

pureshare WHITEPAPER



Metrics Dashboard Design Designing Effective Metrics Management Dashboards

Designers of metrics management dashboards need to incorporate three areas of knowledge and expertise when building dashboards. They must understand the dashboard users' needs and expectations both for metrics and for the presentation of those metrics; they must understand where and how to get the data for these metrics; and they must apply uniform standards to the design of dashboards and dashboard suites in order to make them 'intuitive' for the end-users.

This paper outlines dashboard design best practices and design tips, and will help dashboard designers ensure that their projects meet with end-user approval. It concludes with a checklist of design considerations for dashboard usability

Probably the most common reason dashboards remain under-used is that the dashboard designer did not understand the end-users' needs

Increasing User Adoption of Metrics Dashboards

Users turn to metrics management solutions to find out what is going on with the business in order to make informed, reasoned decisions.

Good metrics management dashboards show key performance indicators (KPIs) in context so that they are meaningful, and present them in a way that allows users to instantly understand the significance of the information. This presentation lets users quickly evaluate choices and make decisions with full confidence that these decisions are supported by facts.

Dashboards are neither detailed reports nor exhaustive views of all data. Good metrics management solutions can offer users the option to 'drill-down' to as much detail as they require, or even link into reporting systems, but these are only ancillary functions. The primary function of metrics management dashboards is to support—even induce—pro-active decision-making.

Know the End Users

Users want dashboards that respond to their business requirements.

There is no substitute for understanding end-users' needs and getting involved in dashboard development. Even more important than understanding product capabilities is understanding the people who will be using the dashboards, what they need to know to improve the business, and what sort of dashboard organization and displays will work best for them.

Use Context to Make Metrics Meaningful

Users need to understand what the metrics *mean* before they can make decisions. Data is meaningful only in context.

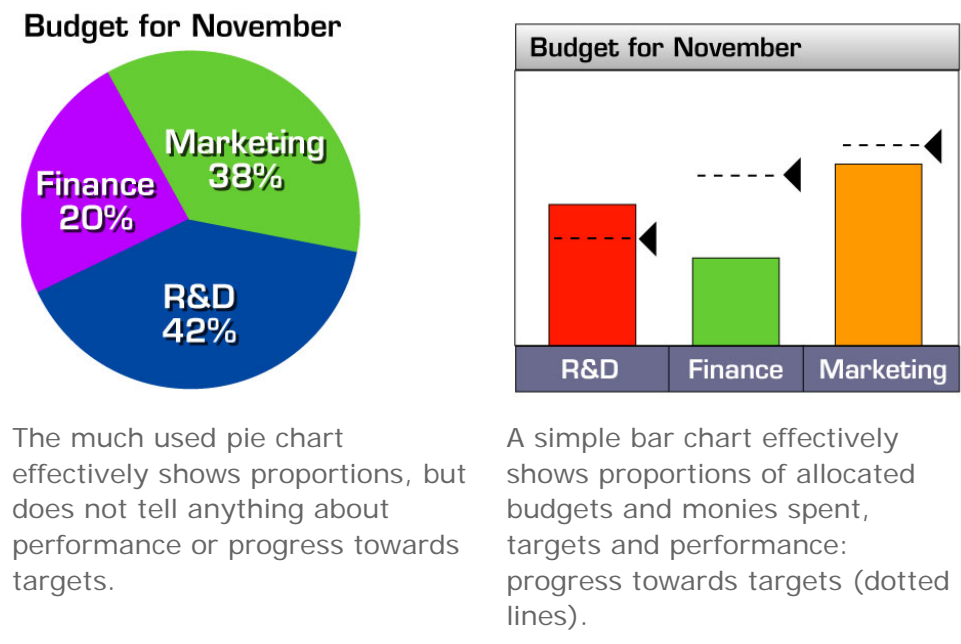
In order to easily understand metrics users must see them in context—their context. In fact, context and presentation are integral to any metric; without them the metric is simply meaningless numbers.

Dashboard designers should take time to learn what contextual information users require in order for metrics to be meaningful *for them* and to facilitate decisions and actions.

Context includes the date and time the metric was updated. In many cases, a metric has value only if the user knows when the data was retrieved.

Contextual information will differ depending on the specific area being managed. For example, dashboard users in finance may need to track actual expenditures against budget targets, while a support desk may need to track the number of trouble tickets exceeding mean resolution times by more than 15 percent. In an environment where a metrics management solution is being used to help improve processes, users may need to monitor trends, compared to performance during another given period.

