

# Business-Driven BI

## Using New Technologies to Foster Self-Service Access to Insights

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# Executive Summary

**SELF-SERVICE** business intelligence (BI) has been the holy grail for BI professionals for a long time. Yet almost two-thirds of BI professionals (64%) rate the success of their self-service initiatives “average” or lower. Newcomers to BI struggle even more, with more than half (52%) rating their attempts at self-service BI “fair” or “poor.”

One reason for these less-than-stellar numbers is this: Implementing self-service BI is more complex than it looks. It’s not a one-size-fits-all program. BI users come in many different shapes and sizes, each with unique information requirements. This report lays out several frameworks that explain how users interact with information and then maps elements of each to BI functionality and categories of BI tools. This mapping is critical to success with self-service BI.

At the highest level, there are two types of self-service BI: There is report interactivity geared to casual users and report authoring and analysis tools geared to power users. Giving both types of users the same tool is a recipe for disaster: Either casual users find the tools too complex or power users find them inflexible and limiting. A better strategy is to deliver the right tools to the right users based on their information requirements.

The 80/20 rule provides suitable guidance for meeting these needs. It says that 80% of the time, casual users need interactive reports and dashboards, while 20% of the time they need ad hoc tools to create their own reports and views. The reverse is true for power users. The primary challenge with self-service BI is meeting the 20% ad hoc requirements of casual users.

Rather than provide casual users ad hoc authoring tools that they won’t use, it’s better to cultivate superusers in each department to support the ad hoc reporting requirements. Superusers are businesspeople who gravitate to BI reporting tools when they are first deployed and become the go-to people in their departments for obtaining ad hoc views of data. Superusers are the primary targets for self-service authoring tools, and they are the key to achieving

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success with self-service BI in most organizations. But to take advantage of superusers, corporate BI teams need to provide them with ample training and support as well as a solid data environment that contains consistent definitions of key data elements built into a robust semantic layer.

Although casual users need tailored views of information, power users need the opposite. They need to use a variety of tools to explore and analyze data as well as publish sanitized views to casual users. They also need to be made full-fledged members of the corporate BI environment. Left to their own devices, they'll create spreadmarts and data shadow systems. One way to corral power users without undermining their freedom is to create data sandboxes inside the analytical ecosystem, where they can blend local and corporate data to their hearts' content.

Another key to succeeding with self-service BI is a hierarchy of functionality for the two types of self-service. For instance, users who consume information, rather than produce it, require different levels of data interactivity, ranging from viewing static data to navigating that data to eventually modifying, exploring or modeling that data. A BI manager should create a hierarchy for information consumers and producers and then map categories of business users to each level in that hierarchy.

To make efficient use of the hierarchy, the BI manager should select self-service BI tools that offer functionality on demand as business users are ready and willing to use the new capabilities. Good self-service BI tools either hide these functions behind an unobtrusive but visible icon or allow administrators to enable them. Regardless, it's imperative that BI managers continually monitor user abilities and requirements, which change rapidly, and adapt tools to align with user needs.

Other salient facts from the research include the following:

- **BI self-service gets barely passing grades:** 64% of survey respondents gave their self-service BI initiatives a grade of "average" or worse, while 31% rated it "good" and 5% "excellent." BI beginners were more apt to give self-service BI lower grades, while advanced BI users gave it higher grades.

- **The biggest challenge to self-service BI is counterintuitive:** 73% of BI professionals said it "requires more training than expected." That's because most casual users find it difficult to use self-service BI tools, and superusers need lots of support to become proficient BI developers.

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- **BI penetration is minimal but growing:** Today only 26% of employees use BI tools, but this is an improvement from 2005 when the penetration of BI tools was 18.5%. Another 37% use the output of BI tools today, while 42% don't use BI tools at all.

- **BI usage today is still rudimentary:** 47% of business users just view static reports or dashboards, and 29% just navigate predefined drill paths. Twelve percent modify BI reports, 9% explore pre-existing data and 6% model it. Newer, more analytical BI tools promise to accelerate usage.

- Among information producers, **the most common way to create new reports and dashboards is to craft them using a semantic layer** (35%) followed by assembling them from pre-existing report parts (20%).

- **Traditional ways of delivering self-service BI dominate:** The most commonly used self-service BI tools are BI tools with semantic layers (69%), followed by desktop analysis tools (63%). Up-and-coming self-service BI tools are in-memory visual discovery tools (25%) and BI mashup tools (21%) that support both power and casual users.

To succeed with self-service, BI managers need a deep understanding of their business users and capabilities of their BI tools, and then they have to map requirements to tools. They need to continually monitor the capabilities of business users and BI tools because both evolve quickly, and that can quickly make a well-crafted self-service strategy obsolete. ■

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# Research Background

**THIS REPORT EXAMINES** best practices for implementing self-service BI and the technologies and tools that let users create their own reports and dashboards and conduct their own analyses.

The research is based on interviews with BI practitioners, briefings with BI providers, including sponsors of this report, and a survey of BI professionals. The five-minute survey was promoted to the BI Leadership Forum, an online group of about 1,400 BI directors and managers, and my 2,000-plus Twitter followers in July 2012. The survey was taken by 249 people. Survey results are based on 234 respondents who indicated their positions as “BI or IT professional,” “BI sponsor or user” or “BI consultant.” Responses from those who selected “BI vendor” or “Other” were excluded from the results.

Among this set of qualified respondents, 70% are BI or IT professionals, and 55% are from large companies with more than \$1 billion in annual revenues. The industry with the highest percentage of respondents was manufacturing

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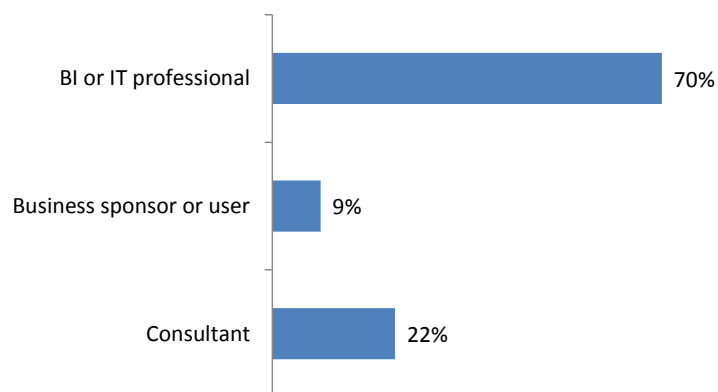
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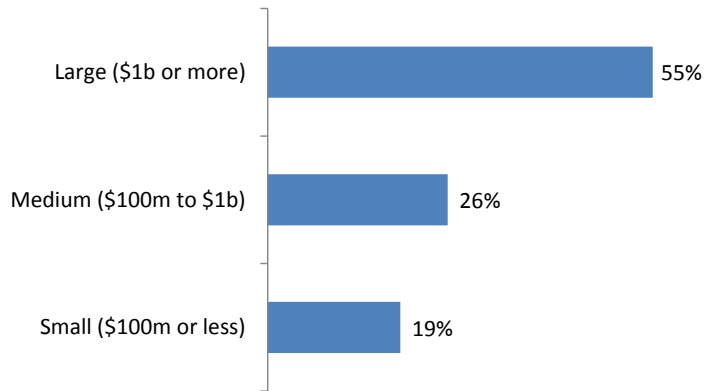
**FIGURE 1. Demographics: Respondent Profile**



BASED ON 234 RESPONDENTS (BI LEADERSHIP FORUM, JULY 2012, [WWW.BILEADERSHIP.COM](http://WWW.BILEADERSHIP.COM))

