Eckerson Group

Twelve Costs of Embedding Reports and Analytics into Business Applications

The Economics of Build versus Buy

Wayne W. Eckerson

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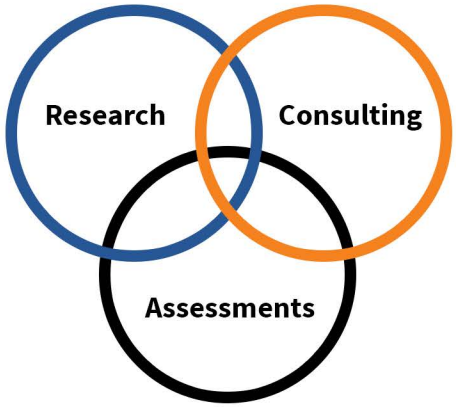
About the Author

Wayne W. Eckerson has been a thought leader in the business intelligence and analytics field since the early 1990s. He is a sought-after consultant, noted speaker, and expert educator who thinks critically, writes clearly, and presents persuasively about complex topics. Eckerson has conducted many groundbreaking research studies, chaired numerous conferences, and written two widely read books on performance dashboards and analytics. Eckerson is the founder and principal consultant of Eckerson Group, a research and consulting firm that helps business and analytics leaders use data and technology to drive better insights and actions.

About Eckerson Group

Eckerson Group is a research and consulting firm that helps business and analytics leaders use data and technology to drive better insights and actions. Through its reports and consulting services, the firm helps companies maximize their investment in data and analytics. Its researchers and consultants each have more than 20 years of experience in the field and are uniquely qualified to help business and technical leaders succeed with business intelligence, analytics, data management, data governance, performance management, and data science.



Executive Summary

In today's data-driven economy, organizations often compete on the data and insights they provide customers. To succeed as data suppliers, these organizations—including software makers and commercial enterprises in any industry—embed business intelligence (BI) and analytics functionality in their applications, providing customers with tools to view, interact, modify, model, and visualize data to suit business requirements.

Most data suppliers start their BI journey by building reports and dashboards using in-house developers and engineers, but many quickly get overwhelmed with requests for new reports and self-service features such as authoring, visualization, and data blending. These data suppliers may then opt to replace custom code with a commercial BI tool, which they embed or integrate with on-premises or cloud applications.

This report investigates the costs of both building and buying BI and analytics functionality to embed in software applications. Each option—build and buy—has overt and hidden costs that enterprises who want to monetize data with reporting and analysis tools should understand.

Why Embed BI and Analytics?

Today's leading organizations compete on velocity and data. To steer companies through a competitive landscape, executives, managers and workers need operational, historical, and contextual data to understand business drivers, evaluate options, and make decisions fast.

Software makers have led the charge to arm business people with critical insights. Most augment packaged applications with reports and dashboards that display performance or activity data, giving users contextual information with which to make decisions. Some even aggregate and mine customer data to enrich applications with benchmark information and automated recommendations, among other things.

But companies in other industries—particularly financial services, retail, telecommunication, and healthcare—are now following suit. Many recognize the importance of adding reports, dashboards, and analytics to existing products and services to improve customer satisfaction and remain competitive in a data-rich market. Some go a step further and sell reporting services as stand-alone products, turning data and insights into new revenue streams.

Monetizing Data. To monetize data assets, organizations provide customers with business intelligence (BI) and analytics tools to view, interact with, modify, model, and visualize information. More specifically, BI delivers static and interactive reports and dashboards that enable customers to track business activity and measure performance. Analytics takes BI one step further—it enables data-savvy analysts to query, explore, and visualize data as well as create data models that expose patterns and relationships buried inside data sets. By giving customers powerful tools to understand trends, evaluate options, and make better decisions, data suppliers enrich their products, gain loyal customers, and generate new revenue streams.

Build or Buy BI and Analytics? New data suppliers sometimes use in-house developers to create reports and dashboards that they embed into customer-facing applications. The developers often supplement open source reporting tools and charting libraries with custom code. This works—up to a point. Eventually, many data suppliers forgo custom development in favor of a commercial BI or analytics tool. This relieves the development burden and provides state-of-the-art BI and analytics capabilities, but requires integrating a third-party tool with the application.

