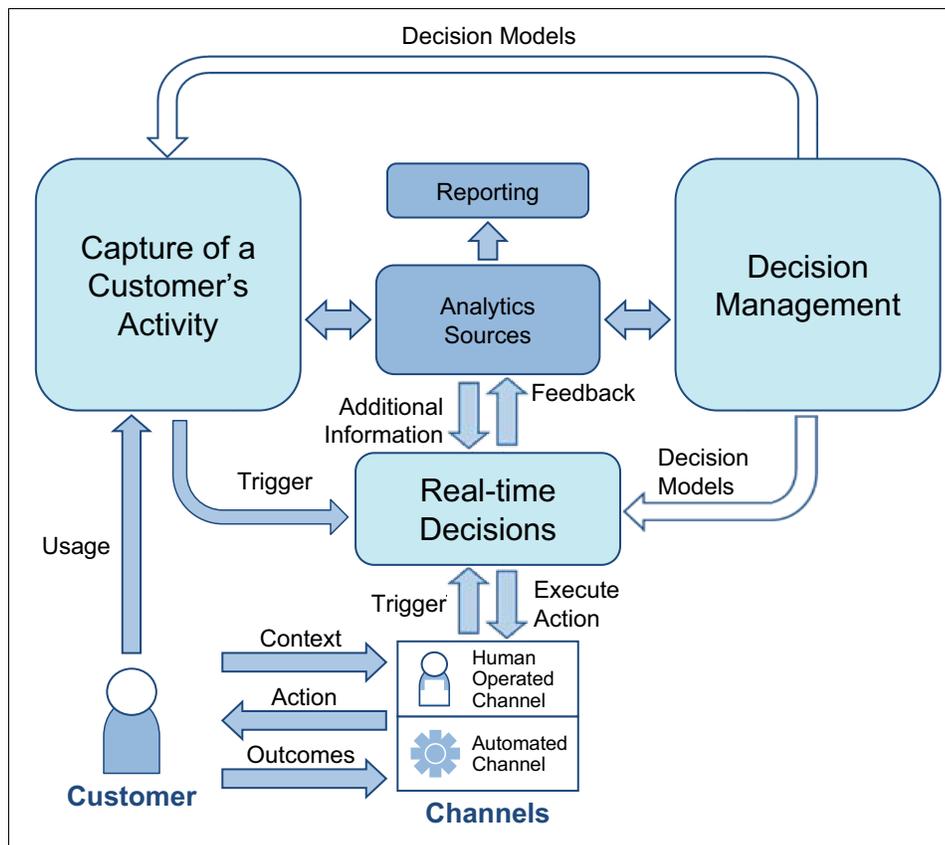


Figure 5 Solution overview

The subsystems of the solution are supported by information sources such as, a data warehouse and master information systems that together provide customer information, a product catalog, and a historical record of customer activity. The success of the solution is reported through a reporting environment.

State-of-the-art analytics, information management, and service-oriented technology sit in each subsystem of the solution as in the following examples:

► Decision management

Decision management supports the information pattern discovery process and information decision definition process in the decision management subsystem. It also supports the decision loop in the real-time decisions subsystem and event-driven activity. It has the following components:

- Business rules, which are used to capture the policies, regulations, best practices, and know-how of an organization. An example is defining a policy that a marketing offer must not be offered to a customer more than once a week.
- Business events, which support the ongoing process of monitoring events that can impact a customer. An example is understanding when a customer has experienced some dropped calls within a period. Another example is knowing when a customer's bank balance drops below a threshold or transaction activity has reduced by a certain percentage.
- Predictive analytics, which uses an analytical model that is derived from historical data to determine the likelihood of certain events that might occur in the future. An example is a customer's likelihood to move to another supplier or to accept a particular marketing offer. Another example is the organization's ability to know the most appropriate channel and time in which to contact the customer with a recommendation.
- Optimization, which is the process of determining the *best* recommendation of many possible recommendations. An example is decreasing or eliminating delivery cost, predicting the likelihood to respond, and predicting revenue to determine which of three marketing offers is best.

► Big data platform

The big data platform is the platform for managing the information that is used by the IBM next best action solution. It includes the following capabilities:

- Stream computing, which analyzes various type of data in motion in its native format. This process is done in massive volume and scale (terabytes per second), so that you can process new information about your customer's activity that was not viable before.
- Distributed map reduce, which analyzes large volumes of various data at rest to gain insights that were not previously possible, including social media data, emails, web-click logs, and other document collections. It analyzes data in its native format, without imposing a schema or structure, to enable fast ad hoc analysis.
- Data warehouse, which provides high performance analytics on a large volume of historical data that is structured for control, consistency, and integrity, such as customers, transactions, products, and related activity.
- Master data management (MDM), which provides a single view of your customers, products, services, and assets.
- Information integration, which moves, transforms, and remediates information as it flows between the other components, ensuring the appropriate level of quality.

► Enterprise service bus (ESB)

ESB can host the decision loop and offer it as a common service for the IBM next best action solution to real-time systems. This approach can simplify the rollout for the solution across multiple channel applications.

► Complex event processing (CEP)

CEP detects the opportunity for an action based on events that are happening in combination over time.

- ▶ Marketing platform
The marketing platform helps marketing to augment their understanding of customers and to make better marketing-specific decisions. It becomes a partner with decision management to coordinate enterprise and marketing decisions to determine the next best action.
- ▶ Reporting and measurements
Reporting and measurements visualizes the benefits that the solution brings to your organization.

Entry points and transformational roadmap

The IBM next best action solution is typically implemented through a staged roadmap, where each stage delivers value and gradually draws in more of the customer-facing parts of your organization.

At each stage of the roadmap, the following changes can occur:

- ▶ The gathering, validating, and cleansing of customer information comes from a broader set of sources.
- ▶ This new insight is passed to decision management to enrich the scope of the decision.
- ▶ Real-time decisions are incorporated in more channels.

Through this process, the richness and effectiveness of the recommendations of the IBM next best action solution grow over time. What follows are examples of starting points and subsequent stages on a possible roadmap to show how the solution can develop over time. The following examples are of starting points:

- ▶ Starting with precalculated decisions
- ▶ Enabling real-time decisions
- ▶ Using the marketing platform to drive marketing decisions

These starting points can be combined and augmented with the following enhancements:

- ▶ Collecting activity from your applications
- ▶ Driving complex event processing
- ▶ Introducing social media
- ▶ Understanding customer conversations
- ▶ Understanding customer use of a website
- ▶ Mining the network

The result is an evolving ecosystem that can support the growth in sophistication of your customer insight and customer service.

Building decision models

At the heart of the IBM next best action solution are the decision models. “Fundamentals of predictive analytics” on page 6 described the two-step process in building a decision model with an execution step. The first step, where the information pattern discovery process is used by data scientists to create an analytics model, can be run against your existing production data. However, it is a compute-intensive activity that might cause fluctuations in the performance of your production environment, which is why it is often run against a copy of the data in what is called a *sandbox store*. The sandbox does not need to contain a complete copy of your data, but rather just enough data to provide a representative sample of your

customers, the products you offer, and the associated activity around them. The data in a sandbox might also be reformatted to better suit the analysis work.

Figure 6 shows the information pattern discovery process and information-decision definition process that runs in the decision management workbench against a sandbox store.

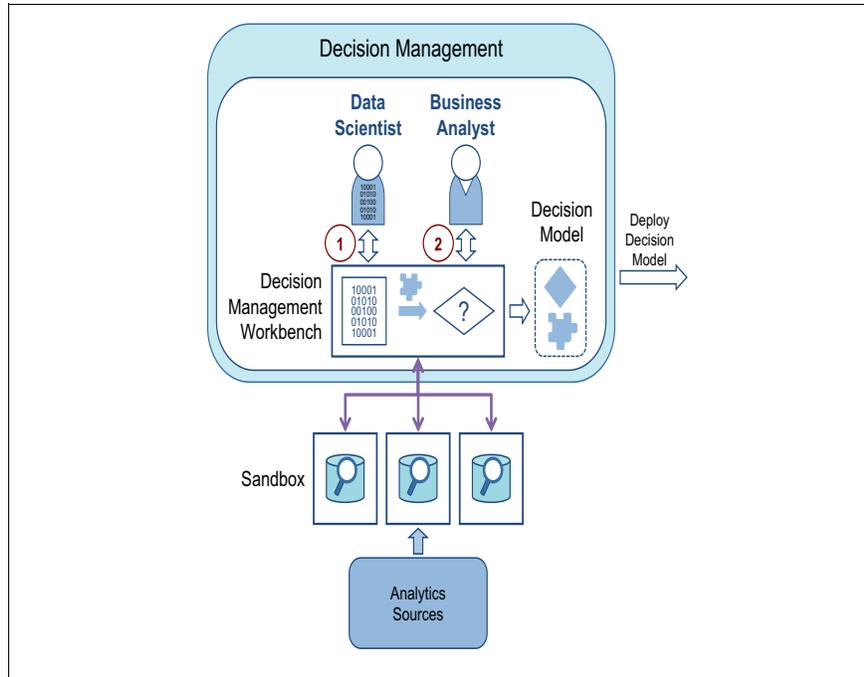


Figure 6 Developing the decision model in the decision management workbench

Figure 6 shows the actions of the data scientist and the business analyst, where the following numbers correspond to the numbers in the figure:

1. The data scientist investigates the data and creates a configured analytics model by using an information pattern discovery process.
2. A business analyst assembles one or more such analytics models with business rules to create a decision model. These business rules define policies set by the business that must be followed during the next best action decision. An example of a business rule could be to only allow one marketing offer to each customer every month.