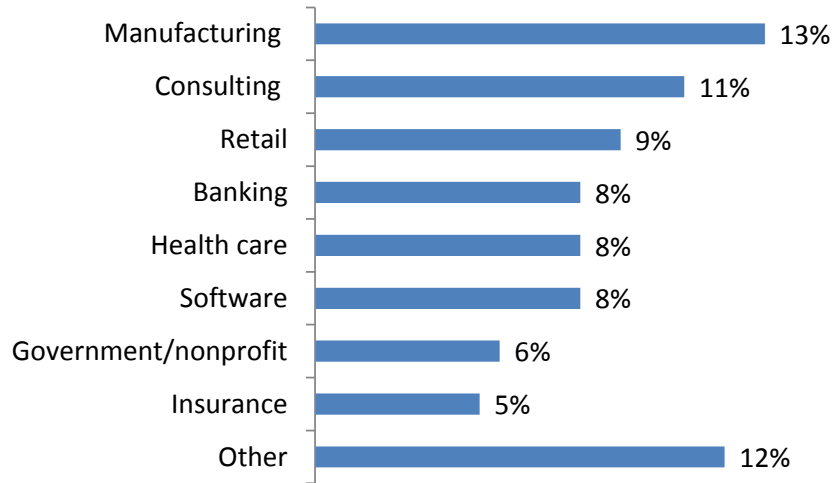
with 13%, a first in the 10 years I've been conducting these types of surveys. Next were consulting with 11%, retail with 9% and banking, health care and software, all at 8% (see **FIGURES 1, 2 AND 3**). ■

**FIGURE 2. Demographics: Company Size**



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**FIGURE 3. Demographics: Industries**



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# The Promise of Self-Service BI

■ **Vision.** Self-service has been an elusive goal for BI professionals for more than a decade. The idea is simple: empower users to build their own reports and dashboards so they get the information they want, when they want it and how they want it displayed. Self-service BI removes IT professionals as intermediaries between business users and the data. This gives business users direct access to the raw material for business insights and liberates swamped IT professionals from a never-ending backlog of report requests. As such, self-service BI offers a win-win situation: Everyone benefits and no one loses. But if that's true, why do so many companies struggle to make self-service BI work?

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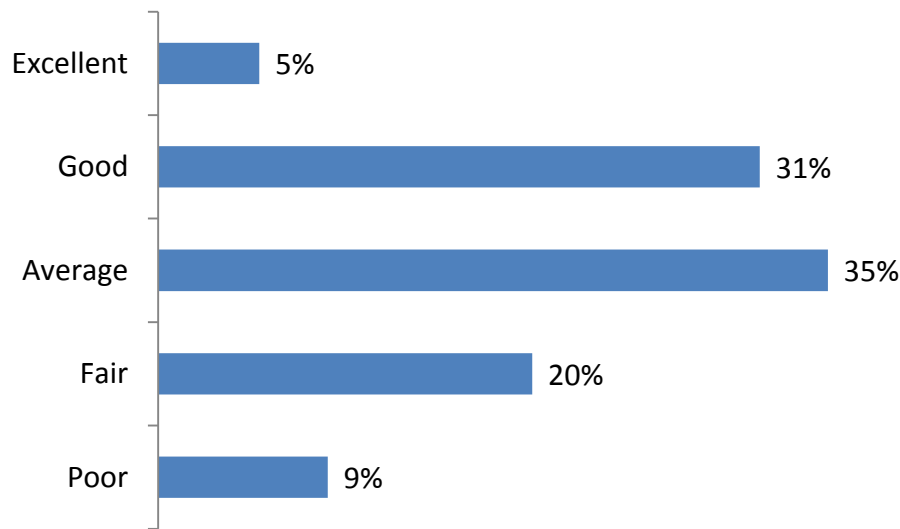
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**FIGURE 4.**  
How would you rate the success of your self-service BI initiative?



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■ **Reality.** Our research shows that about two-thirds of organizations, or 64%, struggle with self-service BI, giving their self-service BI initiatives a grade of “average” or lower, with 29% rating self-service BI “fair” or “poor.” Only slightly more than one-third, or 36%, gave self-service BI a grade of “good” or “excellent” (see **FIGURE 4**).

■ **Challenges.** Implementing self-service BI is trickier than many BI professionals anticipate. This is largely because there are two types of self-service BI, one for report users and another for report authors. Giving authoring tools to report users, who simply want to interact with data to a greater degree, creates a slew of problems (see **FIGURE 5**). The No. 1 challenge cited by almost three-quarters, or 73%, of BI professionals is counterintuitive: Self-service BI “requires more training than expected.”

How can something be “self-service” if it requires the IT department to train and support users continually? That’s the conundrum of self-service BI. If you want to empower users, you first need to give them the know-how to service themselves, and how to do this varies widely, depending on the skills and experience of the business users. As one survey respondent wrote, “Self-service BI is great for users with analytical experience, but bad for users without

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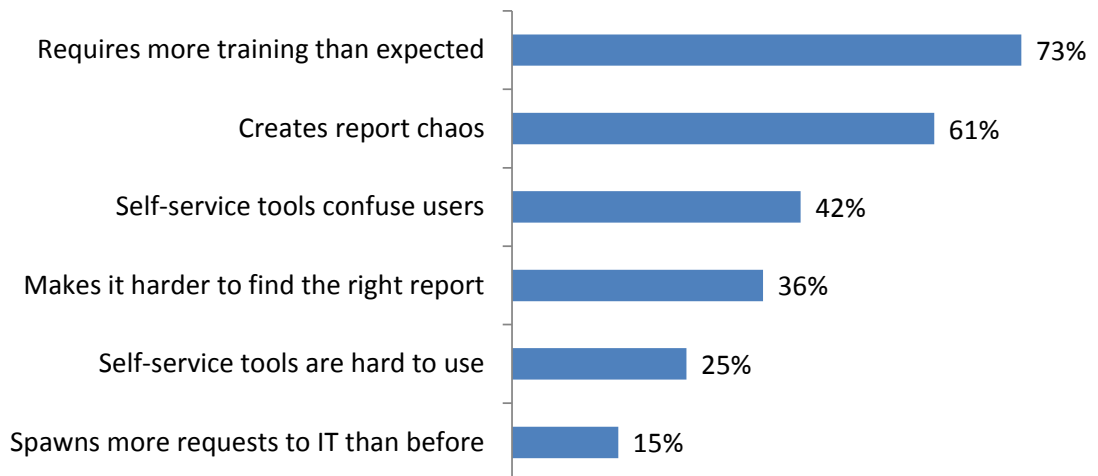
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**FIGURE 5. Challenges of Self-Service BI**



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an analytical background.” This training not only involves teaching users how to use the tool, but more important, how to interpret the data and which data elements and fields to use for which types of analyses.

Survey respondents also said self-service BI “creates report chaos” (61%), “makes it harder to find the right report” (36%) and the “tools confuse users” (42%). Survey respondents cited other challenges in open-ended comments, many of which reflected the downsides of opening the BI spigot to many users, including poor query performance, lack of adequate access control, an explosion of nonstandard BI tools and increased licensing costs. Other issues were germane mainly to power users, such as lack of analytical flexibility, missing data and runaway queries caused by users trying to download large sets of data to an Excel spreadsheet.

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### KEY TO USER ADOPTION

Our research shows that there is a correlation between success with self-service BI and BI adoption rates. Thus, it’s imperative that BI professionals crack the code of self-service BI.

