

Building Information Dashboards with R

UseR! 2009, Rennes, France

July 10, 2009

Jim Porzak



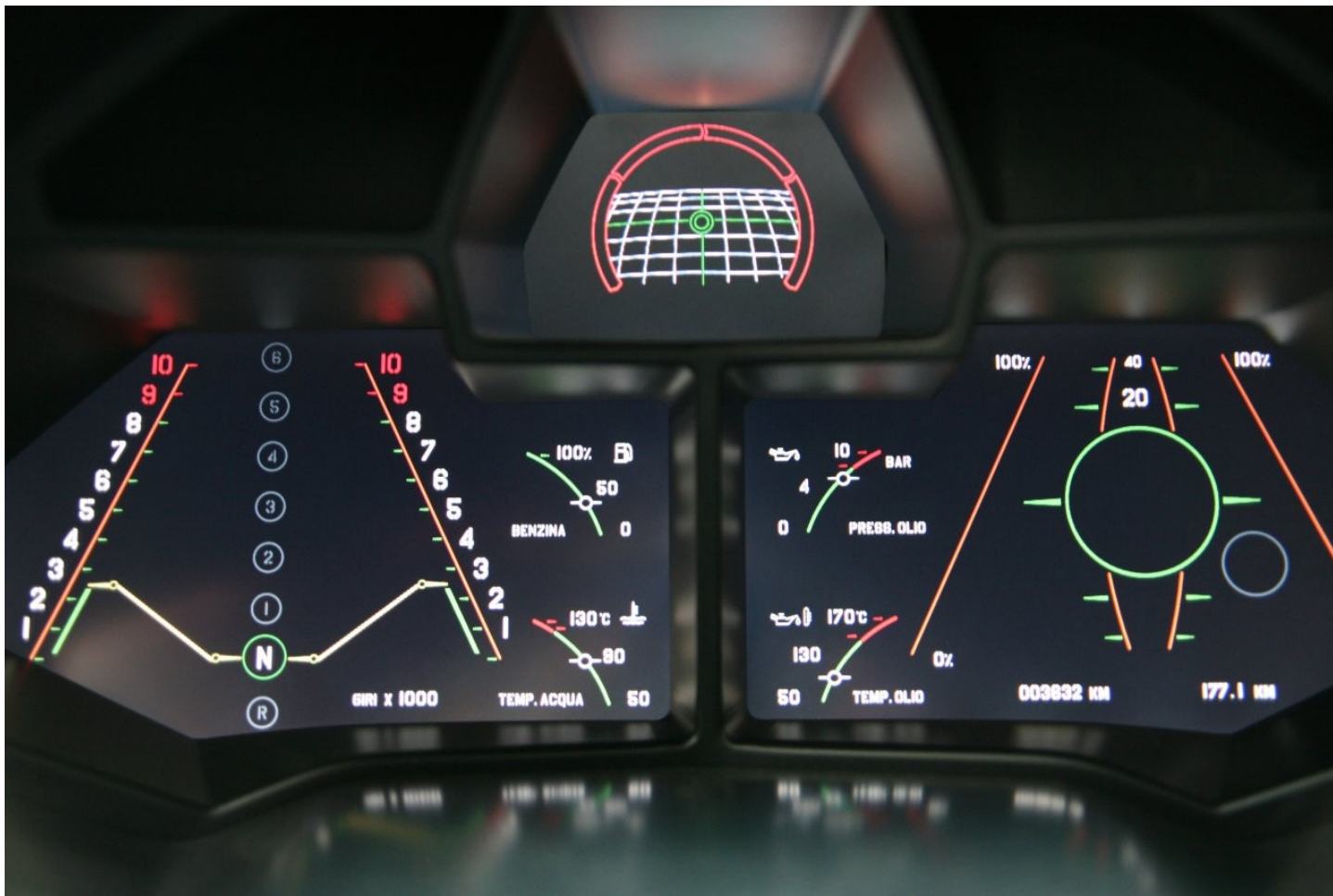
Outline

- ✦ What is an “information dashboard” (ID)?
 - And what it isn't!
 - Stephen Few's ID Library
- ✦ Design Strategy
- ✦ Examples
- ✦ Next Steps & Wrap