When the decision model is assembled, it is ready for deployment into your IT infrastructure.

Regardless of the stage that you are in, the maintenance and refinement of the decision model is an ongoing process. The architecture of the IBM next best action solution includes a periodic refresh of the sandboxes with recent information about your customers, products, and the performance of the recommendations. The deployed decision model is refreshed when the data scientist and business analyst decide that they have developed an improved decision model that better correlates to more recent facts.

Starting with precalculated decisions

As a first step, analytics can be performed in batch by using existing stores of information, such as a data warehouse, data mart, MDM server, or distributed map-reduce store (such as Hadoop Distributed File System (HDFS) or IBM General Parallel File System (GPFS™), HBase, and Hive). The results are typically stored in a relational database, where they can be

used in real-time operations. This relational database is called the *Customer Activity operational data store*. Figure 7 shows the configuration using an enterprise data warehouse.

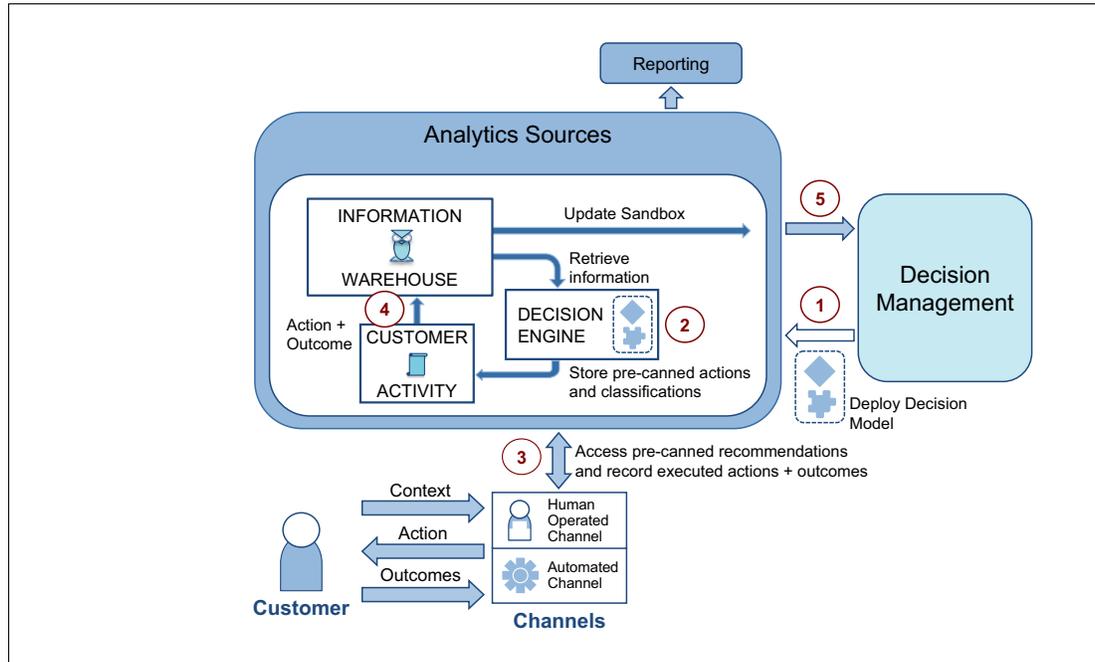


Figure 7 Batch processing of a recommendation for each customer

Figure 7 shows the batch process, which consists of the following activities, where the following numbers correspond to the numbers in the figure:

1. The decision model is deployed where it has access to the data warehouse.
2. Periodically, the decision model runs. It loops through all of the customer details on file, determining the action for each customer. This information is stored with the customer identifier in a new Customer Activity data store.
3. When the channel applications detect an opportunity for a recommendation, they retrieve the precalculated action from the Customer Activity data store. They offer it to the customer and record the result of making the offer back in the Customer Activity data store. This process prevents the same action from being used twice, and the result is part of the feedback information for tuning the analytics models.
4. Periodically, updates from the Customer Activity data store are passed to the data warehouse.
5. The sandbox used to build the decision model is refreshed when needed from the data warehouse. Refreshing the sandbox provides feedback on the performance of the existing decision model, enabling the data scientist to improve the analytics model as required.

In this configuration, the decision model runs offline from the applications that support the channels. It runs against all customers, regardless of whether they are active, and uses information from a particular time. However, it is a simple first step to gain some experience in using analytics in your customer channels.

As the overall solution evolves, the Customer Activity data store introduced at this stage is enhanced to be a key resource for tuning your understanding of your customer's habits and preferences. Its content is fed back (often through the data warehouse) into the information pattern discovery process to refine the decision model.

Enabling real-time decisions

A next step on the roadmap is to move the execution of the decision model into the real-time code that is supporting the channels. With this configuration, the decision model is run only for active customers and uses the latest information. Therefore, the decision processing is more targeted and up-to-date. However, a small additional latency is in the operational transaction when executing the decision model inline.

Figure 8 illustrates the decision model that is called from the web services that are hosted on an ESB.

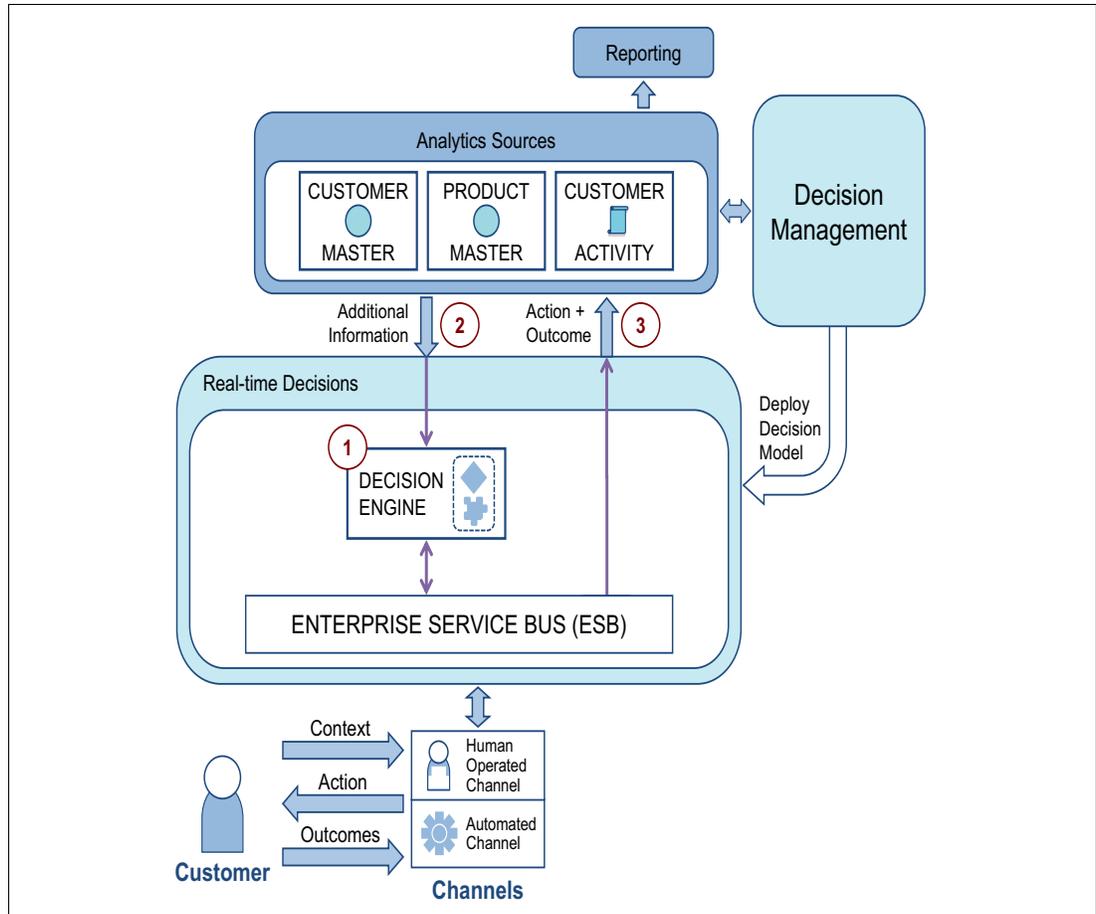


Figure 8 Enabling real-time decisions

To enable real-time decisions, the following actions occur, where the numbers correspond to the numbers shown in Figure 8:

1. A channel application identifies that it needs a decision. It calls the solution's decision service that passes information about the customer's current interaction, such as which channel they used, what they are seeking, and other related information.
2. The decision engine pulls any additional information it needs to run the decision model. The decision model executes and produces one or more recommendations. This result is returned to the channel or forwarded to a different channel for asynchronous delivery.
3. When the recommendations are delivered to the customer, the details of the executed recommendation and the outcome are recorded in the Customer Activity data store, where they are used as input to subsequent decisions.

Integrating the marketing platform

In some industries, the products and services that are offered to customers must evolve rapidly based on competitive pressure and consumer demand. Offers are typically managed in a specialized Enterprise Marketing Management application, where the marketing team can rapidly assemble new offerings and gauge their success. The marketing software uses analytics to ascertain the offer to make to a customer and drives it through inbound (customer contacts organization directly) and outbound (unsolicited communication) channels.