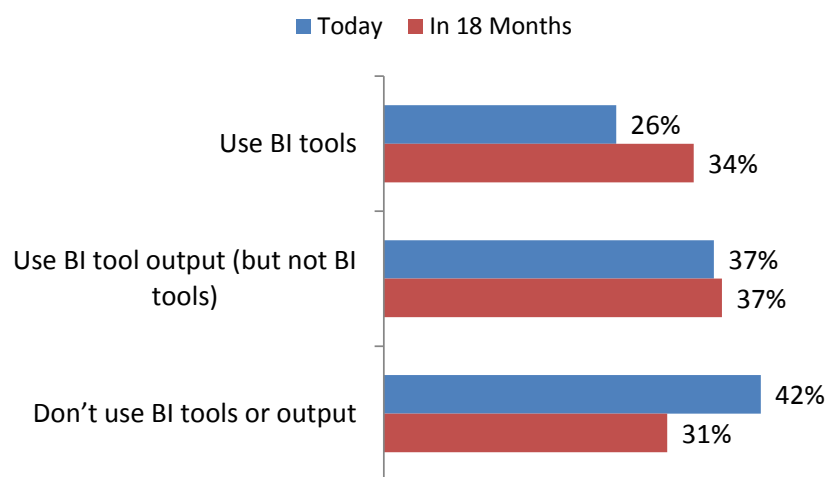
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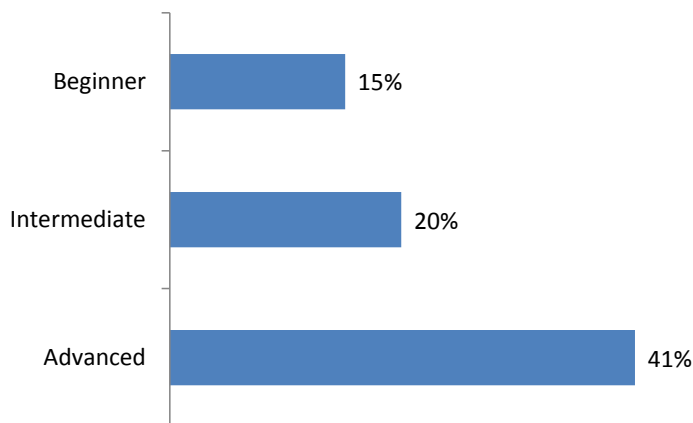
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**FIGURE 6. Breakdown of BI Usage, Today and in 18 Months**



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**FIGURE 7. BI Tool Adoption Rates**



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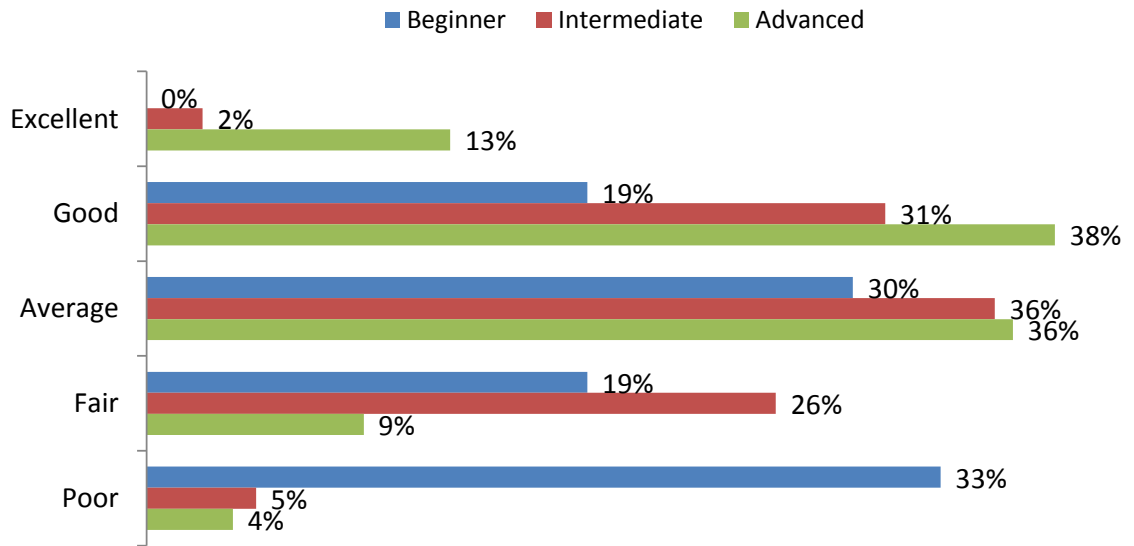
■ **BI penetration.** According to our survey respondents, 26% of employees use BI tools today (see **FIGURE 6**). This is a shockingly low number considering that companies began implementing BI more than 20 years ago. But it’s an improvement since 2005, when **MY RESEARCH INDICATED AN ADOPTION RATE OF JUST 18.5%**. So we’re making slow but steady progress.

Not surprisingly, the rates of BI adoption vary by the maturity of a BI environment. Companies that are just getting started with BI, or BI beginners, have a 15% adoption rate, while intermediates have a 20% rate, and companies with advanced BI environments enjoy an impressive 41% rate (see **FIGURE 7**).

■ **Self-service by BI maturity.** At the same time, if you break out the self-service ratings by BI maturity, you see a similar pattern. Only 19% of BI beginners rate their self-service BI initiatives “excellent” or “good,” while a whopping 52% rate them “fair” or “poor.” In contrast, 51% of companies with advanced BI environments rate self-service BI “excellent” or “good,” and only 13% describe it as “fair” or “poor” (see **FIGURE 8**).

Although there may be many variables that account for the correlation between BI adoption rates and success with self-service BI, organizations that have been doing BI longer have figured out how to make more employees productive with BI tools. Given that BI teams don’t grow in size proportionally

**FIGURE 8. Self-Service BI Ratings by Degree of Maturity**



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with the number of BI users, it's clear that getting users to do more for themselves is critical to driving BI adoption rates.

- Mobile BI.** Deploying self-service BI on mobile devices improves adoption. Organizations that deploy the same self-service BI application on Web and mobile platforms find that users are more apt to use self-service capabilities on the mobile device. Users perceive mobile applications to be easier to use than Web-based or desktop applications, and they like the instant access to information wherever they are.

Besides the underlying platform, the obvious question is, How have advanced BI teams cracked the code of self-service BI? What have they done to reap the benefits of self-service without suffering the downsides? ■

# Making Self-Service BI Work

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**THERE'S NO** “one size fits all” in self-service BI. Different types of business users require different types of self-service approaches and tools. At its most elementary level, most users want self-service interactivity, while a few more advanced users want self-service authoring. But this simple fact eludes most BI professionals and business-side sponsors. The biggest mistake most BI teams make is buying a single self-service BI tool and giving everyone in the company access to it. That’s a recipe for disaster.

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The reality is that the vast majority of business users find self-service BI tools confusing. As a result, they quickly revert to old habits like asking the IT department to create custom reports for them whenever they need a different view of an existing report. There is a ton of self-service BI shelfware in our industry. The primary culprit is this mismatch between users and tools.

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- **Casual and power users.** The quickest way to right a sinking self-service BI ship is to recognize that there are two types of users, each with very different information requirements. There are casual users, who use information to do their jobs, such as executives, managers and front-line workers; and there are power users, who are hired to analyze information. They include superusers, business analysts, statisticians and data scientists.

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## CASUAL USERS

The most important thing to remember about casual users is that they have very basic information needs. Most simply want to view the output of a report and perhaps click a few times to see more detail. At least, that’s the case with this generation of casual users. The youngest generation of workers, which has been reared in the digital age, will be more comfortable using a wider range of analytical features and will expect greater levels of interaction with information. But today, most BI users are content to view static BI output rath-

er than use BI tools. Figure 6 shows that 37% of employees today use only the output of BI tools, and 42% don't use BI tools at all.

