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Embedded Analytics

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Understand the value of embedded analytics

Understand key criteria for build or buy evaluation

Find ten takeaways for embedded analytics

Qlik Special 2nd Edition

Jared Decker

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Introduction

According to global market research firm IDC, the big data and analytics software market is huge — and growing. In 2020, it reached \$71.6 billion worldwide, and is expected to continue growing at a five-year compound annual growth rate of 12 percent, putting the total addressable market at roughly \$112.6B by 2024.

As this trend builds, more and more organizations are realizing that they must provide high-quality analytics to a far broader audience (both internal and external) and in more contexts, such as business applications and workflows, portals to serve their extended eco-systems, and public and customer websites. To achieve this goal, organizations are embracing and accelerating their move to embedded analytics.

Embedded analytics is a specialized use case of a long-established field known as *data analytics*, or *business intelligence*. Organizations require more immediate, contextual insights into data these days, as well as the ability to integrate data from disparate sources, applications, and systems. They also need to be able to provide analytics line of sight to a more diverse internal and external constituency to accelerate and align decision-making and action. To accomplish all that, they need to embed the right data analytics platform within their applications, intranets, workflows, and larger systems.

Done right, embedded analytics makes for better-informed employees, better-aligned partners and vendors, and an overall more nimble and data-driven team and organization. It also allows original equipment manufacturers (OEMs) such as software companies and information providers to reach new markets, deliver new revenue streams, grow customer loyalty, improve competitive advantage, and drive better adoption and engagement of their products.

About This Book

This book outlines the factors that your organization should consider before rolling out embedded analytics. In four short chapters, I discuss why many organizations are turning to embedded analytics and explain how to deploy embedded analytics in your own organization or as an OEM partner, covering the technical factors, business considerations, and design principles that lead to successful deployments and differentiated products or services. To close the book, I present ten important takeaways on embedded analytics.

Icons Used in This Book

This book uses icons in the margin to draw your attention to certain kinds of information. Here's a guide to the icons:



TIP

I use the Tip icon to highlight anything that'll save you time or money or just make your life a little easier.



REMEMBER

When I tell you something so important that you should commit it to memory, I mark it with the Remember icon.



WARNING

When I want you to avoid making a potentially costly mistake, I mark that material with the Warning icon.



TECHNICAL
STUFF

Sometimes I get into the weeds, providing some information that's a bit more technical in nature. When I do, I mark it with the Technical Stuff icon.

Beyond the Book

For more information on embedded analytics, go to <https://www.qlik.com/us/bi/embedded-analytics> and <https://www.qlik.com/oem>.

IN THIS CHAPTER

- » Viewing the structure of embedded analytics
- » Understanding how embedded analytics works
- » Seeing who employs embedded analytics
- » Discovering ways to use embedded analytics

Chapter 1

Understanding Embedded Analytics

Analytics methods and technologies have been around for a long time, so they've matured to the point that they're powerful, easy to use, cost-effective, and available in many varieties for many audiences, from line of business consumer to business analyst to executive suite. In fact, analytics have become so pervasive that users of all types need access to the high-quality solutions that were traditionally limited to senior management. Today, you have vast opportunities to provide analytics, no matter what kind of business you're in.

This chapter provides a broad overview of embedded analytics, including its benefits and applications.

The Anatomy of Embedded Analytics

Embedded analytics is the integration of analytical content and functionality into broad categories of user interfaces and underlying applications to provide customized insights on data for different audiences that helps deliver improved operational performance and velocity to the business.

This definition includes three key elements:

- » **Analytical content:** *Analytical content* is quantifiable (can be summarized mathematically in some form) and interpretable (leads to some interpretation that's relevant to a specific task or decision or action).
- » **Analytical functionality:** *Analytical functionality* facilitates the analysis of information in a user interface. Typical examples are data visualization, interactive filtering, and data navigation.
- » **User interfaces:** *User interfaces* can be anything visible from analytics portals to applications to customer, partner, public, and vendor websites. They can also be within automated workflows that are unseen and possibly event-driven.

Embedded analytics empowers users to assess and act on current, relevant information via a powerful interface that makes strategic use of data. The result is improved, immediate decision-making and ability to take the appropriate action.