This capability makes the marketing platform a useful starting point for the solution where marketing is a key part of the business value. Then, at a later date, the marketing-driven offers can be folded into the decision model of the solution as shown in Figure 9.

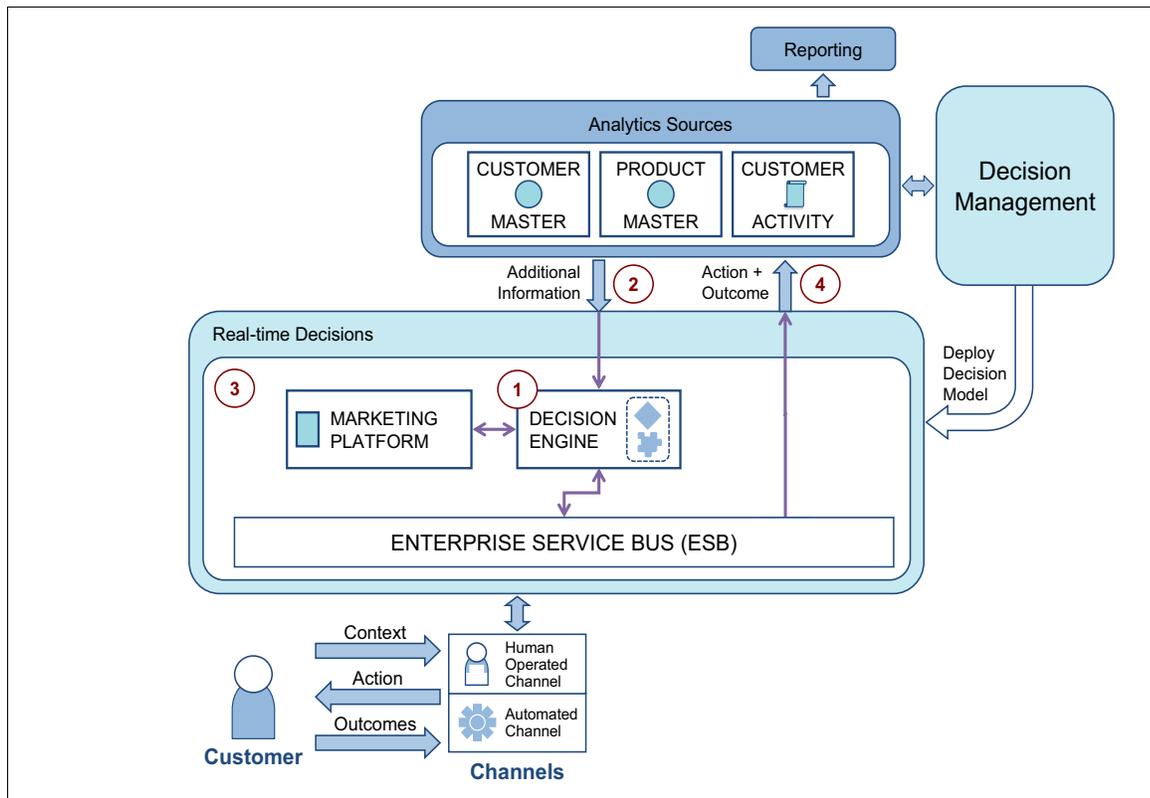


Figure 9 Incorporating the marketing platform into the solution

Figure 9 illustrates the following actions to incorporate the marketing platform into the solution, where the numbers correspond to the numbers shown in the figure:

1. A channel application identifies that it needs a decision. It calls the decision service of the solution, passing information about the customer's current interaction, such as which channel they used, what they are seeking, and other related information.
2. The decision engine pulls any additional information it needs to run the decision model.
3. The decision engine calls the marketing system to pick up the marketing recommendations to fold into the decision. The decision model chooses the optimal actions by comparing the marketing recommendations to the service, billing, and other actions. It produces one or more recommendations. This result is returned to the channel or forwarded to a different channel for asynchronous delivery.
4. When the recommendations are delivered to the customer, the details of the executed action and the outcome are recorded in the Customer Activity operational data store.

With this configuration, the marketing team is in control of the marketing offers that are made. The decision model of the IBM next best action solution determines when it is appropriate to make a marketing offer when given the complete picture of the customer’s activity.

Other types of applications that can generate recommendations for customers can be incorporated into the decision model by using a similar pattern.

Collecting activity from your applications

Customer interaction and activity might be supported by legacy or packaged applications that are difficult to change. Extracting details about each customer’s activity from these applications might require probes to be placed at key places in their implementation to collect the customer activity information into a database for use by analytics.

Figure 10 shows four different approaches for extracting customer activity from an existing application. In each approach, the customer activity triggers a communication that is intercepted, and the relevant details are extracted and stored for later processing.

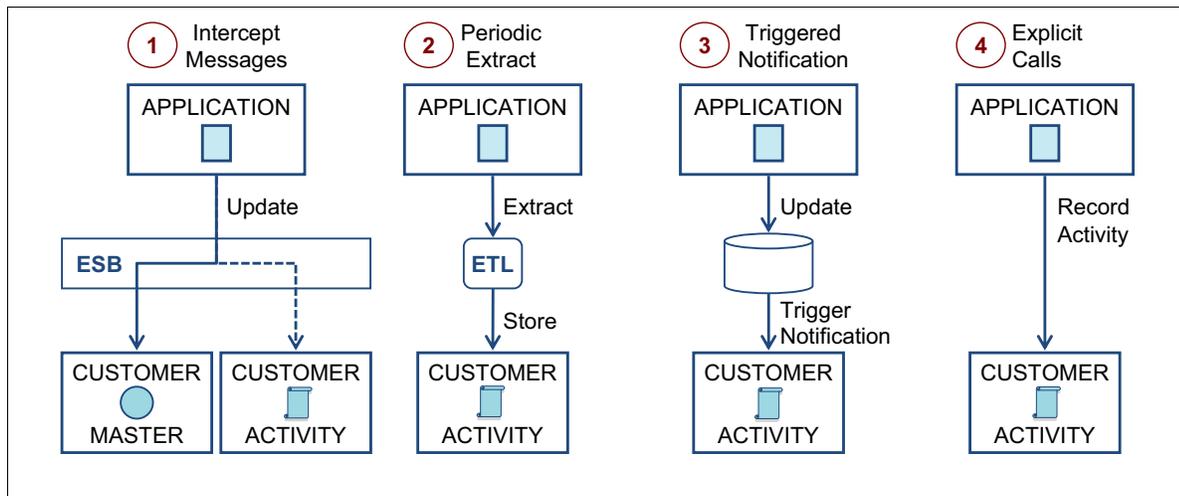


Figure 10 Intercepting customer activity using integration and connectivity technology

Figure 10 illustrates the following four approaches, which are described in the order shown in the figure:

- ▶ Intercept messages. The application calls the customer master system to record a change to a customer’s details, such as a new address. This call is intercepted in the ESB, and an additional call is made to record the event in the Customer Activity data store.
- ▶ Periodic extraction. A regular extract-transform-load (ETL) job pulls information from an application and saves relevant details in the Customer Activity store.
- ▶ Triggered notification. An application updates data in its database. The database creates a notification, which in turn, drives an update to the Customer Activity data store.
- ▶ Explicit calls. An application makes an explicit call to add information to the Customer Activity data store.

Over time, information from more applications can be added to the Customer Activity data store.

Driving complex events

In some situations, the significance of a series of events can be determined only over time. Similarly, it might take additional information to determine the timing and which channel to deliver the recommendation. Complex event processing (CEP) engines can augment the IBM next best action solution by correlating events that occur over time and creating triggers for the decisions.

For example, a customer abandons their online shopping cart that contains an order of five items. Five days later, the CEP component can detect that the user has not returned to the website. The IBM next best action solution issues a real-time decision that recognizes that one of the items in the shopping cart now has a 5% discount and then sends an email to the customer to inform them of the new discount.

Figure 11 shows a CEP at work in the IBM next best action solution.

