Data Visualization for Oracle Business Intelligence 11g

BIWA Summit 2015

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Vlamis Software Solutions

- Vlamis Software founded in 1992 in Kansas City, Missouri
- Oracle Gold Partner, Oracle University Partner
- Developed more than 200 Oracle BI systems
- Specializes in ORACLE-based:
  - Business Intelligence
  - Data Warehousing
  - Data Mining and Predictive Analytics
  - Data Visualization
- Expert presenter at major Oracle conferences
- Authors of 2015 book “Data Visualization for Oracle BI 11g”
- Co-author of book “Oracle Essbase & Oracle OLAP”
- [www.vlamis.com](http://www.vlamis.com) (blog, papers, newsletters, services)
- Beta tester for OBIEE 11g, 12c
- Conference chair for BIWA Summit 2014, 2015
Tim and Dan Vlamis

- Tim (business analyst and academic guy)
  - 25+ years in business modeling, valuation, and scenario analysis
  - Professional Certified Marketer (PCM) from AMA
  - Active Member of NICO (Northwestern Institute on Complex Systems)
  - Adjunct Professor of Business, Benedictine College
  - MBA Kellogg School of Management (Northwestern University)
  - BA Economics Yale University

- Dan (OLAP expert and career IT guy)
  - 25+ Years in business intelligence/executive information systems
  - Led development team at IRI
  - Founded Vlamis Software Solutions 20+ years ago in 1993
  - Author, speaker, Oracle ACE Director
  - BA Computer Science Brown University
New Book!

Special Thanks to:

Paul Carlstroem
Philippe Lions
Brian Macdonald
Jayant Sharma
Oracle BI Prod Mgmt
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What to expect in the book

• Not a “how to”, more of a “what and why to”
• Not every example is perfect
• Writing process (Tim rough draft, Dan challenge and fix)
• Color challenge (gray scale versus color)
• Content challenge (advanced material requires explanation which we didn’t have space for)
Presentation Agenda

• Human cognition insights
• OBIEE demo
• Table design
  • Best practices
  • When and when not to use
• Graph design
  • Best practices
  • Use cases for different graph types
• Questions from audience at all times
Many BI Systems Can Create Beautiful Results
OBI Operates at a Different Scale
Ingredients → Data Quality & Variety
Technique ➔ Data Processing & Prep
Presentation → Data Visualization
• Best practices are objective guides to what is likely to work best.

• Visualizations should be guided by:
  • Human cognition
  • Accurate representations of data
  • Preferred message (consciously designed by visualization developer)

• Visualizations should NOT be guided by:
  • Taste or what looks “good” to one person
  • Entertain users
  • A desire to “fill the white space”
The Principles of Human Cognition Should Guide BI Dashboard Design
The Spirals are the Same Color
Graphs and Tables

• Graphs and Charts depict visual representations and relationships

New Product Market Penetration

• Tables show data organized for lookup of specific, precise values or items.

<table>
<thead>
<tr>
<th>Order Type</th>
<th>No of Orders</th>
<th>Sales</th>
<th>Billed Quantity</th>
<th>Actual Unit Price</th>
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<tbody>
<tr>
<td>Express</td>
<td>13,980</td>
<td>$14,027,034</td>
<td>1,117,199</td>
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<td>Secure</td>
<td>29,347</td>
<td>$28,513,745</td>
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<td>Standard</td>
<td>27,673</td>
<td>$27,459,221</td>
<td>2,213,482</td>
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<tr>
<td>Grand Total</td>
<td>71,000</td>
<td>$70,000,000</td>
<td>5,657,221</td>
<td>$12.37</td>
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</table>
Characteristics of Tables

• Can present data at drastically different scales.
• Can present very different data types simultaneously.
• Can repeat and include multiple sets of the same data values.
• Are extraordinarily dense and include numerous data relationships without direct distortion of the data itself.
• Tables can present “federated” data from different sources in a single simultaneous view.
I want to see Sales (specifies cell values) by Product Type and Company (defines rows) across Market Segments (defines columns).
## Keys to Effective Tables

- Prefer smaller tables
- Words are important
- Enable roll overs for meta data for commonly used tables
- Write informative titles for tables and column head descriptions
- Make tables clean and easy to read
- Eliminate unnecessary gridlines
- Use space (padding) to create groups of data
- Left justify text cells and Right justify numerical cells
- Make numbers easy to read and understand
- Judiciously use conditional formatting
- Avoid putting text in color
- Align the decimal point for numerical cells
- Use symbols to denote units of measure (%, $, etc.)
- Enable column and row sorting
- Avoid scrolling (if possible)
- Be transparent about data selection

