

# Move from insight to action with interactive, self-service dashboards

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## INTRODUCTION

Dashboards are an important tool in the business analytics arsenal for midsize companies. In its paper *Tips for Implementers: The Basics of Good Dashboard Design*, Gartner defines dashboards as a “subset of reporting, which includes the ability to publish formal, Web-based reports with intuitive interactive displays of information, including dials, gauges, sliders, check boxes and traffic lights. These displays indicate the status of an item or the state of a performance metric compared with a goal or target value.” Gartner also emphasizes, “the main purpose of a dashboard is to enable managers to quickly and routinely comprehend how they are performing against their KPIs [key performance indicators], not to provide an environment for complex data analysis.”<sup>1</sup>

Yet all dashboards are not created equal. Based on its findings from a study of 489 firms undertaken as part of the 2009 BI Magic Quadrant report, Gartner offers some recommendations about the essential characteristics of effective dashboards.

- **Dashboards and the charts, dials and gauges they contain are only as good as the KPIs they serve up.** Gartner suggests that midsize companies, “Allow the user to add and subtract metrics from their dashboard, based on a defined pool in the metrics framework. End-users’ needs change and perfect alignment is hard to obtain — let the final content be in the hands of the user.”
- **Dashboards and the charts, dials and gauges they contain are only as good as the data they draw on.** Gartner suggests that midsize companies, “Avoid the danger of data quality issues being seen as a nasty surprise by using one of the visual objects on the dashboard to deliver a data quality metric, either sourced from data quality tools, derived during the extraction, transformation and loading process or as supplied by the data stewards responsible.”
- **A dashboard that only refreshes monthly isn’t really a dashboard at all. Data must be timely, with appropriate latency.** Gartner explains, “There’s a big difference between pushing a graphical report to users via e-mail on a monthly basis and having a portal-based dashboard, which is visible to users every day on their personal intranet home page.”<sup>2</sup>

<sup>1</sup>See full Gartner report on page 4

<sup>2</sup>See full Gartner report on page 4





### **IBM COGNOS EXPRESS PROVIDES DASHBOARDS THAT DELIVER RESULTS**

IBM Cognos Express is a single, integrated solution that encompasses reporting, analysis and planning capabilities in one unified environment. It delivers intuitive, easy-to-use dashboards as part of its core business analytics capabilities. Its interactive, self-service dashboards can be instantly shared company-wide to support collaborative decision-making.

IBM Cognos Express delivers user-definable KPIs for targeted insights, benchmark metrics for easy comparison and clear, compelling visuals for quick consumption. Common metadata models ensure that the same trusted information is used throughout an organization so data is of the highest quality based on a shared set of standards.

Midsize companies can use the dashboard capabilities of IBM Cognos Express to meet Gartner's three criteria for effective dashboards.

**Dashboards are only as good as the KPIs they serve up.** An embedded in-memory analytics server, which is unique to IBM Cognos Express, provides a central repository for key business data, including plans, budgets and forecasts. This streamlines the delivery of high-quality KPIs, enabling organizations to quickly measure actual performance against plan to ensure the best strategic alignment. With instant visibility into critical performance data, users can focus on the areas that will deliver the greatest business impact.

Interactive, self-service dashboards enable users to include elements from any IBM Cognos Express module and any data source. Executives can get at-a-glance business summaries of critical information while business users may want to drill up or down through graph or chart elements to see the big picture or the essential detail. Business users who can select their own dashboard elements are better equipped to uncover business insights that are aligned with their goals. Because they are actively engaged in business analytics processes, they are more likely to turn business insights into specific actions that can help manage costs and improve revenue opportunities.

**Dashboards are only as good as the data they draw on.** IBM Cognos Express uses one trusted set of business rules, calculations and data to ensure the reliability of business information throughout an organization. Data may come from multiple sources to create a dimensional view of the business. Rich metadata modeling capabilities shield business users from complex underlying data structures, so they can focus quickly on familiar business terms such as customers, products and regions.

These metadata modeling capabilities also provide the ability to create a single dashboard with personalized and relevant information for business users based on user roles. For example, a sales management dashboard can display California sales data only for the salesperson, West Coast sales data for the regional sales director and global sales data for the management team.