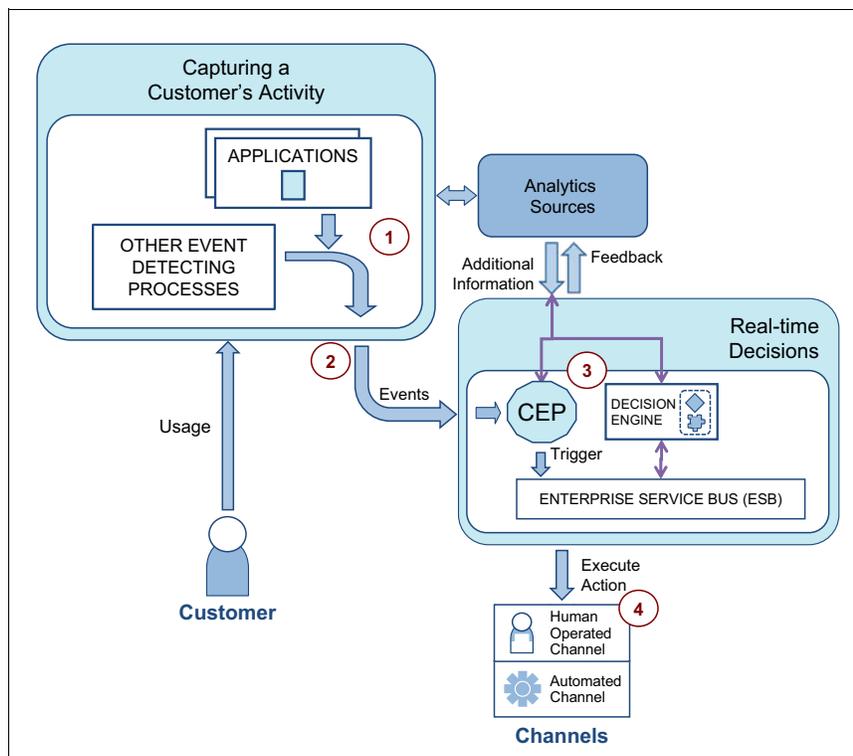


Figure 11 Using an event processor in the solution

Figure 11 illustrates the following actions of using the CEP, where the numbers correspond to the numbers in the figure:

1. Events are detected by applications and other systems that are monitoring external sources. Then the events are passed to the CEP component. These events can be about customers, issues, or products.
2. The CEP component correlates the events together, and when a significant pattern occurs, it triggers a real-time decision. The triggering of the decision is often controlled by a business rule that can be changed easily because it can take multiple iterations to set the right thresholds for your environment.
3. The decision engines create the recommendation and push them down the appropriate channel to the customer.
4. The channel executes the recommendation and records the outcome as normal.

Introducing social media

Customers might express opinions about your organization's products and services or express desires and preferences for new purchases. This type of information can help to guide the decision. Big data analytics can be used to extract this type of information from social media and add it to the customer activity information that feeds the analytics.

You can use the following basic approaches alone or together:

- ▶ You can analyze the sentiment around your products and services for an anonymous user to detect trends in the general market.
- ▶ You can analyze the reactions of targeted individuals who are customers of yours to your products and services.

Figure 12 shows how you can analyze social media for information about your customers' sentiments and desires. Essentially a batch process creates additional insight in the Customer Activity data store for use by future decisions.

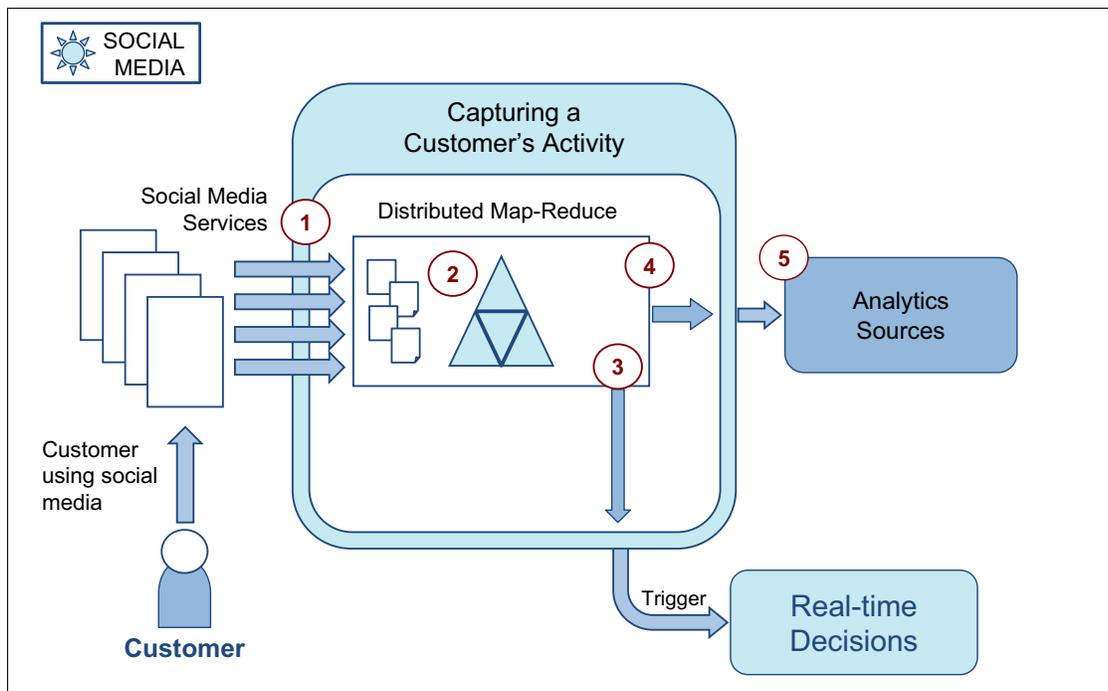


Figure 12 Analyzing social media

Figure 12 illustrates the process of analyzing social media, which entails the following actions, as indicated in the figure:

1. The content of a social media service is captured and stored in local files.
2. A distributed map-reduce-based text analytics application processes these files.
3. Any significant events that need rapid action trigger a decision.
4. Additional information about your customers and products is captured and stored in the analytics sources.
5. Recent activity is stored in the Customer Activity data store for use by the next best action decision.

Understanding customer conversations

The reports that employees make about customer interactions are not always accurate and take time to prepare. Big data analytics can also support analysis of recordings of customer conversations to accurately record direct interactions between a customer and an employee (Figure 13).

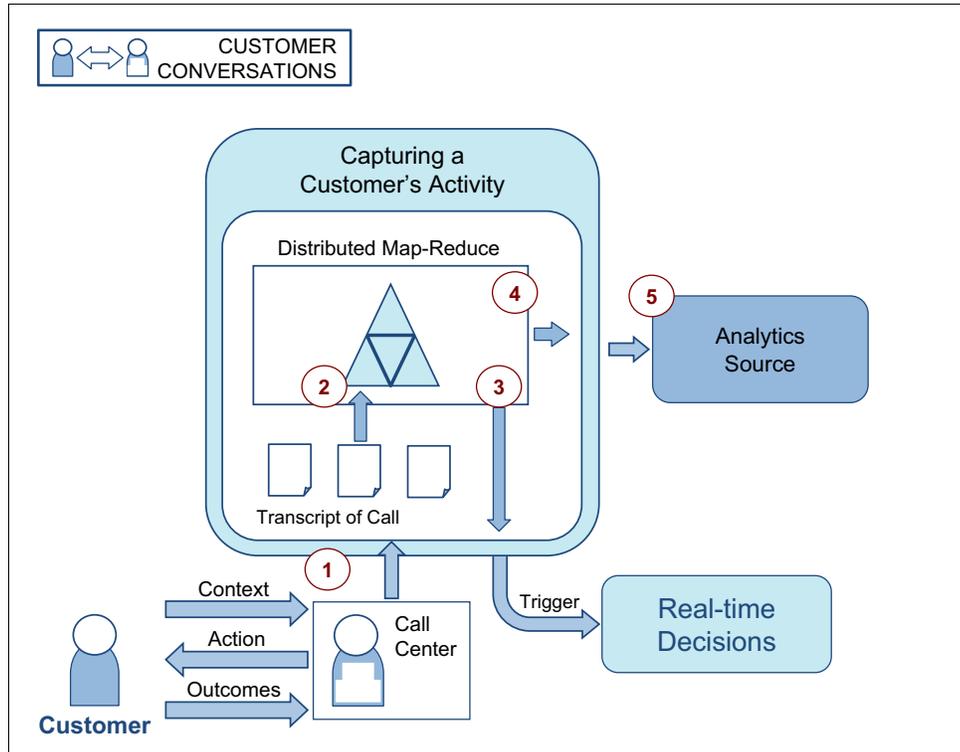


Figure 13 Analyzing customer conversations

Analyzing customer conversations (Figure 13) consists of the following actions, where the numbers correspond to the numbers in the figure:

1. A customer service representative speaks to a customer on the telephone. The call is recorded, and transcripts of the call are automatically generated and placed in text files.
2. The text files are analyzed with big data analytics to extract the essence of the conversation.
3. If a significant event is detected, such as an angry exchange, a decision might be triggered immediately.
4. Details of the conversation are stored in the analytics sources.
5. Summaries of recent conversations are stored in the Customer Activity data store for use by the next best action decision.

Understanding customer use of a website

The path that a customer takes through a website can indicate the desire for a new product or an issue with an existing product. Various web analytics products give you the ability to detect why a customer is using your website through analysis of web-click logs. If this analysis can be captured and intercepted at the right points, it can be incorporated into the IBM next best action solution. Figure 14 illustrates how analyzing web clicks works.

