CPA CHARTERED PROFESSIONAL ACCOUNTANTS CANADA

From Data to Decisions

A FIVE-STEP APPROACH TO DATA-DRIVEN DECISION-MAKING

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What is the issue?
Too many organizations are drowning in data while thirsting for good insights – insights that can help people within the company make quicker and more informed decisions to drive optimal performance.

Why is the issue important?
From financial data to customer data to data generated from all our connected and intelligent devices, organizations have access to more data than ever before. In our increasingly data driven world, an organization's success hinges on its ability to turn data into insights faster than the competition, and to turn those insights into good decision making.

What can be done?
This guide sets out a five step framework for data driven decision making, providing a structured approach for turning data into evidence based insights and decisions.

Who is this guideline for and how can it be applied?
This guideline is directed primarily at practising CPAs in mid- to senior level roles. This guideline is intended to provide a straightforward, adaptive approach for CPAs to rethink how they approach and implement evidenced based insights and decision making within their organization.

The framework for data driven decision making can be applied by public, private and non profit organizations.

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Overview

What's inside?

This guideline discusses emerging industry trends and challenges as well as opportunities that require organizations to manage big data and turn insights into data-driven decision-making. A five-step structured approach is provided as guidance for CPAs to:

1. Define objectives and information needs
2. Collect data
3. Analyse data
4. Present information
5. Make data-driven decisions

How emerging trends impact your business

A cursory glance into the operations of most organizations shows a common challenge, irrespective of an organization's size, industry or sector. The fact is, there is more data available than ever before, yet most organizations are struggling to capitalize on this data explosion.

We live in a world where data is being generated at a startling rate. Roughly every two days, we create as much data as we did from the beginning of time until 2003. Almost everything we do leaves a digital trace.

Most organizations struggle to turn this ever-expanding, fast-moving mass of data into the critical knowledge needed to win in today's fiercely competitive and sometimes unpredictable markets. This leads to the frustrating situation where many companies are data-rich but insight-poor.

At the same time, there are pioneering organizations who are able to use data to improve their competitive positions. These companies continually use the best and most appropriate data to guide the decision-making process. That doesn't just mean they have the technical ability to collect and work with data in large quantities (although those abilities are important) – they have also built competitive strategies around data-driven insights. In other words, data is at the very heart of what they do.

Data is not just fueling decision-making, though. It is also transforming the way forward-thinking organizations operate, particularly in the form of automation and improved business processes. In short, data has never been so important. Organizations of all shapes and sizes must learn to harness the power of data, turning it into smarter decisions, more streamlined operations and better business performance. Those who cannot achieve this will struggle to thrive or even survive.

Introduction to the topic

The gold rush to the data rush

For a moment, let's imagine that you are part of the California gold rush of 1849, where people flocked en masse to the state with the hope of making their fortunes from unearthing more of the gold that had just been found there.

Thousands of prospectors used their gold pans to sift out gravel, sand and sediment but retained the heavier and valuable gold nuggets. By panning the endless tons of silt, the prospector hoped to find those few precious nuggets of gold that would make them rich. Some did indeed become hugely wealthy. But most returned to their homes having either used up their investments without an adequate (if any) return or, worse, having become bankrupt.

Fast forward to today and replace the gold rush with the data rush. What we see are some organizations behaving in very much the same way as the prospectors of old: they are panning masses of data, with the hope that, somehow, they will discover those golden nuggets of information that will give them some valuable new insights.

Thanks to more than a decade of breathtaking advancements in computing technology, we now live in a world in which data is abundant. The amount of data that organizations now have access to each day is almost incalculable, as too is its value. Think of this data as the raw material required for forming those "golden nuggets" of insights that enable managers and leaders to make evidence-based decisions and, in turn, gain competitive advantages. Although some organizations are indeed able to leverage their data successfully, most are not.

What is data-driven decision-making?

As the name suggests, data-driven decision-making simply means using good data, business intelligence (BI) and analytics to find insights, and then acting on those insights to gain competitive advantages. It is built on the premise that the best decisions are those supported by good data.

Why is data-driven decision-making relevant?

What makes organizations succeed in today's competitive, unpredictable and digital world is the ability to:

- learn faster than the competition
- act on data-driven insights in a way that drives competitive advantage

The fact is that the sheer volume and accessibility of data available to today's organizations provide an exciting resource. There is simply no excuse for organizations not to tap into this valuable resource and boost their competitive position by:

- aligning data with the organization's strategic objectives
- collecting the best available data to support the organization's strategic information needs
- analyzing this data to extract valuable insights
- communicating the information in a way that allows people to act based on the insights

Although the idea of data-driven decision-making seems intuitive and straightforward, most organizations seem to struggle with it in practice. Whether it's the result of an inability to find and collect the most relevant data among the overwhelming amount that is available, or an inability to turn the data into insights that can be acted upon, too many organizations are missing out on the possibilities that data-driven decision-making can deliver.