This report analyzes the costs and challenges of both building and buying embedded BI and analytics solutions and weighs the pros and cons of each. It also points out pitfalls that trip up product managers as they devise and implement embedded BI and analytics strategies. Specifically, it outlines 12 costs to evaluate—six when building BI and analytics capabilities, and six when buying them from a third-party vendor.

Six Costs of Building an Embedded Solution

Most organizations initially build reporting and analysis capabilities rather than buy them. They think, "Since all we need is a few standard reports and dashboards, let's assign one or two developers to work on these features for a month or two." They also reason that their in-house developers will create a more seamless, integrated BI experience for customers—one that looks and feels like their own application.

[Customers] get more demanding … and before long, all hell breaks loose.

That's how it starts. And all goes well during the beta and launch phases as customers experiment with the BI features. Early customers may request a few tweaks to existing reports and dashboards, plus a new standard report or two that developers overlooked. But as the customer base grows and customers get more familiar with the application and its BI capabilities, they become more demanding. And before long, all hell breaks loose.

1 Development Costs

As customers begin requesting more reports and dashboards, developers get overwhelmed. What was once a part-time job for one developer mushrooms into a full-time job for more developers. Dashboards and reports become table stakes as customers start asking for self-service data blending and analytics capabilities, putting application managers in a squeeze. Should they add developers, which will cut into profits? Or delay delivery schedules, which will alienate customers?

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Inevitably, the scale and scope of BI development get the best of most organizations that pursue a build-only strategy. The problem is compounded when a company has multiple applications, each with custom-built reporting capabilities developed independently by different engineers using different development languages and frameworks. Coordinating BI development across multiple applications and environments consumes an inordinate and unexpected amount of development time and costs.

2 Complexity Costs

Most organizations underestimate the complexity of BI, thinking that it's just a couple of reports and a dashboard or two. BI technology has evolved significantly during the past several decades, and hundreds of vendors have applied new technologies with deep knowledge of data to produce innovative new products. As a result, customers have high expectations for analytics.

Modern BI tools now come standard with features ranging from reporting, analysis, and dashboards to self-service reporting, data discovery, and data preparation to collaboration, alerts, search, mapping, storyboarding, and pixel-perfect reporting. (See ***"Ten Characteristics of a Modern BI Tool."***) A company whose core competency is not BI will spend a tremendous amount of time and money meeting the needs of customers whose prior experiences are shaped by modern BI and analytics tools. Moreover, as the BI market continues to innovate, software developers must keep pace.

3 Maintenance Costs

Another cost is the time (and hence money) required to maintain custom-developed BI and analytics code. Without clear delineation between BI and non-BI code, developers may run into problems as the code base expands. Any change or addition to the code can have a ripple effect, increasing the time it takes developers to develop and test changes. Eventually, developers may have to refactor the application code.

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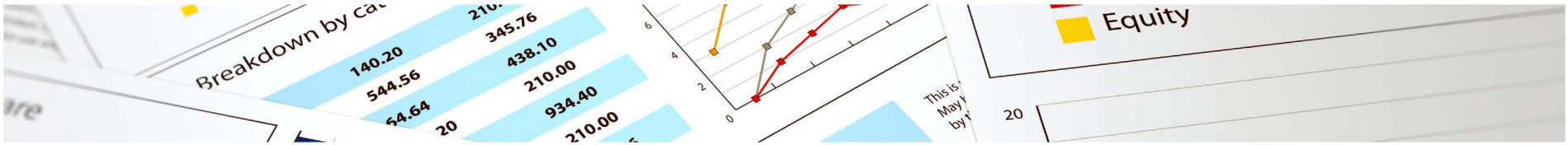
In addition, new customers often create forks in the code, compounding the problem. Many customers have unique reporting requirements that cannot be satisfied by adding standard reports. Some have their own data stores that must be integrated with the data supplier's application. Consequently, developers must create data model extensions and customer-specific reports. Each fork must be separately maintained with its own release cycle and development, testing, and production environments, increasing the burden of developing reports.



4 Support Costs

Meanwhile, the BI developers must field support calls that customer service representatives can't handle, further squeezing their time. Developers pulled off the core project may resent being trapped in a BI cul de sac. They may see better career opportunities at other companies, making them easy targets for recruiters.

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Moreover, organizations will need to hire and train customer support personnel to handle BI support calls and create training videos, technical documentation, and a self-help Web forum. In contrast, with commercial BI software, training, support, and documentation can be largely outsourced to the vendor.