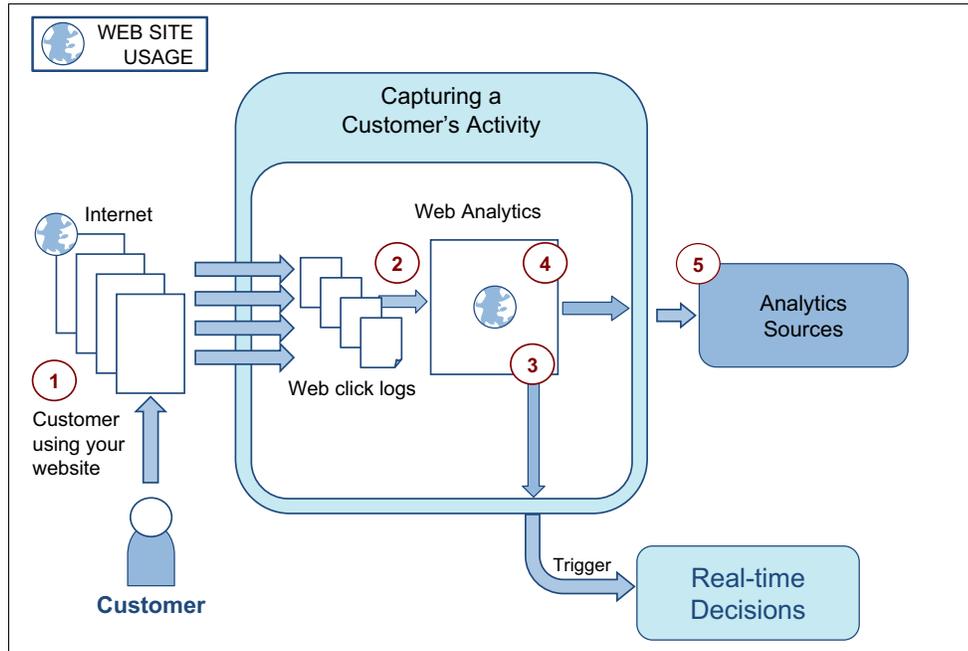


Figure 14 Analyzing web click logs

Analyzing web click logs consists of these steps (Figure 14), where the numbers correspond to the numbers in the figure:

1. The customer uses your website. As they move through the pages, web-click logs are stored to files.
2. The web-click logs are analyzed to understand what the customer was trying to do, such as to look up details about a product, search for support, and make a purchase.
3. If something calls for an immediate response, a decision is triggered.
4. Details of website use are stored in the analytics sources.
5. Summaries of the recent website activity are stored in the Customer Activity data store for use by the next best action decision.

Mining the network

For companies in the telecommunications industry or companies in other industries where the product uses your network, understanding the use of the network can explain where the customer is located and what they are doing. This information is a useful context for the decision and can be extracted by big data analytics to augment the Customer Activity data store.

Figure 15 shows how real-world sensor data can be processed.

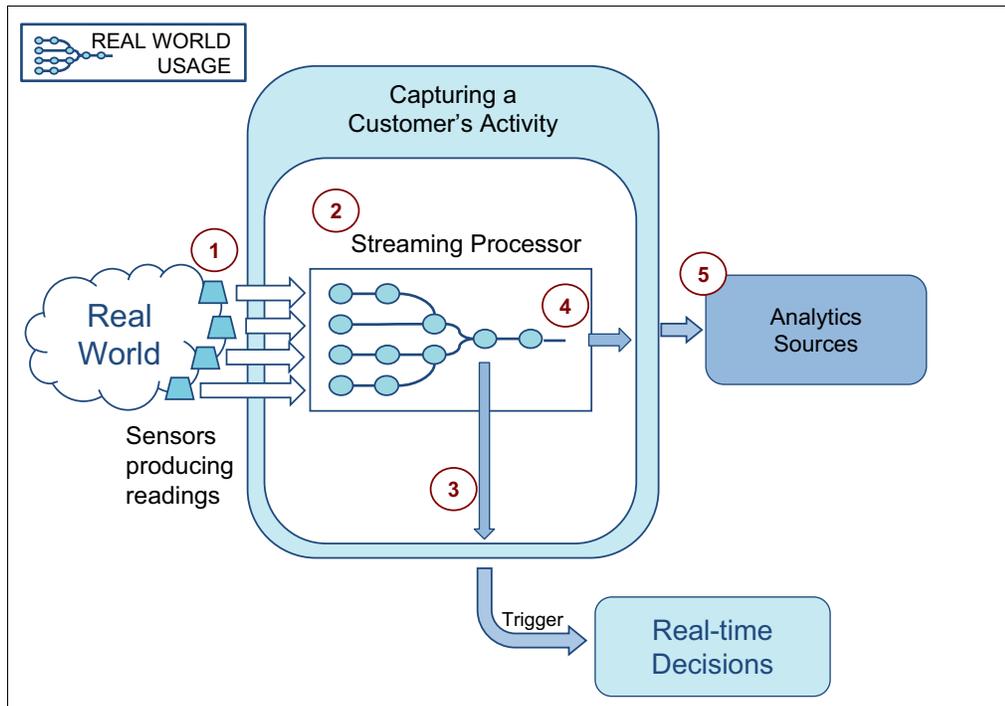


Figure 15 Analyzing real-world sensor data

Analyzing real-world sensor data involves the following actions as illustrated in Figure 15:

1. The sensors create records that contain their readings.
2. A streaming processor receives these records, parses them, and combines them with other information to understand the situation.
3. If a situation is detected that requires immediate attention, a decision is triggered.
4. Details of all detected situations are stored in the analytics sources.
5. Summaries of recent situations are stored in the Customer Activity data store for use by the next best action decision.

Pulling everything all together

As shown in these sections, the IBM next best action solution has the following basic capabilities:

- ▶ The decision management capability to maintain the decision models
- ▶ The ability to collect information about a customer's activities
- ▶ The execution of real-time decisions while your channel applications are processing work for an individual customer

By using these capabilities, it is possible to grow the breadth and depth of your solution to eventually cover all types of interaction. For example, Figure 16 shows a multichannel solution that takes advantage of customer activity information from many different sources.

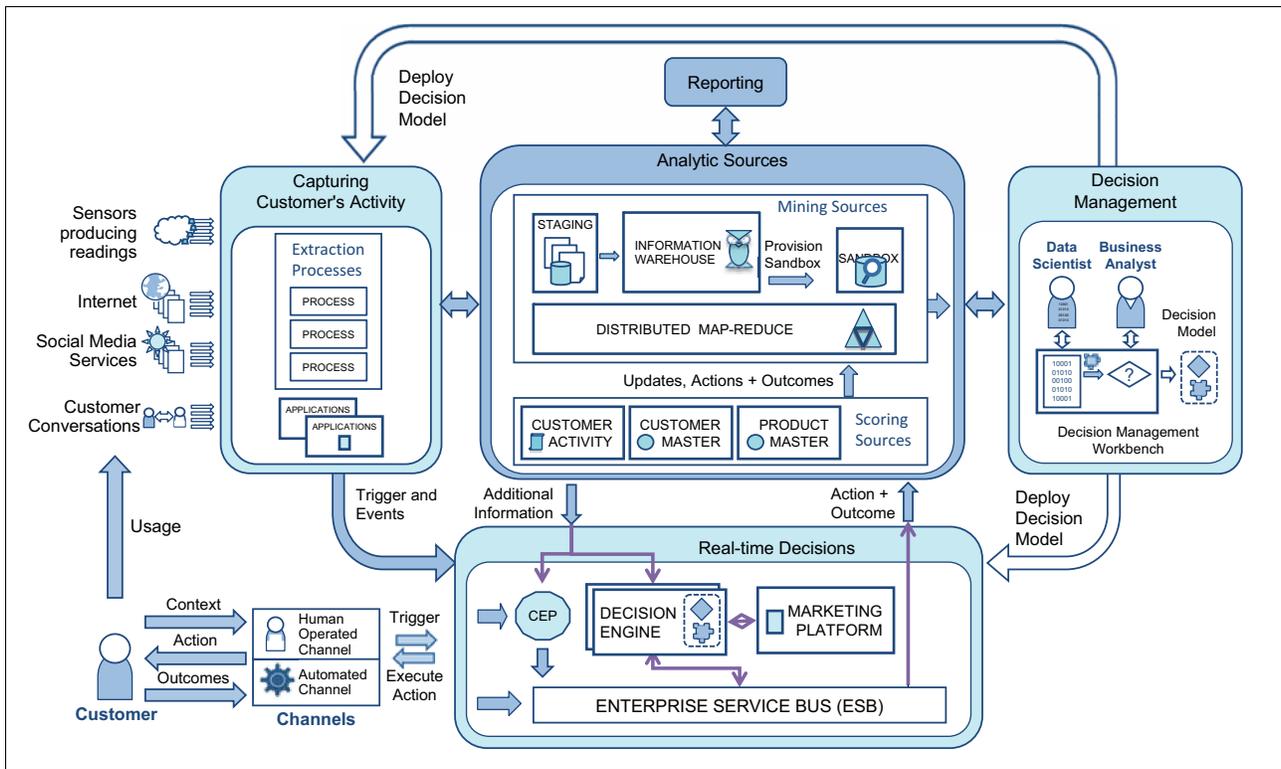


Figure 16 A fully developed solution

Through this roadmap, you can see the pieces of the solution coming together. From here, you are now positioned to tune and refine all aspects of your customer interactions, and your customers will continue to grow in sophistication.

Views from different industries

To help you picture the IBM next best action solution in your business, this section provides example use cases and real-world case studies in the telecommunications, banking, and insurance industries.

Telecommunications

The telecommunications sector has several requirements, such as the following examples, that the IBM next best action solution directly addresses:

- ▶ Reducing churn
- ▶ Increasing average revenue per user (ARPU)
- ▶ Increasing the revenue generating unit (RGU)
- ▶ Increasing market share

Example 1: Renewing a contract for an inbound call center interaction

A call center agent receives a call from a customer, named John, with a simple billing query. He wants to move the billing date from the fifteenth of the month to the first of the month. After arranging this change for John, the agent looks to see whether an appropriate recommendation is available for John.