Defining key terms used throughout this guide

Data comes in a myriad of forms, including numbers, words, sounds and pictures. It can mean the company's own internal data (e.g., sales transactions) or external data (like social media data). And it can be structured (i.e., data that can easily be organized, often into rows and columns) or unstructured (i.e., data that cannot be easily organized, such as Facebook status updates).

Information includes a collection of words, numbers, sounds, or pictures, but, crucially, the information has meaning and context. This is what makes it different from raw data.

Knowledge is acquired when we take in and understand information about a subject, which then allows us to make decisions and act on the information. We do this by using rules about how the world works based on information we have gained from past experiences.

Business intelligence (BI) refers to technologies, applications, and practices for collecting, integrating, analyzing and presenting business information for meaningful decision-making.

Analytics means our ability to collect and use data to generate insights that inform fact-based decision-making. Given today's data is often too "messy" for traditional BI approaches, new analytics techniques (e.g., artificial intelligence and machine learning) have evolved to help us make sense of huge volumes of unstructured, complicated data.

Artificial intelligence (AI) revolves around the central concept of building machines that are capable of "thinking" and acting in ways that seem intelligent. Chat bots, virtual assistants (e.g., Amazon's Alexa) and self-driving cars are all examples of AI technology in action.

Machine learning is a leading-edge approach to AI. It refers to machines' ability to learn from data (like humans do), so that they can refine their actions and decisions based on what they have learned.

The Internet of Things (IoT) describes the fact that many everyday objects now have the ability to send and receive data via the internet. A smartphone syncing photos with a computer is one very simple example of the IoT in action, but the enormous range of "smart" devices and machines now extends to connected cars, fitness bands, smart watches and even smart yoga mats.

What is RAISE and how it applies to data-driven decision-making

CPA Canada's RAISE philosophy is founded on the premise that companies need to be **R**esilient, **A**daptive and **I**nnovative to be **S**ustainable **E**nterprises. The RAISE philosophy can help guide an organization to sustainable success, and data-driven decision-making is going to help with all aspects of that.

In today's fast-paced world, organizations must be resilient and adaptive. This means they must respond quickly, make the best decisions possible and change course if necessary. Data-driven decision-making ensures that these decisions can be taken in near real-time, that the decisions are grounded in real facts (rather than guess work) and that they lead to actions that ensure an organization stays adaptive.

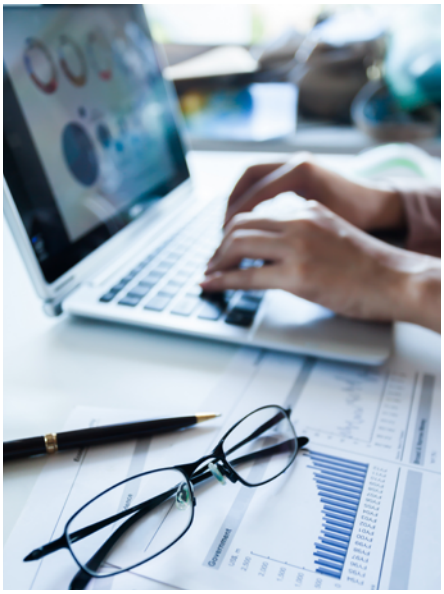
On top of that, organizations that use data to inform their decisions are more likely to innovate. A data-driven understanding of your business and your customers will help you innovate and find the right customer offerings and business processes that will drive future success.

Together, data-driven decision-making enables organizations to become more resilient, adaptive and innovative, which in turn will make them more sustainable.

How CPAs add value

CPAs in business are important custodians of organizational data. A working knowledge of data-driven decision-making (including the use of BI reporting and data analytics) will help to:

- broaden professional accountants' scope
- move them beyond the analysis of quantitative information only to using all forms of data.



This will then result in better organizational decisions.

Professional accountants play a critical role in data-driven decision-making. Over recent years, management's information requirements have expanded massively in terms of the range of data, level of analysis and expected presentation format. BI and analytics vendors have responded by developing accounting applications to integrate into organization-wide BI and analytics offerings.

