Data Visualization Best Practices in Oracle Business Intelligence Applications

Session 12633

Tim Vlamis

Vlamis Software Solutions, Inc.

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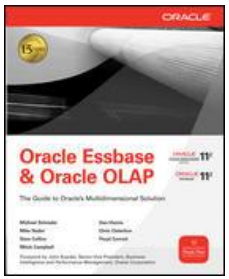
TECHNOLOGY AND APPLICATIONS FORUM
FOR THE ORACLE COMMUNITY

Vlamis Software Solutions

- Vlamis Software founded in 1992 in Kansas City, Missouri
- Developed more than 200 Oracle BI systems
- Specializes in ORACLE-based:
  - Data Warehousing
  - Business Intelligence
  - Design and integrated BI and DW solutions
  - Training and mentoring
- Expert presenter at major Oracle conferences
- www.vlamis.com (blog, papers, newsletters, services)
- Developer for IRI (former owners of Oracle OLAP)
- Co-author of book “Oracle Essbase & Oracle OLAP”
- Beta tester for OBIEE 11g
- Reseller for Simba and Nokia map data for OBIEE
- HOL Coordinator for BIWA Summit 2013



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SOFTWARE SOLUTIONS

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Tim Vlamis' Bio

- 20+ years experience in business modeling and valuation, forecasting, and scenario analyses
- Expert in principles and elements of design
- Expert in curriculum development and pedagogical theory
- 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)
- BA Economics Yale University

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Pretty Sunset Description

The sun is setting over the pacific. ---

The light is glistening off the water, reflecting in the waves…

Nature at it's peaceful best . . .

Visualize this serene seascape . . .

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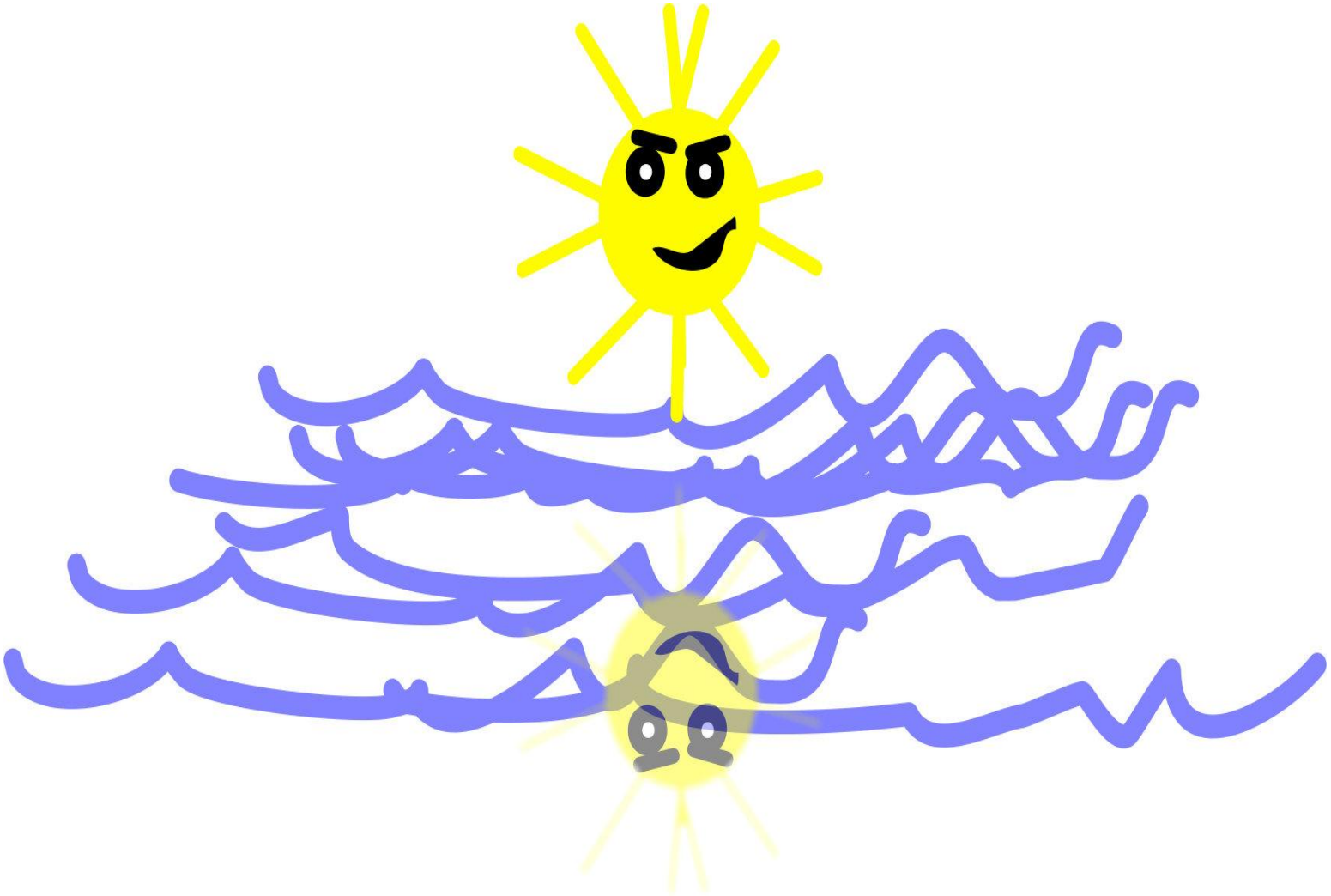

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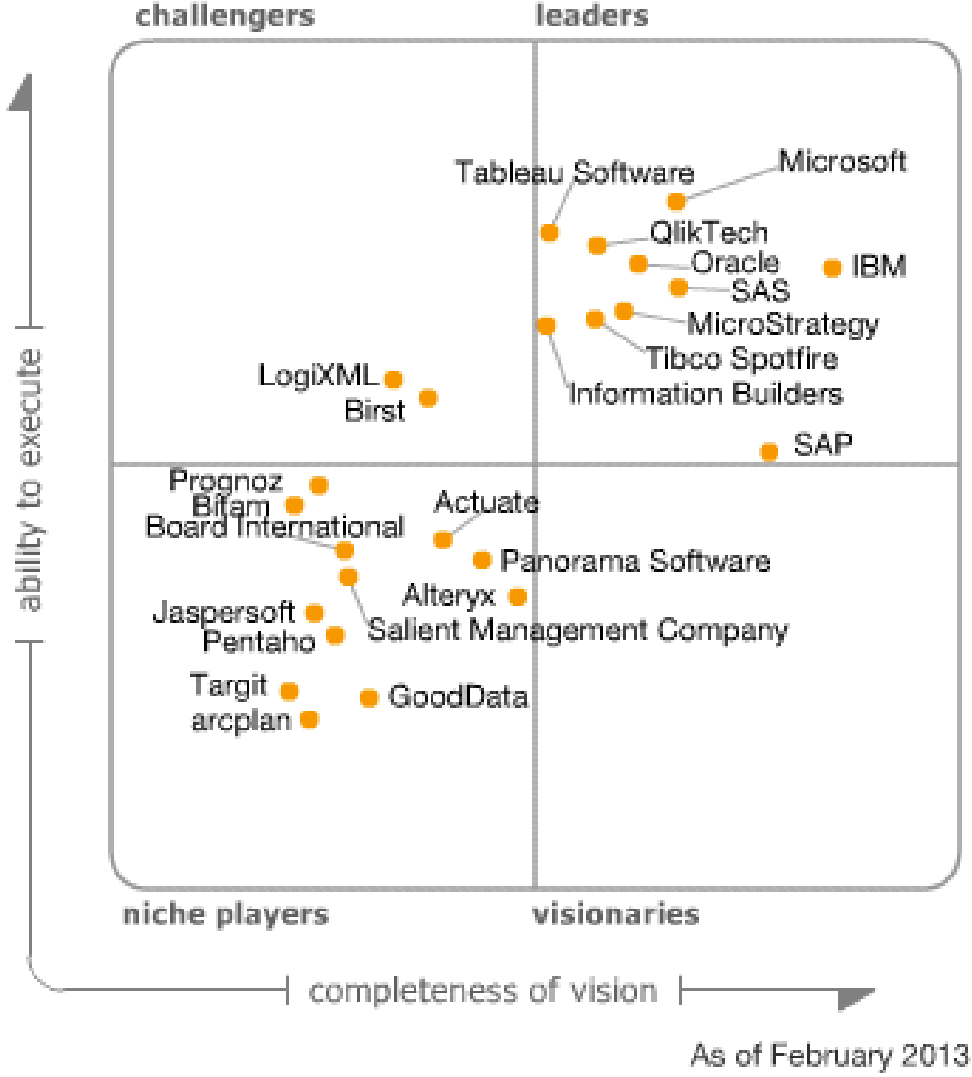
Gartner Magic Quadrant for BI Feb 2013