■ **Challenges with ad hoc.** As a general rule of thumb, 80% of the time casual users want basic information interactivity delivered through a canned report or dashboard. But 20% of the time, they want true ad hoc access to information so they can create their own reports and dashboards. This 20% ad hoc usage is a killer; it makes BI professionals think that casual users want to author their own reports. This is categorically not true, and it's the biggest reason why self-service BI initiatives fail. For BI professionals or people raised on technology, this is hard to fathom. Ad hoc BI and authoring tools seem so easy to use. Just point and click to select a field or metric and drag and drop to form a query.

But there are several reasons why casual users can't do ad hoc BI and author reports.

First, most aren't comfortable with technology and view it as an alien appendage that doesn't respond to normal nervous-system commands. They find using technology time-consuming, exhausting and a bit humbling. Second, despite hours of training, casual users quickly forget how to use BI tools, especially their more advanced features. They simply don't use the functions enough to remember how to use them. After a few tries, they quickly realize it's easier to ask the IT person to create a new view or report rather than do it themselves.

Third, they may not be analytically inclined—that is, they may not know exactly what to look for, and they may not understand the nuances of the data well enough to know which attributes and metrics they should use in a report. This is a matter of business and process experience. It usually afflicts newcomers to the company or a department who are unfamiliar with core business processes and data.

Last, casual users are sensitive to poor system performance. If the queries are sluggish or screens refresh slowly, casual users become even more frustrated with BI tools. Save for a tenacious few, they give up using the tools when they see their analytical output slow to a crawl.

When BI professionals see casual users abandon self-service BI tools, they become bewildered, then bitter. Many blame the victim, as these comments from our survey suggest: "The challenge with self-service BI is resistance from some users to do their own analysis, rather than being spoon fed." Or, "The

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business is lazy; they want IT or someone do it for them.”

Unfortunately, the problem doesn’t necessarily stem from casual users; it stems from BI professionals who don’t understand user requirements and give the wrong BI tools to the wrong users. Simply put, self-service BI fails when BI professionals give self-service authoring tools to casual users. Casual users can’t or won’t use such tools.

- **The solution for casual users.** To best meet the information needs of casual users, BI professionals must adopt a hybrid approach: they must deliver departmental dashboards to meet casual users’ interactive requirements and personalized support to meet their ad hoc authoring requirements.

The IT department—or perhaps technically savvy power users—needs to create a standard, interactive dashboard for each department that addresses 80% of the most common questions that casual users regularly ask. This departmental dashboard serves as a nice little sandbox. It has about 10 metrics and 20 dimensions—big enough to answer most questions, but not so big that users get lost or query performance suffers.

I call this layered information environment a MAD dashboard. (MAD stands for monitor, analyze and drill to detail.) With a quick glance at a MAD dashboard, users can monitor the status of key metrics and access any details they want in three clicks or fewer. I’ve written extensively about MAD dashboards in earlier reports and in my book *Performance Dashboards: Measuring, Monitoring, and Managing Your Business*.

- **Dealing with ad hoc.** Once a standard departmental report is in place, the next challenge is to support the casual user’s ad hoc authoring requirements. Since casual users won’t touch ad hoc functions in BI tools, this is a dilemma. No amount of training is likely to fix the problem. Only when our industry delivers ad hoc BI tools that are as simple as typing or speaking a Google query will casual users take ownership of their ad hoc authoring requirements.

- **Superusers.** Meanwhile, the simplest solution—and the one most companies gravitate to—is to assign superusers in each department to handle the ad hoc needs of casual users. A superuser is a businessperson who gravitates to the corporate-issued BI tool when it’s first deployed, learns its ins and outs and becomes the go-to person in the department to get custom views of data. In essence, a superuser is the real target for most self-service BI tools.

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So the ad hoc solution for casual users is not to give them self-service authoring tools; rather it is to give them access to a superuser who creates ad hoc reports on their behalf and shows them how to find data that already exists in standard departmental dashboards. Savvy BI directors also enlist superusers to help gather requirements for the departmental dashboards so they can address the evolving needs of departmental users.

■ **Challenges.** But superusers are not a panacea. Often, they emerge in the absence of a strong corporate BI team. They fill the void of information with independently sourced reports that create a viral form of data chaos. These so-called spreadmarts, or data silos, wreak havoc on information consistency and are the bane of every corporate BI professional. Even when there is a strong corporate BI team, superusers can be hard to control. When finally given self-service BI tools, they go overboard and create a flood of reports, most of which are variations on the same theme. And with a jumble of reports, it's hard for casual users to find what they are looking for.

Smart BI directors identify de facto superusers in each department or cultivate them if there aren't any. They realize that superusers are the key to making self-service work. They are their eyes and ears in each department and can help evangelize BI best practices and provide valuable input on BI standards and tools. Thus, they make a point to incorporate them—either formally or informally—into a “BI center of excellence,” or a centralized BI team—and let them drive the direction of the program. By putting the fox in charge of the henhouse so to speak, savvy BI directors ensure business alignment for the BI program.

But managing a group of distributed superusers is not easy. It requires time and resources. Once BI managers identify who they are, they need to train them to properly use the self-service BI tool and serve as their first level of support. Moreover, BI managers need to continually communicate with them and foster a collaborative spirit so they continue to align their work with enterprise data standards. This is not for the faint-hearted, but it pays handsome dividends.

■ **Metadata and governance.** Superusers also require a stable, comprehensive and well-documented data layer. They generally don't have the ability to source new data. They are simply experts in the business who happen to work with data. So it's imperative that the corporate BI team implement a robust

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data management environment, complete with an enterprise data warehouse, department-specific data marts and a BI semantic layer. This data infrastructure ensures that superusers use the appropriate metrics, dimensions and attributes when building reports, and it avoids confusion over the meaning of data.

Survey respondents were emphatic about the importance of data governance to self-service BI initiatives. One respondent wrote bluntly, “Self-service BI is bad if the governance rules are followed, and good if they are.” Another echoed that thought: “As long as self-service BI is well-managed from an IT and governance perspective, it is a fantastic way to distribute workload and increase insight.” A third got more specific: “More work has to be done to create a unified business semantic layer and taxonomy that enables users to adapt quicker to the self-service tools. This requires more work to be done on the enterprise model. Also, it is heavily dependent on having a good MDM [master data management] process and data governance maturity.”

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## POWER USERS

Power users are the exact opposite of casual users when it comes to self-service BI. Rather than restricting the options of power users, BI managers need to liberate them. Power users, by definition, need to explore data and generate answers to a wide variety of questions that cannot be anticipated. Often, power users need data that does not exist in the data warehouse to answer a business question. And for most power users, BI tools don't provide the flexibility they need to manipulate data to answer complex questions. This poses a big problem for BI managers who want to standardize on a single self-service BI tool for all users: a single BI tool is either too powerful for casual users or not powerful enough for power users. It's a no-win situation.

- **Multiple tools.** Like skilled craftsmen, power users need the right tool for the job. You wouldn't hire a carpenter to build your house if he showed up with only a hammer in his toolbox. In the same way, you shouldn't restrict the types of tools that power users use.