As the field of data-driven decision-making widens, there is a huge opportunity for professional accountants to provide better, richer information and analysis that supports decision-making throughout the organization.

This ties in with the skills and expertise of the accounting profession in three key ways:

1. **Enabling value through strategic analytics.** Professional accountants play an important role in recommending appropriate performance measurements, as well as aligning systems and processes to access, analyze and convert the data into valuable information for timely decision-making.
2. **Reporting value through the effective presentation of information.** Professional accountants develop and present financial and non-financial information to senior management for use in organizational decision-making. Proper presentation of this information is critical to the success of the organization in making correct decisions.
3. **Providing governance through developing new data standards and real-time key performance indicators.** Trust and integrity are core attributes of professional accountants. These attributes will provide a strong basis for positioning professional accountants as data governance leaders in the organization. Appropriate data governance will allow the organization to make data-driven decisions, with the assurance that the data supporting those decisions are accurate.

Process

There are five steps for effectively deploying data-driven decision-making, as shown in Figure 1.

FIGURE 1

Step 1

Defining objectives and information needs. This step is about answering the questions, "What are our strategic aims?" and "Based on those aims, what do we need to know?" This vital first step ensures we clearly articulate the real information needs of your organization, and clarify who needs to know what, when and why.

Step 2

Collecting data. This stage centers on gathering and organizing the right data. The emphasis here is on finding meaningful and relevant data to meet the information needs identified in Step 1. Organizations need to either:

- assess whether the required data is already held somewhere in the organization
- identify the best way to collect the data

Step 3

Analyzing data. Once the right data has been collected, it must be turned into insights. To do this, the data must be analyzed to extract information.

Step 4

Presenting information. This step is about communicating the information extracted in Step 3. The focus here is on getting the right information, in the right format, to the right people, at the right time.

Step 5

Making data-driven decisions. This step concerns turning information into decisions, which means making sure the available information results in action. Successfully turning information into decisions requires a culture shift, from making decisions based on assumptions or gut instinct to making decisions that are firmly rooted in data-driven insights.

Each of the five steps are explored in more detail in this guideline.

In addition to these five steps, there is a feedback loop between the last and the first steps. After the right decisions have been made, those decisions and actions will, in turn, inform future information needs.

Even though it is not a step in its own right, there is also a sixth component present in the framework – IT infrastructure, analytics and data visualization tools as enablers. IT and data tools play a crucial role in data-driven decision-making. They are critical enablers of the data collection process, data analysis, and presentation and dissemination of information.

Applying the topic to your organization

Step 1

Defining objectives and information needs

Successfully navigating Step 1 requires careful answering of one key question: "What do we need to know?" In most organizations, the use of data and analytics is driven more by the information that is available than by the information needed to make essential organizational decisions. This is clearly back to front. Effective decision-making should be driven by the information needs of the decision makers. In essence, this means identifying the information they need and then applying data and analytics to meet those needs.

There are two approaches to serving decision makers, and both approaches must work hand in hand if data-driven decision-making is to become part of the organization's DNA:

1. **Top-level information needs:** Working with the leadership team to identify the strategic information needs and frame data questions for the organization as a whole, based on the company's strategy, as well as to foster a culture of data-driven decision-making across the business. Buy-in and support "from the top" also sets the tone for the organization in ensuring that their data / decision-making needs are met.
2. **Democratization of data-driven decision-making:** Serving the department heads and managers throughout the organization who increasingly need access to more data analysis to effectively perform their jobs. Instead of business analysts and IT departments controlling data, organizations must give all employees access to data so they can interrogate it themselves – albeit with some guidance, training, and ongoing support from analysts to help guide the process, define information needs and deliver the right answers. Walmart's Data Café provides an excellent example of this democratization of data (refer to the accompanying case studies, "From Data to Decisions: Data-Driven Decision Making in Practice").

Both elements – the top-level information needs and the democratization of data-driven decision-making – are about getting everyone in the company using data more regularly to inform business decisions.

Here are the key steps involved in this stage of the process.

Linking data to strategy

First, it is vital that we link the data that organizations collect to strategy and the key drivers of value and performance. Because of the sheer volume of data that is available today, organizations that do not link their data needs to the company's overall strategic objectives risk being

paralyzed by information overload or, worse, wasting time and money collecting and analyzing data that is irrelevant.