Figure 1: Use displays to show context and progress towards targets.



Whatever the case, the dashboard designer should spend time understanding not only the data behind the indicator, but also the data that creates the context for the indicator (such as revenue targets, time period coverage, maximum capacities, etc.). This rule should guide the dashboard designer through every step of design, from data gathering to detailed composition of displays.

If a metrics management solution cannot easily bring together data from disparate sources, it may be worthwhile considering another solution.

Data Retrieval

Users need to have confidence in the integrity of the metrics they use to manage the business. They need to know that they are acting on facts, not guesses.

There is no easy formula that will guarantee the value of data brought to dashboards. Nonetheless, it is essential to determine the sources, ownership and quality of the data to be used before starting dashboard design.

The following guidelines will help dashboard designers deliver the metrics dashboard users need and will use.

Identify KRAs and KPIs

Users need to know *their* metrics so they can make informed decisions for *their* areas of responsibility.

A common—and effective—approach to understanding what users need to know is to work with end users to identify the key results areas (KRAs) for which they are responsible, then the key performance indicators (KPIs) they need to monitor and manage to improve performance in their areas of responsibility.

Get the Data Whatever Its Format or Location

Users want metrics derived from complete data, no matter where that data is stored, so they do not have to guess.

Once the metrics users require have been identified, the data should be retrieved, *no matter where it is located*.

A well-designed metrics management dashboard provides both a current synthesis and details of key metrics. Often the data required to provide this synthesis and these details is spread across a variety of databases technologies and even spreadsheets at different physical locations. It is, nonetheless, essential that all required data be retrieved. A dashboard that provides metrics based on partial information is of little value when a global view is needed.

A good metrics management solution will be able to play a role in ensuring data quality by monitoring data sources and by automating data transformations.

Refresh the Data According to Users' Needs

Users need metrics that are up to date so they can act on current and probable future situations.

The timeliness of a metric is as important as the metric data itself. Find out how current data must be for it to be valuable to users, and set the polling frequencies for the queries that retrieve the data accordingly.

Metrics used to monitor hourly call levels to a help desk are worse than useless if data is gathered every Sunday at 6 a.m. Similarly, if sales personnel report sales once a week on Thursdays, there is little point in polling the database every hour for updates to this data.

Usability Design Best Practices

Users do not want to be surprised by the dashboard design. They need to be able focus on metrics and decisions.

A metrics management dashboard should function for the user in the same way that an automobile dashboard or traffic signs function for an automobile driver.

Just as a driver knows to stop at a red light, a metrics dashboard user should understand without deliberation that, for example, a red thermometer means that corrective action is required. This requirement means that dashboard design must be consistent with common usage and practices as well as across all dashboards.

Offer Users a Choice of Views

Users need to be able to view metrics differently, so they can see the relationships between the metrics that affect their specific concerns.

Users may need to view metrics differently, and dashboards should allow them to do this. For example, financial metrics dashboards showing actuals versus budgets could offer views by department, and by line item or profit center.

Whatever the view offered, dashboards should be consistent, and the current view should be clearly identified by titles and labels.




PureShare Accelerators are best practices-based, ready-to-deploy dashboard templates for specific areas of business.

Use Commonly Accepted Symbols, Colors & Organization

Users need to understand dashboards instantly and without specialized training so they can focus on their jobs, not on deciphering data.




Use symbols, colors and organization in ways that are commonly accepted and therefore easily understood.

Figure 2: Use color to improve communication of key information.

By Region	
Flagstaff	
Phoenix	
Tuscon	

Users might be confused by the use of color combined with the expressions on the faces.

Red usually means that something is amiss, but the red face has a smile. The user will not know if action is required.

By Region	
Flagstaff	
Phoenix	
Tuscon	

Green usually means that everything is going well. The message is reinforced by the smiley face.

Red usually means action is required. This message is reinforced by the frown.

For example, red is the color most commonly used to identify something that requires attention. Therefore, unless there is a compelling reason to use another color to identify, for example, sales that are below targets, use red to communicate this information. Similarly, where appropriate use commonly accepted symbols, such as stop signs or caution signs, rather than new symbols that users will have to learn.

Organize information using commonly accepted norms. Generally, this means that the most important information is placed at the top of a dashboard and secondary information and details are placed below.

Note, however, that symbols may differ between countries and cultures. Take these differences into account if the dashboards will be used in different parts of the world.