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Highlights from Gartner's BI & Analytics Magic Quadrant Report 2013

- BI and Analytics "growing in importance"
- "Organizations continue to turn to BI as a vital tool for smarter, more agile, and efficient business."
- OBI has high aggregate "Ability to Execute" score.
- Broadest global deployment score
- Average user population nearly 3000
- Average data volumes nearly 5 Terabytes
- Below average complexity scores (mostly used for static reporting)
- Below average ease of use scores
- OBI has low "data discovery" score

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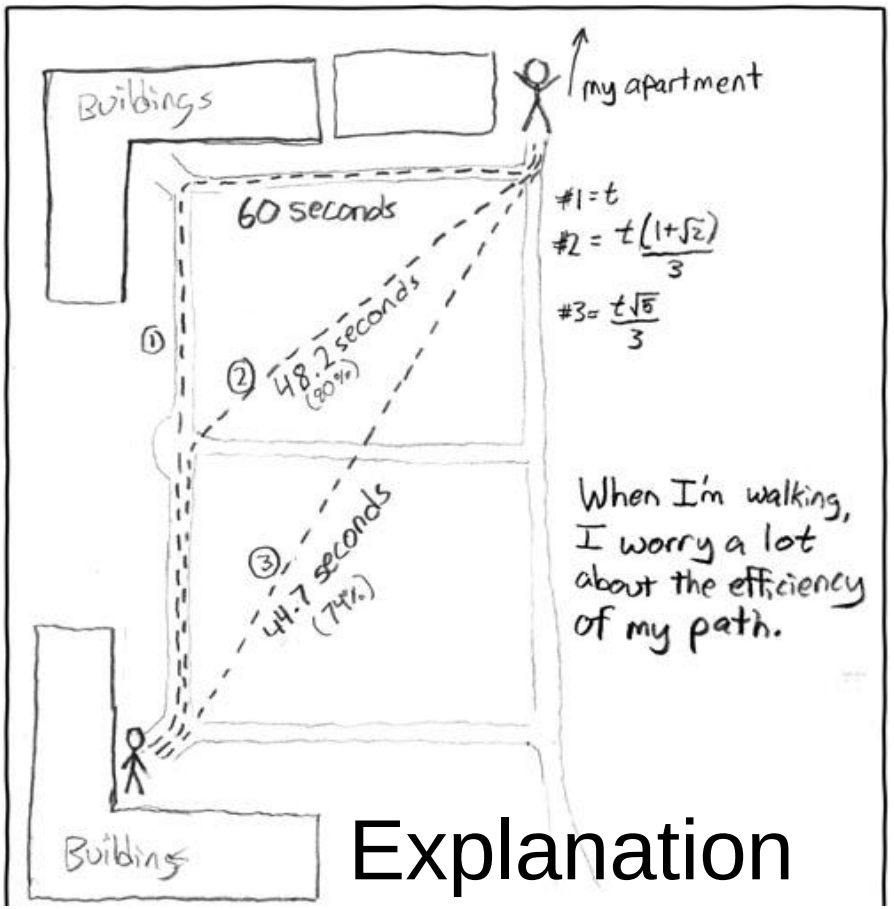
Many BI Systems Can Create Beautiful Results

OBI Operates at a Different Scale

Main Uses of BI Reports & Dashboards



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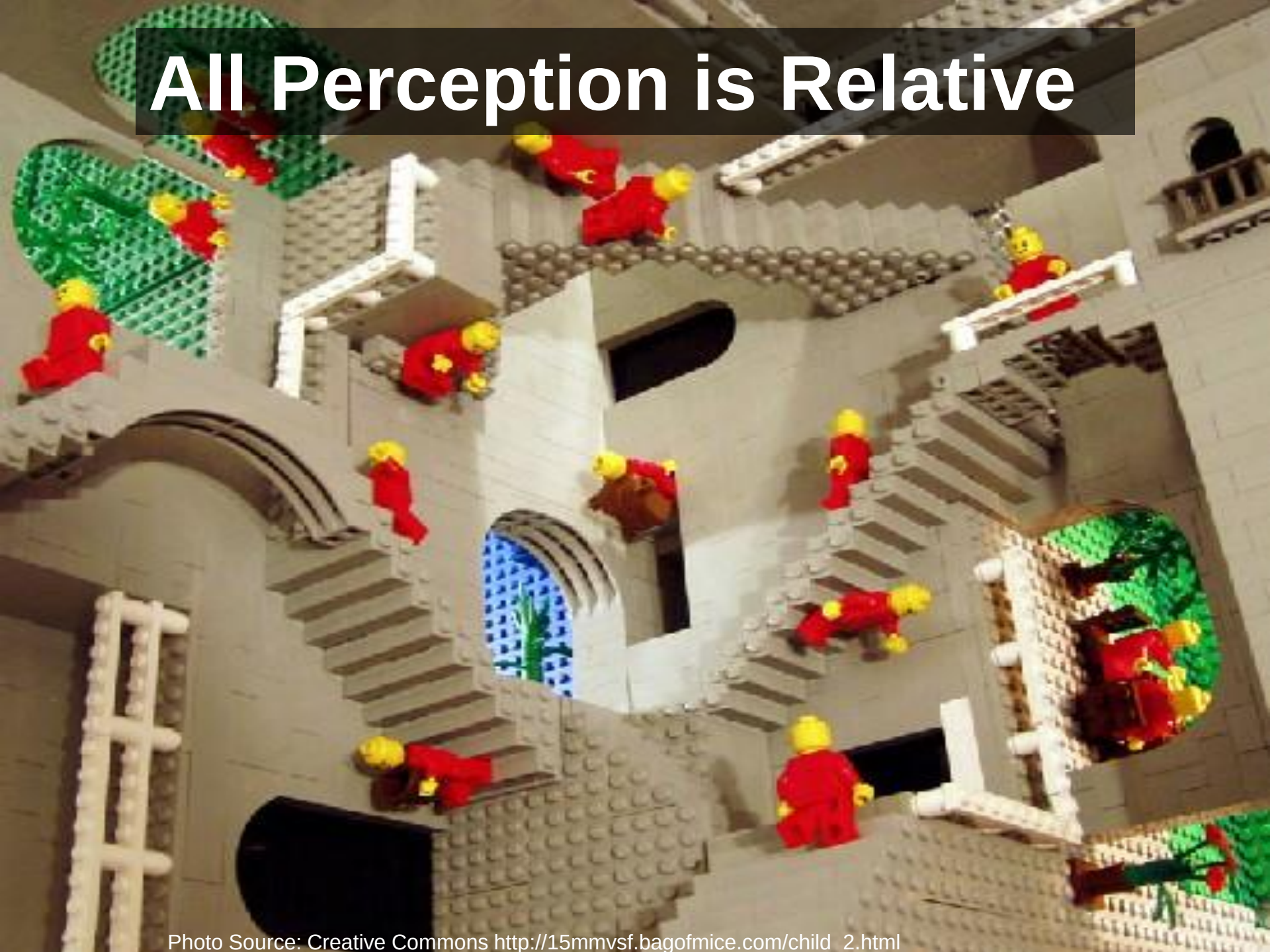
The Principles of Human Cognition Should Guide BI Visualization Design