Behind the scenes, the solution determines the most likely offer for John. The recommendation is based upon a 360-degree view of John. It includes information gathered during this customer interaction, in addition to a deep knowledge of the customer gathered over the last 6 months that he has been a customer.

The current query is simple, and the agent addressed the query immediately. John's profile now includes the following information:

- ▶ Has 6 months left on his contract.
- ▶ He spent a half hour last week looking at newer, more functional handsets on the company's website.
- ▶ This query is his first one since taking out the contract, and the interaction is positive.
- ▶ He lives and works in areas of good cell coverage and has had only one dropped call in the last 6 months.

The following analysis applies in this example:

- ▶ Moving the billing date is a strong indicator of customer loyalty.
- ▶ He is a high-value customer based on his historical spending and is predicted to continue to spend over \$80 a month over the next 12 months.
- ▶ Of the people he calls, 70% are on the same cell network, and John is considered to be a key player in a small, but tight, social network of people.

The recommendation presented to the agent is to offer John a complementary handset upgrade if he renews his contract now. John accepts the offer, ensuring that he remains a customer for the next 18 months and maintains a \$1000 a year revenue stream.

Example 2: Upgrading a plan and phone at a branch location

Amy walks into the company's branch location to ask if she can upgrade to the newest smartphone. The customer service agent brings up Amy's details on the computer. Amy is not eligible for the particular phone she wants on her current contract.

The solution has the following information about Amy:

- ▶ She sends 20 – 30 international text messages each month that are not covered by her current contract, which costs Amy a few dollars extra each month.
- ▶ Amy is tied to her current contract for another 3 months.
- ▶ Before walking into the branch, Amy was considered to be a low churn risk. However, her interest in this new smartphone has increased her churn risk score from low to medium.
- ▶ The branch agent just entered text notes into the system, stating that "Amy is willing to switch suppliers to get this new phone," which increases her churn risk.
- ▶ Although she is not eligible for this phone (on her current plan), she can move to three possible plans, one of which is the Global Executive plan. With this plan, she can have a low-cost equivalent phone and is allowed up to 50 international text messages each month.

The agent is presented with a recommendation to offer Amy her selected phone with an upfront cost of \$50. This offer stipulates that she must move to the Global Executive plan, which causes her contract to be renewed for an additional 12 months. The Global Executive plan will cost Amy

an extra \$10 per month. However, she is reminded that this new plan includes 50 international text messages. Amy accepts the new plan and leaves with her new phone.

Example 3: Avoiding customer churn after proactive contact by a customer who is experiencing repeated dropped calls

Beth is becoming increasingly frustrated with the performance of her cell network. Beth makes 10 or more calls every day, and on about half of the calls, she loses the network connection. Having the calls dropped requires her to re-dial the call. This specific problem started last week. Beth is not alone because many people living in the same area are having similar problems.

The solution is on a constant watch for events that can cause customer churn:

- ▶ Over the last week, Beth's churn risk increased steadily at a rate of 5% – 75%.
- ▶ On average, she has 5 dropped calls each day for the last 5 days.
- ▶ She is a high-value customer, regularly spending over \$50 per month.
- ▶ The calling network is broad and complex. Many of her friends are on a different network, but the three most common numbers she calls are on the same network.
- ▶ Fifty customers (similar to Beth) have been identified with the same problems. They all share the same cell tower.

The recommendation schedules Beth and the other 50 people for direct contact. Beth receives a phone call to apologize for the problems that she has been having with the network. As part of the apology, Beth is offered a \$20 discount on her bill for the next two months. Beth is informed that the company is aware of the problem with the cell tower, and it expects to fix the problem by the weekend.

Depending upon their churn risk and contact preferences, each of the 50 individuals is contacted. Each individual is contacted through the most appropriate channel, such as using an outbound call center, email, direct mail, or SMS. The discount offered also varies by customer from no discount to \$50.

Telecommunication companies that benefit from the solution

This section highlights various IBM customer case studies.

Digital+

For Digital+, part of Sogecable, its Call Center Department required an interface to personalize agent communication with clients. With this approach, the company might improve interactions with the clients and optimize its customer service over the telephone. By implementing personalized up-selling recommendations, many agents can generate value in a single contact, so that they can recommend the purchase of particular products to their clients.

For more information about this case study, see “Sogecable improved its call center’s performance thanks to IBM SPSS® software” at the following web address:

http://www.ibm.com/software/success/cssdb.nsf/CS/AFRG-8GDCVS?OpenDocument&Site=sps&cty=en_us

Telenet

In addition to answering customers’ questions correctly, Telenet wanted to allow its call center operatives to make relevant and interesting offers. With help from IBM, their customer care call center is now a key part of the company, because sales after a customer call doubled within six months.

For more information about this case study, see “Telenet transforms its customer care call center into a sales outlet” at the following web address:

http://www.ibm.com/software/success/cssdb.nsf/CS/AFRG-8GWBGQ?OpenDocument&Site=sps&cty=en_us

XO Communications

XO Communications is a US-based national communications service provider of Voice over Internet Protocol (VoIP), voice, network, carrier, wholesale, and hosted services. One of the biggest business challenges for telecommunications companies is managing customer churn. The company felt it needed a better way to understand and retain customers and decided to explore predictive analytics as a means to proactively identify at-risk midsized customers.

By using IBM Business Analytics to predict customer behavior and proactively reach out to customers with a high potential to churn, XO has been able to increase customer retention and retain subscription revenues.

For more information about this case study, go to the following web address:

http://www-01.ibm.com/software/success/cssdb.nsf/CS/CPOR-8E6HPW?OpenDocument&Site=default&cty=en_us

Banking

The IBM 2012 Global CEO Study states that 73% of CEOs are making significant investments in their organizations’ ability to draw meaningful customer insights from available data.³ It also states that, although face-to-face will remain the most prevalent form of customer interaction, CEOs expect a step change in the use of social media. Over half expect social media channels to be a primary way to engage customers within five years.⁴

Even though banking and financial institutions do not experience the same level of churn found in the telecommunications sector, they realize that this solution is applicable to them.

Example 1: Increasing the efficiency of customer service agents

A fictional multiproduct and full-service bank wanted to use the IBM next best action solution to differentiate itself in an increasingly competitive market for its credit cards and savings accounts. The bank was running into problems getting offers to customers. What was the problem?

Customer service agents and advisors were overwhelmed at the point of sale. They could not keep up with all the new offers nor match the best possible offers to the most likely candidates. Their top advisors were selling just 15% of their portfolio. They sold only what they knew. To make matters worse, high turnover meant that the bank invested much time and resources in training its agents on the breadth of its entire portfolio.

To solve these problems, the bank built a system that equipped agents at the point of sale with personalized advice for the customer, based on all the information available to them from past and current interactions. For example, when a customer applied for a car loan or mortgage, the system generated up-sell or cross-sell offers to customers who were preapproved. Through this action, all the credit risk checks and compliance checks were already performed.

The system considered dozens of variables, even more than the most seasoned advisor was able to consider during a customer interaction. It balanced the bank’s sometimes competing

³ Ibid, page 30.

⁴ Ibid, page 7.

objectives of acquiring new customers, retaining existing customers, and maximizing the revenue per customer to generate the optimal recommendation.

The system started at branch locations and is now integrated into the call centers and website of the bank. It is available to some of their brokers. With the new system, the company was able to accelerate its ability to cross-sell by two-and-a-half times and will be able to improve the acceptance of cross-sell offers by 10 times.

Example 2: Helping a customer who has insufficient funds

James just received his first overdraft notice and is reviewing his agreed overdraft amount. He decides to call the bank to see if he can get the overdraft fee waived. While he is on the phone with the customer representative, the solution helps drive a successful outcome.

The solution has the following details:

- ▶ This time is the first time that James has gone over his overdraft limit.
- ▶ He came close to the limit each of the last 4 months.
- ▶ His monthly income has not increased, but his outgoing funds have increased dramatically.
- ▶ The biggest outgoing expense is a new mortgage payment.
- ▶ He uses no other products or services with the bank.

The customer service representative asks for an explanation as to why James exceeded his overdraft limit. James indicates that he is in the process of moving to another house. He moved into his new house, but is still in the process of selling or renting the previous house. He is servicing a larger mortgage and a bridge loan. Finances will be tight for the next 3 – 6 months. The representative enters this information into the notes area of the call center application.

The solution first recommends waiving the overdraft fee for James. Also, he is offered a temporary increase in his overdraft limit to cover this difficult time. Finally, James is invited to meet with the bank's financial manager to review his situation. James agrees and leaves the conversation much happier. Over the next 6 months, the bank earns \$100 in additional interest payments from James.

Example 3: Enabling cross-channel customer service

Jenny has the potential to be a valuable customer for a bank. She is affluent, with significant disposable income, and has several savings accounts with the bank. Her mortgage and pension are not managed by the bank. These financial instruments, in addition to a long-term savings account and mutual funds, might be a natural up-sell opportunity for the bank. However, the bank recently handled a problem she had poorly, causing her to submit a written complaint. The bank is not in a position to market new or additional products and services to Jenny as the situation currently stands.

The IBM next best action solution can assist with this situation. The priority is to ensure that the problem is resolved with a satisfactory outcome for both parties and that this outcome is achieved as soon as possible.