At the same time, an intuitive, self-service interface gives business users the ability to create and personalize their own dashboards. They can select the type of charts, tables and graphs that communicate most clearly to them, knowing that they are always seeing accurate, up-to-date information.

**Dashboard data must be timely.** When data is changed in IBM Cognos Express, its in-memory analytics server propagates those changes instantly to all users. And because IBM Cognos Express natively supports the ability to write-back to the database, dashboards are not just static. They are actionable. For example, if the sales director observes a large variance in the forecast, she can drill down and analyze the data to better understand the shortfall. She might find that a large deal on the West Coast had fallen off the forecast. If she knows that the deal will close this quarter, she can make a change instantly and annotate a comment so everyone can see the rationale for the change.

With integrated business intelligence and planning, insight is gained quickly and applied instantly to the planning process through write-back capabilities. Immediate action can be taken to optimize the business faster. The direct write-back capabilities are governed by secure access and audit trails that promote top-quality data standards. Users can see data updates in real time and are assured of compliance. There is no need to spend extra time or effort enforcing best practices for data standardization. This results in transparent, effective decision-making based on a single shared view of the business.

### **CONCLUSION**

IBM Cognos Express offers the full range of dashboards – operational, tactical and strategic – to help companies monitor, measure, manage and optimize performance across the company. Its intuitive, self-service dashboard capabilities provide flexible viewing options centered on a solid foundation of trusted business information that is shared company-wide.

IBM Cognos Express offers dashboard capabilities as one part of an integrated business analytics solution that gives midsize companies the ability to “think big and start small.” This complete business analytics solution offers midsize companies the flexibility to start anywhere – with dashboards, reporting, analysis or planning – and add other capabilities over time. This approach helps companies deliver project rollouts that match their resource and budget constraints, realize business benefits quickly and justify further investment to get the most value from their business analytics solutions.



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## **TIPS FOR IMPLEMENTERS: THE BASICS OF GOOD DASHBOARD DESIGN**

Business intelligence (BI) tools offer an increasing array of dashboard capabilities for the presentation of data, including diverse chart types and animations, however most BI developers aren't experts in user interface (UI) or graphic design. This note sets out some basic good practice when it comes to building dashboards, and covers some common traps to avoid.

### **KEY FINDINGS**

- Dashboards (a variant of reporting) can be an effective way to deliver BI to a wide variety of users, especially those ill-served by ungainly pages of tabulated reports.
- Dashboard design is a particular skill, requiring a strong focus on the user's role to secure the long-term adoption of the technology.
- Irrelevant key performance indicators (KPIs) mean irrelevant dashboards.
- Surprisingly, despite years of hyping, less than a quarter of the firms surveyed for the 2009 Magic Quadrant for business intelligence platforms use dashboards extensively.

### **RECOMMENDATIONS**

- Focus on what dashboards are for; the targeted delivery of a small group of KPIs relevant to a user's role.
- Dashboards need to be simple in form to be effective, and avoid the more "gimmicky" features available in products (like 3D effects) as they add no value to the delivery of information.
- Consider working with an experienced UI developer, human-computer interaction or layout specialist as part of your dashboard development team.

### **ANALYSIS**

The survey conducted for the 2009 "Magic Quadrant for Business Intelligence Platforms" found that dashboards still have a relatively low adoption in the BI user community – while 62.6% of 480 respondents were making "extensive use" of reporting functionality, only 22.6% were doing the same for dashboards. Most firms are just beginning to make full use of dashboard capabilities and need advice on the fundamentals. Furthermore, where firms are using dashboards, they're not always well developed. Some of the dashboards that Gartner analysts see are poorly designed and so unlikely to help users understand what the data is telling them or help them to make better decisions. This report is intended to help implementers create dashboards that are more consumable.



It's perhaps worth reiterating our definition of dashboards at this point: "This subset of reporting includes the ability to publish formal, Web-based reports with intuitive interactive displays of information, including dials, gauges, sliders, check boxes and traffic lights. These displays indicate the status of an item or the state of a performance metric compared with a goal or target value. Increasingly, dashboards are used to disseminate real-time data from operational applications."

In other words, the main purpose of a dashboard is to enable managers to quickly and routinely comprehend how they are performing against their KPIs, not to provide an environment for complex data analysis.