Humans are Pattern Seeking Creatures

All Perception is Relative



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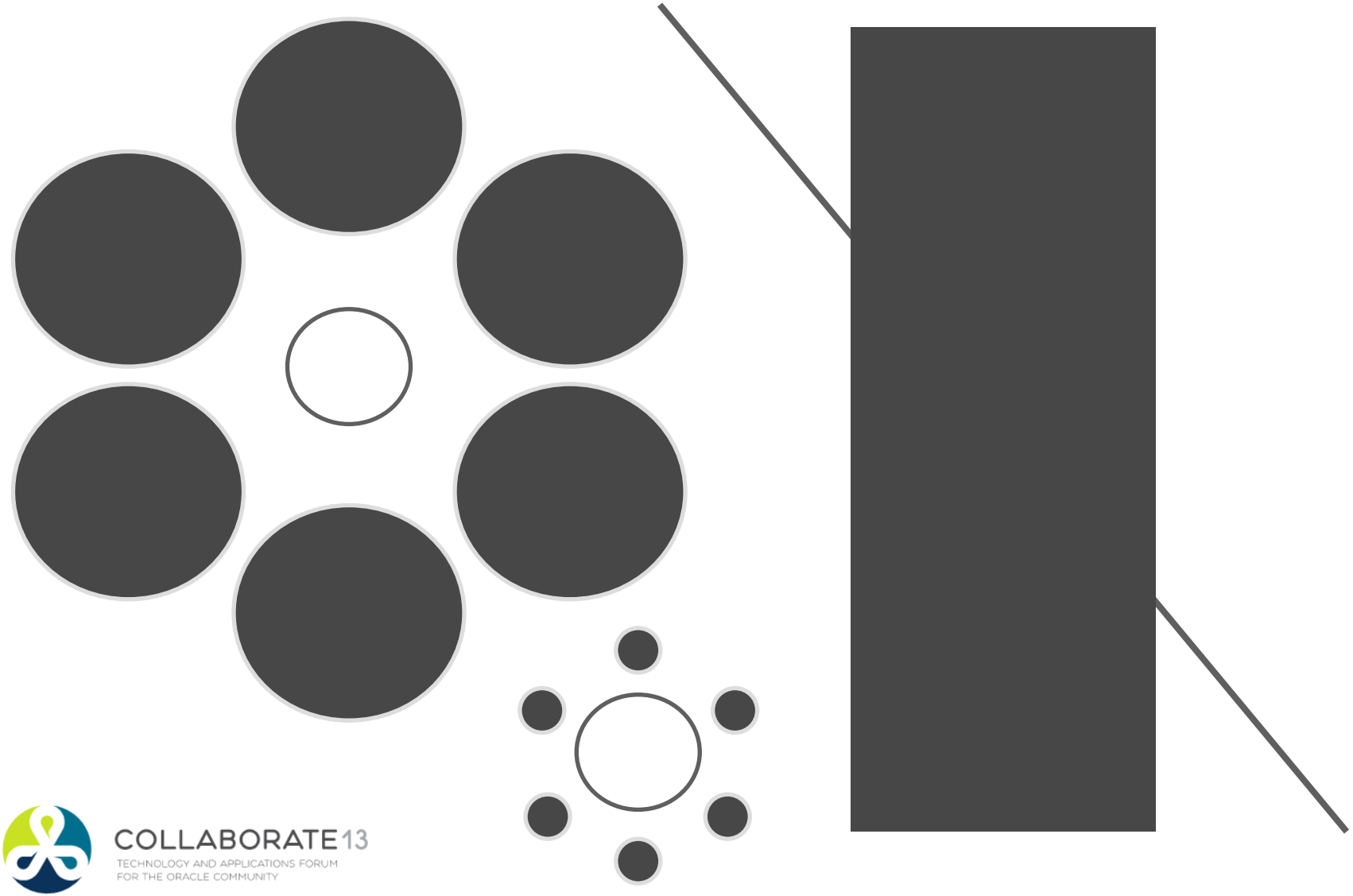
Classic Optical Illusions



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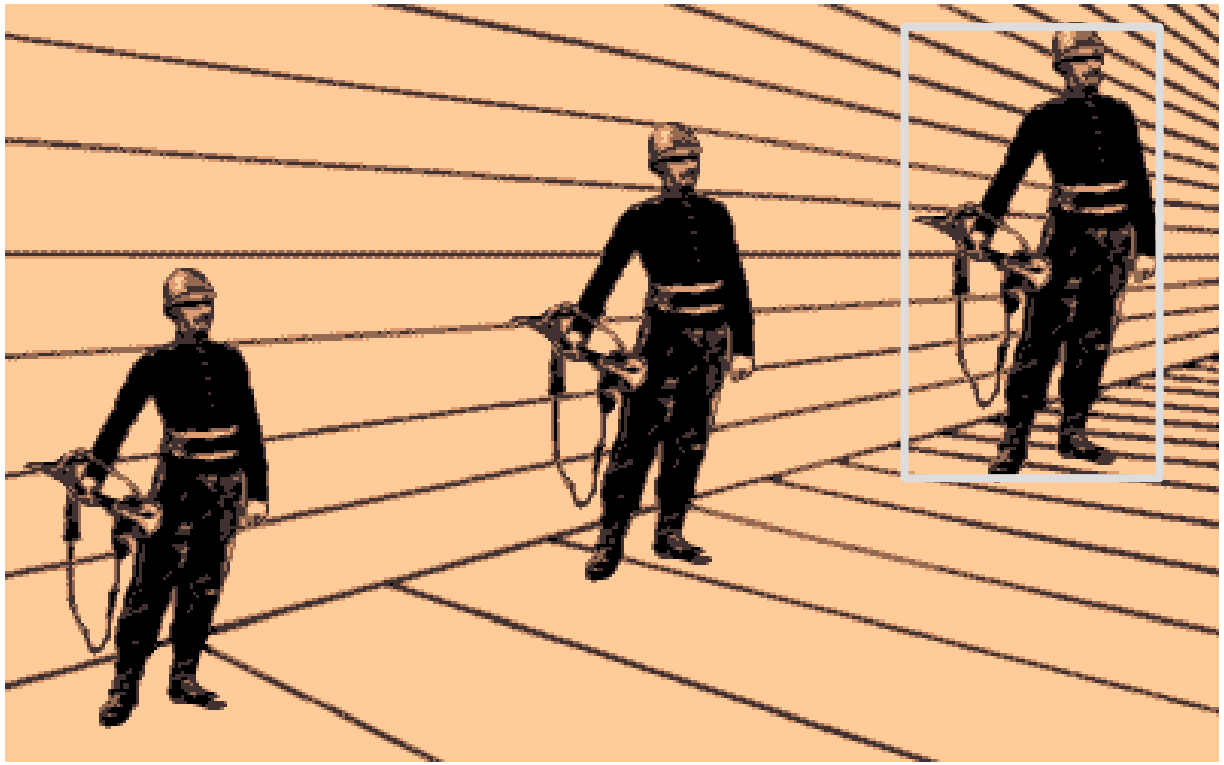
Which Soldier is tallest?



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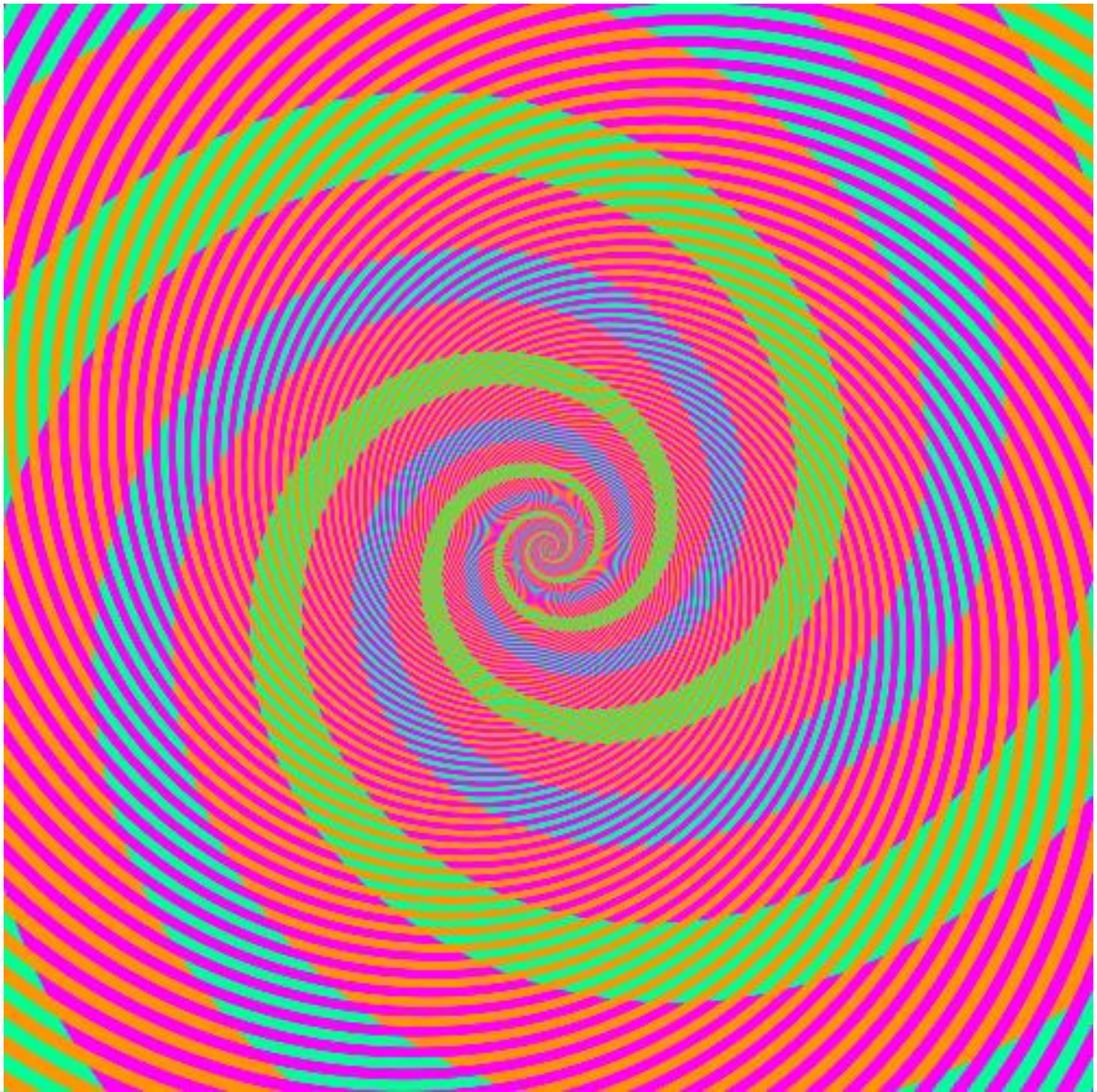
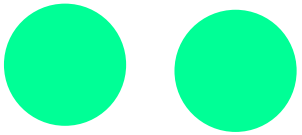
The Spirals are the Same Color





