

The Best Data Dashboard Alternative: More Efficient But Equally Effective Performance Monitoring and Reporting

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ABSTRACT

You can build a web and email based Performance Monitoring and Reporting package with just Base SAS, ODS Graphics, and ODS HTML5, for an incisive package to make best use of the time, and seize the attention, of its users/recipients. Show Them What's Important! An email, triggered by conditions in the data, can attach (or link to) an Exception Report. It can link to all other relevant information, or you can attach a zip file of the entire package. Why would anybody bother to look at a report when there are no exceptions at the latest monitoring date?

A Sufficient and Necessary Reporting Structure (all parts interlinked) consists of:

- (a) Exception Report (produced only when any occur, OR one line: "No Exceptions");
- (b) Regularly scheduled Summary Listing of Actual versus Standard for Every Measurement Being Monitored at the Current Reporting Cycle (Each Actual has link to its Trend);
- (c) For Each Measurement, Trend Plot of Actual Start Date through Current (with a reference line at the monitoring standard)—linkable from measurement entries in the Exception and Summary Reports.

If your report user REALLY need

as extra visual gadgets, like dials and gauges, you could license SAS/GRAPH to use PROC GKPI, to report on measures (renamable as "Key Performance Indicators") as an add-on to this inherently sufficient communication package for the essential monitoring information.

INTRODUCTION

I am showing you the 2026 version of the method I originally developed to keep management apprised of what they needed to know about the status, usage, capacity, and performance of all of the computing, printing, and network resources at Miller Brewing Company. That scope was broader than what I am focusing on here. It was an era BEFORE email, BEFORE the internet, and BEFORE the ability to deploy interlinked information. The monthly report was hardcopy only. The master was photocopied to multiples that were disseminated via inter-office envelopes.

The key process, features, and needs of enterprise performance reporting are still the same. To track and inform people who must know the performance status of their business or organizations, NO peculiar graphic gadgets are necessary.

Check the measures of interest as frequently as deemed necessary: intermittently in real time (every N minutes), hourly, daily, weekly, monthly, quarterly, or even only annually. Compare each measure with a Goal for Achievement (i.e., a standard number that must be equaled or exceeded), or a Threshold for Danger (i.e., a standard that is a signal for Too High that must not be reached or exceeded). Whenever a Goal is Failed, or a Threshold is Crossed, that should trigger an Exception Report.

At each monitor results reporting event:

- Notify the responsible or concerned parties of any exceptions to what the performance should be
- Provide current status with a summary table of every performance measure, actual versus its standard
- Provide a trend plot of each measure, with a reference line for its standard as a comparison across as many reporting intervals as are deemed of interest. If the standard changes over time, then that reference line should instead be a Step Plot overlaid with the trend plot, not a flat line.

- Include a table of all past exceptions for the performance measures as a helpful concise Look Back. Code is available upon email request to the author.

DATA

Measure Data

Measurement Date

Measurement Variable1, 2, 3, . . .

Performance Criteria (one for each of the MeasurementVariables1, 2, 3, . . .

Measurement Variable

Measurement Variable Description

Performance Standard Value

Type of Standard (Minimum OR Maximum)

Performance Standard SAS Format

THE INTERLINKED REPORT ELEMENTS

The independent HTML files displayed in this section can be filed anywhere accessible to recipients of the email. No image of a linking-from email is shown. Its appearance would differ, depending on the specific email client used. Information on how to send an email from a SAS program is available in the references.

The email can link to the Exception Report, wherever it might be. From there, one can ultimately find one's way through the entire package of reports. Alternatively, as shown in Displays 5 and 6, the Exception Report can be part of a single package of all of the reports. One can find one's way through that single package. That package can have the reports conveniently interlinked as shown in Display 6, or can simply be scrollable as shown in Display 5, which may be feasible for a sufficiently short package.