How Embedded Analytics Works

For more than a decade, executives, managers, and analysts have been using analytics in data-driven decision-making. This trend continues to increase as analytics extends to a far broader range of users, use cases, and applications.

Embedded analytics is built on two simple principles:

- » **Analytics should be contextual.** Instead of being used only to support strategic decision-making, analytics should be available within an organization's familiar business applications and workflows. This enables in-the-moment analysis of a wide range of scenarios and possibly enhanced by alerts. When an employee serves a customer, for example, contextual analytics may indicate the net value of the customer along with the customer's rate of growth or decline.

» **Analytics should be pervasive.** We live in an analytical world, with increasing amounts of comparative information at our disposal. This information enables us to work, shop, and live smarter. Likewise, the user interfaces in business applications, portals, and websites should feature analytic functionality, allowing a wide population of users to understand and use data strategically.

In truly contextual and pervasive analytics, analytic functions and content are embedded in user applications and workflows. Embedding makes analytics available when and where analysis is most useful. It provides users a powerful experience and access to data held in managed systems, disparate business applications, machines and devices.

Who Uses Embedded Analytics?

Although new data-analysis technologies are always emerging, any type of organization can benefit from using embedded analytics today, including:



- » **Independent software vendors:** Any enterprise that makes and sells software can provide embedded analytics to augment its existing software.
- » **Information providers:** Information providers are in the business of collecting and disseminating information. Examples include market research, competitive intelligence, and data syndication companies. These companies can provide their analytical content via embedded analytics.
- » **Original equipment manufacturers (OEMs/IoTs):** High-technology and manufacturing enterprises can enhance their devices, tools, and equipment by adding embedded analytical capabilities.
- » **Public and government organizations:** A government agency, administrative authority, or public entity that shares information with its constituents (such as the City of Los Angeles, Team Rubicon, and the United Nations) can provide publicly available quantitative information via embedded analytics.

» **Other enterprises:** Embedded Analytics can be useful to an enterprise within any industry that needs faster, more concise intra-daily decision-making. Common uses include embedding analytics within web pages for employees, publishing analytic insights and reports to an extended ecosystem through portals, and sharing immediate analytic insights at specific decision endpoints within a business application.



REMEMBER

Commercially speaking, any organization that wants to enhance its offerings and appeal may do so by embedding analytic visualizations or dashboards in its applications. Likewise, any enterprise wanting to take advantage of data-driven business models and break down any barriers to analytics usage and engagement should consider pursuing embedded analytics systematically across its entire organization, ecosystem and applications.

How Organizations Use Embedded Analytics

Organizations are discovering new and powerful ways to use embedded analytics whenever and wherever they have the opportunity to give their users, customers, ecosystem, and constituents analytical information. The following outline a few examples to highlight the range and innovation in using embedded analytics.

Internet of Things (IoT)



A fleet management service organization provides a solution that simplifies financial and administrative tasks by aggregating all data under a single management and control standard. It uses sensors to monitor fleet vehicles to understand their conditions, locations, fuel consumption, engine runtime, and usage patterns. This information is then shared via dashboards that can analyze and score vehicles for driving safety, preventative maintenance, production output, and profitability.

Information provider



A healthcare information provider in the pharmaceutical and biosciences industries builds and develops anonymized patient and health transactional data sets that it combines with a suite of analytic applications. Serving these different markets and using both natural language processing and embedded analytics, the systems give customers instant access to key performance metrics, data visualizations, and predictive analytics situation analyses to speed decision making. For pharmaceuticals, time to market is paramount. Real-time market data allows users to make adjustments on the fly and respond quickly to signals from the market, potentially saving millions of dollars.

Portal



A national restaurant chain enhances its performance with end-to-end supply chain visibility from suppliers to restaurant sites. They do this by developing an innovative portal providing analytics across the entire product journey and evaluating its key food products in terms of ethics, sustainability, quality, and cost. The shared supply chain analytics is one key to the brand's success. Critical and complex data is collected from multiple internal and external sources and then shared within functional dashboards such as procurement, food safety, and quality assurance.