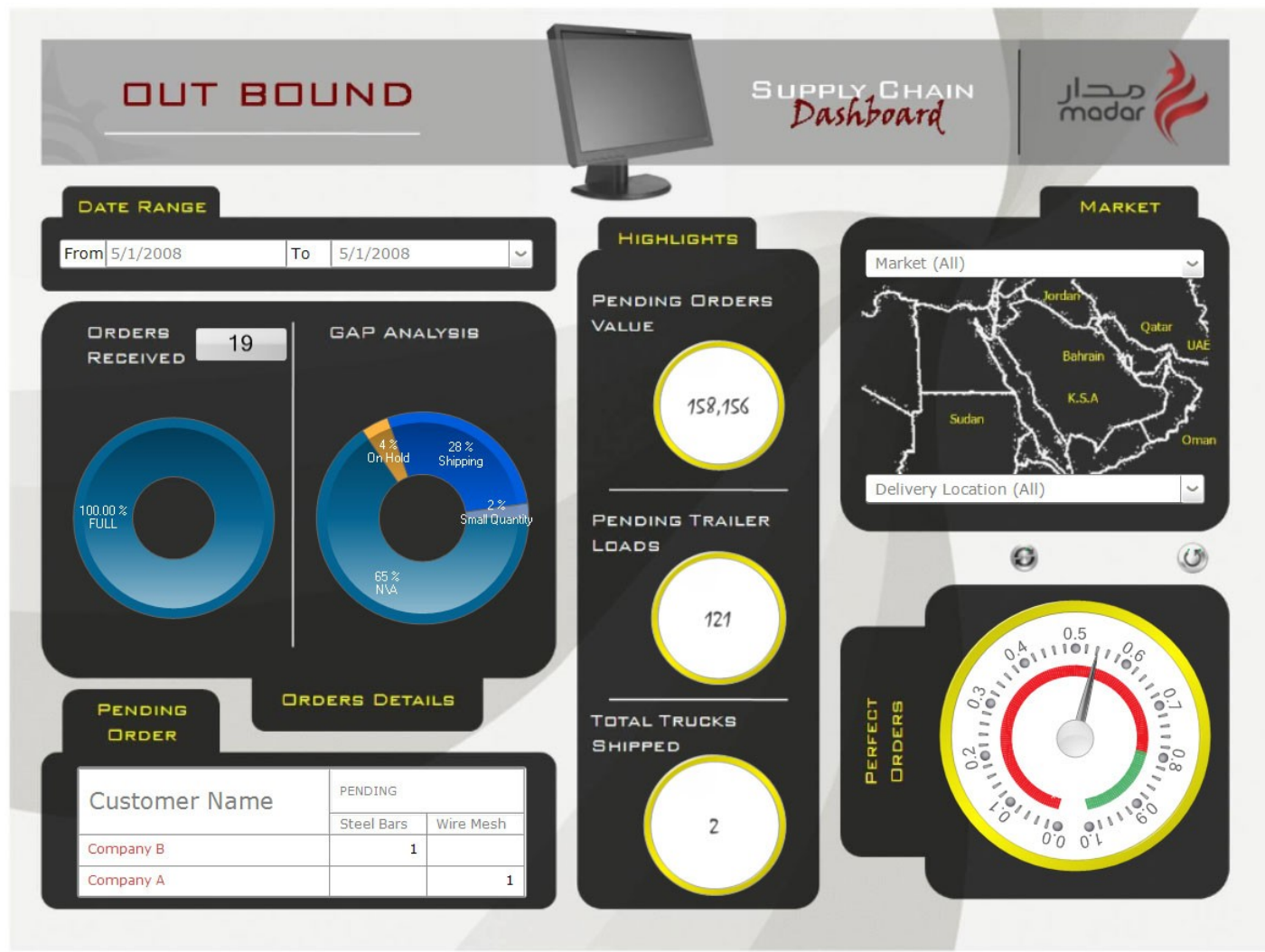
ID != 2010 Ford Fusion Hybrid Dashboard



ID != Lamborghini Reventón Dashboard



ID != too literal application of metaphor



Stephen Few's ID Definition

A dashboard is a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance.