By ensuring data is linked to the organization's strategic needs, we can frame questions in a more focused, data-driven way. We can therefore ensure the data collected is:

- relevant to the organization's competitive positioning and critical objectives
- supporting the organization's greatest information needs
- focused on must-know, business critical information – not wasted on irrelevant "interesting to know" issues

One very effective way to articulate a strategy is using a strategy map. This allows organizations to express their strategy on a simple one-page document that can then be used to anchor any future data requirements. For practical guidance on developing a strategy map for an organization, refer to the CPA Canada MAG "Strategy Mapping – A Six-Step Process – Guideline."

Identifying who needs the information

The second phase is to identify who needs the information. In other words, who is the target audience or information customer? As mentioned, information customers fall into two camps:

1. the leadership team that is making big-picture strategic decisions
2. the business units and managers who are helping to deliver the organization's strategic objectives

Different audiences have vastly different needs, even in relation to a single strategic objective, so it's important to clarify who requires the information at this early stage. For example, the leadership team of a supermarket may need to know which product categories are most profitable for the business. Meanwhile, a store manager may need to know why a certain product within that highly profitable category isn't selling in their particular store.

Clarifying what questions they want answered

Next, we must identify exactly what questions the target audience wants answered. Often, however, information customers may not fully know their exact requirements. A powerful tool for guiding information customers through this process is to formulate key analytics questions (KAQs). In essence, a KAQ makes sure we know what it is that we want to know – that we are drilling down to the precise questions that need answering.

KAQs should focus on the present or the future (not the past), and link to the goals and desired targets of your organization's strategy map. For example, ask, "How effective are our attempts to increase our market share?" instead of "Has our market share increased?" By focusing on the future, we open up a dialogue that allows us to "do" something about the future. We then look at data in a different light, trying to understand what the data means for the future. This helps with data interpretation, and ensures we collect data that helps to inform our decision-making.

Understanding what decisions need to be taken

Although KAQs narrow the possible data that can be used, it still leaves many data sets to choose from. An effective way to narrow the range of possible indicators is to identify what decisions the data would support.

By articulating both the questions and decisions that the data will help to address, it is possible to reduce the potential number of indicators from an almost endless number to a smaller, more focused data set.

Examples of KAQs

- To what extent are we growing profitably?
- To what extent are we retaining our most profitable customers?
- What do our customers really think about our product, service or brand?
- What are they key inefficiencies in our most important processes?
- How well are we communicating within our organization?
- What are the most valuable competencies for new managers?
- How engaged are our employees?
- How do people inside and outside the organization perceive our employer brand?

Examples of data-driven decisions

- Which customers to target.
- How best to redesign the website.
- Which element of branding to invest in.
- How best to price and package service offerings.
- The best route for delivery trucks.
- Which part of the production process to optimize.
- Which people to recruit.
- Which element of learning and development to invest in.

Step 2

Collecting data

Once the strategic information needs are clear, the right data (in the right quantity) needs to be collected to support decision-making.

Today, data means more than numbers in a spreadsheet. Data encompasses emails, tweets, telephone calls to a helpdesk, CCTV video footage, credit card transactions, GPS information and so much more. Consequently, it is important to become familiar with the many different data options available.

Supporting internal data with external data

Too many organizations rely heavily on internal data, when they should be looking to supplement their internal data with relevant external data:

- *Internal data* refers to all the information an organization currently has or has the potential to collect. Some of the most common examples of internal data include customer and employee survey data, sales data, financial data, HR data, customer records, stock control data, and website activity data.
- *External data* is the infinite array of information that exists outside of the organization. The data may be publicly available (e.g., government census data, crime statistics, social media data or weather data) or privately owned data from data brokers (e.g., Acxiom, Nielsen, Experian, Equifax and Corelogic) that sell various types of data – from credit scores to consumer preferences. In addition to data brokers, many other companies (e.g., social media companies, financial services firms or telecom companies) are now offering data.

For example, a football team wanted to understand more about their customers. Their internal ticket sales data only gave them the address of the person who purchased the tickets but nothing about who actually attended the game, where they came from, when they travelled, and where they went before and after the game. This changed when the company bought data from a telecom company that was able to trace visitors within the stadium and provide anonymized and aggregated insights into their movements before and after the game.

Balancing structured data with unstructured data

Structured data is any data that is located in a fixed field within a defined record or file, usually in databases or spreadsheets. Essentially, it is data that is organized in a predetermined way, usually in rows and columns. While this data is certainly valuable (think of the vast amounts of structured transactional data available to retail giants like Walmart), it often presents just a limited glimpse of what is going on.

Unstructured data is any data that does not fit into traditional structured formats. This represents the vast majority of the available data in the world and can often be rich in insights. Examples include email conversations, website text, social media posts, video content, photos and audio recordings.