Empowering the enterprise



More organizations are upending traditional business intelligence (BI) by making analytics accessible for everyone everywhere. One organization operates under the mantra of “bringing data to where the decisions are made.” Analytics are so completely seamless that users have no idea they’re even using analytics as they work in their business apps in sales, marketing, finance, supply chain, and even environmental affairs. The enterprise succeeded in “meeting the user where they are” and increased analytics usage 50 fold.

IN THIS CHAPTER

- » Choosing your path to deployment
- » Weighing technical and business considerations
- » Selecting an analytics platform
- » Focusing on stakeholder requirements

Chapter 2

Getting Started with Embedded Analytics

All organizations should consider analytics a strategic investment. Not all organizations use the same strategy, however. Some organizations build their analytics platforms from the ground up to complement their core business solutions; others invest in best-in-class platforms that typically deliver better functionality with more predictable cash flow. This buy-versus-build decision also applies to embedded analytics.

In this chapter, I discuss the first important decisions that you need to make before launching an embedded analytics solution. Throughout the chapter, I also provide guidance on how to decide between custom and best-in-class platforms so that you can choose the right embedded analytics solution for your needs.

Making the First Important Decisions

The decision to deploy embedded analytics isn't a small one, because adding new analytic content and functions affects an organization's existing applications, business processes, services,

devices, portals, and websites. Before you embark on the embedded analytics journey, you must make several important decisions:

- »» What's the best way to deliver analytic content to business users and my customers, suppliers, partners?
- »» Should I build the analytic functionality or license it from a third-party platform?
- »» How can I ensure that the organization's IT standards are maintained across all components and access points?
- »» What are the key business and technical stakeholder evaluation criteria for a licensing scenario?
- »» How can I ensure that embedded content is successful and engaging, and that it will help transform the organization or improve upon an existing commercial offering?

You should also consider how an embedded analytics initiative will affect the following:

- »» **Stakeholders:** Although authority (and funding) for an embedded analytics initiative may reside with one business unit or executive, multiple stakeholders have equal importance: other executives, product and project managers, marketing and sales personnel, IT, and developers. We look more closely at stakeholder requirements later in this chapter.
- »» **Existing applications, workflows, and interfaces:** Analytics initiatives are tricky to get just right, as are application and external interfaces. Embedded analytics is a product of both types of interfaces, so it's *doubly* tricky to get just right. It's equally important to understand and identify decision endpoints for surfacing timely analytic insight within workflows.

If you bring subpar embedded analytics into a highly regarded application or site, you may have user-satisfaction or adoption issues to deal with. To avoid such outcomes, seek feedback from all stakeholders, starting in the planning phase of the initiative.
- »» **Users:** Embedded analytics users usually fall into two categories: *external users* (such as customers and partners) and *internal users* (who leverage the embedded analytics for a purpose such as gaining insight into a customer, patient, shipment, or transaction). Any internal user or business user can be an analytics user.



WARNING

Considering Technical and Business Needs

When the stakeholders of an embedded analytics initiative investigate analytics platforms, they want to evaluate what functions can be developed in-house, as well as total costs and resource allocation. Resource allocation is important, because an in-house development effort may tie up resources for years, affecting other projects.

Technical considerations

Analytics platforms combine data handling and user interface (UI) components with features that vary in sophistication. When you evaluate analytics platforms, you have several technical considerations, such as depth and breadth of analytics feature set, including advanced and augmented features, the analytics engine, security and governance, scalability, available and public APIs, extensibility, and data and connectivity.

Business considerations

Business considerations are easy to overlook but also require thorough investigation. You need to consider the following:

» **Total cost of ownership (TCO):** TCO represents the total cost of a project, including direct and indirect costs. When it comes to in-house custom analytics solutions, it's easy to underestimate direct costs and overlook indirect costs, such as third-party software components and internal long-term support costs.

Although a prebuilt analytics platform is never a truly turnkey solution, it's easier to estimate TCO for a prebuilt analytics platform than for a custom-built platform.

Compare how developer resources would be allocated on a prebuilt platform versus an ongoing in-house analytics solution. In the latter case, the developers' time would be allocated to developing and maintaining an ongoing system rather than embedding and integrating analytics into core business applications and workflows on an ongoing basis.