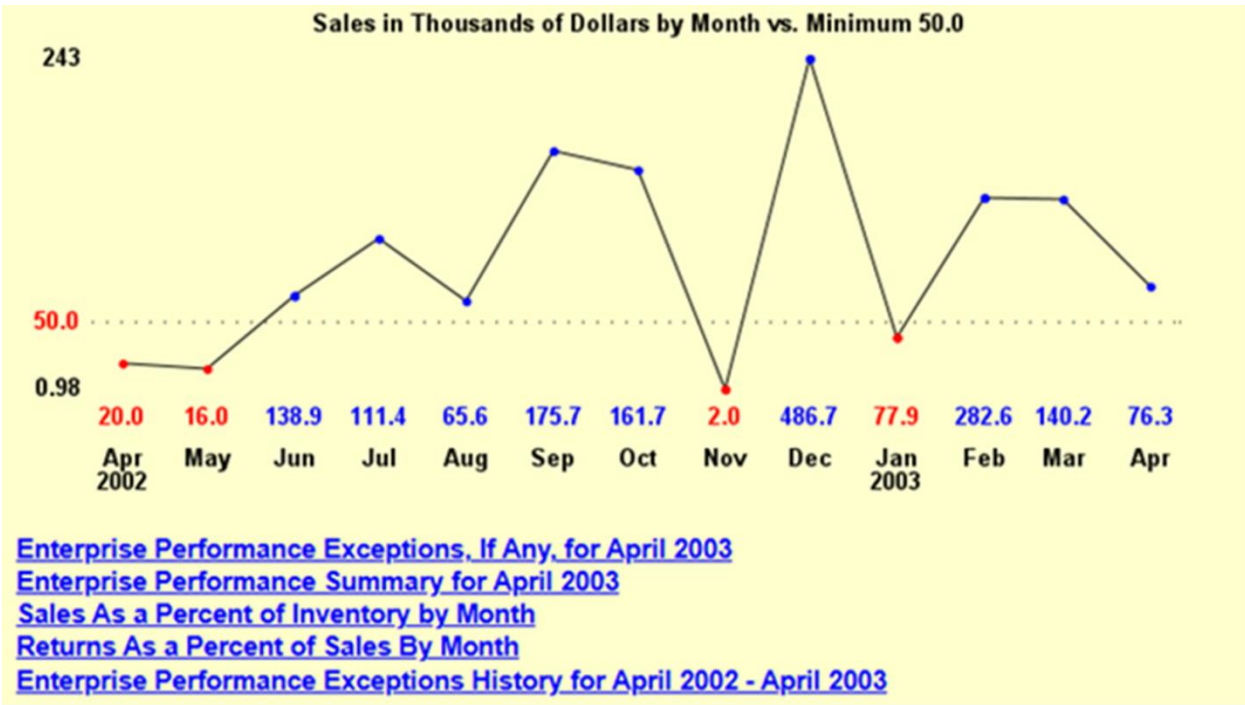
Displays 1 through 4 take you through a tour of the reports, but include only one of the time series plots.

There were Enterprise Performance Exceptions for April 2003
Please review the Enterprise Performance Exceptions Report (and other reports, if interested)
If questions, contact LeRoy Bessler [BesslerLeRoy2024@gmail.com]
Enterprise Performance Exceptions for April 2003

Performance Measure	Actual Performance	Problem	Performance Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	Greater Than	4.00	0.88
Sales As a Percent of Inventory	22.3	Less Than	25.0	-12.5

[Enterprise Performance Summary for April 2003](#)
[Enterprise Performance Exceptions History for April 2002 - April 2003](#)
[Sales in Thousands of Dollars By Month](#)
[Sales As a Percent of Inventory by Month](#)
[Returns As a Percent of Sales By Month](#)

Display 1. Exception Report. **Here, click, e.g., on the link Sales in Thousands of Dollars By Month**



Display 2. Trend Plot. [Here, click Enterprise Performance Summary for April 2003.](#)

Enterprise Performance Summary for April 2003

Performance Measure	Actual Performance	Performance Standard	Type of Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	4.00	Maximum	0.88
Sales As a Percent of Inventory	22.3	25.0	Minimum	-12.5
Sales in Thousands of Dollars	76.3	50.0	Minimum	-63.8

[Enterprise Performance Exceptions, If Any, for April 2003](#)
[Enterprise Performance Exceptions History for April 2002 - April 2003](#)
[Sales in Thousands Of Dollars By Month](#)
[Sales As a Percent of Inventory by Month](#)
[Returns As a Percent of Sales By Month](#)

Display 3. Summary Report. [Here, click Enterprise Performance Exceptions History.](#)