Like internal and external data, it is the combination of structured and unstructured data that tends to deliver the most useful insights for decision-making.

Identifying data collection formats

There are many different data formats, but they can be broadly categorized as follows:

- **Activity data** describes the computer record of our actions, whether they occur online or offline – giving us an indication of what people *really* do (as opposed to what they say they do). Examples of activity data include browsing a website, "liking" something on Facebook or physically walking around a store.
- **Conversation data** covers any conversation in any format, whether verbal or written. This type of data is particularly valuable because it provides insights on how happy (or otherwise) people are. Examples include text messages, instant messages, emails, blog comments, social media posts, survey responses and telephone calls.
- **Photo and video data** refers to any kind of image data, from CCTV footage to photos posted on Instagram. It can be used to identify individuals and their behaviour patterns, or to identify certain products or brands in images.
- **Sensor data** is being generated at an incredible rate, thanks to the proliferation of IoT-enabled "smart" devices and sensors being increasingly built into products and machines. Examples include data from smart TVs, wearable devices, sensors in production machinery and vehicle sensors.

Data can be collected automatically (through web activity logs or sensors) or manually (through surveys, focus groups, performance reviews, interviews and so on).

Considering data privacy

With data also comes the responsibility to keep that data safe, especially when the data is personally identifiable or private in nature. Many places around the world are currently tightening their data privacy laws. For example, Europe now has the General Data Protection Regulation (GDPR), which requires any company (anywhere in the world) that holds data about any citizen of a European Union country to comply with their strict regulations. For example, GDPR stipulates that companies require explicit consent to collect any personal data as well as permission to analyze and use that data. Also, individuals can request for their data to be deleted at any time. It is therefore a good idea to check any legal requirements and regulations before collecting any data. Key advice to any organization is to be transparent about what data is being collected and for what purpose. Over time, this will build the trust customers require to know that their data is safe with your organization.

Considering data ownership

As data is becoming an increasingly important business asset, it is also important that companies ensure they own the data or at least have access rights to data that is essential for their decision-making. Some companies have developed their data strategy with critical data sets owned by third-party providers that could stop the company from accessing it at any point. Companies should ensure they own the rights to data and have the correct contractual arrangements in place to access data collected by data suppliers and third-party companies.

Planning data collection

Collecting data typically involves the following steps:

1. **Decide on the data source and collection method.** At this stage, it is crucially important to think about access to data and answer questions such as, "Is the data readily available?" If the ideal data is not available or needs to be supplemented with more evidence, new data must collected.
2. **Decide when the data will be collected, and in what sequence and frequency.** It is important to determine when and how often the data should be collected. Some data sets are collected continuously, others hourly, daily, monthly or even annually. There is no rule of thumb here, so the right frequency is the one that provides sufficient data to answer the KAQs and support decision-making.
3. **Decide who is responsible for collecting the data.** Here, we identify who is responsible for data collection and data updates. The person responsible for data collection could be an internal person or function within the organization or, increasingly, it can be external agencies. Many organizations outsource the collection of specific data (e.g., customer or employee surveys) or pay to access third-party data (e.g., social media data).

Step 3

Analyzing data

After ensuring we are collecting the right data, we need to turn this data into insights that can inform decision-making. Analytics is what allows us to extract insights from data. In most cases, analytics involves using software-based algorithms and analytic tools that employ one or more of the analytics techniques listed in this section.

Data analytics is advancing at a rapid pace, thanks largely to the ever-increasing volume and variety of data that is now available to us. Previously, when we wanted to analyze data, it had to be contained in structured databases or spreadsheets. Anything that did not fit that neat and orderly structure was near-on impossible (or, at least, prohibitively expensive and time-consuming) to work with. Now, it is possible to work with nearly any kind of data; what was previously seen as unmanageable is now more easily leveraged to aid decision-making. Advances in data storage techniques (particularly cloud storage) and computing power are also fueling these leaps in analytic technology.

Looking at the different analytics options

There are too many analytics techniques to provide an exhaustive list here, but the following are some of the more common techniques used by organizations:

- **Correlation analysis** is a statistical technique used to determine whether there is a relationship between two separate variables, and how strong that relationship may be (e.g., analyzing the relationship between customer profitability and customer loyalty).