TIP



REMEMBER

- » **Vendor expertise:** Not far behind TCO in importance is the expertise of the original equipment manufacturer (OEM) or vendor. Analytics-software companies generally have decades of experience in the field and could provide the exact functions that users want, implemented in a way that supports current best practices in data visualization, self service, governance, data prep, embedding options, advanced analytics, alerting, and other important areas of analytics.
- » **Vendor support:** Another factor in the buy-versus-build decision is vendor support. A vendor can help resolve data anomalies, performance and scalability issues, integration requirements, multitenancy deployment situations, and many other problems that can surface in an analytics solution.

Choosing an Embedded Analytics Platform

How can you compare a hypothetical custom-built system with an existing analytics platform on technical merits? You must consider analytics capabilities, embedding options, development environment, breadth of APIs, scalability, and overall openness of the architecture. This comparison isn't an easy one to make, but the following sections give you a good place to start.

Technical factors

Here are some technical factors to consider:

- » **Administration:** Developing and setting up administration functionality for a custom build shouldn't be particularly difficult. But some administrative features, such as centralized metadata, can be difficult to custom-develop because they require an additional repository and interfaces for creating and managing objects. Custom-building administration capabilities becomes especially tricky when multitenancy is required.

» **Data handling:** Developing a user-friendly interface that integrates data from various sources and provides a standardized way for users to analyze data is a significant undertaking in a custom-build project. This type of interface must incorporate several varieties of query-language syntax for various data platforms.

By comparison, query performance and data storage optimization features are typically built into vendor platforms. Prebuilt analytics platforms should offer robust data handling features out of the box.

» **User interface:** It's helpful to have a robust back end for an analytics platform, but all will be for naught if the information isn't presented in a compelling UI that looks professional in different browsers and at different screen sizes. Though open-source data visualization libraries are available for building data visualizations, controls, and the other UI components that are necessary for a powerful analytics experience, user expectations are very high; because analytics are everywhere, people have been exposed to many high-quality data visualizations and websites. Developing a UI that meets users' expectations (not to mention executives' and stakeholders' expectations) is a significant undertaking in a custom-developed project.

» **Use of modern technologies:** HTML5, CSS3, JavaScript, WebSockets, and in-memory data storage are examples of the latest technologies that should be the basis of a strong analytics platform. These web technologies make it possible to consistently render rich content while ensuring compatibility with different user devices.



TECHNICAL
STUFF

Features and architecture

Feature breadth and depth are key technical considerations in a thorough buy-versus-build analysis. These are the features that are typically necessary for embedded analytics:

» **Centralized administration:** By definition, embedded analytics are dispersed, but you should centralize administrative functionality, such as assigning security, assigning licenses, and scheduling data loads.



TECHNICAL
STUFF



TIP

»» **Data integration capabilities:** The analytics platform should easily integrate data from many source types.

In addition, the platform should enable you to create analytics models that may act as supersets of imported data, possibly incorporating new elements based on optional logic and formulas, thus facilitating analysis and ease of use.

»» **Comprehensive and public APIs:** An open and fully extensible analytics platform should also support a robust set of modern, well-documented, and supported APIs. These features enable you to expand, customize, and fully integrate the platform in the future within internal systems, existing stacks, or applications without modifying base code. Examples of API development in an analytics platform are building new types of data visualizations, adding user interactivity, and incorporating new data types (such as data retrieved from web services). They also improve the overall ability to interact with the platform using web applications and various backend solutions.

You should be able to build these types of customizations by using Google Maps, D3, or other web services and libraries. For nonweb customizations, you can easily use a fully functional development platform such as .NET.

»» **Libraries and tools:** With embedded analytics, the ability to customize the client-side with additional libraries and tools remains a key requirement. Developers want to understand the various libraries offered as well as vendor support.

»» **Multitenancy support:** Deploying embedded analytics through commercial applications to a customer audience requires *multitenancy*, which allows a single platform installation to handle many clients. An embedded analytics platform should be a single platform that supports multiple customers with seamless single sign-on without any compromise of data security per customer. In other words, it should use a single data model for multiple clients without the risk of commingling customers or cross-accessing data. This significant feature enables you to configure a single store of data in an optimized fashion, along with a single set of processes to manage and access that data, typically in a templated application for each client user.