What Attracts Attention

1. **Motion**
2. **Color**
3. **Size**

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OBI Intro Demo

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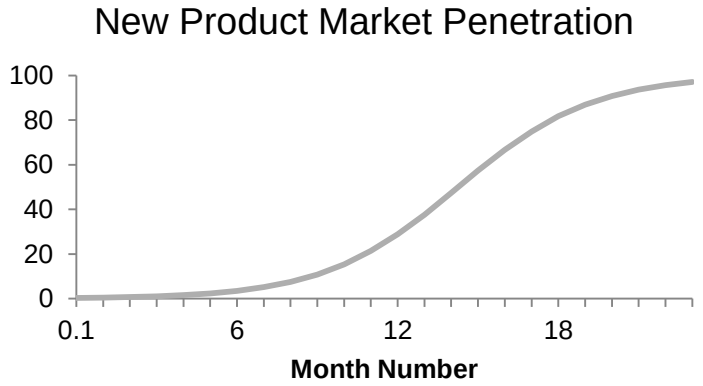
Graphs and Tables

- Graphs and Charts depict visual representations and relationships.



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

District	Month	Dollars	WB Forecast Dollars	% Forecast
ATLANTA DISTRICT	03/01/2008	595,232.0	535,185.0	111.2
BOSTON DISTRICT	03/01/2008	1,882,036.0	1,954,736.7	96.3
CHARLOTTE DISTRICT	03/01/2008	215,360.0	204,592.0	105.3
CHICAGO DISTRICT	03/01/2008	1,381,552.0	1,236,574.0	111.7
CINCINNATI DISTRICT	03/01/2008	827,162.0	742,869.0	111.3
DALLAS DISTRICT	03/01/2008	1,060,316.0	897,654.0	118.1
DENVER DISTRICT	03/01/2008	955,876.0	1,050,735.4	91.0
DETROIT DISTRICT	03/01/2008	961,026.0	1,249,333.8	76.9
JACKSONVILLE DISTRICT	03/01/2008	1,827,434.0	1,892,779.4	96.5

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Keys to Effective Tables

- Enable column and row sorting.
- Use appropriate number format.
- Avoid scrolling if possible.
- Lock titles if do use scrolling (BI Publisher)
- Display significant figures.
- Judiciously use conditional formatting for data exploration.
- Avoid putting text in color.
- Alignment, proximity, contrast.

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Bad Table

		WIDGETS TO GADGETS RATIO CALCULATED USING CHECK LEVEL DETAIL					
		ELECTROMECHANICAL			PNEUMATIC		
	PERIOD	IN-STORE	WEBSITE	DISTRIBUTOR	IN-STORE	WEBSITE	DISTRIBUTOR
INCLUDES ONLY DATES FROM JANUARY THRU OCT 2007	PERIOD 1	22.36%	11.37%	83.00%	85.34%	20.90%	46.80%
	PERIOD 2	21.22%	15.25%	81.00%	81.31%	18.01%	35.39%
	PERIOD 3	21.64%	13.22%	82.00%	78.29%	29.94%	41.28%
	PERIOD 4	20.89%	13.44%	82.00%	47.82%	16.30%	39.46%
	PERIOD 5	21.90%	13.24%	81.00%	84.58%	17.19%	20.52%
	PERIOD 6	25.09%	14.78%	80.00%	59.93%	31.08%	35.14%
	PERIOD 7	26.23%	14.98%	79.00%	36.35%	32.85%	22.52%
	PERIOD 8	26.83%	13.08%	80.00%	82.10%	30.41%	36.10%
	PERIOD 9	23.79%	14.27%	81.00%	43.40%	25.17%	23.81%
	PERIOD 10	24.39%	12.61%	82.00%	38.21%	17.70%	40.30%

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Better Table

Widgets to Gadgets Ratio

	Electromechanical			Pneumatic		
Period	In-store	Website	Distributor	In-store	Website	Distributor
1	22%	11%	83%	51%	21%	40%
2	21%	15%	81%	74%	21%	32%
3	22%	13%	82%	48%	22%	23%
4	21%	13%	82%	58%	31%	30%
5	22%	13%	81%	52%	19%	28%
6	25%	15%	80%	87%	15%	22%
7	26%	15%	79%	51%	23%	20%
8	27%	13%	80%	44%	22%	45%
9	24%	14%	81%	54%	17%	31%
10	24%	13%	82%	75%	31%	29%

Ratios calculated using check level detail.

Periods include Jan - Oct 2007

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Keys to Effective Graphs

- Do not use 3-D effects.
- Avoid “stop light” color palette.
- Prefer pastel color palettes.
- Avoid bright colors.
- Do not use round gauges or dials.
- Eliminate gridlines, drop shadows, and other graphics.
- Enable interaction for “exploration” graphs
- Prioritize a single message for “explanation” graphs
- Alignment, proximity, contrast.