Power users need a tool for every type of analytical job they might encounter. This includes SQL, Hive, Excel, Access, ad hoc query tools, reporting tools, online analytical processing (OLAP) tools (including multidimensional OLAP, or MOLAP, and relational OLAP, or ROLAP), visual discovery tools, text min-



**FIGURE 9. Functional Categories of Power-User Tools**

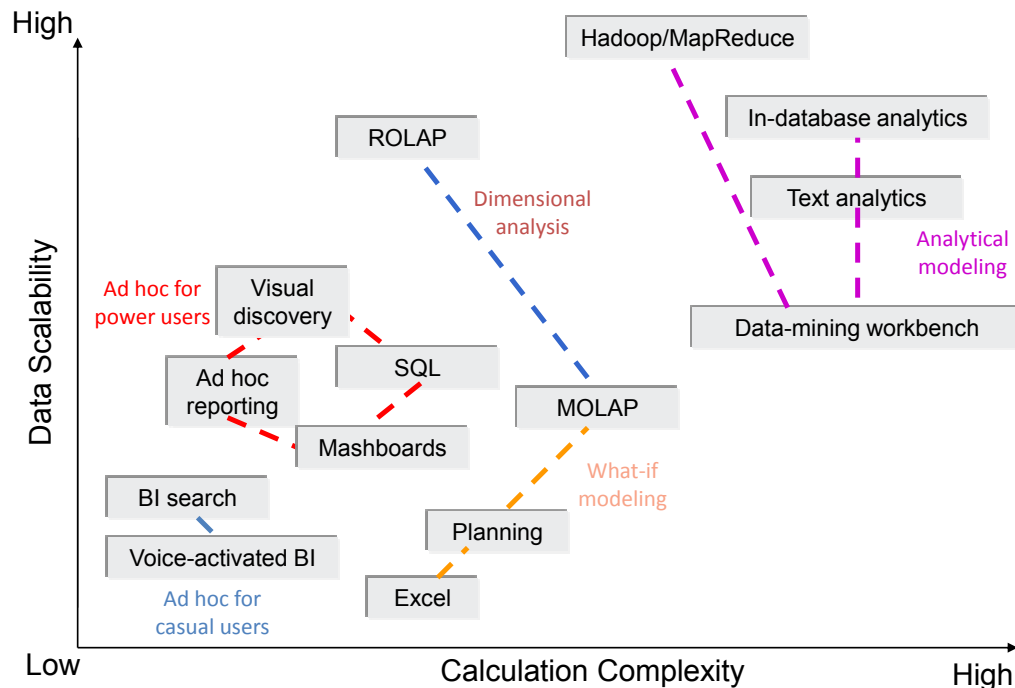


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ing, dashboards, planning tools, data mining workbenches and a variety of programming languages, such as Java, Perl and Python. Not every power user will use every tool. Superusers use ad hoc query and reporting tools and dashboards; business analysts use Excel, Access, planning tools, mashups and OLAP tools; statisticians use data mining workbenches and SQL; and data scientists use Hive, Java, Python and Perl.

But populating a toolbox with multiple tools doesn't mean you can't have tool standards. Just as a carpenter doesn't weigh himself down with duplicate tools, a BI team shouldn't be forced to support redundant tool sets. Although you don't want to limit tool choices, you can still standardize on a single tool in each category of power-user tools (see **FIGURE 9**).

■ **Data management.** With a plurality of tools, it's imperative that you have your data house in order. The last thing you want is power users running

willy-nilly, downloading data from everywhere and issuing runaway queries that bog down performance for everyone else. It's best if they pull data from a clean, sanitized set of data in the data warehouse and supplement this information with local data that isn't in the data warehouse. This puts the onus on the corporate BI team to get the funding and resources to build out an enterprise data warehouse and populate it with the major subject areas in the company. When done right, this won't take more than a half a year from start to finish.

■ **Sandboxes.** To give power users the freedom to source data and use their preferred tools, BI managers need to create **ANALYTICAL SANDBOXES IN THEIR ENTERPRISE ANALYTICAL ECOSYSTEMS**. One type of sandbox gives power users dedicated space inside the data warehouse to load their own data, mix it with corporate data and conduct analyses. Another type of sandbox gives power users access to a dedicated analytical appliance that the IT department populates with a replica or subset of data from the data warehouse. Other sandboxes include staging areas (either Hadoop or relational), desktop visualization and analysis tools that pull data from the data warehouse, and cloud-based data services with replicated data warehouse data.

■ **The 80/20 Rule.** When you boil it all down, the information requirements for both casual and power users can be summarized by the 80/20 rule. That is, casual users need a MAD departmental dashboard 80% of the time and an ad hoc solution delivered by a superuser 20% of the time. Conversely, power users need an ad hoc solution 80% of the time and an interactive dashboard 20% of the time (see **FIGURE 10**).

### **INFORMATION CONSUMERS AND PRODUCERS**

The next nuance of self-service BI that BI professionals need to understand is the distinction between information consumers and producers. Information consumers consume information, while producers produce it. In other words, information consumers want to view, interact with and analyze data, while information producers want to create ad hoc reports and dashboards. In reality, most users do a bit of both, although casual users mostly consume, while power users do both in equal measure. According to our survey, 76% of BI users are consumers and 16% are producers.

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FIGURE 10. The 80/20 Rule

	80% of the time		20% of the time	
CASUAL USERS	Task	Tools	Task	Tools
Executives	Monitor	MAD Dashboard	Create queries	Superusers (Excel, BI search, voice-based BI)
Managers	Analyze		Create plans	
Workers	Drill to detail		Create reports	
POWER USERS	Task	Tools	Task	Tools
Superusers	Ad hoc reports	Self-service BI	Monitor, analyze, drill to detail	MAD dashboard
Business analysts	Explore, plan, visualize	Visual discovery, Excel, SQL		
Statisticians	Create models	Data mining tools		
Data scientists	Explore Hadoop	Java, Perl, Hive, Pig		

Tailored reporting

Ad hoc analysis

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FIGURE 11. Hierarchies of Self-Service BI

There are two types of self-service, one for information consumers and the other for information producers. The best BI tools expose greater levels of self-service functionality as users are ready to use them.

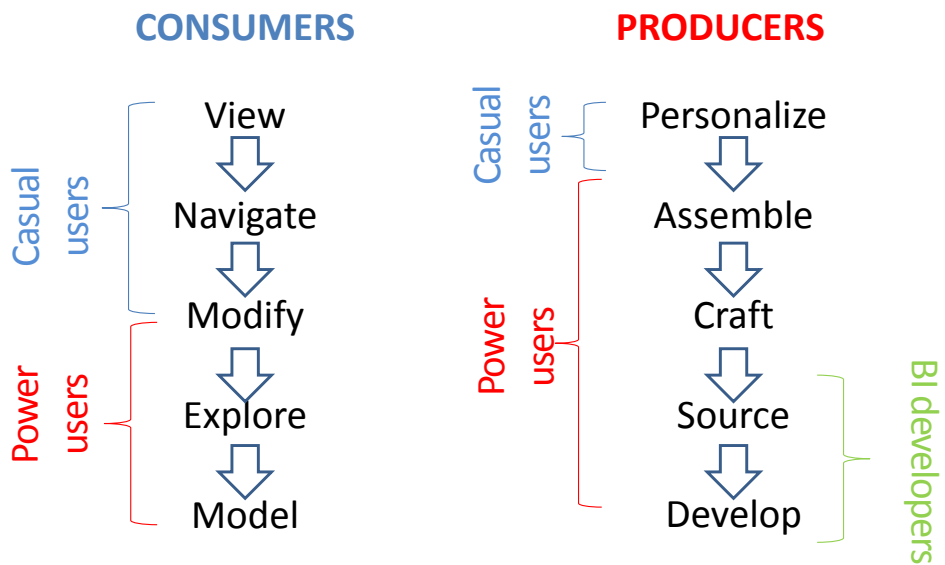


ILLUSTRATION BY WAYNE ECKERSON/BI LEADERSHIP FORUM FOR TECHTARGET

Not all information consumers and producers are created equally; that is, people consume and produce information in different ways. We can plot these differences in a hierarchy of capabilities or needs and then map users to the hierarchy (see **FIGURE 11**).

As you move down the consumer hierarchy, tools deliver greater interactivity and analytical capability. A surprisingly large percentage of users (47%) simply view static reports or dashboards, which may be static Web images or PDF documents emailed to them. Almost a third (29%) navigate predefined drill paths, while just 12% modify existing reports by sorting, ranking, changing chart types or adding columns, calculations and custom groups. Only 9% explore the data by adding new dimensions and metrics, and only 6% model the data by creating what-if or analytical models (see **FIGURE 12**).