To each user, the analytics application looks and feels like a personal database, though data is stored for many users. You can configure the application to show only the pages, objects, and data that each user has permission to view. (One user may see only certain segments of a pie chart, for example, while another user may see all segments.) In addition, when viewing summarized data, totals may be different for different users, based on their access rights.

User-specific data as a security feature shouldn't impact the performance of the analytics platform.

- » **Cloud support:** In general, the analytics platform should be easy to deploy in the cloud and/or as an on-premise solution. The vendor could manage the infrastructure, or the client could manage their own data on-premises, in the cloud, or as a hybrid combination thereof.
- » **Security:** Enterprise security for the platform should leverage both internal and external resources to manage access, authentication, authorization, and data governance on four levels: network, server, process, and application. For an OEM, attribute-based access control provides a comprehensive framework to govern user capabilities within the platform and using section access.
- » **Web, mobile, and tablet support:** Given the proliferation of mobile devices in recent years, most organizations want to deliver embedded analytics that work not only in web browsers, but also on mobile devices — and without rework. An analytics platform that incorporates responsive design automatically repositions and resizes dashboard objects in a visually appealing way on smaller screens. The analytics solution should be a fully optimized experience independent of the device being used. Capabilities including visualization, analysis, creation, collaboration, and administration should be available anywhere.
- » **Centrally managed business logic:** The analytics platform should have a central business-logic library that keeps business logic consistent in all applications and UIs.
- » **Customization:** An embedded analytics platform must be easy to customize for a variety of user requirements. Examples might include using the documented APIs to build custom visualizations, analytical interfaces, or perhaps administration UIs. Or they might simply use the mashup



TIP

approach to embed existing or new visualizations. Another example might include custom color palettes that match the organization's standards or styles and custom skins that make the analytics interface consistent with the rest of the application or site.

You don't have to develop all customizations from scratch. You can achieve customization by using open-source projects that have been developed by an active developer community that shares a common interest in the analytics platform and has collectively developed customizations that can be downloaded from user community websites.

» **Scalability:** The scalability domain spans multiple categories, including applications and data, users, and delivery. Each should be understood and evaluated separately. Benchmarks are helpful, but it's also critical to consider scaling to the number of concurrent users, the impact of data volumes and load balancing, and measuring performance with dynamic calculations. Not all prebuilt analytics platforms can accommodate hundreds or thousands of users as easily as they accommodate dozens of users. You may need to make additional effort to scale such a platform.



TECHNICAL
STUFF

In most cases, the ability to scale to thousands or tens of thousands of users requires an underlying architecture built on support for geographically dispersed, multinode deployments.

Stakeholder requirements

In weighing the purchase of an embedded analytics platform, different stakeholders have different requirements.

Enterprises

When enterprises embed analytics in their internal and external portals, applications or stacks, various stakeholders have specific needs that should be addressed. These stakeholders include the following:

» **Enterprise Analytics leaders:** Analytics leaders typically bridge the gap between business and IT. They must ensure that the BI/Analytics infrastructure drives business growth and efficiencies and that it must also function within a complex data management environment that integrates

with existing systems and adheres to corporate standards. They recognize that integrating digital and analytics elements into existing products and services creates opportunities for new revenue streams allowing for entirely new products and services for the organization. They also understand the need to advise the business on how to integrate analytics insights into workflows and decision making and pinpoint opportunities to embed even more sophisticated analytics.

- » **App developers:** Developers look at ease of integration, embedding options, maintenance, data handling and transformation capabilities, data presentation, and UI interactivity. In addition, developers require well documented APIs that extend out-of-the-box functionality by incorporating libraries and leveraging modern web technologies and supported frameworks. Developers also want to be able to readily scale, reuse code, tap into an online community for support, and access tutorials and videos.
- » **Product managers:** Product managers working within a dedicated IT or Line of Business team look for analytics solutions that provide data access with an app interface that's easy to learn, easy to use, and highly adopted. Core use cases involving embedded analytics and an integration with a heavily utilized application are often initial candidates — particularly sales and marketing applications. The seamless integration of analytics within the application is critical, with analytic visualizations tightly coupled with the application workflow. This enables the right degree of discovery and interactivity at the right location for the decision or action.