Establish Clear Dashboard Navigation & Hierarchies

Users need to be able to find information—more detail, less detail or a different view—instantly.

Few dashboards are deployed individually. Typically users require a suite of dashboards. Clearly establish an organization for the dashboard suite. Use an easily recognizable hierarchy of dashboards and consistent links for navigating between dashboards.

A good rule is to use the dashboard with top-level information for a user's area of responsibility as that user's entry point, then provide links from individual metrics to dashboards with more details about that area of the business. This is known as 'drill-down' capability.

Maintain Consistency of Design

Users do not want to have to *learn* how to read each dashboard.

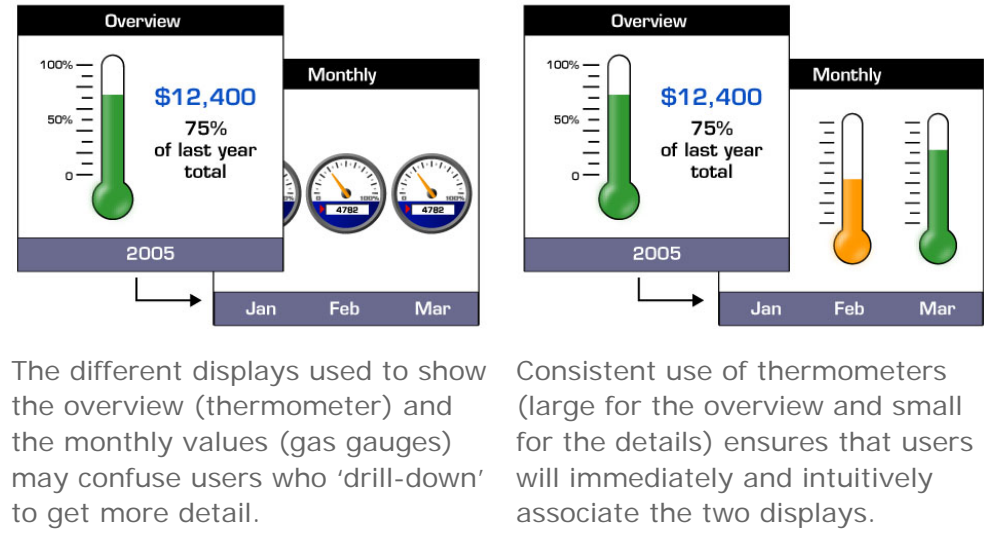
Establish and implement a limited set of templates with consistent use of color, symbols and navigation, and use them throughout the dashboard suite.

Presentation of information on dashboards should be consistent. For example, if dashboards show trends, percentages and absolute numbers, place each type of information in the same place on every dashboard and use the same display for these types of information across similar dashboards.

For example, if thermometers are used to show progress of revenue against targets in the company financials roll-up dashboard, do not use gas gauges to show revenue against targets in the regional detail dashboards; use thermometers.

Similarly, if display threshold of red-yellow-green are set to 40, 60 and 80 percent for the company roll-up dashboard, use the same thresholds for the details unless there is a compelling reason to do otherwise.

Figure 3: Maintain consistent design for all dashboards.



Use Color Judiciously

Users expect color to provide important information they need, not distract them.

Generally, color can be used to for four effects on a dashboard. It can:

- Identify the status of key metrics and areas that require attention. For example, use red to identify expenditures that have increased more than 15 percent over the same period the previous year.
- Identify types of information. Color can be used to help users instantly identify the type of information they are looking at. For example, dark green can be used for monetary values, and dark blue for quantities of items.
- De-emphasize areas or items. Border areas, backgrounds and other supporting dashboard components (the dashboard skins) should use plain, unobtrusive colors that help define dashboard areas without distracting from the information displayed.
- Identify the dashboard type or its level. Different background colors, or the color of dashboard titles can help users identify