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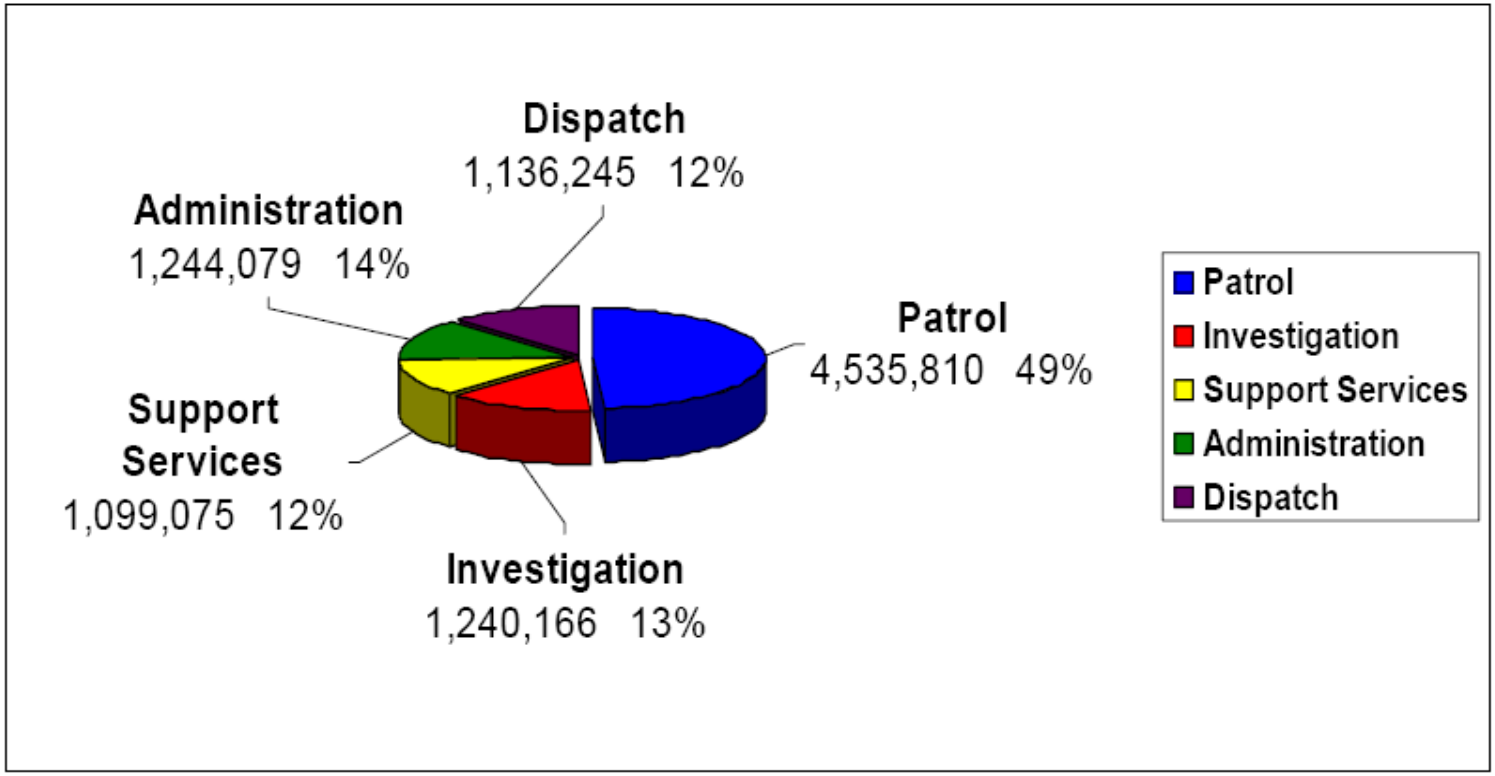
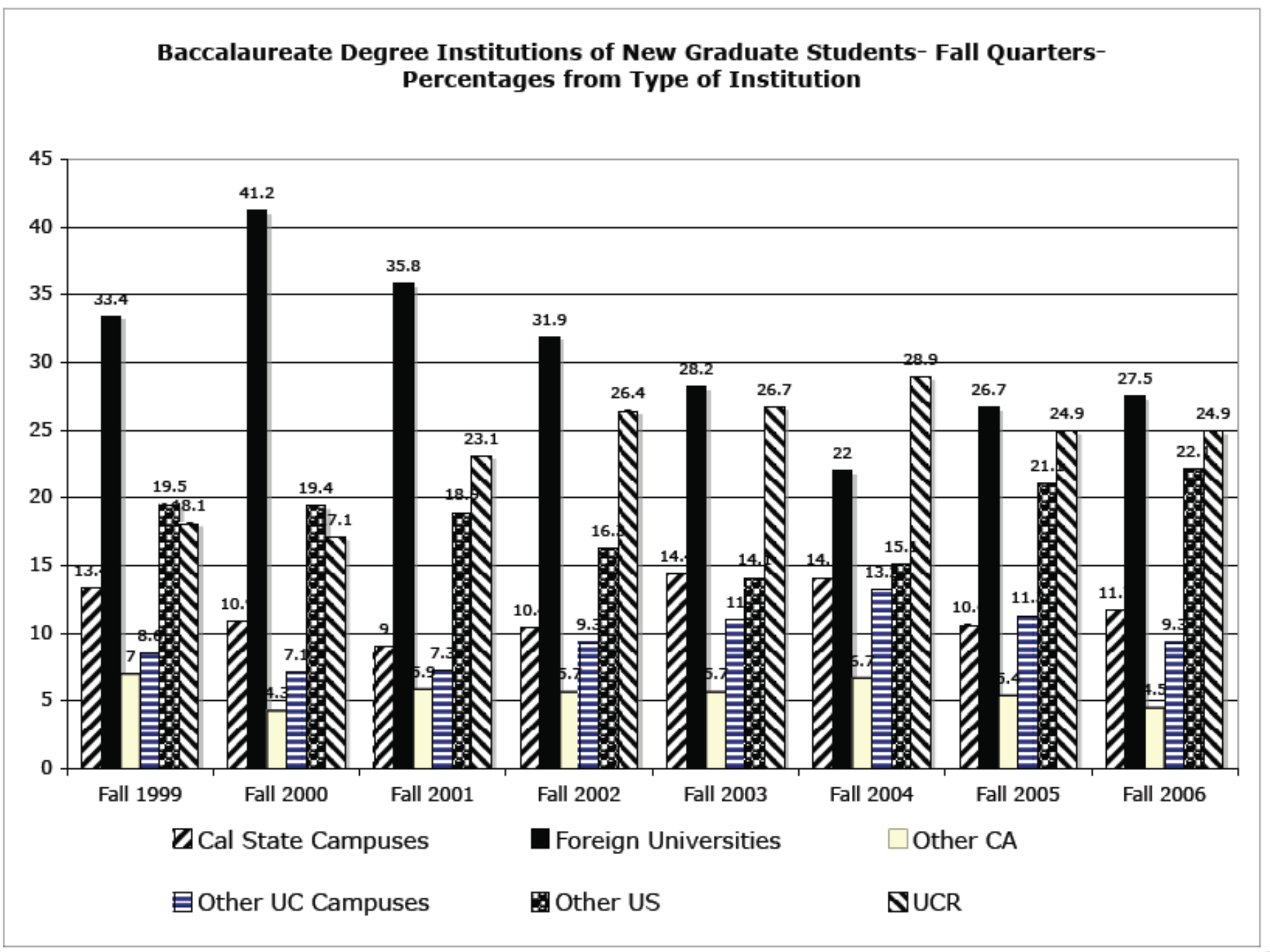
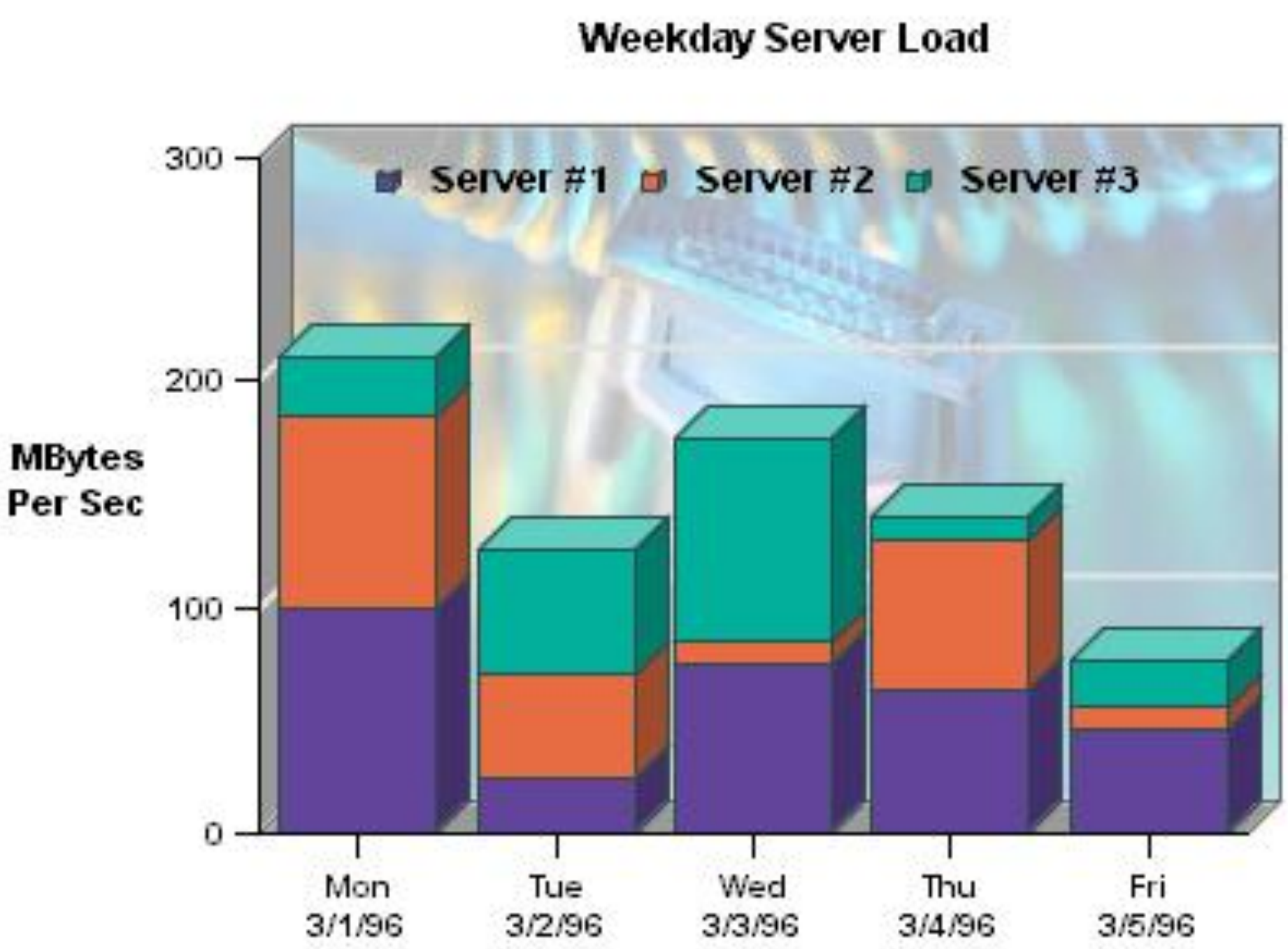
2004 - 2005 Budget

Budget By Division

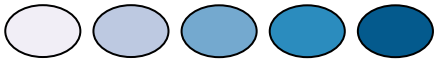



Baccalaureate Degree Institutions of New Graduate Students- Fall Quarters-
Percentages from Type of Institution
45
40
35
30
25
20
15
10
5
0
41.2
35.8
33.4
31.9
28.9
28.2
26.7
26.7
26.4
24.9
24.9
23.1
22
19.5
19.4
18.1
7.1
Fall 1999
Fall 2000
Fall 2001
Fall 2002
Fall 2003
Fall 2004
Fall 2005
Fall 2006
Cal State Campuses
Foreign Universities
Other CA
Other UC Campuses
Other US
UCR


Weekday Server Load
Server #1
Server #2
Server #3
300
200
100
0
MBytes
Per Sec
Mon
3/1/96
Tue
3/2/96
Wed
3/3/96
Thu
3/4/96
Fri
3/5/96

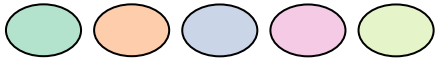
Using Color Effectively

- Consciously choose a color palate.
- ColorBrewer2.org
  - Sequential schemes



    - Designed for ordered data that progresses from low to high.
  - Divergent schemes

    - Place equal emphasis on mid-range values and extremes at both ends of the data range.
  - Qualitative schemes



    - Used for nominal and categorical data where magnitude differences between classes should not be emphasized.