5 Opportunity Costs

In most mature deployments, a company's customers feel the impact of a custom BI strategy. Customer dissatisfaction grows if the data supplier delivers inflexible reporting tools, delays upgrading BI features, and offers less-than-adequate customer support. Although it may be difficult to calculate the cost of inadequate BI and analytics functionality, a custom-build approach will eventually create a drag on profits, market share, and customer loyalty.

In addition, building BI and analytics functionality distracts an organization from its core competency. Instead of focusing resources and energy toward developing products and strategic initiatives, the company must invest and allocate resources to support customer data and analytics needs.

The perfect storm happens when a competitor aces its BI strategy, delivering state-of-the-art functionality.

The perfect storm happens when a competitor aces its BI and analytics strategy, delivering state-of-the-art functionality. To survive, the company needs to either double down on its custom strategy or bite the bullet and embed a commercial BI and analytics tool. In either case, the organization must spend unanticipated time and money fixing its BI strategy to remain competitive.

6 Operations and Infrastructure Costs

Finally, building custom BI and analytics functionality requires companies to invest in administrative tools to manage the data environment. This includes separate test and development environments, backup and recovery utilities, load balancing and failover functionality, user administration tools for defining data access rights and permissions, and a management console for monitoring BI servers, processes, and user activity.

To avoid this extra investment, some organizations try to run both application and BI/analytics processing on a single server. Although this saves hardware costs, it doesn't obviate the need to manage BI data models, reports, customizations, and utilities. Managing a BI and analytics environment is a lot of work no matter how it's physically architected. As the volume and sophistication of requests for BI and analytics functionality rises, most data suppliers recognize the utility of buying and embedding a commercial BI tool.

Six Costs of Buying an Embedded BI Solution

Although many data suppliers eventually recognize that the benefits of embedding a commercial BI or analytics solution outweigh the costs, the path forward is not easy or without risks. There are many decisions to make, and the process can take months and cost plenty of money. (See ***"Ten Things to Consider When Embedding Reports and Analytics into Applications."***)

Not all BI tools are created equal, and not all embed equally well.

First, simply identifying appropriate BI and analytics products to evaluate and then sorting through vendor claims can be daunting. Ultimately, companies need to conduct an exhaustive analysis of vendor capabilities, culminating with a proof of concept that demonstrates critical integration points between the BI tool and their host application. Not all BI tools are created equal, and not all embed equally well.

Companies seeking to embed commercial BI and analytics products should be aware of the following costs.

1 Server Costs

Commercial BI software normally runs as a separate code base on a separate server or cluster of servers. This not only increases platform costs, but requires the data supplier to integrate the two environments. Some level of integration work is also required to implement security and support single sign-on, or passing of parameters via a URL string or application programming interface (API) from the application to the analytics software.

Costs are compounded if the BI software is not inherently multi-tenant.

Single Versus Multi Tenant. These costs are compounded if the BI software is not inherently multi-tenant. This forces companies to create separate BI instances for each tenant, which is not scalable or efficient since they can't achieve economies of scale by spreading the costs across multiple customers. Single-tenant BI software makes sense only if the company decides for security reasons that it must isolate data processing on a separate-server database, or if the company only has a handful of customers.

2 Functionality Costs

Before selecting a BI and analytics tool to embed, companies need to identify requirements. This usually entails interviewing potential BI and analytics users, both inside and outside the company, conducting focus groups, and prioritizing features and functions. Is self-service discovery a priority? Do users need ad hoc reporting or data blending? Do they need to create custom groups, hierarchies, and comparisons? What about collaboration and alerts?

Companies need to define the gap between the features customers want and the functionality offered by each prospective BI and analytics vendor. They need to assess the time and costs required to customize the tool to meet top requirements, and determine whether the benefits outweigh the costs.

For instance, customers may want to compare performance by various time periods (e.g., this month versus last month), but perhaps the BI tool doesn't automate the creation of time-based snapshots. If the company can't convince the vendor to add this functionality in the short term, it will need to develop custom code to support the feature on its own.

3 Customization Costs

If the company decides to customize the BI or analytics tool, then it will need to assess whether it has available developers with the right skills to do the work. If it's lucky, it can convince the vendor to develop the custom code or partner with them and share the costs. If the vendor converts the capability into a commercially available feature, perhaps the company can earn royalties. This is not an option, however, if the customizations involve passing parameters between the commercial tool and host application.