### Example Table

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Company</th>
<th>Active Singles</th>
<th>Baby Boomers</th>
<th>Others</th>
<th>Rural Based</th>
<th>Seniors</th>
<th>Students</th>
<th>Urban Based</th>
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<td>$50,236</td>
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<td>$74,952</td>
<td>$126,754</td>
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<td>$30,048</td>
<td>$102,717</td>
<td>$162,078</td>
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<td>$161,995</td>
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<td><strong>Cell Phones Total</strong></td>
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<tr>
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<td>$121,302</td>
<td>$170,018</td>
<td>$173,601</td>
<td>$177,137</td>
</tr>
</tbody>
</table>
7 Keys to Effective Graphs

• Do not use 3-D effects.
• Avoid “stop light” color palette.
• Prefer pastel color palettes and avoid bright colors.
• Eliminate gridlines, drop shadows, and other graphics.
• Enable interaction for “exploration” graphs.
• Prioritize a single message for “explanation” graphs.
• Above all else, show the data!
• Show a pattern or progression over a continuous range.
• Can be valued within a range to highlight a particular pattern (careful!).
• Maintain a rectangular shape close to golden proportion.
• Use scale marker lines and ranges for context.
• Use darker versions of standard colors.
• Eliminate grid lines.
• Use zoom function for detailed line graphs.
• Choose curved lines to smooth overall shape.
• Choose stepped lines to emphasize point transitions.
Target Revenue % by Brand for 2012

- BizTech
- FunPod
- HomeView

Legend:
- Good
- Low
- Scale marker

% Achieved

Bar Graphs

- Show nominal data values in comparison to one another.
- Start with zero.
- If use a logarithmic scale, clearly notate.
- Think through sort order carefully.
Bar Graphs

- Add data labels as interactive rollover.
- Balance colors.
- If change is most important, graph change.
Stacked Bar Chart

- Somewhat confusing, not great for representing change.
- Total is most clearly represented number.
- Typically stack with largest values on the bottom.
- Single scale can make for interesting intra-bar comparisons.
Pie Charts

• Typically used for showing parts of whole by percentage.
• Not great for piece to piece comparisons.
• Limit number of pieces.
• Can be interesting to show lots of pies together if significant differences exist.
• Stephen Few hates them.
• Do not use 3-D.
Scatter Plot

- Shows single data points at the intersection of two values.
- Often depict a large number of discrete data points (hundreds or thousands).
- Useful comparisons of two variables.
- Trend lines are often added.
- Clearly notate if use logarithmic scale(s).
Bubble Chart

- Special type of scatter plot.
- Size of bubble is related to a third variable.
- Color is related to a fourth variable.
- Reduces number of points that can be depicted.
- Best for depicting approximate values and comparisons.
i want hue

Colors for data scientists. Generate and refine palettes of optimally distinct colors.

Color space

Palette

Make a palette
A Dashboard is a visual presentation of current summary information needed to manage and guide an organization or activity.
BI Dashboards are Different

• No mechanical systems needed to move indicators.
• Decisions are not typically made on a second-to-second basis.
• BI dashboards are not primarily single situation or single person devices.
BI Dashboards

- Role-based.
- Data selection and filtering are extremely important.
- Dashboards support evidenced-based decision making.
- Shared understanding of business situation is a key benefit.
- Content may be individualized.
- Design should be standardized.
OBIEE Dashboard Overview

- Designed with columns and sections (containers).
- Presentation server is often separate from BI server.
- Dashboards are web-based and are viewed with browsers.
- HTML, XML, and Java coding skills are useful, but not required.
Dashboard Principles

• Promote user interactivity
  • Prompts
  • View and column selectors
  • Hierarchical column drills
  • Column sorts
  • Guided navigation and action links

• Promote data transparency
  • Prompts
  • Filter views
  • Narrative views
  • Master detail linking

• Establish design guidelines for consistency
Maps

- Humans think spatially
- Types of maps
- Map best practices
- Making meaningful maps
- Built-in data sets
- HERE (NAVTEQ) data sets and POI data
- Sources for additional data sets
Maps convey dense, multi-dimensional relationships in data faster and more intuitively than any other graphical display methodology.
When Are Map Views Useful?

• Visualizing data related to geographic locations.
• Showing or detecting spatial relationships and patterns.
• Showing lots of data in a relatively small area.
• Drilling down from a (map) overview to a detailed report, chart, or graph.
• When is location important? Can the dimension be plotted on a map?
Map View Tips

• Think about what scale to use. Different map scales will reveal different patterns and insights.
• Use Variable marker to display two measures on a map at a point – size and color.
• Avoid overlapping shapes too much.
• Be aware of spatial distortions E.g. Texas is larger than Connecticut.
• Look at color palette.  www.colorbrewer2.org
Map Definitions

• FEATURE
  • Provide a spatial context: cities, highways, rivers, etc…
  • Features of Interest: store location, postal boundaries, pipelines, etc…

• STYLE
  • Define rendering properties for features
  • Can control fill color, border color, line thickness, line style and more

• THEME
  • Collection of features
  • Typically associated with a spatial geometry layer
  • County/state boundaries, major highways, etc…

• BASEMAP
  • A grouping of themes to create a map
  • Maps can share themes
  • When associating a theme with a map, can specify min scale and max scale (sometimes known as zoom control)