OEM stakeholders

OEM stakeholders can include partners, product owners, developers, and partner's end customers.

OEM partners tend to focus on the ability to create highly branded and customized products such as business applications which embed analytic capabilities. The analytics UI components and functionality should be tightly integrated into the existing theme and layout of the application, fitting seamlessly with other objects. OEM partners also focus on return on investment, time to market, maintenance costs, and reusability of components in later customizations.

Product owners want to ensure that visualizations and other UI widgets from the embedded analytics platform fit seamlessly into a fully branded application. They also want to ensure that the embedded analytics platform integrates seamlessly with customer-developed or third-party UI components and services, thereby maximizing earlier investments. Product owners look for best-in-class analytics with a strong roadmap aligned to their own integrated product vision. Breadth and depth of key capabilities would be included to support their end customer requirements such as dashboards, ease of use, self-service, conversational analytics, and geo-analytics. They also want the ability to configure the platform to create a rich and highly interactive user experience.

An OEM partner's customers are the end users and the product owner focuses on meeting their analytical needs. The foremost requirement for them is an intuitive, user-friendly interface embedded directly within the application. Typically the end user is looking for the dashboard or visualization to appear seamlessly within the application with filtering and interactivity.

Here are some of the analytical features that customer end users commonly request:

- » **High-quality, effective data visualizations:** Not all data visualizations tell the data's story equally well. To ensure that your embedded analytics platform tells the data's story in the most effective way, choose a platform that provides a wide variety of chart types for different types of analysis, along with extensive ways to customize those charts. Colors and sizes of data points should be customizable, allowing for extra dimensions of analysis where appropriate. Geographical plotting and the ability to add reference lines are other important features.
- » **Self-service capabilities:** Users are accustomed to being able to perform their own analysis, even if they start from a static view. If a user is given a monthly snapshot of metrics, for example, she's likely to want to break high-level data points into more fundamental units, which is the very definition of analysis. Sophisticated users want to be able to create their own data visualizations and possibly their own dashboards.
- » **Support for different devices:** Users are likely to consume analytics on tablets or smartphones, so analytic content must be responsive and easy to read on screens of different

sizes. Just as important is the speed of the analytics UI, which usually means a few seconds or less of response time per interaction.

- » **Interactive UI:** Users expect UI interactivity with embedded analytics. Quite often, data visualizations generate follow-up questions, and most users prefer to ask those questions in an intuitive manner. Users also expect to navigate visualizations easily so that they can find their way back to earlier steps or a home state.

Developers

Developers and architects engaged in commercial application integration efforts look for many of the same attributes as enterprise stakeholders do. Their top priorities include ease of integration, embedding options, maintenance, speed of prototype development, and UI interactivity.

For developers, APIs are critical. They want well-documented APIs that extend out-of-the-box functionality by incorporating libraries and leveraging modern web technologies and supported frameworks. Performance at scale is key, as is the ability to get assistance through tutorials and other enablement resources in an online community.

Planning the Deployment

Embedded analytics should be introduced in tightly controlled increments. If you have some familiarity with business intelligence, big data, and analytics, you're already familiar with this principle. Most companies that use embedded analytics have learned that mistakes will occur in analytical output and that those mistakes can be costly in terms of poor decisions based on bad assumptions, leading to loss of confidence in the data.



WARNING

Users of embedded analytics platforms are likely to have low tolerance for unplanned system outages, poor response times, and incorrect output. It's important to mitigate this risk with a strong analytics platform with well-known reliability and performance at scale standards.

IN THIS CHAPTER

- » Identifying the best embedded analytics approach and design for your organization
- » Growing and supporting your embedded analytics initiatives

Chapter 3

Charting Embedded Analytics Success

An analytics platform alone can't guarantee success. You need the right funding, time, development resources, approach, and identified business objectives to maximize your investment.

This chapter lays the groundwork for the type of planning you need to do. It also describes the guiding principles that lead to successful outcomes and that are necessary to build engagement and adoption.

Designing Your Embedded Analytics System

Frontline employees, customers, and suppliers are empowered to make data-driven decisions when the embedded analytics project team members are able to observe relevant design principles, prioritize business categories, and focus on adoption and engagement.