Because Jenny submitted a written complaint, the IBM next best action solution is triggered to initiate a request for a customer service representative (CSR) to contact Jenny. In addition, all sales and marketing activities to Jenny are stopped immediately. The representative sends Jenny an email (her preferred means of contact) apologizing for the situation. She is asked to call the bank at her earliest convenience to discuss the issue, giving the bank an opportunity to make amends. The next day Jenny calls the bank. The IBM next best action solution has been integrated into the call routing system and identifies Jenny is the caller. Her call is immediately routed to the representative with the skills necessary to handle issues with

valuable customers. The representative is provided with both a summary of the issue and detailed background for reference.

Jenny speaks with the representative, who apologizes, making amends for the problems. The IBM next best action solution suggests giving Jenny a voucher for \$100 to spend at her favorite online store. This offer is based on her transactional spending behavior. With the issue resolved, sales and marketing activities for Jenny are set to resume in a two-month time frame.

Banking organizations that benefit from the solution

This section highlights various IBM customer case studies.

DekaBank

DekaBank needed a data mining tool to help savings banks within the German Sparkassen Group determine which customers might be most likely to purchase certain investment funds. IBM predictive analytics solutions help maximize customer value and minimize risk by transforming data into applied customer insight. The solution analyzes data from every channel in a closed loop that generates results to improve interactions, often in real time. Examples of such channels include ATM transactions, web data, and textual data, such as notes from call centers and applications.

For more information about this case study, see “DekaBank improves individual customer contacts” at the following web address:

http://www.ibm.com/software/success/cssdb.nsf/CS/AFRG-87QET2?OpenDocument&Site=sps&cty=en_us

Rabobank

Rabobank, a financial services leader, wanted to optimize its market and customer information to gain a better picture of individual customers. This solution enabled the bank to create strategic offers for cross-selling, up-selling, and deep-selling initiatives.

Rabobank uses IBM predictive analytics software to create and execute targeted direct marketing and lead-generation campaigns. By combining knowledge obtained from market research and data mining, the financial services provider has an up-to-date picture of the marketing possibilities within new and existing target groups.

For more information about this case study, see “Rabobank: Using predictive analytics to lower costs and generate higher returns on marketing campaigns” at the following web address:

http://www.ibm.com/software/success/cssdb.nsf/CS/GREE-8F8M84?OpenDocument&Site=sps&cty=en_us

Insurance

The IBM 2012 Global CEO Study identifies customer insights as one of the most critical investment areas:

- ▶ Seven out of every ten CEOs are making major changes in their organizations to deepen the understanding of individual customer needs.⁵
- ▶ A CEO from the insurance industry in the United Kingdom explained the goal this way: “It’s not just about differentiating ourselves; it’s about how we can help our clients be different.”⁶

⁵ Ibid, page 32.

⁶ Ibid, page 33.

Example 1: Ensuring high value customers receive the best service

Julie has several insurance policies (specifically life, pet, home, and auto insurance). Last week she was involved in a traffic accident. The accident was not her fault, but her car was badly damaged. Julie calls her insurance company for an update on the progress with the claim.

The solution has the following information:

- ▶ She has several policies and this claim is the first one.
- ▶ All of the policies have been in effect for many years.
- ▶ She does not make an annual call trying to negotiate better rates.
- ▶ She is a low churn risk.
- ▶ She is a low fraud risk.

When confirming that the other party's insurance company will settle her claim, the solution makes a recommendation of a repair shop to use. It usually takes a day or two longer than her nearest shop and is 5 miles farther away from her home. However, the quality ratings for this shop are much higher. Julie agrees that it is a good idea to use the better shop and authorizes the customer care representative to arrange for her damaged automobile to be towed and repaired there.

Example 2: Preparing for outbound customer service

Benny has had a \$500,000 life insurance policy with an insurance company for 5 years. The policy has another 10 years before it is up for renewal. This month, the payment for the policy is not received by the company.

This fact triggers an event that is picked up by the IBM next best action solution. Failure to pay might cause the policy to lapse. The IBM next best action solution schedules a call to Benny. During the call, Benny states that he has just got married to Penny. The couple is in the process of creating a joint bank account. A mix-up has occurred with their new account, delaying payment for the life insurance premium. Because Benny has been a good customer, the company agrees to collect a double payment next month from the new account. Benny indicates that he is interested in extending his policy to include his wife. Currently, he is not ready to add her to the policy because they are still paying for the wedding. This information is stored in the system and is ready for use when the right time comes to market additional products to Benny.

Insurance companies that benefit from the IBM solution

This section highlights various IBM case studies with insurance companies.

Fortis Turkey

Fortis purchased Disbank, a large Turkish bank. Fortis needed to rebrand its banking operations in Turkey with an emphasis on customer growth and satisfaction. To accomplish that goal, Fortis Turkey required an in-depth understanding of its new customers and which products and services those customers most desired. The bank used IBM products to identify which products or services were most likely to be accepted by more than 1.7 million individual customers. This approach enabled the bank to successfully market investment products, loans, safety deposit boxes, and other offerings to the precise customer segments that desired them.

For more information about this case study, see "Fortis Turkey Utilizes Predictive Analytics for Offer Optimization" at the following web address:

http://www.ibm.com/software/success/cssdb.nsf/CS/GHAT-8EH588?OpenDocument&Site=sps&cty=en_us

Developing your solution with IBM

When you decide that the IBM next best action solution can bring value to your organization, what is the next step? The solution requires both a business change and a technical change. IBM has the technical breadth and depth to deliver a comprehensive and lasting solution. It also has the industry expertise, project management skills, and business transformation know-how to guide you through the project every step of the way.

How does IBM engage in this solution? The first step is to hold a strategy workshop that gives you a more in-depth understanding of the solution and how you can apply it to your business.

IBM takes four basic inputs, as shown in Figure 17, of which the first two inputs are about your current systems:

- ▶ The client data roadmap is an assessment of your existing information quality, governance, and management infrastructure. If you do not have an existing roadmap, the information agenda team can help you with it.
- ▶ The client technology roadmap is a view of your information management infrastructure and any changes you have in plan.

The purpose of these inputs ensures that IBM maximizes the use of your existing investment. The following inputs are made up of the assets from the solution:

- ▶ The key representative use cases and capabilities provide a checklist of potential use cases that the solution supports. They are refined and prioritized during the workshop.
- ▶ The reference architecture of the solution defines how the solution is assembled.

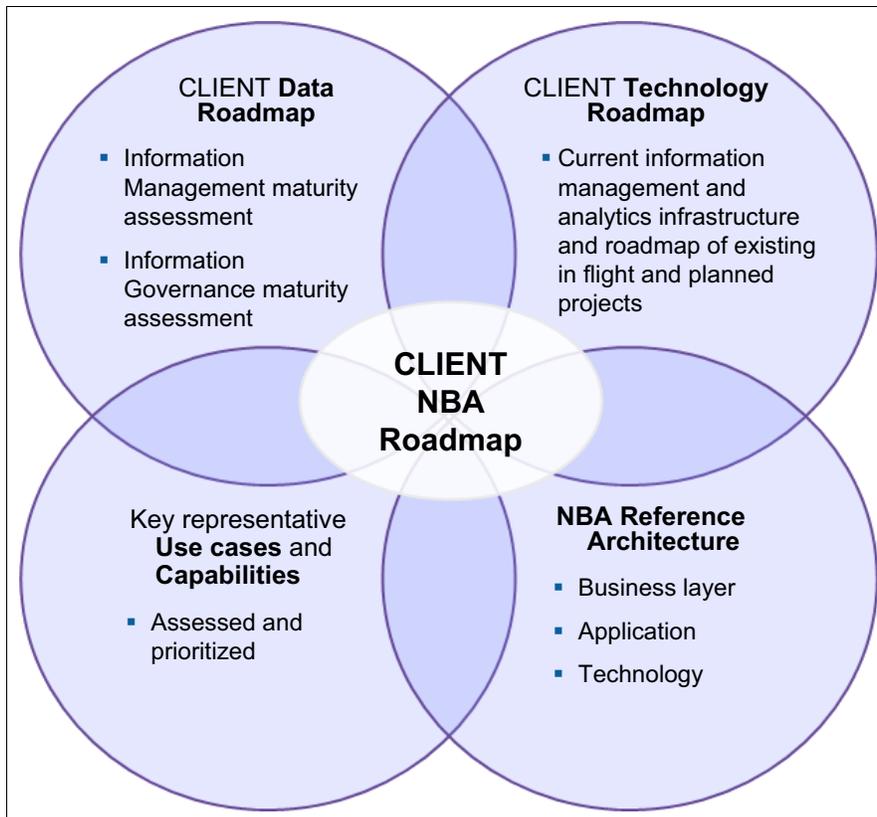


Figure 17 Four inputs to the workshop

When IBM worked with one telecommunication company, the company supplied an initial set of use cases. We expanded their idea of what was possible and what might make a difference to their business by introducing Smarter Analytics use cases based on previous experience in the industry. These additional use cases used real-time analytics applied to high volume data. The result was richer insight about the client that delivered better decisions.

As a result of this successful 2-day strategy workshop, the telecommunications company was able to refine their vision. The company also gained a better appreciation of the role of their current information management investments (particularly IBM InfoSphere® Master Data Management and the IBM InfoSphere Foundation Tools) to enable this key initiative. The company was also aware of the need to implement the appropriate information governance for their customer and product information. This governance was important, because the customer was planning to collaborate more widely across the organization, and the need might impact real-time operational conditions.