Enterprise Performance Exceptions History - April 2002 through April 2003

Year	Month	Performance Measure	Actual Performance	Problem	Performance Standard
2002	April	Returns As a Percent of Sales	4.78	Greater Than	4.00
2002	August	Returns As a Percent of Sales	4.31	Greater Than	4.00
2002	September	Returns As a Percent of Sales	5.60	Greater Than	4.00
2002	November	Returns As a Percent of Sales	6.35	Greater Than	4.00
2003	April	Returns As a Percent of Sales	4.31	Greater Than	4.00
2002	May	Sales As a Percent of Inventory	13.3	Less Than	25.0
2002	August	Sales As a Percent of Inventory	21.7	Less Than	25.0
2002	November	Sales As a Percent of Inventory	21.2	Less Than	25.0
2003	January	Sales As a Percent of Inventory	16.9	Less Than	25.0
2003	April	Sales As a Percent of Inventory	22.3	Less Than	25.0
2002	April	Sales in Thousands of Dollars	20.0	Less Than	50.0
2002	May	Sales in Thousands of Dollars	16.0	Less Than	50.0
2002	November	Sales in Thousands of Dollars	1.0	Less Than	50.0
2003	January	Sales in Thousands of Dollars	39.0	Less Than	50.0

[Enterprise Performance Exceptions, If Any, for April 2003](#)

[Enterprise Performance Summary for April 2003](#)

[Sales in Thousands of Dollars By Month](#)

[Sales As a Percent of Inventory by Month](#)

[Returns As a Percent of Sales By Month](#)

Display 4. Enterprise Performance Exceptions History Report.

EVERYTHING IN ONE HTML FILE, TWO WAYS

A single-package HTML file can either be attached to the email, or linked to from the email.

There were Enterprise Performance Exceptions for April 2003

Please review the Enterprise Performance Exceptions Report (and other reports, if interested)

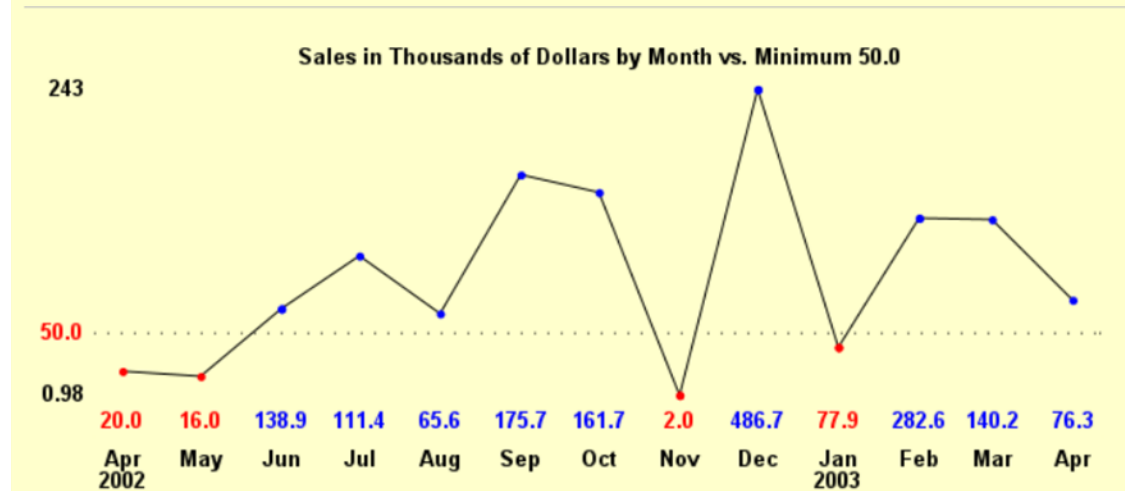
If questions, contact LeRoy Bessler [BesslerLeRoy2024@gmail.com]

Enterprise Performance Exceptions for April 2003

Performance Measure	Actual Performance	Problem	Performance Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	Greater Than	4.00	0.88
Sales As a Percent of Inventory	22.3	Less Than	25.0	-12.5

Enterprise Performance Summary for April 2003

Performance Measure	Actual Performance	Performance Standard	Type of Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	4.00	Maximum	0.88
Sales As a Percent of Inventory	22.3	25.0	Minimum	-12.5
Sales in Thousands of Dollars	76.3	50.0	Minimum	-63.8



Display 5. (Clipped Top of) Concatenated Reports.

Links Between the Reports Are Unnecessary for a Short Enough Package.