For embedded analytics, be sure to take the following design principles into account.



REMEMBER

Centralizing administrative functions

Centralizing administrative functionality is one of the most important design principles. It isn't just a "nice to have" feature; it's a must. The reasons have to do with security and maintainability:

- » **Security** is achieved by enforcing the principles of least privilege (allowing users only the necessary permissions to accomplish the desired tasks) and surface reduction (running only the components and services that are necessary for the task at hand).
- » **Maintainability** is achieved by reducing the effort required to update, enhance, and expand functionality or to find and resolve production issues. These goals can't be met without centralized administration.

Standardizing code

Code standardization, like centralized administration, facilitates maintenance of the overall system. Standardized code also makes the system more efficient.



TECHNICAL
STUFF

With embedded analytics, efficiency involves balancing the following:

- » System resources required during processing time (when the data is prepared for analysis)
- » Query time (when the users are interacting with the embedded analytics UI components)



REMEMBER

Like any system, an embedded analytics system is ultimately defined by code. If you don't have a way to standardize the code, you don't have an easy way to ensure that the code is efficient because by definition, it's nonstandard and nongoverned. The embedded analytics platform needs a library or some other means of standardizing code.

Centralizing data

Data stores should also be centralized so that redundancies are reduced or removed. This means that the data in the analytics platform is stored in one place, even if there are different parties that own different parts of the data.



REMEMBER

The ability to serve multiple groups (or tenants) with a single, centralized data store, as well as centralized code and administrative capabilities, is called *multitenancy*.

The reason for centralizing data stores has to do with reducing administration and maintenance while maximizing performance and making efficient use of hardware. Ideally, you should have a single database. Performance and hardware efficiency are maximized with a single database because optimizations (such as indexes) can be done only once.

Although storing data in fewer containers (databases, files, and so on) is ideal, it's a necessity to ensure that data access is controlled granularly down to the row level, ensuring that data belonging to different parties isn't commingled or accessible to users without the necessary permissions.

Focusing on Support

If you invest in an analytics platform from a vendor with a reputation for providing good support and training, that partner can meet many of your education, deployment, and service needs. For this reason, support is one of the key factors that you should evaluate when investigating analytics platform vendors.



WARNING

The uptime target for embedded analytics systems should be extremely high. Companies opting to build their own custom analytics solutions from scratch must ensure that they account for the time and resources that it will require to support a high-availability platform. When licensing an embedded analytics platform, the vendor typically provides support, freeing up developers' time to focus on other projects.



TIP

As a general rule, the components of an embedded analytics system should inherit the same level of service as the application or site in which they're embedded.

Aligning priorities with the business

Remember, implementing embedded analytics isn't your organization's goal. The goal is to enable technology that supports specific identified business objectives. Embedded analytics is just a tool for making that happen.

Make sure everyone involved understands the priorities of the impacted business initiatives. Prioritization by category is a more effective approach in delivering and quantifying value from embedded analytics than viewing from a single use case perspective. The highest priority should be given to rolling out embedded analytics resources and solutions to key business domains or categories. These may include procurement, the customer experience, the buyer's journey, and the supply chain. These categories cross service lines and applications, and include key workflows that share data sources and business users.

Adoption

Regardless of whether the embedded analytics project is an internal application or portal project or an OEM partner's commercial application solution, engagement, growth of user base, and retention all signal success of the project. A key to this success is making partnering and collaboration early and often with the end-user or customer community a priority. Focusing on a single category of domain for the initial embedded project, such as sales or supply chain, can increase your chance of achieving broad adoption and usage.