Ideally, the tool offers a rich set of configuration options that support common requirements, such as mimicking the host application's fonts, color schemes, and general look and feel. But with more complex integration requirements, developers need to rely on the tool's application programming interface (API) to expose or augment BI and analytics functionality within the host application. Without a rich, well-documented API, it is difficult to deliver required functionality quickly.

4 Extensibility Costs

One way to reduce customization costs is to select a BI and analytics tool with rich self-service features. Many customization requests give users greater flexibility to create their own reports and dashboards, develop custom groups, metrics, dimensions, hierarchies, and comparisons, and mash together data sets. A tool that gives users the flexibility to extend the boundaries of predefined reports, dashboards, and data models within a prescribed governance model (e.g., permissions for data access and sharing) goes a long way toward minimizing customization projects.

One way to reduce customization costs is to select a BI tool with rich self-service features.

In the same way, flexible multi-tenant environments minimize custom development efforts. With some multi-tenant BI software, tenants can extend global data models and reports to support local requirements without creating new logical or physical instances of the BI environment, which is complex and costly. Multi-tenant BI software balances central governance and administration with local views and flexible modeling, blending economies of scale with self-service authoring.

5 Licensing Costs

Commercial BI and analytics tools carry a price tag. Companies have to purchase a license for the software or pay a royalty on every sale, or some combination of the two. Every BI vendor licenses its software differently, and some are more flexible than others. Thus, it's important for companies with customer-facing analytics needs to find a BI and analytics vendor that is willing to partner with them to develop appropriate licensing strategies as well as custom features and functions (when required).

It's also critical that a vendor's licensing terms enable a data supplier to create its own tiered pricing using BI functionality. For instance, the company may want to include basic reports and dashboards in its standard pricing, but charge an additional fee for discovery, data blending, and report authoring. This requires the vendor to have granular security controls that enable organizations to allocate BI and analytics functions to different pricing tiers.

6 Operational and Administrative Costs

Maintaining a separate BI and analytics environment costs time and money. The more a commercial tool automates administrative functions, the less expensive it will be to embed it into an application. Here, cloud-based vendors offer a striking advantage, since most manage infrastructure and operations for their customers as a shared service.

There is a laundry list of operational and administrative costs of running a BI and analytics environment. The list includes installing, managing, and optimizing BI infrastructure, tuning databases and queries to meet service-level agreements, handling backup, recovery, and failover processes, fixing bugs and applying patches, provisioning users, setting security parameters, loading data, and establishing disaster recovery processes, to name a few.

A huge operational cost that most companies fail to anticipate is the time required to upgrade software releases.

A huge operational cost that most companies fail to anticipate is the time required to upgrade software releases. Many companies create a duplicate BI and analytics environment from scratch to test an upgrade before releasing it, doubling the BI footprint. Some BI vendors alleviate this pain by enabling customers to copy their existing environment, apply a new release, test it, and swap it back into production without creating a duplicate physical environment or interrupting production.

Upgrades are particularly painful if a company has significantly customized application code to meet business requirements. Some BI vendors offer migration and test utilities to help customers upgrade custom code, but the process can still be laborious. It behooves companies to look for a BI and analytics vendor that is committed to the long-term success of its customers.

Conclusion

To build or buy embedded BI and analytics functionality—that is the question! As we've discussed, many data suppliers start by building reports and dashboards because it's simple and inexpensive and provides a seamless user experience. However, customers quickly become more demanding, requesting many different types of reports and dashboards and new types of BI and analytics functionality, particularly self-service capabilities. Before long, BI and analytics development becomes a major endeavor and a financial drain on would-be data suppliers.

On the flip side, embedding commercial BI and analytics software is not without costs as well. Instead of one integrated application, organizations must support two separate applications and integrate them using API calls. This cost is minimized with cloud-based BI environments where BI vendors manage the infrastructure and handle operational and administrative tasks. But in some cases, the data supplier may find it necessary to customize the BI tool, which can create additional development work and make it challenging to update to a new release.

Ultimately, most companies that are serious about meeting their customer's data needs decide to embed a commercial BI or analytics tools. That's largely because the tools are becoming more advanced, open, and cloud-based. When a BI or analytics tool offers the complete spectrum of capabilities along with rich APIs and runs in the cloud with true multi-tenant capabilities, the benefits of embedding a commercial BI and analytics product will almost always outweigh the costs.

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