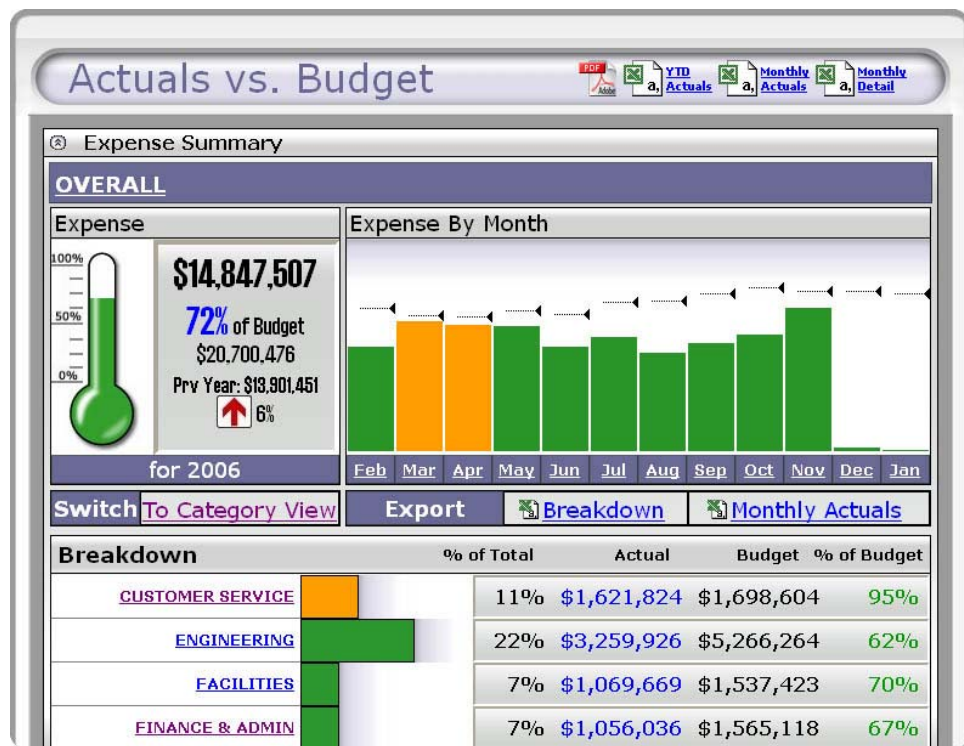
what they are looking at. For example, financial dashboards could use a green skin, while help desk dashboards could use a beige as a reassuring color.

Use Dashboard Groups to Improve Organization

Users need to see metric groups and hierarchies so they can understand relationships between different areas of the business.

Group displays together by the type of metric displayed or by functional area.

Figure 4: Sample dashboard with grouped metrics



PureShare's Profit Accelerator dashboards group related information together to improve dashboard 'legibility'.

For example, on a dashboard showing financial roll-ups, put top-level information into one group that shows progress against targets in three ways: absolute numbers against targets; performance compared to the same period in the previous year, or against average performance for

Large, geometric shapes are easier to see on screen and they are more quickly processed than detailed illustrations.

the same period during the last five years; and the trend, based on performance over the last 60 days. Alternately, show absolute numbers against targets for each region or department.

Whatever the rationale used to group information on dashboards, be consistent. Use the same rationale when establishing groups on different dashboards.

Set dashboard groups to 'open' or 'closed' based on the hierarchy of information. Closed groups can be used to provide more detailed metrics, or complementary metrics on the same dashboard without distracting the user's eye from the primary information.

Display Selection & Design

Users must be able to understand *what* they are being shown without stopping to analyze *how* it is being shown.

Select the display symbols that are most appropriate for displaying the information the dashboard users need.

Identify a limited set of symbols and use these on all dashboards. Be consistent with location, size and color of supplementary information associated with the symbols. Consider using different sizes of the same display symbol for different levels of information.

Avoid displays that are overly complex, colorful or animated. Such qualities are very effective when correctly used. However, the more complex the display, the more difficult it is to process. Overly complex dashboard displays distract users from the information they need and want. Consider offering views that separate the information into grouped displays or even different dashboards.

Do not hesitate to work with the dashboard vendor to design new display symbols that will improve presentation of information.

Actual Values, Percentages & Trends

Different users need different information in order to make informed decisions and take appropriate action.

Decide with the dashboard users what metrics they need to monitor and manage. Different users may require different information from the same data.

For example, a CEO may want to know trends in budget expenditures, while a CFO and department managers may be more interested in actual numbers (actuals versus budgets). Use data to present the information users need, and make sure that the type of information is clearly identified. A thermometer showing revenue trends that is interpreted as showing actual numbers can lead to costly misinterpretations.

Timestamps

Users need to know when the metric was updated so they know the age of the data on which they base their actions.

Time is an essential part of a metric's context. Ensure that users can know when the data for the metrics was retrieved. In many cases this information is the key to understanding what the metric means. Ensure that this information is available, but that it does not crowd the display. Consider putting the date and time in a mouse-over.

Titles & Labels

Users need to know instantly what they are looking at so they can focus on what it means for the business.