- » Giving users the best value and experience
- » Making your solution flexible
- » Achieving pervasive analytics

Chapter 4

Ten Key Takeaways on Embedded Analytics

In this book, I give you a high-level tour of embedded analytics, from planning to choosing a platform to execution. I leave you with ten key takeaways:

- » **Seek to provide actionable insights.** With analytics in general, and especially with data visualization, you can easily get caught in the trap of showing what you want to show rather than what the user needs to see. This trap comes into play in several ways, such as not displaying enough supporting information and cherry-picking the data to show information that may lead to the conclusion you want to emphasize. It may be useful to highlight certain analytical information within an application to improve data-driven decision-making, but the primary goal of your embedded analytics solution should be to let users easily find and act on insights that deliver and accelerate business value.
- » **Tell a visual, interactive story.** The power of the human brain to recognize patterns is remarkable, giving artificial-intelligence algorithms a run for their money. Showing numbers in tabular layouts doesn't harness the brain's pattern-recognition abilities. On the other hand, if done

visually and interactively, an embedded analytics solution increases the user's focus and understanding of the subject or application in which the analytics are embedded, creating new opportunities to engage with that user.

- » **Choose a scalable platform purpose-built for data ingestion and integration.** Your analytics platform should be able to connect to and load data from diverse sources, supporting all database formats as well as big data systems and cloud applications. The platform should also be able to easily transform and model data as it's retrieved from source systems and loaded into the analytics platform, making it possible to work with many different data sources flexibly, quickly, and at scale. Analytics platform integration using a broad range of supported APIs is critical for your embedding and automation initiatives. Evaluate platform architecture, API focus, and extensibility for customization.
- » **Seek choice in deployment options.** Understand your deployment needs and the available paths for your organization as it progresses through the analytics lifecycle. Ensure there are multi-cloud and on-premises options. When deploying to the cloud, your analytics platform should have a high-performance cloud native architecture that will easily expand to support many users, some possibly with multitenancy requirements.
- » **Customize your solution to perfect the user experience.** When you deploy an embedded analytics solution, create an ideal user experience by customizing not only the functions, but also the look and feel, and workflow integration (for example, where an action in the analytic content initiates an action in the overall application such as in the case of marking a step completed). Embedded analytics should be viewed as an enabling function that provides navigation from analytic to application content and vice versa, to seamlessly support a user's insight to action goals.
- » **Centralize and standardize.** Your embedded analytics platform should allow for centralization and standardization of code, source data, and administrative capabilities (see Chapter 3). Embedded analytics should integrate into your source control systems for version control and collaborative development.

- » **Fast-track your developers.** Your developers want an analytical platform that comes with the tools, libraries, and tutorials they need to get the job done quickly and correctly. Whether developers are starting new projects or adding to existing ones, your analytics platform should provide a robust set of tools including snippets and kits that enables them to incorporate new data quickly, as well as to develop and deploy new, high-quality analytical content that integrates easily with the existing technology infrastructure, and that can be easily scaled and expanded as needed in the future.
- » **Make analytics useful.** Unless embedded analytics provide context for the user and the decision at hand, the user might ignore them. A great deal of care must go into planning where to embed analytics within the application workflow and what the appropriate analytic content should be (such as object or full dashboard). In addition, make embedded analytics pervasive and contextual, ensuring that they're always useful, available, and actionable at the right time and place.
- » **Employ the power of partnership.** Investing in an optimal prebuilt platform for embedded analytics is half the battle. The other half is ensuring that your platform vendor is a true partner, offering flexible licensing options, expert training, and excellent customer service.



TIP

Contact research firms such as BARC (<http://barc-research.com>) and Gartner.com to do your homework on vendors' reputations and ratings.

Another partner resource is an extensive, active developer community that can contribute to everyone's knowledge base. Developer communities provide solutions to technical questions that may be outside of the scope of help documentation, as well as code samples and open-source projects that can further customize your analytics platform.

- » **Make analytics valuable to users.** Embedded analytics should be valuable to any user. Though an enterprise may realize benefits from offering analytics in certain contexts, the most important consideration is providing analytics that are of high value to users and that can be tailored to deliver value for every important decision or action.



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Embedded analytics makes it easier for organizations to empower employees, customers, suppliers, and partners with the information they need right where they work to answer questions, make better decisions, and take action faster. From understanding the need for and organizational benefits of embedded analytics, to selecting the right technology platform, this book provides guidance that should be at the forefront of any embedded analytics initiative.

Inside...

- See why embedded analytics is essential
- Understand embedded analytics use cases
- Consider factors for buy or build decision
- Explore criteria for an embedded analytics platform
- Successfully deliver embedded analytics across the business ecosystem

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