- **Regression analysis** is another statistical tool, this time used to investigate the relationship between variables (e.g., whether there is a causal relationship between price and product demand). To clarify the difference between correlation and regression analysis: regression analysis identifies the relationships between two variables and plots the course of that relationship, while correlation analysis explores the strength of that relationship.
- **Data mining** is an analytic process designed to explore very large data sets to uncover interesting but previously unknown patterns, relationships or anomalies.
- **Text analytics** refers to the process of analyzing text – be it emails, reports, customer records and communications, blogs, social media posts, or any other kind of text – for insights. It can be especially helpful for understanding more about the organization's customers or employees from looking at social media posts or survey feedback.
- **Image analytics** is the process of extracting information from images (e.g., photographs or medical scan images). As a process, it relies heavily on sophisticated pattern recognition, and it can be used for facial recognition and recognizing specific products or brands.
- **Video analytics**, or the process of extracting information from video footage, is very similar to image analytics, except it can also be used to measure and track things like the behaviour of people over the time of the footage.
- **Sound and voice analytics** refers to extracting information from audio recordings of soundscapes or conversations. It can be used to analyze the sounds, and it understand topics or actual words and phrases being used, which makes it useful for highlighting recurring themes or issues that crop up in conversations (e.g., helpdesk calls).
- **Sentiment analysis** involves extracting subjective opinion or sentiment from text, audio or video data to understand whether stakeholders feel positively, negatively or neutrally about a particular product, service, brand or business.
- **AI and advanced analytics** encompasses technologies like AI and machine learning, where computers crunch through data and then decide the best course of action based on the data. In other words, thanks to self-learning algorithms, machines now have the ability to learn from the data they are given and decide what to do next. Sometimes machines may prompt some sort of human action, but increasingly computers are able to carry out the interventions autonomously.
- **Augmented analytics** with the advances of AI make it possible to automatically generate insights from data. Algorithms can scrub and analyze raw data and even effectively communicate the insights so that humans can understand them.

Combining analytics for maximum effect

It is important to note that the value of analytics often does not lie in one single analytic tool or technique. The most valuable insights are often identified through the combination of different analytics techniques. For example, correlation and regression analyses might show that the most loyal customers are also the most profitable. Text and sentiment analysis of customer surveys as well as voice analytics from customer call conversations could be used to identify

the key factors for customer loyalty. AI and augmented analytics could then be used to automatically identify loyal customers and the factors that seem to make them more loyal.

Step 4

Presenting information

When analyzing data, it is crucial to keep the target audience(s) and their specific needs in mind. After all, organizations gain competitive advantage when the right information is delivered to the right people at the right time.

It is crucial that the information presented is relevant and meaningful to that audience. There are three key elements to making sure data is relevant to the people receiving it:

1. **Finding the right reporting frequency.** After all, a great indicator is of little use if that information gets to its audience too late for timely decision-making.
2. **Determining which outlets, reports or tools will be used to communicate the data.** Data sets might, for example, be included in the quarterly performance report to the board, the weekly performance reports for department heads or a reporting dashboard for line managers.
3. **Deciding how best to present the data.** For example, data can be shown as a number, narrative, table, graph or chart. In any case, it is crucial the presentation is clear, informative and compelling for the target audience.

Often, the most effective way to communicate data in a clear, informative and compelling way is to combine a number of different presentation formats into the report / dashboard to tell a "story" with the data (e.g., a chart may be supported by narrative text).

Here is how to tell a story with data.

Starting with the question

When displaying information, it is a good idea to start with the question (KAQ outlined above) the data is aiming to answer (e.g., "How engaged are our employees?"). This provides context for the information that follows. It also helps to ensure the data is laser-focused on meeting the information needs of the target audience, thus avoiding any inclination to focus on "interesting" rather than "valuable" information.

Using headlines

A good report or dashboard should use headlines. A headline summarizes the main finding from the data so that users don't have to go into the detail to get the main insights. If the KAQ was to look at employee engagement, the headline could say something like "Employee engagement has improved significantly over the past year" or "Over the past three months, we have seen a 25% drop in employee engagement."

Using effective visuals

The KAQ may be followed by a meaningful visual (e.g., chart, graph, table or infographic) that highlights the most important facts that help to answer the KAQ. Visuals are great for conveying information because they are quick and direct, memorable, and easy to understand.

Here are some generic tips for producing effective visuals:

- Keep them simple and focus on the message the user needs to receive.
- Rarely use emphasis colours (e.g., bright red, yellow, orange or green) and only where it is important to highlight specific issues.
- Do not use too many different varieties of graphs, because an analysis across different graphs is difficult.
- Try to avoid any unnecessary decorations, background colours and so on. Any additional and unnecessary elements just distract the reader, making it harder to extract insights.