After the strategy workshop, the company had three choices (Figure 18):

- ▶ Option 1 is a small-scale implementation of the solution, focused typically on one channel and a limited set of data in a controlled environment most likely outside of production. This approach gives the company an opportunity to gain experience with the Smarter Analytics technology and gain proof points before embarking on a full-scale implementation.
- ▶ Option 2 is a full-scale implementation that is delivered through a staged approach, similar to the approach described in “Transformational roadmap and architecture” on page 4.
- ▶ Option 3 is a deeper review of the potential business value that the solution can bring to the company's business. This type of review is helpful if a significant business transformation is associated with the solution, because this option creates a forum to discuss various options. This option is one of the most common entry points, because it allows a company to develop a workable roadmap grounded on solid, business-driven use cases along with a realistic target reference architecture. This option is often combined with Option 1.

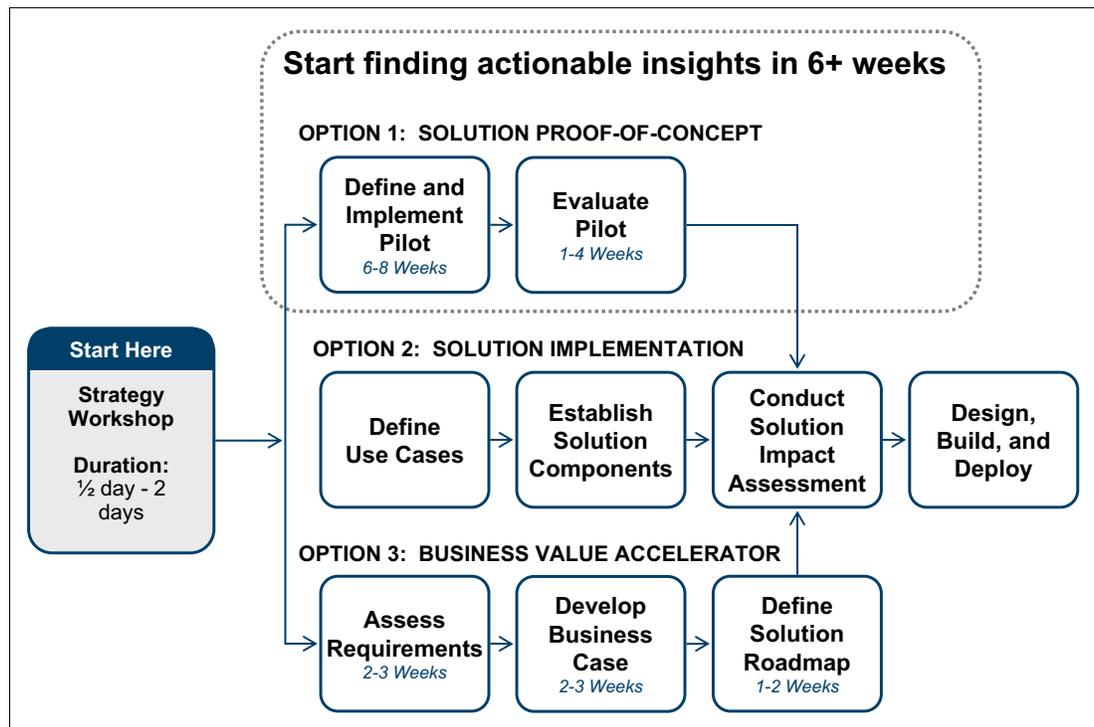


Figure 18 Implementation options

Options 1 and 3 can lead to the solution implementation offered in option 2. The solution implementation approach is based on many years of experience around delivering information management and analytics solutions. It is an iterative approach that uses advanced metadata and quality tools to ensure that your decisions are based on sound information.

Figure 19 identifies the following phases:

- ▶ The *Invest phase* entails the decision to invest and includes the strategy workshops and any pilots (options 1 or 3) that you undertake.
- ▶ The *Implement phase* entails the iterative implementation of a step in the solution roadmap. The philosophy of the method is to analyze the state of the existing system (at the start), use that knowledge to design or engineer the solution, and proceed:
 - Analyze. The identification and analysis of the data sources and existing systems that will be incorporated into this stage of the solution development.
 - Design. The design of new capability and any data cleansing or remediation that is necessary to prepare data that will be used by the solution.
 - Configure. The development and configuration of a new capability.
 - Deploy. The assembly and test of all components for the solution ready for production.
- ▶ The *Operate phase* entails the use, monitoring, and improvement of the analytics models after the solution is in production.

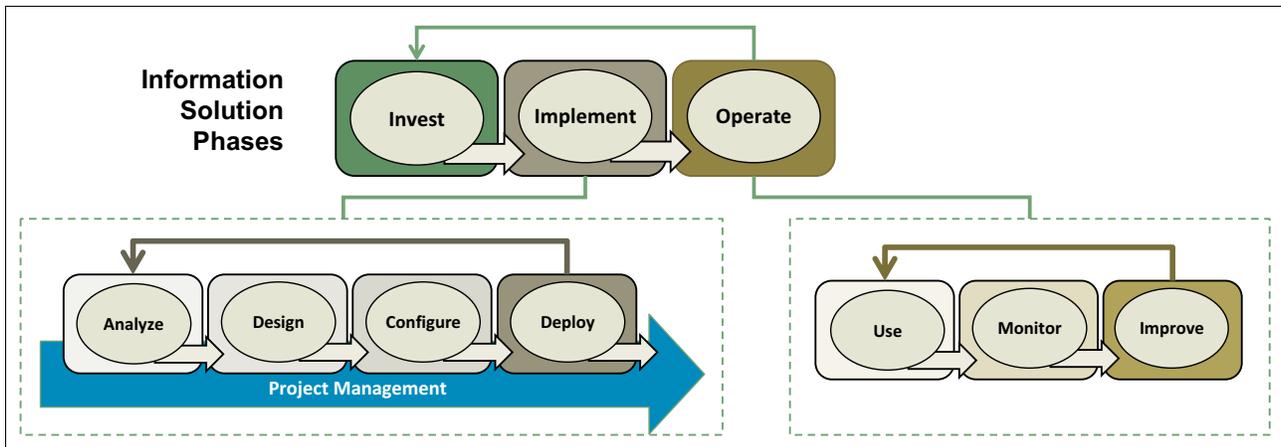


Figure 19 Phases for developing the solution

Conclusion

IBM Smarter Analytics Signature Solution - next best action provides the technology and business expertise to deliver exemplary customer service to your organization. It offers the following advantages:

- ▶ Maximizes strategic lifetime value, profitability, and loyalty of your customers
- ▶ Improves delivery of service and customer satisfaction
- ▶ Optimizes events that drive enterprise business results one interaction and one decision at a time
- ▶ Increases the success of revenue-generating recommendations, such as up-sell, cross-sell, and retention

- ▶ Empowers employees by giving them the optimal recommendation to take for each customer and the business
- ▶ Reduces the loss of existing customers
- ▶ Delights existing customers by anticipating their desires and keeps them coming back for more
- ▶ Identifies and converts potential customers by engaging with them when they are most ready for influence, such as when they are in a physical store or discussing products
- ▶ Helps to understand where value is and the consequences of not taking action

IBM has the experience and breadth of capability to guide you through this transformation, ensuring that value is delivered quickly and keeps on growing as more of your organization embraces the solution.

IBM Business Analytics software delivers actionable insights that decision makers need to achieve better business performance. IBM offers a comprehensive, unified portfolio of business intelligence, predictive and advanced analytics, financial performance and strategy management, governance, risk and compliance, and analytic applications.

With IBM software, you and your company can spot trends, patterns, and anomalies; compare what-if scenarios; predict potential threats and opportunities; identify and manage key business risks; and plan, budget, and forecast resources. With these deep analytic capabilities, IBM customers around the world can better understand, anticipate, and shape business outcomes.

IBM Information Management software delivers trusted information throughout your information supply chain. It ensures that information is available to the right person, at the right location, and at the right time, and protects your information from inappropriate use. The IBM portfolio includes database and data warehouse servers, information security and privacy, information lifecycle management, information integration, information governance, master data management, and big data analytics.

In addition, you can draw on the extensive experience with advanced analytics solutions that IBM Global Business Services® offers. This group has services to design, implement, and manage Smarter Analytics Signature Solutions and provide any level of support that your business needs.

Other resources

For more information, see the following resources:

- ▶ IBM Smarter Analytics:
http://www.ibm.com/smarterplanet/us/en/business_analytics/ideas
- ▶ “IBM Introduces New Predictive Analytics Services and Software to Reduce Fraud, Manage Financial Performance and Deliver Next Best Action”:
<http://www.ibm.com/press/us/en/pressrelease/37212.wss>
- ▶ *Analytics in a Big Data Environment*, REDP-4877:
<http://www.redbooks.ibm.com/abstracts/redp4877.html?Open>
- ▶ Pugh, David. “The Seven Steps of Decision Management,” guest post on the *IBM Business Analytics Blog*:
https://www.ibm.com/connections/blogs/predictiveanalytics/entry/the_seven_steps_of_decision_management10?lang=en_us

- Taylor, James. *Decision Management Systems: A Practical Guide to Using Business Rules and Predictive Analytics*, IBM Press, October 10, 2011, ISBN: 0132884380.
<http://www.redbooks.ibm.com/Redbooks.nsf/ibmpressisbn/0132884380?open>

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