As you move down the producer hierarchy, the tools provide more sophisticated design, development and administrative capabilities. About 21% of producers personalize the display of their reporting environment by changing colors, fonts or branding. Another 20% assemble dashboards from predefined report parts. But more than a third (35%) craft custom reports using a BI semantic layer. BI tools with a semantic layer are the most popular self-service BI tools today, and they are used primarily by superusers. Rounding out the hierarchy, only 11% of producers source their own data, but 19% develop applications using script or programming languages (see **FIGURE 13**).

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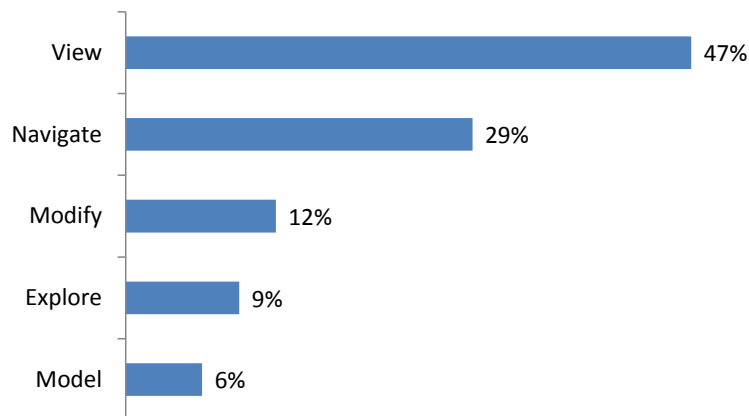
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**FIGURE 12. What percentage of your information consumers use the following functions?**



BASED ON 234 RESPONDENTS (BI LEADERSHIP FORUM, JULY 2012. [WWW.BILEADERSHIP.COM](http://WWW.BILEADERSHIP.COM))

It's instructive to conjecture which types of casual and power users map to each level of the consumer and producer hierarchies.

■ **Mapping users to consumer functions.** In the consumer hierarchy, for example, casual users dominate the top three levels (see **FIGURE 14**). Most front-line workers today simply view dashboard output. The same is true for executives who might click once or twice to drill down to more detail before picking up a phone to talk with an analyst. But managers typically might want to do more analysis on their own and will drill down several levels before picking up the phone. In addition, managers might also modify an existing table or chart by sorting or ranking the data or adding a calculated column, such as a subtotal for a group of records.

Power users, on the other hand, spend most of their time in the bottom three levels of the hierarchy. In general, business analysts modify and explore data visually, while statisticians and data scientists create statistical models.

■ **Mapping users to producer functions.** In the producer hierarchy, casual users occasionally personalize the look and feel of a report or dashboard by

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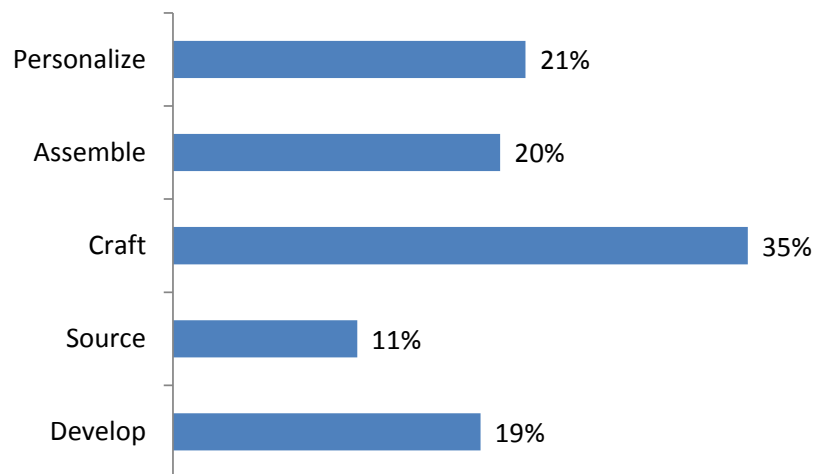
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**FIGURE 13.** What percentage of your information producers use the following functions?



BASED ON 234 RESPONDENTS (BI LEADERSHIP FORUM, JULY 2012, [WWW.BILEADERSHIP.COM](http://WWW.BILEADERSHIP.COM))

changing colors, fonts and chart types. Superusers, with access to dashboard tools, assemble dashboards by dragging predefined tables and charts from a library onto a dashboard canvas. But more often, superusers will craft an ad hoc report using the semantic layer of a reporting tool. Business analysts will also assemble and craft reports and dashboards, but they also may source new data using a query generator or by writing custom SQL and importing the data set. Data scientists may write code to create a complex query or report, while IT developers might write a script to create a custom application with unique functionality, workflow, and look and feel.

The benefit of depicting self-service hierarchies is you can map the levels to user requirements, which can help when selecting BI and analytical tools. It's best to select tools that enable administrators to expose these different levels of functionality to users on demand, once they are ready and able to use them. Otherwise, the additional functionality can overwhelm business users and cause them to stop using the tools. ■

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FIGURE 14. Mapping Users to Hierarchies

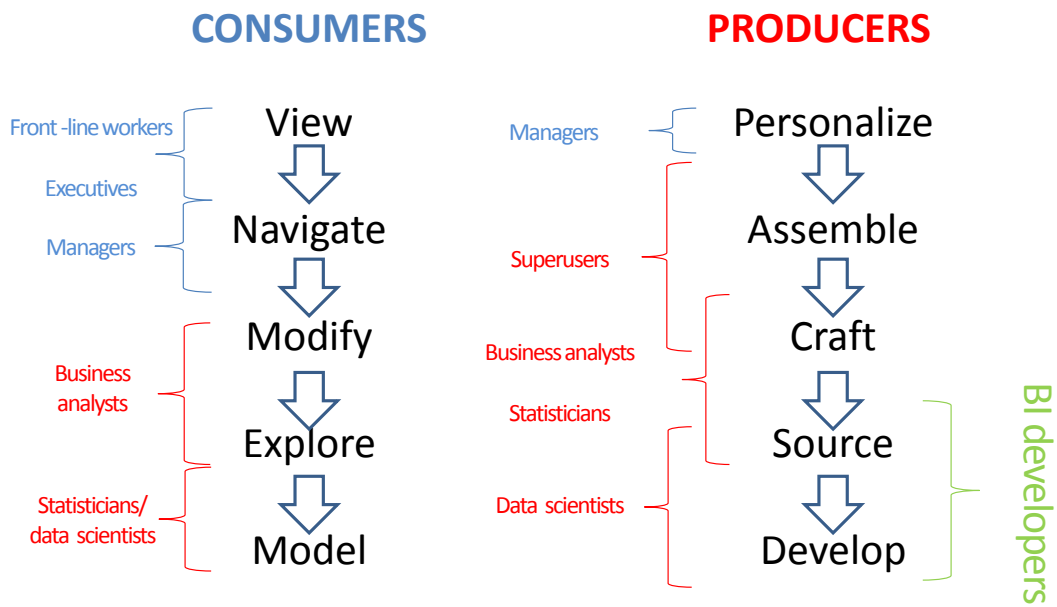


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# Selecting Self-Service Tools

**THERE ARE TWO** major categories of self-service BI tools: top-down reporting tools and bottom-up analysis tools. Each delivers self-service in a different way. Reporting tools generally provide a semantic layer that lets superusers create custom queries and reports, while analysis tools enable power users to publish interactive dashboards to casual users.