Without the necessary thought, dashboards can be built that are ill-suited to the task of delivering clear, unambiguous management information. A dashboard should be narrow in focus to be effective and not aim to cover too broad a dataset. A good maxim is to keep dashboards simple – this approach is much more likely to be useful in helping you build dashboards that are fit for purpose. Another good reason for simplicity is to ensure adequate performance – there is an inevitable trade-off between users wanting to see everything on the face of the dashboard and acceptable response times when rendering multiple graphical objects, particularly for animated dashboards built using Flash.

Based on this situation here are 12 pointers to help you deliver better, more useful dashboards:

- **Dashboards and the charts, dials and gauges they contain are only as good as the KPIs they serve up.** Presenting a set of irrelevant measures has one inevitable result – the disuse of the dashboard by the end users and, more often than not, a return to spreadsheets as an unregulated, but user controlled, substitute environment. Building a mutually agreed enterprise metrics framework can address this problem. Where possible, allow the user to add and subtract metrics from their dashboard, based on a defined pool in the metrics framework. End-users' needs change and perfect alignment is hard to obtain – let the final content be in the hands of the user.
- **Dashboards and the charts, dials and gauges they contain are only as good as the data they draw on.** Avoid the danger of data quality issues being seen as a nasty surprise by using one of the visual objects on the dashboard to deliver a data quality metric, either sourced from data quality tools, derived during the extraction, transformation and loading process or as supplied by the data stewards responsible. If you do not want to use a separate gauge or dial for this, consider different ways to indicate the quality, like using shading to indicate when the data is stale or poor. Gartner analysts have seen this type of approach used on flight watcher, for example where altitude, speed and position are on the dashboard. When the telemetry is delayed, the path shown goes from solid to dotted and the altitude/speed changes to gray.





- A dashboard that only refreshes monthly isn't really a dashboard at all. Data must be timely, with appropriate latency. There's a big difference between pushing a graphical report to end users via e-mail on a monthly basis and having a portal-based dashboard which is visible to users every day on their personal intranet home page. In the latter case the data must be updated at least daily. If it doesn't it's just a waste of screen real estate and will become ignored by users. Dashboards are good at giving "status" or perspective, and in some cases the status only updates daily as such less frequently updated dashboards can be useful (say if there is only weekly updates), as long as there is some means of interaction, perhaps a time slider, so users can see the measures changed with time, with the understanding that different metrics have different frequency – customer satisfaction data only refreshes every month, while other metrics like sales pipeline index may be updated during the day. However, the caution would still be not to persist this dashboard on a user's home page, but rather distribute it or allow them to drill to it when needed.
- Using too many dials is just more information overload. Don't weigh your dashboard down. It's hard for humans to process lots of information feeds at once – a basic rule of thumb is to use no more than seven objects on a dashboard. This aligns directly with Gartner's advice that at any given management level using seven metrics (plus or minus two) is most optimally effective. Developers sometimes get a little ambitious and decide to build a "cockpit" akin to that on a Boeing 747. What they don't realize is that pilots concentrate on four key flight instruments for the vast majority of the time and these are arranged in the same layout on all planes (see Figure 1). This also applies to "sparklines"

Figure 1. Learning From "Real" Cockpits



Source: [en.wikipedia.org/wiki/File:Six\\_flight\\_instruments.JPG](http://en.wikipedia.org/wiki/File:Six_flight_instruments.JPG)



(small high-resolution charts reporting one variable in context), which are undoubtedly elegant, but when used to excess can also add to information overload.

Dashboard designers can learn a lot from aircraft cockpits, which are:

- Focused on real key indicators: airspeed, rate of climb, altitude, direction and so on. Note that these are all status rather than performance indicators – the analogy only goes so far.
- Standardized, with four key flight instruments laid out in a basic “T” format.
- Graphically simple, with no unnecessary decoration.
  - **Use familiar chart formats.** If your dashboard design includes charts (as distinct from dials, gauges and traffic light indicators) for comparison across series use concrete visual metaphors (column/bar, line/area and maybe pie charts – see below). Managers and executives already know how to read these and assimilate the data they contain. Use unfamiliar, highly multidimensional chart types (x/y, heat/treemaps) with caution – these are best used for analysts working across broad data sets as part of exploratory interactive data visualization.
  - **Keep charts simple.** This applies to charts themselves too, where “less is more.” The aim should be to communicate the data with as little visual “noise” as possible. Edward Tufte, an authority on visualization defines this as the “data to ink” ratio where “data ink” is the essential ink (or pixels) used to present the data. You should aim to have as high a data:ink ratio as possible in each chart, dial, indicator or gauge too. In practical terms this means averring the use of unnecessary decoration, chart backgrounds that add no meaning, redundant text, filled objects (for example, colored areas) and grid lines – anything that adds nothing to the communication of the data or worse obscures it. However, take care not to go too far and remove meaning; Gartner analysts see too many dashboards that have no labels (or obscure labels), making it hard to understand what is being shown.
  - **Make dashboards “real.”** It goes without saying that the use of geographic maps overlaid with BI data immediately resonates with dashboard consumers. However, don’t be afraid to go beyond this by using mashup capabilities to overlay measures, variance or status flags onto process models, building layouts, seating plans and so on, in fact any representation that carries meaning in itself is a very powerful aid in making the data the dashboard delivers “real” to end users by transmitting context effectively.
  - **Avoid using color alone to transmit meaning.** While “traffic lights” are easily understood it should be remembered that a good minority of people (around 10% of males) perceive colors differently. Obviously this impacts other chart types too. Although there is a limited pallet of “safe” colors that can be used for all viewers, ideally a combination of color and shape or shade or position should be used to avoid ambiguity (and falling foul of disability regulation in some countries).



- **Don't be afraid to use (small) tables.** To misquote Gordon Gecko: “grids are good” (or at least they can be). Dashboard users know how to read rows and columns and they almost always want to see the underlying figures driving the important charts shown. Having a small, limited scope table (ideally no more than a 7x7 matrix) on the face of a dashboard linked to a chart or visual avoids unnecessary drill steps into data and can aid rapid understanding. Remember the aim is to give users quick access to important information. Granting tabular columns, interactive sorting and filtering features (linked to the graphical elements) can also aid self-serve behavior and user adoption.
- **Use pie charts with care.** Believe it or not pie charts are a hotbed of controversy: “It is one of the most widely criticized charts, and many statisticians recommend to avoid its use altogether, pointing out in particular that it is difficult to compare different sections of a given pie chart, or to compare data across different pie charts.” (Source [http://en.wikipedia.org/wiki/Pie\\_chart](http://en.wikipedia.org/wiki/Pie_chart).) With this in mind, and remembering that dashboards are intended to show how KPIs are trending against target, beware of using pie charts. If you do use them, pie charts should never have more than six segments. (The same can be said of stacked bar or column charts, where too many divisions is confusing, and strongly indicates that another chart type should be used.)
- **3D chart effects add no value.** Although this could be covered under the “keep charts simple” maxim above it's worth mentioning as it's a very prevalent issue. Although 3D chart effects may look “cool” they're just unnecessary chart junk. Try not to put 3D effects on 2D charts (like bar charts) as it just makes it more difficult to compare the data pictured effectively. Some 3D charts form themselves (for example, a 2x2 column of bars rendered in perspective) can obscure pieces of data, and actually make it harder to understand. There is a place for 3D representations in BI, but a dashboard isn't usually that place – these kinds of techniques are best used by analysts when exploring data or testing hypotheses visually.
- **Don't use animation for animation's sake.** Ever since Hans Rosling presented his compelling “gapminder” time-based analysis of family size by life expectancy by country since 1962 at TED (<http://www.gapminder.org/videos/ted-talks/hans-rosling-ted-2006-debunking-myths-about-the-third-world/>), BI vendors have been falling over themselves to produce animated bubble charts. Dr Rosling's presentation shows the power of animation when exploring complex datasets, but that's not what dashboards are for or how they're used. In the main, animation on dashboards is just decoration (for example, using Flash to make the segments of a pie chart unfold), there to add aesthetic gloss and of no value in the process of understanding the KPIs presented. You should only make extensive use of animation if it helps the user see trends or notice changes in data.





Finally, this note only covers some fundamentals to consider when designing dashboards. If you want to go deeper into dashboard design read “Information Dashboard Design: The Effective Visual Communication of Data” by Stephen Few (published by O’Reilly Media), for more on charts, “The Visual Display of Quantitative Information, 2nd edition” by Edward R. Tufte (published by Graphics Press).

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