Building Information Dashboards with R

UseR! 2009, Rennes, France
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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
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
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

- **Net New**
  - MTD
  - YTD

- **New Billings**
  - MTD
  - YTD

- **Renewal Billings**
  - MTD
  - YTD

**Trailing 45 Days**

<table>
<thead>
<tr>
<th>Trend</th>
<th>Yesterday</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,214</td>
<td>Net New</td>
</tr>
<tr>
<td></td>
<td>$70</td>
<td>CPA</td>
</tr>
<tr>
<td></td>
<td>235,320</td>
<td>Awareness</td>
</tr>
<tr>
<td></td>
<td>1,762</td>
<td>Signups</td>
</tr>
<tr>
<td></td>
<td>0.80%</td>
<td>CVR</td>
</tr>
<tr>
<td></td>
<td>41.01%</td>
<td>BTR</td>
</tr>
<tr>
<td></td>
<td>604,308</td>
<td>Sub Inventory</td>
</tr>
<tr>
<td></td>
<td>07.26%</td>
<td>Retention Rate</td>
</tr>
</tbody>
</table>

**Location**

- US

**6 Month Awareness**

- Survey Key States

**Conversion**

- CVR
  - MA
  - A

**Retention**

- Retention Rate
  - Actual
  - Projected

**Signup City**

- FT#
  - HO#

**BTR**

- MA%
  - A%
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

<table>
<thead>
<tr>
<th>Metric</th>
<th>Yesterday</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net New</td>
<td>954</td>
<td></td>
</tr>
<tr>
<td>Billings</td>
<td>$309,713</td>
<td></td>
</tr>
<tr>
<td>CPA (faked)</td>
<td>$68</td>
<td></td>
</tr>
<tr>
<td>Awareness</td>
<td>221,338</td>
<td></td>
</tr>
<tr>
<td>Signups</td>
<td>1,695</td>
<td></td>
</tr>
<tr>
<td>CVR</td>
<td>0.68%</td>
<td></td>
</tr>
<tr>
<td>BTR</td>
<td>45.9%</td>
<td></td>
</tr>
<tr>
<td>Subr Invtry</td>
<td>606,237</td>
<td></td>
</tr>
<tr>
<td>Retention</td>
<td>81.7%</td>
<td></td>
</tr>
</tbody>
</table>

#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.perceptualledge.com/articles/misc/Bullet_Graph_Design_Spec.pdf

See above for more basic bullet graphs.
After Stephen Few’s Bullet Graph Design Specification (Feb 4, 2008):
http://www.perceptualedge.com/articles/misc/Bullet_Graph_Design_Spec.pdf
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(qualitiveLimits)), 
       ## 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

  

- His web site & blog: [http://www.perceptualedge.com](http://www.perceptualedge.com)

Edward Tufte

  

- His web site: [http://www.edwardtufte.com](http://www.edwardtufte.com)

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