## TOP-DOWN REPORTING

■ **BI semantic layer.** According to our research, the most popular self-service BI tools incorporate a “user-friendly semantic layer,” which is used by 69% of organizations (see **FIGURE 15**). A semantic layer is a set of predefined reporting objects that encapsulate database elements in terms businesspeople can

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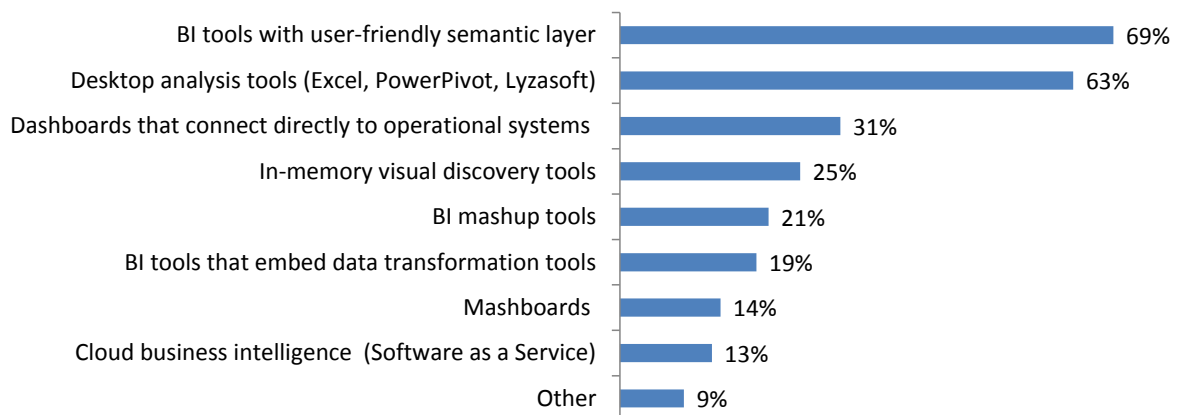
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**FIGURE 15. What self-service BI tools has your BI team implemented?'**



BASED ON 234 RESPONDENTS (BI LEADERSHIP FORUM, JULY 2012, [WWW.BILEADERSHIP.COM](http://WWW.BILEADERSHIP.COM))

understand. At its simplest, a semantic layer will change an arcane field name, like “Cust\_id” to a plain name, such as “Customer number.” At its most complex, a semantic layer may join fields from several tables to create an aggregated metric, such as “Daily sales.”

Reporting tools began supporting semantic layers in the early 1990s so business users could create their own queries and reports. Although casual users by definition don’t do ad hoc authoring using semantic layers or other techniques, superusers have enthusiastically embraced such capabilities. Categories of tools that incorporate semantic layers include ad hoc querying, ad hoc reporting and ROLAP and MOLAP tools.

- Dashboard tools.** The newest form of a top-down report is a dashboard that delivers a graphical view of key metrics and three-click access to any detailed data. A well-designed dashboard is really a glorified visual exception report.

Some dashboard vendors support self-service by allowing users to drag and drop “report parts”—charts, tables, controls—from a library on a dashboard canvas. These so-called mashups or mashboards enable users to create dashboards from predefined components created by professional reports writers. Because the components are wrapped in a gadget-like interface, they simply snap together once assembled on a dashboard canvas. Superusers are also the primary users of mashboards, which they use to create ad hoc dashboards for themselves and their departmental colleagues. But BI mashup tools are used by just 21% of organizations and mashboards by 14%, which reflects the fact that they are new entrants to the BI landscape.

***A well-designed dashboard is really a glorified visual exception report.***

- Mashup libraries.** The best BI mashup tools have libraries of components that hide connections, transformations, queries and functions, visualizations and delivery methods (see **FIGURE 16**). Typically, the IT department creates the connection, transformation and some query and function components, and power users create the rest. Organizations create two libraries, one for advanced information producers and one for superusers. The information producers leverage the components to create report templates, while the superusers apply visual and delivery components to the report templates to create finished reports and dashboards.

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**FIGURE 16. Self-Service Components and Libraries in a BI Mashup Tool**

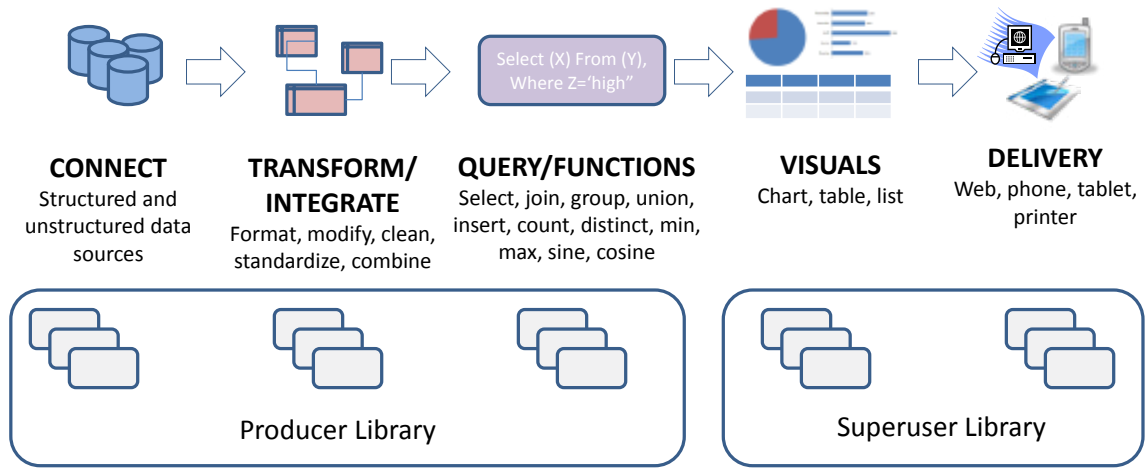


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### BOTTOM-UP ANALYSIS

In contrast to top-down reporting tools, bottom-up analysis tools are designed to support discovery and exploration. By definition, they are self-service tools. They enable power users to identify trends, spot anomalies and do root cause analysis, among other things. Sometimes casual users want to do this type of ad hoc analysis or perhaps even create their own views, but since they typically don't have the skills, they rely on power users to do it for them. So these tools do a double duty: They combine a great exploration environment for power users with a good publishing environment that supports both the interactive reporting and ad hoc needs of casual users.

- Visual discovery tools.** One popular type of bottom-up analysis tool today is the visual discovery tool, which serves the needs of both power users and casual users. These analysis tools enable power users to visually explore data in an ad hoc fashion. Power users typically download source data into the tool's in-memory database, where they can visualize and filter data at the speed of thought.

Once power users analyze the data and create a compelling graphical view of a trend or anomaly, they can publish it to a server so casual users can access the same view. During the publishing process, the power users can

clean up the view by hiding extraneous functions, filters, tabs and charts that might otherwise confuse casual users. They can set permissions to control who can see the dashboard or what parts of it. They can even publish a static view that doesn't allow users to interact with the data in any way. Many companies are now standardizing on visual discovery tools to serve the needs of both power and casual users in a departmental setting.

According to our survey (**FIGURE 15**), 25% of organizations use in-memory visual discovery tools, a high percentage given the fact that most of these tools didn't exist more than 10 years ago and have only received significant airtime in the last few years. Closely related to visual discovery tools are "dashboards that connect directly to operational systems," or operational dashboards (31%), and "BI tools that embed lightweight data transformation tools" (19%). Both of these categories of tools are geared to information producers who want to extract, transform and load data before analyzing it. Self-service analysis tools enable power users to do this without IT assistance.

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■ **Expose on demand.** In addition, the best self-service BI tools expose functionality on demand. This is particularly important when users switch contexts from consumers to producers. The best BI tools display an icon that consumers can click when they want to add new metrics, dimensions or attributes to an existing report. This action exposes an ad hoc interface and dialogue box for customizing the report or dashboard. Similarly, good BI tools offer a graphical control that exposes a calculation engine enabling BI users to add calculated fields to an existing table.