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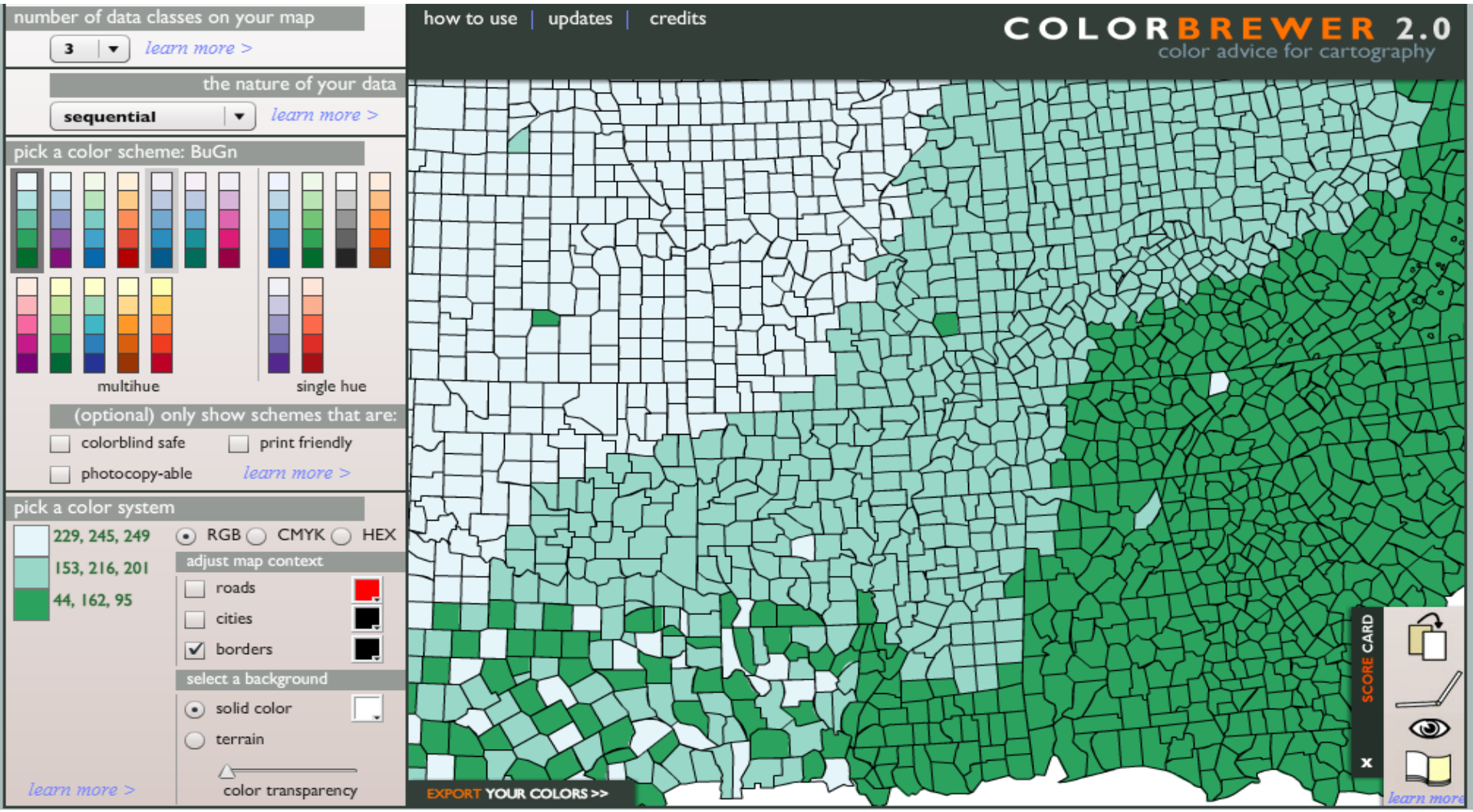
Colorbrewer2.org



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OBI Dashboard Best Practices

- Content is customized.
- Design is standardized.
- Selection and transformation of data is transparent.
- Dashboards are consciously designed and optimized for effectiveness.

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OBI Demo

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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*)

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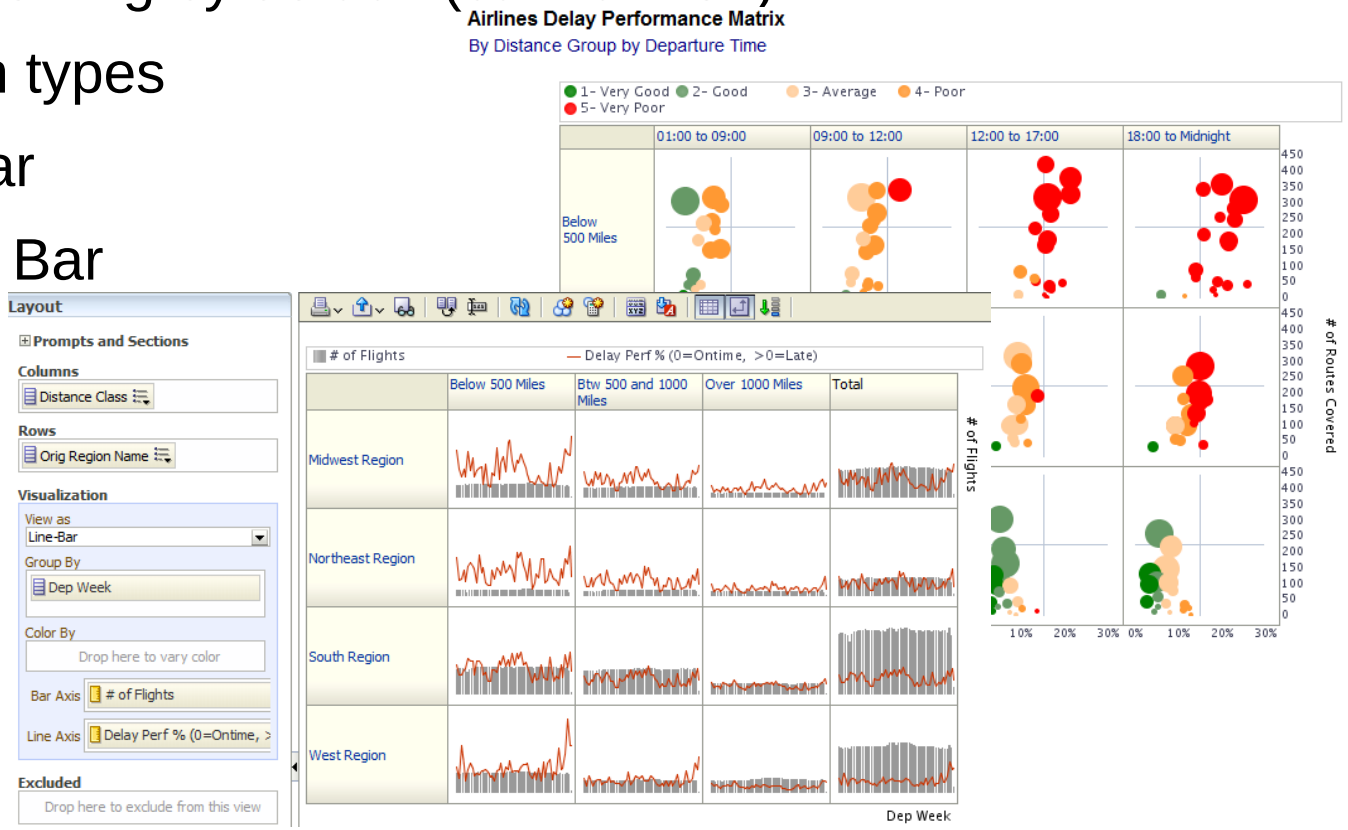
Trellis View - Simple