- *Intelligent Enterprise*, March 20, 2004

Few's Ideal Library of ID Display Media

✿ Fundamental Principals to be included:

- “It must be the best means to display a particular type of information that is commonly found on dashboards.”
- “It must be able to serve its purpose even when sized to fit into a small space.”

✿ Media Categories:

- Graphs
- Images
- Icons
- Drawing Objects
- Text
- Organizers

Few's Graph Types

✦ Bar graphs

- Both horizontal & vertical

✦ Stacked bar graphs

- Both horizontal & vertical

✦ Line graphs

✦ Combination bar & line

- Eg Pareto graph

✦ Scatter plots

✦ Box plots

✦ Spark lines

- Tufte

✦ Bullet graphs

- Few

✦ Treemaps

- Shneiderman

Note: no pie, area, nor radar graphs!

The Other Categories

🌿 Images

- Use sparingly
- Logo for branding

🌿 Icons

- Alert
- Up/Down
- On/Off

🌿 Text

- No fancy fonts
- Short & sweet

🌿 Organizers

- Tables
- Spatial maps
 - Geographical
- Small multiples
 - AKA panels & faceting

🌿 Drawing Objects

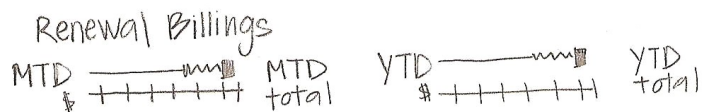
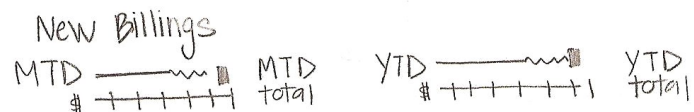
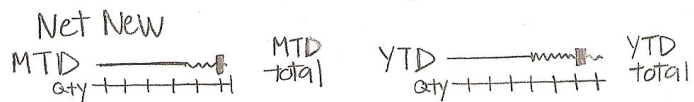
- Connect graphs in a flow

A Marketing Dashboard - Rough Sketch

Marketing Dashboard data as of (previous day)

Key Metrics MTD and YTD

— actual | ~ projected | ■ goal

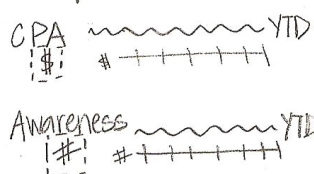


Trailing 45 Days

Trend	Yesterday	Metric
	1,214	Net New
	\$94,097	Billings
	\$70	CPA
	235,320	Awareness
	1,762	Signups
	0.80%	CVR
	46.07%	BTR
	604,308	Sub Inventory
	67.26%	Retention Rate

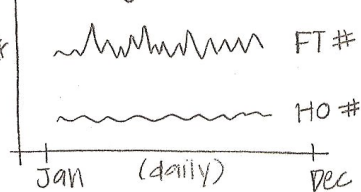
Location | us ▼

Acquisition

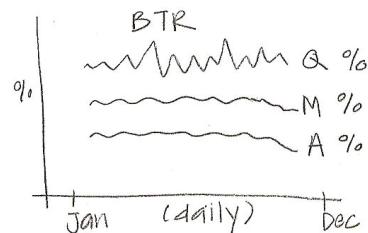
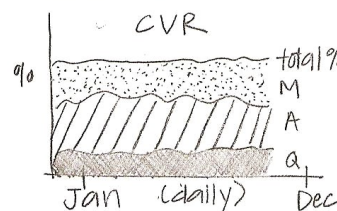


! 6 Month Awareness Survey Key stat(s) !