• MAP
  • Basemap with additional themes overlain
Map Interactivity in OBIEE 11g

- Display BI data on top of maps
  - Color fill
  - FOI point display
- Interact with other Dashboard Elements
  - Drive map content with dashboard prompts
  - Drive map content through drilling and navigation
  - Drive other dashboard elements through map interactions
- Reveal additional information on maps through mouseovers
- Drill to map detail
Map View Formats

- Color Fill (choropleth)
  - Percentile, Value, Continuous binning
  - Dashboard user run-time slider
- Graphs – Bar, Pie
  - Adjustable graph size
  - Series by second dimension
- Bubble (variable sized)
  - Min-Max size specification
  - Color specification
- Variable Shape
  - Circle, Triangle, Diamond
  - Customizable
- Image
  - Imported via MapViewer
  - More can be added from MapBuilder
- Custom Point Layer
  - Uses Lat / Long
  - Does not require a Layer Def
Trellis Charts

• Trellis Layout of Smaller Charts in a grid with Consistent Scales
• Great for finding structures / patterns in complex data
• Use 2D Layout to View Multidimensional Data (like a timeline – mental animation)
Trellis View - Simple

• Single type of inner visualization
• Common synchronized scale across all graphs
• Has scale showing by default (can turn off)
• Lots of graph types
  • Vertical Bar
  • Horizontal Bar
  • Line
  • Area
  • Line-Bar
  • Pie
  • Scatter
  • Bubble
Trellis View - Advanced

- Pivot table with numbers or graphs in cells
- Each microchart has its own scale and not shown
- Most often used to see trend lines
- No axis description, so across should be time
- Can have different visualizations for different measures
  - Spark bar
  - Spark line
  - Spark area
  - Numbers
New Trellis Views

• Does not require Exalytics but need fast Pres Server
• Can display LOTS of data in compact form
• Capable of dense visualizations
  • Great for snapshot of trending
  • Great for comparing patterns across dimension values
• Two types
  • Simple (shows full graphs per cell)
  • Advanced (sparklines – no scales per cell, separate scales)
• Need to think what you’re trying to show on a trellis
• Integrated toolset in OBIEE
• Follows “Balanced Scorecard” methodology
• Enables corporate goals and objectives to be monitored and managed
• Includes strategy maps, strategy trees, KPI watch lists, and cause and effect maps

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New Contribution Wheel Visualization
General Advice

- Working with BI Catalog
- Development Standards
- Working with Executives
- Working with IT and DBAs
- Developing Trust in BI Systems
- Getting Started
  - Workshops
  - Assessments
  - Training
  - Metadata Communication and Documentation
- The Long Road
Where to Start

• Workshops
• Assessments
• Training
• Metadata Communication and Documentation
waterfall graph example profit for 2013

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011/01</td>
<td>2011</td>
<td>781,389</td>
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<tr>
<td>2011/02</td>
<td>2011</td>
<td>1,194,264</td>
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<tr>
<td>2011/03</td>
<td>2011</td>
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<td>2011</td>
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<tr>
<td>2011/12</td>
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</table>

Gross Profit Contribution by Month for 2011

- Increase
- Decrease
- Total
- Break Even

Month
### Pivot Table Heat Map Sorted by Totals

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Games</th>
<th>TV</th>
<th>Communication</th>
<th>Electronics</th>
<th>Services</th>
<th>Digital</th>
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</thead>
<tbody>
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<td>632,993</td>
<td>556,082</td>
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<td>290,953</td>
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<td>3,367,581</td>
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<td>622,936</td>
<td>568,729</td>
<td>407,793</td>
<td>283,408</td>
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<td>Cameron Office</td>
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<td>636,915</td>
<td>612,971</td>
<td>506,409</td>
<td>412,947</td>
<td>270,893</td>
</tr>
</tbody>
</table>

**Total**: 70,000,000

**Add to watching list**
```r
function(n, th=110, ph=0)
# Perspective plot - Manaia Whau, One of 50 Volcanoes in the Auckland

z <- 2 * volcano  # Exaggerate the relief
x <- 10 * (1, ncol(z))  # 10 meter spacing (x to M)
y <- 10 * (1, ncol(z))  # 10 meter spacing (x to M)

z0 <- min(z) - 20
z <- z - z0
x <- c(min(x), 1e-10, x, max(x) + 1e-10)
y <- c(min(y), 1e-10, y, max(y) + 1e-10)

fill <- max(fill, (z > 20)
fill[fill] <- c(0, ncol(fill)) <- "gray"

persp(x, y, z, theta = th, phi = ph, col = fill, scale = FALSE,
      ltheta = -120, shade = 0.4, border = NA, box = FALSE)
```
Questions?
More info

- URL for book
- Table in lobby
- Other presentations by Vlamis
- Collaborate and ODTUG KScope
• Add business card to basket or fill out card
Thank You!

Thank You for Attending Session
Data Visualization for OBI 11g

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