- 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



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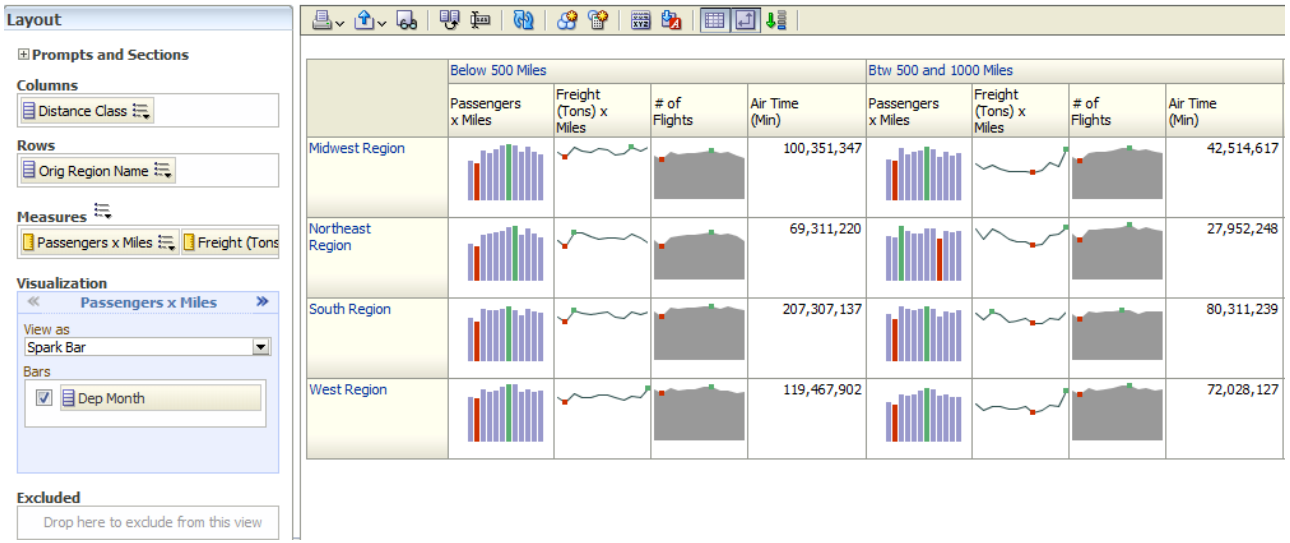
Trellis View - Advanced

- 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



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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

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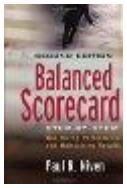
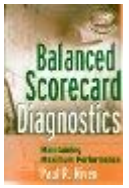
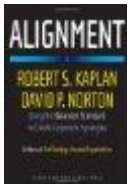
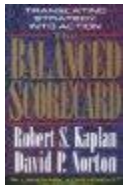
OBI Scorecard & Strategy Management

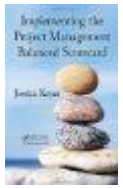


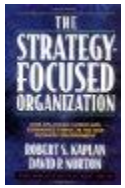


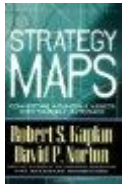


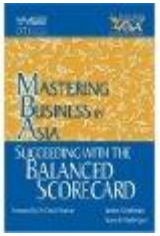
- Integrated toolset in OBIEE
- Follows “Balanced Scorecard” methodology
- Enables corporate goals and objectives to be monitored and managed
- Includes strategy maps, strategy trees, KPI watch lists, and cause and effect maps

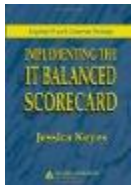


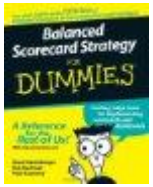


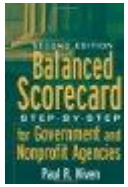


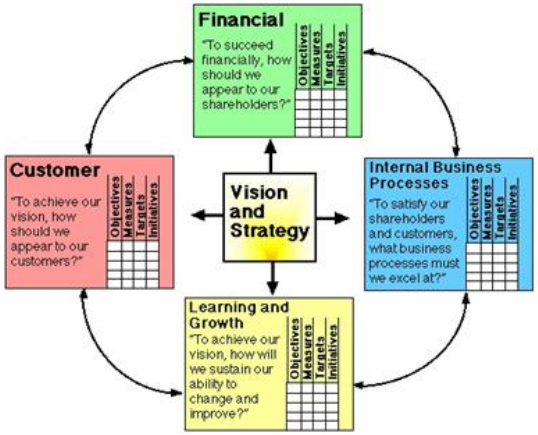












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New Contribution Wheel Visualization

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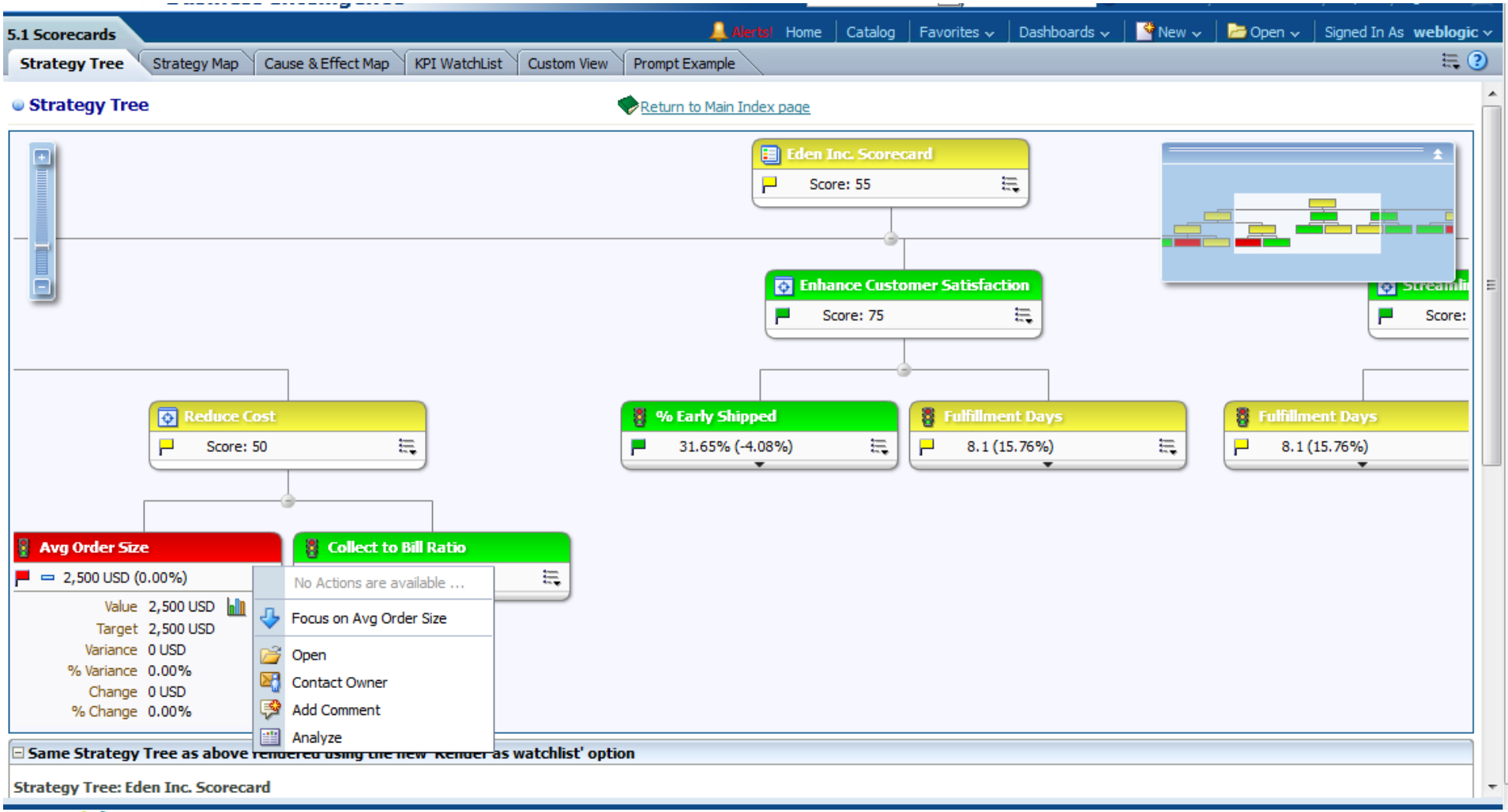
Strategy Tree View