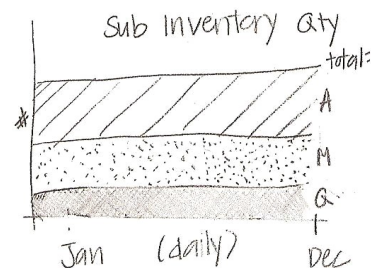
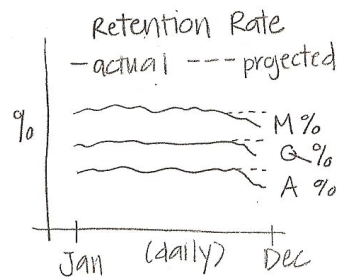
Signup Qty



Conversion




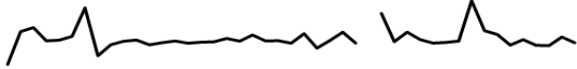


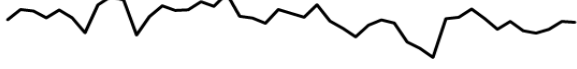



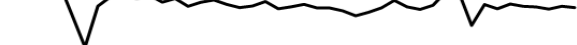
Retention



Implementation Strategy

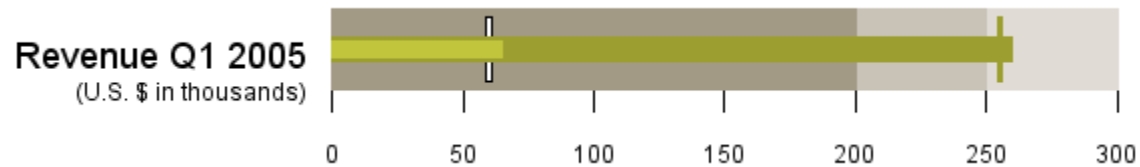
- ✿ Base data from SQL data warehouse
- ✿ Leverage existing R functionality
 - Grid
 - Base graphics
 - Moving to ggplot2
 - Smoothers & Forecasting
- ✿ Code Missing Graphs
 - Sparklines (trivial)
 - Bullet Graph (more fun!)

Sparklines & Icons Added to a Table

Metric	Yesterday	Trend
Net New	954	
Billings	\$309,713	
CPA (faked)	\$68	
Awareness	221,338	
Signups	1,695	
CVR	0.68%	
BTR	45.9%	
Subr Invtry	606,237	 ▲
Retention	81.7%	 ▼

```
#Sparklines
for (i in 1:NumMetrics) {
  pushViewport(plotViewport(layout.pos.row = offset.r + i, layout.pos.col = 1))
  pushViewport(dataViewport(1:45, coredata(trend[, i])))
  grid.lines((1:45)/45, trend[, i])
  popViewport()
  popViewport()
}
```