There were Enterprise Performance Exceptions for April 2003
 Please review the Enterprise Performance Exceptions Report (and other reports, if interested)
 If questions, contact LeRoy Bessler [BesslerLeRoy2024@gmail.com]
 Enterprise Performance Exceptions for April 2003

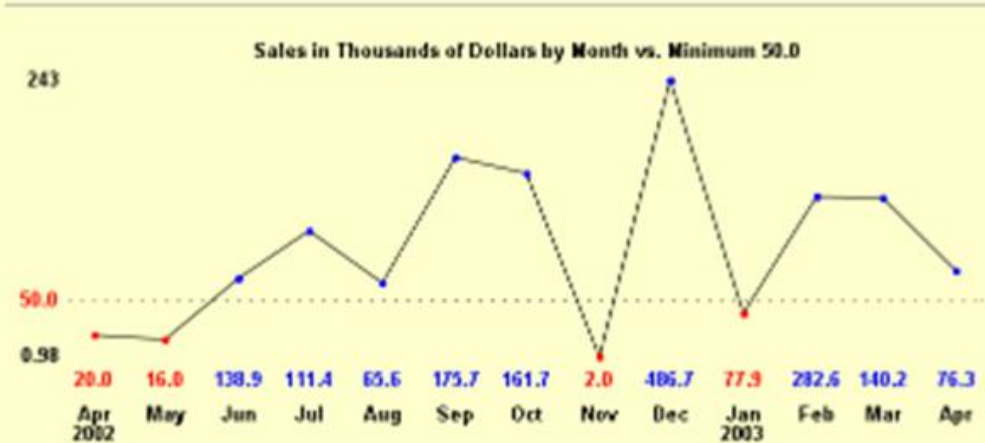
Performance Measure	Actual Performance	Problem	Performance Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	Greater Than	4.00	0.33
Sales As a Percent of Inventory	22.3	Less Than	25.0	-12.6

- [Enterprise Performance Summary for April 2003](#)
- [Enterprise Performance Exceptions History for April 2002 - April 2003](#)
- [Sales In Thousands of Dollars By Month](#)
- [Sales As a Percent of Inventory by Month](#)
- [Returns As a Percent of Sales By Month](#)

Enterprise Performance Summary for April 2003

Performance Measure	Actual Performance	Performance Standard	Type of Standard	Change Since Previous Month
Returns As a Percent of Sales	4.31	4.00	Maximum	0.33
Sales As a Percent of Inventory	22.3	25.0	Minimum	-12.6
Sales In Thousands of Dollars	76.3	60.0	Minimum	-83.3

- [Enterprise Performance Exceptions, if Any, for April 2003](#)
- [Enterprise Performance Exceptions History for April 2002 - April 2003](#)
- [Sales In Thousands Of Dollars By Month](#)
- [Sales As a Percent of Inventory by Month](#)
- [Returns As a Percent of Sales By Month](#)



- [Enterprise Performance Exceptions, if Any, for April 2003](#)
- [Enterprise Performance Summary for April 2003](#)
- [Sales As a Percent of Inventory by Month](#)
- [Returns As a Percent of Sales By Month](#)
- [Enterprise Performance Exceptions History for April 2002 - April 2003](#)

Display 6. (Clipped Top of) Concatenated Reports.
 Links Between the Reports Are Helpful for a Long Package.

DESIGN PRINCIPLES USED AND DEMONSTRATED IN THE REPORTS

ACCESSIBLE COLOR

About 25 years ago, some SAS users/authors began a fad of so-called "Traffic Lighting" to color code Bad & Good with Red & Green. I have long been informing SAS users that the commonest form of color blindness cannot distinguish Red from Green.

READABLE TEXT

Provide sufficient contrast. Light backgrounds need dark (i.e., Black) text. Dark backgrounds need light (i.e., White) text. Red and Blue are dark colors.

Make text big enough. Make it Bold. Bold is Always Safe and Effective.

COMMUNICATION-EFFECTIVE COLOR USE

For color to be distinguishable (i.e., to answer the question "What color is it?"), color requires **mass**. Markers and legend color swatches must be big enough. Text and lines must be thick enough.

BEST USE OF THE AXES FOR THE TIME SERIES PLOTS

When tracking performance versus standard, limit the Y axis range to the actual minimum through maximum. Use an X axis range that starts and ends with the same month (day) of the years (weeks) span. It may reveal cyclic behavior.