Many of today's commercially available analytics tools (e.g., Tableau, Qlik or Microsoft Power BI) come with a reporting element that can visualize data in a simple, effective way.

Using narratives to support visuals

A narrative expands on the headline and provides context and meaning to the data that is represented in the graph or data visualization. For instance, a graph containing past performance is extremely useful for analyzing trends over time, but a narrative can put the graphical information into context, explaining why the trend is as it is. Going back to the employee engagement examples, the narrative could explain the key reasons why employee engagement might have increased or gone down.

Getting the most out of self-service tools

Traditional self-service dashboards continue to be an important means for organizations to present data to those who need it. However, for users to really get the most out of any dashboard, it must be packaged in a way that makes the data easy to understand, combining visuals, narrative summaries and headlines wherever possible.

An ideal dashboard would allow the user to manipulate data, slicing and dicing it in the way they need, and then present them with meaningful visuals and supporting narrative that answers their question. For this to happen, the dashboard must be designed by someone who understands both the analytics and storytelling aspects.

What's next for data visualization and communication?

This is an area that is developing all the time, and we can expect data visualization and communication to change drastically over the coming years. Natural language processing is one particularly exciting area since it allows users to ask questions of their data. So, rather than having to manually manipulate data themselves, users can have a conversation with their

data and ask questions like, “Who are my most profitable customers?” The system will then speak back or present the appropriate data to deliver a meaningful answer to the question.

Furthermore, virtual reality and augmented reality visualization tools will allow us to “step inside” and really immerse ourselves in data. This could be a game-changer for very complex or large data sets that are currently too difficult to report on using standard tools.

Six common mistakes in communicating and presenting data

Poor data communication and visualization can lead to key messages going unnoticed, which, in turn, can lead to poor decision-making. Here are six of the biggest data communication mistakes to avoid:

- **Not linking communication to strategy and information needs.** Because, if you aren’t clear on what people need to know, how can you present that information in the best way?
- **Not tailoring the presentation method to the audience.** It is vital to understand how the audience intends to use the data, so that the presentation can be tailored accordingly.
- **Burying key points in reams of text.** Headlines and visuals should be used to highlight the key messages that should inform decision-making.
- **Not using supporting narrative.** While we want to avoid overly long text, a small amount of supporting narrative ensures everyone understands the message in the same way.
- **Having a cluttered, busy dashboard.** Too many indicators on one screen can lead to information getting lost.
- **Using too many colours.** Colour should be used sparingly to avoid distracting the audience from the core messages.

Step 5

Making data-driven decisions

Organizations where decisions are firmly rooted in data have the clear competitive advantage. This final step looks at how to turn information into smarter business decisions.

No matter how insightful or compelling the information, it is of little value unless it is turned into action. In other words, if knowledge is not turned into action, then the entire effort expended in the previous four steps has been a pointless exercise and a waste of resources. Decisions must be made and acted upon to improve performance and help deliver the organizational strategy.

Creating a data-driven culture

When implementing data-driven decision-making, the organization must create a culture that is conducive to transforming knowledge into action. This means creating a culture where data is valued, where people want to see data rather than talk about assumptions or "how we've always done it," and where good reporting is available to those who need it, when they need it.

The following seven steps will help organizations foster a data-driven culture:

1. **Encourage a passion for learning and improvement.** The most important ingredient, which is why it is the first on the list, is to create an organization-wide passion for learning and improvement, for creating efficiencies, and for embracing new technologies and processes. Good data can inform these improvements at every level of the business.
2. **Ensure leadership buy-in.** To make data-driven decision-making a reality, senior buy-in and support is critical. If the senior leadership team does not appreciate the value of data as the foundation of good decision-making, it is very difficult to effect real change throughout the rest of the organization. Real-life examples of how other organizations have harnessed the power of data to gain a competitive advantage can be powerfully persuasive here.
3. **Develop widespread analytical capabilities throughout the organization.** Data-driven decision-making is not possible without the competencies and skills that turn data into insights. Clearly this means investing in analytics training and expertise (or partnering with an external provider who already has these in spades), but it is also about promoting data literacy right across the organization. Everyone at every level should be aware of the importance of data and how it should be used.
4. **Build appropriate IT infrastructure.** You can have a wealth of analytical intentions and skills, but you also need the tools to put them into practice. Organizations need the right IT infrastructure to collect, store and analyze the data, as well as the means to share that data and make it accessible to those who need it. Where investing in in-house infrastructure is not an option, there are many third-party providers offering relatively inexpensive access to off-the-peg data analytics and communication tools. Even organizations on moderate budgets can now access cloud storage and analytics-as-a-service offerings that provide hosted and managed infrastructure.
5. **Use judgment.** To really get the most out of analytics, employees at all levels must balance facts with judgment. The goal is to back up decisions with hard data – not at the expense of, but rather alongside, individual experience and knowledge.
6. **Share information.** For data-driven decision-making to be effective, the message has to get out, loud and clear, that information belongs to the organization, and that all employees should be focused not on the information's ownership but on working together to create the richness of different perspectives that can turn this information into "golden nuggets" of actionable knowledge. A good way of creating this culture is by establishing a shared data repository (e.g., a common data lake or a BI platform) that accesses data sources across the business.