Give all dashboards meaningful, descriptive titles. Descriptive titles are generally more intuitive than cryptic or symbolic ones. Assign labels to dashboard groups and display symbols so that users can clearly identify information. Keep labels in the same location and use the same color standards throughout the dashboard suite.

Do not abuse labels. Over-use of labels can crowd out essential information.

Mouse-Overs

Users often want more information to help them understand the significance of a metric.

Mouse-overs are an effective way to include detailed metric information without crowding the dashboard.

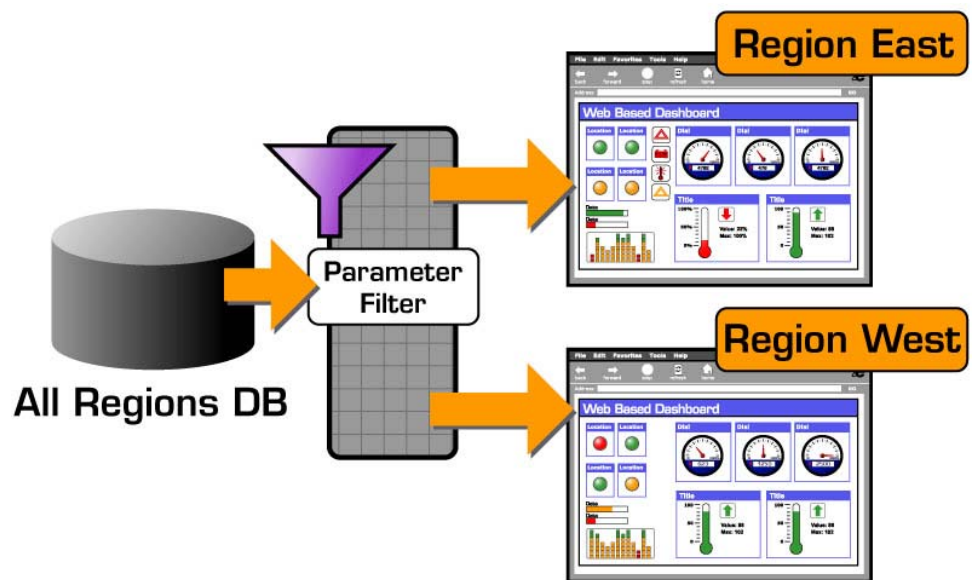
Information such as last and next run time metrics for another corresponding period, etc., can be included in mouse-overs to help users understand the significance of the primary information on the dashboard.

Parameter-Based Views

Users want to see only the metrics that help them do their jobs.

Different users give different weight to different information.

Figure 5: How parameters can be used to simplify dashboard design and implementation, and improve usability.



Parameters can be used to filter data so that users see only the information they need. In the example above, data is filtered by region. All users see the same dashboard, but users in Region East see information for their region, while users in Region West see information for their region.

Parameters are user-set variables that can be used to filter metric data delivered to the dashboards shown to different users. Consider designing dashboards with parameters, so that users get views of the dashboards based on their needs and permissions.

For example, the same dashboard suite might be used by a help-desk manager and individual employees in the department. The manager may need a consolidated view of all calls, by type, while each employee might need to see the calls for which he or she is responsible, a view created by filtering the information based on the user ID.

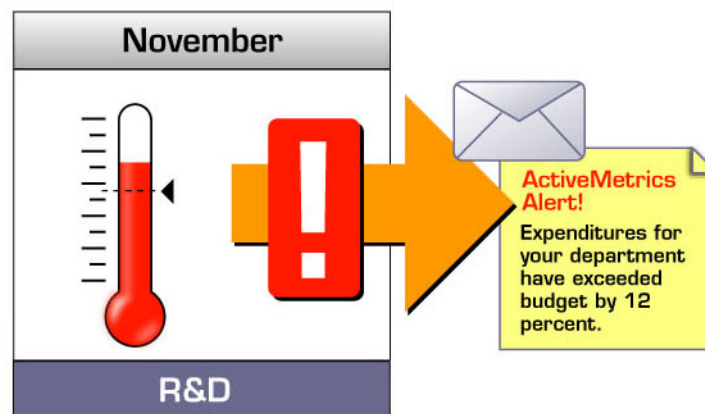
If the dashboards use parameters, display these prominently so that users will know what the metrics they are being shown represent.

Use Thresholds & Threshold-Triggered Actions

Users benefit most from dashboards that help them take corrective actions before problems occur.