UNIVERSAL KEY QUESTION FOR TIME SERIES PLOTS

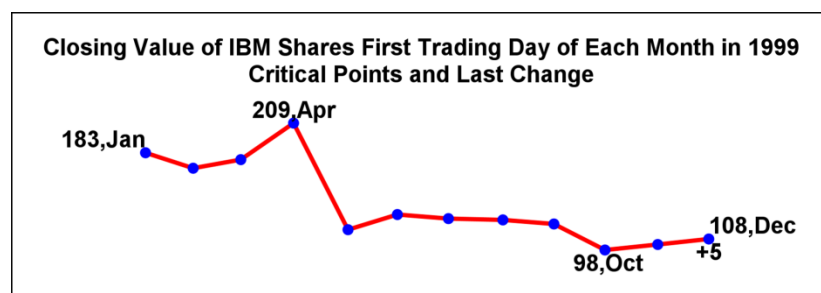
What ARE the X & Y values? Explicitly display them. But HOW?

Do not require viewers to run their eyes from plot points to the Y axis, and then to interpolate a precise Y value based on its embracing axis values.

To annotate the plot points. Including both the Y value and the X value might be impractical due to collisions between adjacent values, or (less likely) between annotation and the plot line. Annotating only the Y value leaves it distant from its X value, a disadvantage, especially when there are many plot points.

An X Axis Table displays Y values in immediate proximity to (i.e., above) their X values.

If both annotation and an X axis table are infeasible, use Sparse Line Annotation. **It Can Suffice.** On a line with no axes, annotate the Y value and the X value for Start, End, Minimum Y, Maximum Y, and Amount and Direction of the Last Change. For performance tracking, knowing the values for EVERY point is not necessarily important. One is primarily interested in the last point, and the most recent change. The Sparse Line Annotation in Display 7 is not representative of the performance monitoring plots that have been shown here. But the concept could be adopted in this context if the policy is to show so much history that an X axis table is infeasible due to the number of Date and Y value pairs to be shown. I first used Sparse Line Annotation in 1990, eight years before Peter Zelchenko developed his simpler annotation-free and axes-free sparse lines to display in a table column for the Medved Quote Tracker.



Display 7. Sparse Line Annotation. The simplest, but importantly informative, plot you can make.

CONCLUSION

To track and inform people who must know the performance status of their business or organizations, NO peculiar graphic gadgets are necessary. Keep them apprised via email. Provide a straightforward package of tables and trend plots. The recipients will know the current status, and see the history.

REFERENCES

Hemedinger, Chris. June 2022. "Tips and Tricks for Sending Email Using SAS". Presented at the 2022 Wisconsin Illinois SAS Users Conference, Milwaukee WI USA, Available at:
<https://www.wiilsu.org/PastConferences/2022/SUSJun2022/Proceedings/Slides/Hemedinger%20-%20Tips%20and%20Tricks%20for%20Sending%20Email%20Using%20SAS.pdf>

Tilanus, Eric. June 2015. "Using SAS® As Your Mail Room". Paper Presented at the 2022 Wisconsin Illinois SAS Users Conference, Milwaukee WI USA, Available at:
<https://www.wiilsu.org/LHIDsgghss734gfs2HR/SUSJun2015/Proceedings/Papers/Tilanus%20-%20Using%20SAS%20as%20your%20mail%20room.pdf>
Slides Presented at the 2022 Wisconsin Illinois SAS Users Conference, Milwaukee WI USA, Available at:
<https://www.wiilsu.org/LHIDsgghss734gfs2HR/SUSJun2015/Proceedings/Slides/Tilanus%20-%20Using%20SAS%20as%20your%20mail%20room.pdf>

For SAS documentation about sending email from SAS, see:

https://documentation.sas.com/doc/en/workbenchcdc/v_001/vwblestmtsglobal/n0ig2krarrz6vtn1aw9zzvte44go.htm

<https://support.sas.com/kb/19/767.html>

https://documentation.sas.com/doc/da/pgmsascdc/v_072/lepg/p1ca38p54k3kxkn10q11zwpicvpk.htm

NOTE: For sending email from a SAS program there may be other information resources unique to your operating system, or to the email environment for your computer.

For more information analogous and supplementary to that presented in the above section DESIGN PRINCIPLES USED AND DEMONSTRATED IN THE REPORTS, see:

Bessler, LeRoy. January 2023.

Visual Data Insights Using SAS ODS Graphics: A Guide to Communication-Effective Data Visualization. New York, NY: Apress.

See Chapters 1 and 2 for best practices for graphic design & use of color, applicable for any software. Remaining chapters provide illustrations and code that implement the best practices. The content can apply to any application, not only to performance reporting.

CONTACT INFORMATION

Your comments, questions, and requests for code are valued and encouraged. Contact the author at:

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