7. **Recognize and reward data-driven decision-making.** Organizations should look to weave in some form of supporting reward strategy, as it is important to recognize and reward attempts to base decisions on data. This will show that the organization takes the approach seriously and values those trying to make it a practical reality. This can start with a simple "thank you" and sharing of success stories.

People and machines working together to make better decisions

The explosion in data, and particularly the developments around AI and automation, have created a narrative of man versus machine among some people. Yet, the goal of data-driven decision-making is not to abdicate all decision-making responsibilities to computers or to imply that there is no place for humans in the decision-making process. Rather, this is about humans and machines working together in a process of joint decision-making.

We have come a long way since IBM's Deep Blue chess-playing computer beat Garry Kasparov in a chess game in the 1990s. Now, hybrid chess teams made up of people and AI systems appear to have the edge over people-only *and* machine-only teams. This indicates that a combination of human and computers – where machines help humans make better decisions – is the optimum solution. This collaborative approach must become part of the very fabric of the organization if data-driven decision-making is to succeed.

Key learnings

What makes organizations succeed in today's competitive and unpredictable world is the ability to learn and act faster than the competition. The framework outlined in this guideline is designed to help organizations do exactly that.

The tips and tools presented as part of the five-part model should enable organizations to become more data-driven in their decision-making and avoid the traps of making decisions based on gut instinct or dangerous half-truths.

We are on the verge of an exciting transformation in business. There is more data available than ever and we are constantly finding exciting new ways to extract never-before-seen insights from data. This is allowing businesses of all shapes and sizes, across all kinds of industries, to make better decisions, drive performance and boost their competitive position. By aligning data with strategy, collecting the best available data, analyzing this data to extract valuable insights and communicating the information in a way that allows people to act on these insights, any organization can achieve better results.

The power of data is so great that, within a few years, we may no longer need to refer to "data-driven decision-making": data will be at the core of all business decisions. It will become second nature. Organizations that can get ahead of the curve and implement this five-step framework for improved decision-making will have an even bigger competitive advantage in a data-driven world.

Resources

Also by Bernard Marr:

- *Artificial Intelligence In Practice: How 50 Companies Used AI and Machine Learning To Solve Problems, 2019, Wiley*
- *Big Data in Practice: How 45 Successful Companies Used Big Data Analytics to Deliver Extraordinary Results*
- *Big Data For Small Business For Dummies*
- *Big Data: Using Smart Big Data, Analytics and Metrics to Make Better Decisions and Improve Performance*
- *Data-Driven HR: How to Use Analytics and Metrics to Drive Performance*
- *Data Strategy: How to Profit From a World of Big Data, Analytics and the Internet of Things*
- *How to develop a data strategy: With handy template:* www.bernardmarr.com/default.asp?contentID=1838
- *Key Business Analytics: The 60+ Tools Every Manager Needs to Turn Data Into Insights*
- *Key Performance Indicators For Dummies*
- *Key Performance Indicators: The 75 Measures Every Manager Needs to Know*

About the author

Bernard Marr

Bernard Marr is an internationally bestselling author, popular keynote speaker, futurist, and strategic business and technology advisor to governments and companies. Through his organization Bernard Marr & Co., he helps companies improve their business performance, use data more intelligently and understand the implications of new technologies, such as AI and big data.

Bernard is a frequent contributor to the World Economic Forum, writes a regular column for Forbes and is the author of 15 books, including the international bestsellers *Data Strategy*, *Big Data in Practice* and *Key Business Analytics*. Bernard's books have been translated into over 20 languages and have earned accolades such as the CMI Management Book of the Year award, the Axiom book award and the WHSmith best business book award.

LinkedIn has ranked Bernard as one of the world's top five business influencers, and every day he actively engages his 1.5 million social media followers and shares content that reaches millions of readers.

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