Thresholds and threshold-triggered actions can be used to transform metrics monitoring into pro-active management. Use thresholds to trigger actions that alert users to potential trouble areas, or even initiate corrective action by running scripts.

Figure 6: Simple alert triggered by a threshold



Thresholds can be used with alerts to transform dashboards from passive monitoring devices into active vehicles inducing corrective and, especially, preventive decisions and actions.

The primary function of metrics management dashboards is to support—even induce—pro-active decision-making.

For example, set a threshold to send e-mails to the person responsible for managing a budget if spending reaches more than 70 percent of budget before the middle of the month. Or, in a help-desk environment, launch a script to change phone messages and reschedule non-essential activities if wait times increase beyond SLA requirements.

Roll-Ups & Drill-Downs

Users need to get both the big picture and the details.

A dashboard is most useful when used as part of a suite of complementary dashboards.

Group together on a dashboard the metrics users need to see together, then use drill-downs and roll-ups to provide details and overviews. This technique provides users the metrics they need without crowding too much information on any single dashboard.

Animation

Users appreciate a bit of fun, but are annoyed by too many gimmicks.

Animation, such as blinking lights, moving figures and other such displays can add interest to dashboards. Use these sorts of features very judiciously, however, and consider providing non-animated versions of dashboards, or an ‘animation off’ button.

Animation can be fun the first few times but, if not properly used, it can become an annoyance. Consider using animation only for special projects, such as a month-end race to motivate the sales team, or to draw attention to new dashboard features for a limited period of time.

Visual ‘Noise’

Users turn to dashboards to be informed, not dazzled.

Avoid cluttering dashboards and dashboard displays with unnecessary paraphernalia, such as ornate frames, patterned backgrounds or 3D effects that add no value to the information displayed.

A minimalist approach is almost always the best approach.

Usability Checklist

Attention given to dashboard design can pay enormous dividends, both in user satisfaction with the dashboards and, especially, in improved business performance founded in pro-active metrics management and reasoned, informed decision-making processes.

Dashboard users want their questions about the metrics they are viewing on a dashboard answered even before they can formulate the questions. In fact, by the time a question about business performance is asked, it is often too late to take corrective action.

Valuable dashboards provide up-to-date information right at the user's fingertips so that problem areas can be addressed as they arise, and opportunities can be taken advantage of immediately.

Ensuring that a dashboard and its components answer the questions in the table below should help dashboard designers create more effective dashboards.

User Question	Design Solution
What am I looking at?	Use clear, descriptive titles and labels.
Does this mean 'good' or 'bad'?	Use standard, culturally accepted colors and symbols.
Are things getting better or worse?	Employ thresholds, and show meaningful comparisons and trends.
What is being measured, and what are the units of measure?	Clearly identify the units of measure, and provide actual values.
What is the target or norm?	Clearly show targets and norms, and design displays that show progress towards these.
How recent is the data?	Provide a date and time stamp for each metric.

User Question	Design Solution
How can I get more details?	Provide drill-down links to groups with detailed information.
How can I get a broader view?	Provide links to roll-up and overview dashboards.
What do I do with this information: what action should I take?	Always place data in context, and where possible suggest advisable actions based on the metric.
When should I check for an update?	Provide the date and time when the metric will be updated. When business needs warrant, allow ad-hoc updates.
How do I get metrics that are not on these dashboards?	Be ready to develop new dashboards. Users will want them!

Table 1: Common user questions and design solutions to these questions

About PureShare

PureShare is a metrics management software vendor that develops proactive, web-based corporate performance monitoring and enterprise reporting applications.

PureShare's proactive metrics management applications empower business users to see key performance indicators (KPI) in real-time and allow business managers to accurately gauge performance. With PureShare, organizations can harness corporate data into powerful visual metrics that:

- **Automate** the reporting and monitoring of key performance indicators (KPIs), as well as data transformations.
- **Enable discovery** of new insights into the business, and to react quickly to those – rather than making after-the-fact corrections.

- **Trigger positive change** by focusing on factors that directly impact corporate performance.

PureShare products include:

- **PureShare ActiveMetrics™**, a web-based corporate performance management application that proactively monitors and measures KPIs within the context that each manager, executive or operator requires, providing real-time executive views of performance drawn from any data source.
- **PureShare ReportRouter™** is a web-based reporting framework that simplifies access to reports from across reporting platforms.

PureShare's customers include Global 1000, Fortune 500, and mid-size organizations in ITSM, support, financial, insurance, retail and other industry sectors.

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