Ideally, self-service BI tools let administrators control which functionality to give to different users and roles. Thus, when users are willing and ready to tackle new functions, the administrator can turn on these functions. But in reality, out of sight is out of mind. If users don't see at least an icon to suggest additional functionality that the tool supports, then they might perceive that the tool can't meet their needs. To avoid this, BI teams need to provide ample training and support. This also keeps BI professionals in regular contact with users so they can track the evolution of their requirements. Superusers can be a big help here since they are embedded in departments and in tune with the evolving needs of their departmental colleagues.

■ **Harmonization.** Many companies cycle back and forth between top-down and bottom-up BI, trying to find an approach and a set of tools that works in

**FIGURE 17. Comparing Top-Down and Bottom-Up BI**

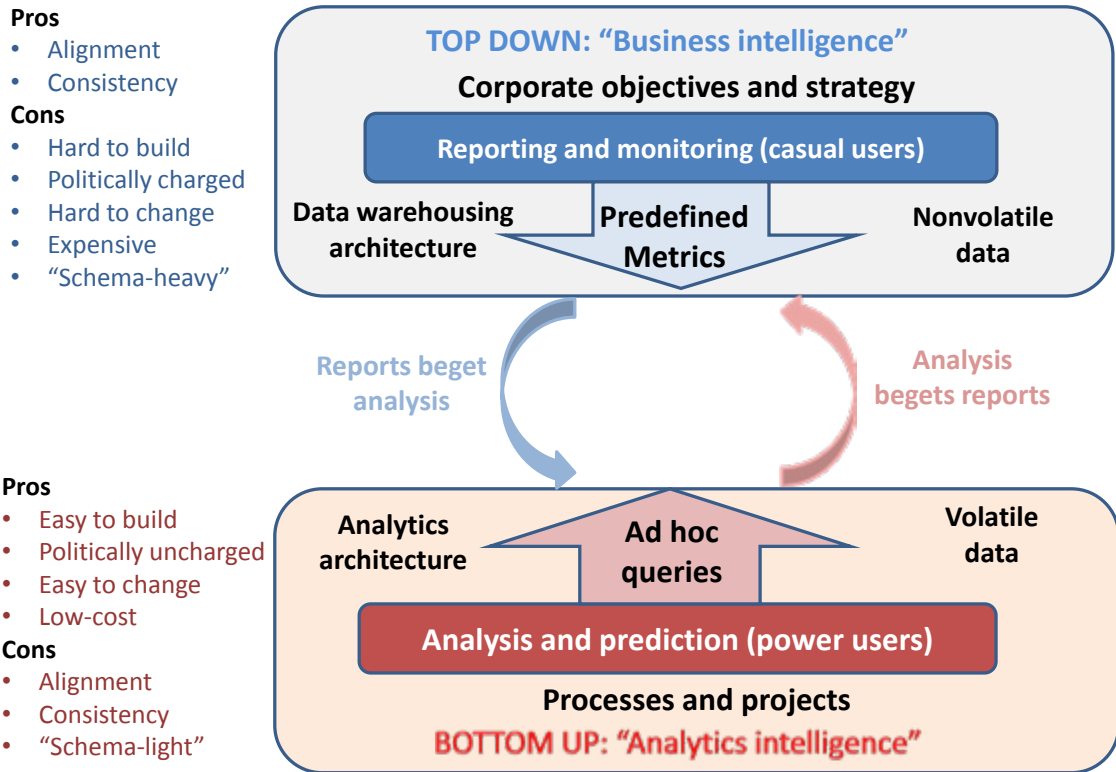


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- Pros**
- Alignment
  - Consistency
- Cons**
- Hard to build
  - Politically charged
  - Hard to change
  - Expensive
  - “Schema-heavy”

- Pros**
- Easy to build
  - Politically uncharged
  - Easy to change
  - Low-cost
- Cons**
- Alignment
  - Consistency
  - “Schema-light”

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all situations. Most organizations don’t realize that they need both top-down and bottom-up BI. Top-down environments are architected to deliver precise answers to predefined questions, while bottom-up environments are designed to explore new questions that can’t be anticipated. At a tactical level, reports generate new questions that require analysis, while analysis generates insights that users want to view on a regular basis through reports. It’s not an either-or proposition; companies need both (see **FIGURE 17**).

Both top-down reporting and bottom-up analysis tools take different approaches to self-service BI. Top-down tools favor semantic layers and mashups, while analysis tools favor customized publishing. In any case, a BI environment that supports both provides more options to satisfy the self-service BI needs of all your BI users.

# Recommendations

**SELF-SERVICE BI** can empower users and increase BI adoption, but it is difficult to implement properly because there are many types of users with different information requirements. There is no single tool or approach to self-service BI that works in all situations. To succeed with self-service BI, organizations need to take a nuanced approach that maps users to tasks and tools.

Here is a list of recommendations to guide your self-service BI initiative:

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- **Recognize that there are two basic types of self-service.** Casual users primarily need interactive BI tools that enable them to access additional data in predefined views or drill paths without IT intervention, while power users need self-service authoring tools to create ad hoc reports and dashboards for themselves and their casual user colleagues.

- **Create an inventory of casual and power users.** Find out who they are and then create subcategories based on their information requirements. For instance, casual users may consist of executives who just want to view data and managers who want to both view and navigate data.

- **Create functional hierarchies for information consumers and producers.** Create hierarchies, similar to those depicted in **FIGURE 11**, that show levels of self-service functionality for information consumers and producers. Then map your casual users and power users to these hierarchies to guide tool selection and expose gaps in your BI tool lineup.

- **Evaluate your self-service BI tools.** Take an inventory of your BI tools and what types of self-service functionality they support. Are they top-down reporting tools that use a semantic layer or mashup library? Or are they analysis tools geared to power users? Determine the types of self-service tools best-suited to each category of users in your inventory.

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- **Pay special attention to superusers.** Superusers are the most frequent users of self-service authoring tools. The best way to ensure they use standardized data is to give them self-service reporting tools with a semantic layer. If they find this too restrictive, give them desktop analysis tools that point to data in the data warehouse. Also, recruit superusers to participate in a BI center of excellence to ensure buy-in and cooperation. They are your eyes and ears in the department, which is where all good BI applications get built. Although you will have to devote considerable resources to train and support them, the payoff is significant.

- **Don't give self-service authoring tools to casual users.** Today's casual users don't have the time or patience to create their own reports and dashboards from scratch. They want to use an interactive dashboard that exposes additional information as they need it. If you come across a casual user who wants to create his own reports, then you have found a superuser!

- **Give power users multiple tools.** Don't restrict what tools power users can use, but do standardize on a single power tool per category. Power users appreciate standards that allow them to spend more time analyzing data.

- **Watch the evolution of users and tools.** Life isn't static. People and technology change, sometimes at alarmingly fast rates. Monitor your users and be ready to expose additional functionality as they want and need it. Evaluate new tools and technologies to see whether they can fill a gap in your consumer or producer hierarchies. For example, evaluate BI search tools to determine whether they are ready to support the ad hoc needs of your casual users.

- **Select tools that expose functionality on demand.** Make sure your self-service BI tools enable administrators to expose functionality to users or embed icons that expose ad hoc interfaces on demand.

- **Harmonize top-down and bottom-up BI.** Remember that you need both top-down and bottom-up BI. So if you come from the top-down world, stop fighting bottom-up users and their tools and figure out ways to give them the freedom they need in an enterprise framework. If you are a bottom-up person, reuse enterprise data sets instead of creating your own. ■

## ABOUT THE AUTHOR



**WAYNE ECKERSON** is director of research in TechTarget's Business Applications and Architecture Media Group. He

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