Data Visualization for Oracle Business Intelligence 11g

Session ID#: 10442

Presented by:
Tim Vlamis, Consultant
Dan Vlamis, President
Vlamis Software Solutions, Inc.

@timvlamis and @dvlamis
Vlamis Software Solutions

- 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 (blog, papers, newsletters, services)
- Beta tester for OBIEE 11g, 12c
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 Practice Focus

- 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
Classic Optical Illusions
The Spirals are the Same Color
Graphs and Tables

- Graphs and Charts depict visual representations and relationships.
- Tables show data organized for lookup of specific, precise values or items.

![Graph: New Product Market Penetration](image)

<table>
<thead>
<tr>
<th>Order Type</th>
<th>No of Orders</th>
<th>Sales</th>
<th>Billed Quantity</th>
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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 specified values by product type and company across market segments.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Company</th>
<th>Active Singles</th>
<th>Baby Boomers</th>
<th>Others Rural based</th>
<th>Seniors</th>
<th>Students Urban based</th>
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<td>Genmind Corp</td>
<td>$55,916</td>
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</table>
## 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>
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<td>$173,601</td>
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</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.
Line Graph

- 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.
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.
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.
ColorBrewer2.org
i want hue

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

Color space

Palette

7 colors soft (k-Means)

Make a palette
Dashboard Definition

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
Why Maps are Powerful

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](http://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
OBI Scorecard & Strategy Management

- 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
New Contribution Wheel Visualization
Strategy Tree View
Strategy Map View
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

#### Gross Profit Contribution by Month for 2011

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Revenue</th>
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</thead>
<tbody>
<tr>
<td>2011/01</td>
<td>2011</td>
<td>781,389</td>
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### Pivot Table Heat Map Sorted by Totals

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<th>TV</th>
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<th>Electronics</th>
<th>Services</th>
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<td>579,012</td>
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<td>684,182</td>
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<td>630,859</td>
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<td>663,799</td>
<td>674,991</td>
<td>987,700</td>
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<td>729,527</td>
<td>658,517</td>
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## Compound Layout

### Pivot Table showing exceptional sales results greater than $200,000

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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Accessories</strong></td>
<td><strong>Gerard Corp</strong></td>
<td><strong>StockPlus Inc</strong></td>
<td><strong>Tesare Ltd</strong></td>
<td><strong>Gerard Corp</strong></td>
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<td><strong>Tesare Ltd</strong></td>
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<td>$89,212</td>
<td>$92,477</td>
<td>$93,277</td>
<td>$88,370</td>
<td>$92,477</td>
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<td>$88,370</td>
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<tr>
<td>Audio</td>
<td>$75,420</td>
<td>$72,992</td>
<td>$70,580</td>
<td>$76,427</td>
<td>$78,267</td>
<td>$75,188</td>
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<td>$75,188</td>
</tr>
<tr>
<td>Cell Phones</td>
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<td>$40,792</td>
<td>$38,580</td>
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<td>$44,327</td>
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<td>$13,956</td>
<td>$12,768</td>
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<td>$16,178</td>
<td>$14,356</td>
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</tr>
</tbody>
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<td>$16,178</td>
<td>$14,356</td>
<td>$14,267</td>
<td>$16,178</td>
<td>$14,356</td>
</tr>
</tbody>
</table>

### Selection Steps
Volcano Perspective Plot Graphics Result

```r
function(x, yr=10, ph=6){
  # Perspective plot - Mount Rhea, one of 80 Volcanoes in the Auckland
  z <- 2 * volcano
  x <- 10 * (1:nrow(x)) # vertical spacing (8 to 16)
  y <- 10 * (1:ncol(x)) # horizontal spacing (6 to 14)
  z0 <- min(z) = 20
  x <- cbind(0, y = a0, y = x, a0)
  x <- cbind(x, 1e-10, x, max(x) = 1e-10)
  y <- cbind(y, 1e-10, y, max(y) = 1e-10)
  fill <- matrix("green", nx = nrow(x)-1, ny = ncol(x)-1)
  fill[1, 1] <- c(1,1,1,1,1)] <- "gray"
  fill[1, nx] <- c(1,1,1,1,1)] <- "gray"
  for (i in 1:ny)
    fill[i, 1] <- c(1,1,1,1,1)] <- "gray"
  for (i in nx)
    fill[1, i] <- c(1,1,1,1,1)] <- "gray"
  rest <- volcano[-1,-1] + volcano[-1,-1] + volcano[-1,-1] #/ 4
  rest[1,1] <- 1
test.colors(20) [c(1, quantile(1, seq(0.1, 1, 0.1) = 21)]
  include.lostes <- TRUE
  persp3(x, y, test, theta = 90, phi = 90, col = fool, scale = FALSE,
         theta = 120, shade = 0.3, border = NA, box = FALSE)
}
```
Questions?
More info

- www.vlamis.com/DVforOBI
- Other presentations by Vlamis
- BIWA Summit and ODTUG KScope
# Vlamis Collaborate Presentations

<table>
<thead>
<tr>
<th>Presenter</th>
<th>Session</th>
<th>Time</th>
<th>Location</th>
<th>Title</th>
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<tr>
<td>Dan and Tim Vlamis</td>
<td>OAUG</td>
<td>Mon 12:45 – 1:45 PM</td>
<td>South Seas D</td>
<td>Data Visualization for Oracle Business Intelligence 11g</td>
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<tr>
<td>Dan and Tim Vlamis</td>
<td>OAUG</td>
<td>Mon 3:15 – 4:15 PM</td>
<td>Coral B</td>
<td>Designing an Analytics Strategy for the 21st Century</td>
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<td>Dan and Tim Vlamis</td>
<td>IOUG</td>
<td>Tues 2:00 – 3:00 PM</td>
<td>Jasmine E</td>
<td>Forecasting, Prediction Models, and Time Series Analysis with Database Analytics and OBIEE</td>
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<td>IOUG</td>
<td>Wed 3:15 – 4:15 PM</td>
<td>Banyan D</td>
<td>The Oracle Data Mining Machine Bundle: Zero to Predictive Analytics in Two Weeks</td>
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<td>Jon Clark</td>
<td>IOUG</td>
<td>Thurs 12:15 – 1:15 PM</td>
<td>Reef F</td>
<td>Using Cloud technology for Oracle Database and Oracle BI Sandboxes and Training Environments</td>
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</tbody>
</table>
Thank You!

Thank You for Attending Session
Data Visualization for OBI 11g

Presenter Information:
Tim Vlamis, Consultant
Dan Vlamis, President
Vlamis Software Solutions, Inc.
816-781-2880
tvlamis@vlamis.com
dvlamis@vlamis.com
For more information go to www.vlamis.com
Please complete the session evaluation

We appreciate your feedback and insight

You may complete the session evaluation either on paper or online via the mobile app