Bullet Graph - Period to Date & Projected

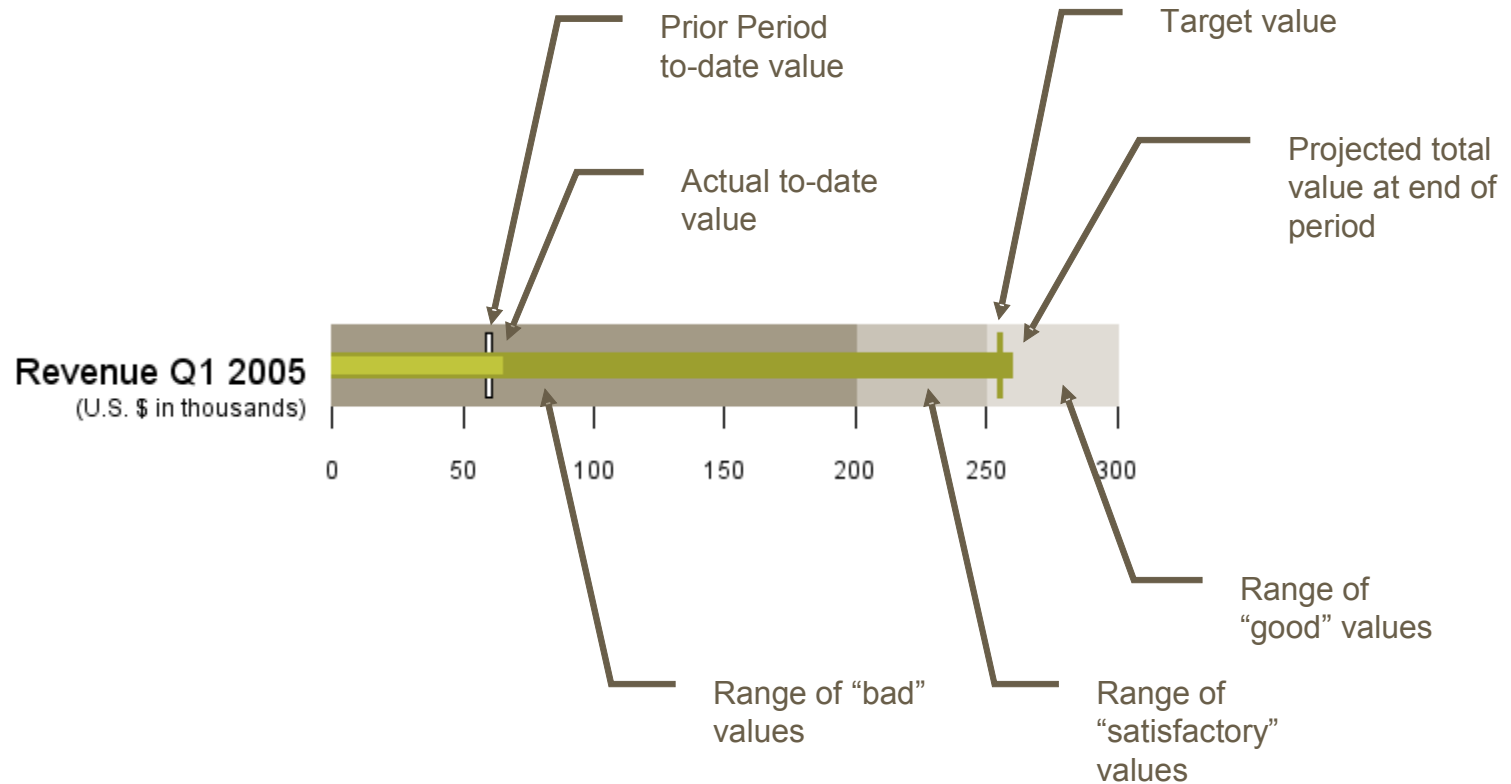


After Stephen Few's Bullet Graph Design Specification (Feb 4, 2008):

http://www.perceptualedge.com/articles/misc/Bullet_Graph_Design_Spec.pdf

See above for more basic bullet graphs.

Bullet Graph - Annotated



After Stephen Few's Bullet Graph Design Specification (Feb 4, 2008):

http://www.perceptualedge.com/articles/misc/Bullet_Graph_Design_Spec.pdf

Bullet Graph in Grid

```
grid.bulletGraph <-  
  function(qualitativeLimits,      ## 2 to 5 values for qualitative ranges;  
          max is upper limit of quantitative scale,  
          min is assumed to be zero  
          target = NA,            ## goal at end of period  
          value,                  ## actual value  
          projected = NA,         ## projected value  
          ToDate = NA,           ## optional actual to-date value  
          ppToDate = NA,         ## optional prior period to-date value  
          main,                   ## main text label  
          sub = "",              ## optional sub label  
          col.qual = bulletGraphGrays(length(qualitativeLimits)), ## background bar  
                                                                    colors  
          col.bullet = brewer.pal(9, "Blues")[c(9, 7)],           ## bullet colors  
          labelWidth = 0.3      ## proportion total width for text label  
  )
```


Challenges & Next Steps

✿ Make ID layout easy(er)

- Goal: Interactive layout of top viewport layers
- Trick: leverage OpenOffice Draw
 - After odfWeave method of getting into OO XML
 - Draw & label vpXXXXX's
 - Parse XML & generate grid code to define viewports

✿ Move to ggplot2 for “out of box” graphs

- Create (at least one) ID Theme

✿ Package it up!

- With *ID Developer Guide*

References & Links

✿ Stephen Few

- *Information Dashboard Design - The Effective Visual Communication of Data*. O'Reilly Media: Sebastopol, 2006.
- *Bullet Graph Design Specification*. 2008.
http://www.perceptualedge.com/articles/misc/Bullet_Graph_Design_Spec.pdf
- His web site & blog: <http://www.perceptualedge.com>

✿ Edward Tufte

- *Sparklines: theory and practice*. (2004)
http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0001OR
- His web site: <http://www.edwardtufte.com>

✿ Jim's email: jporzak@tgn.com