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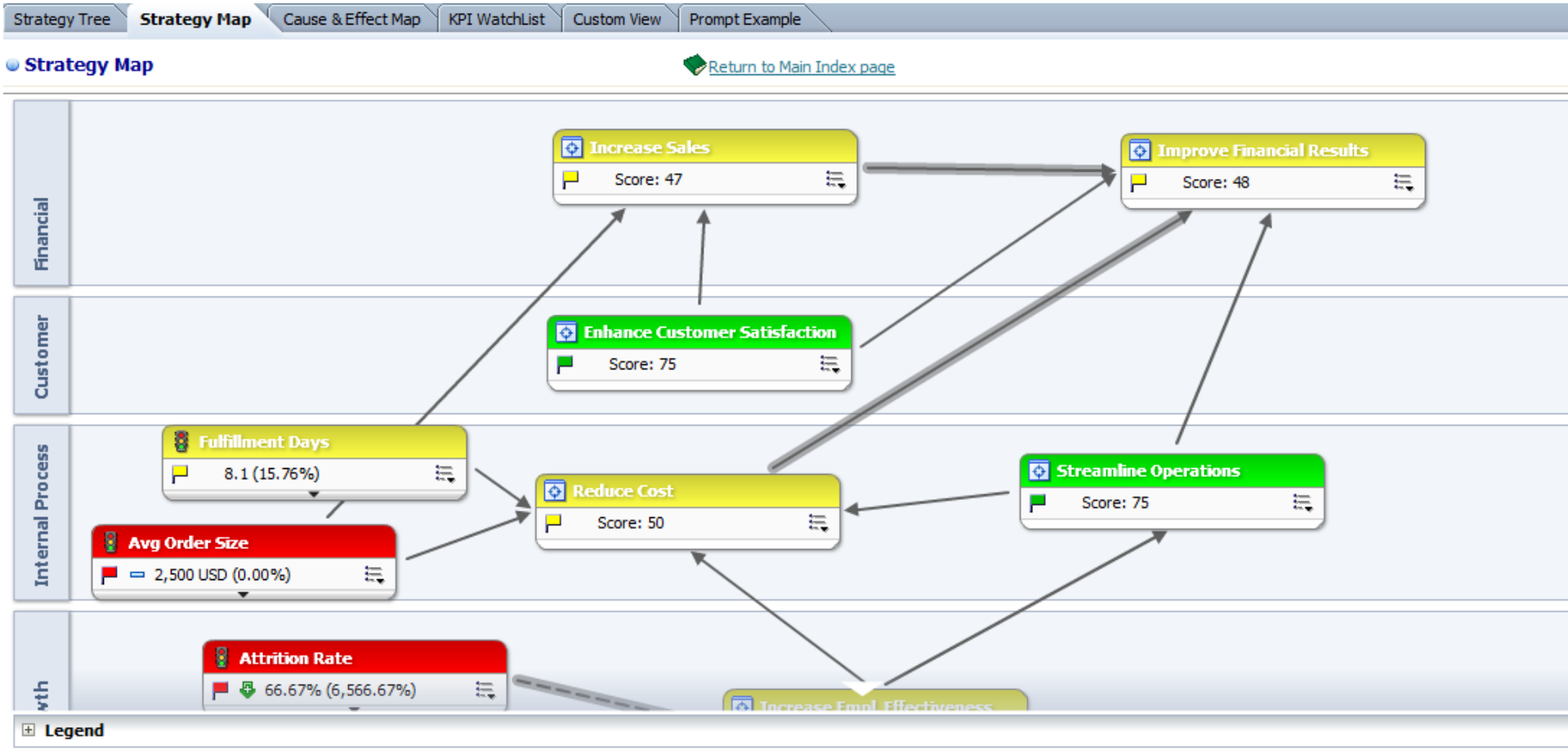
Strategy Map View



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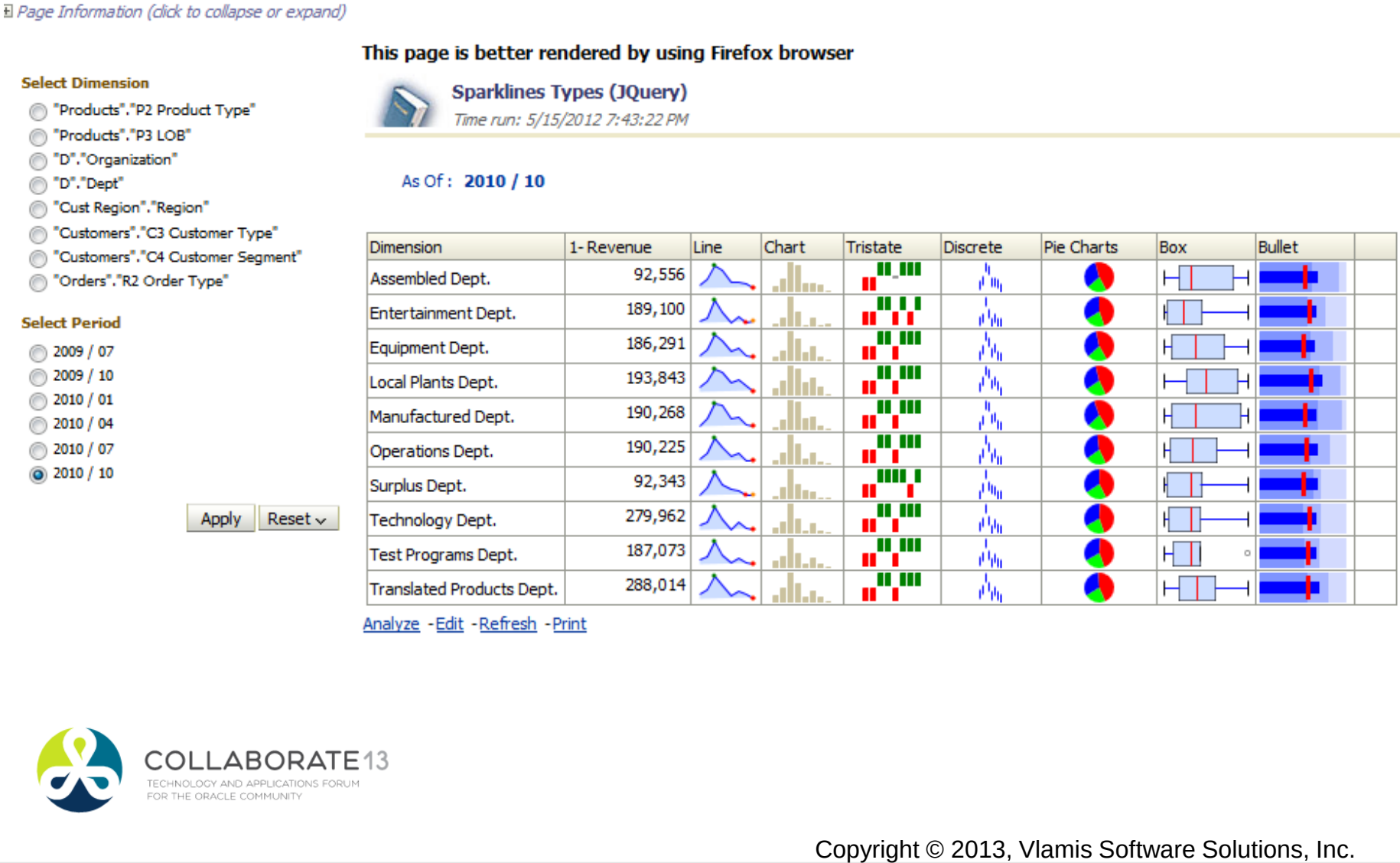
Sparklines



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Pivot Heat Map

	Grand Total	Games	TV	Communication	Electronics	Services	Digital
Figueroa Office	**3,842,927**	914,978	729,734	681,729	701,586	407,924	406,975
Guadalupe Office	**3,724,904**	862,523	693,361	664,967	707,356	406,223	390,474
Madison Office	**3,717,168**	825,439	779,666	739,256	611,821	446,599	314,387
Spring Office	**3,709,488**	858,879	717,308	667,767	685,675	422,997	356,863
Eiffel Office	**3,686,688**	823,046	728,679	676,979	682,524	405,847	369,613
Morange Office	**3,641,103**	811,852	721,242	665,251	663,154	418,867	360,736
Perry Office	**3,619,566**	855,577	683,439	644,954	665,790	409,505	360,299
College Office	**3,585,299**	819,437	694,455	651,687	657,574	405,017	357,129
Copper Office	**3,580,654**	839,416	687,128	646,676	635,637	410,738	361,058
River Office	**3,492,079**	818,428	680,394	623,420	619,194	407,964	342,679
Montgomery Office	**3,408,826**	759,058	682,610	645,294	577,336	448,314	296,214
Mills Office	**3,403,649**	781,304	642,323	626,079	605,688	404,210	344,045
Sherman Office	**3,402,840**	755,860	664,127	657,163	600,825	418,788	306,077
Blue Bell Office	**3,381,098**	736,555	663,794	674,607	586,915	417,255	301,973
Casino Office	**3,375,885**	748,299	667,646	650,591	585,134	427,806	296,409
Eden Office	**3,339,479**	736,841	647,572	675,796	559,997	424,357	294,916
Foster Office	**3,315,059**	739,504	658,783	638,605	570,621	416,816	290,730
Tellaro Office	**3,296,487**	739,693	665,197	633,022	558,079	409,549	290,947
Merrimon Office	**3,267,813**	736,837	636,913	623,980	568,846	407,850	293,386
Glenn Office	**3,208,987**	722,666	626,456	611,952	556,473	412,547	278,894

Top
Top 5
Top 10
Top 15
Top 20
Top 25
Top 30

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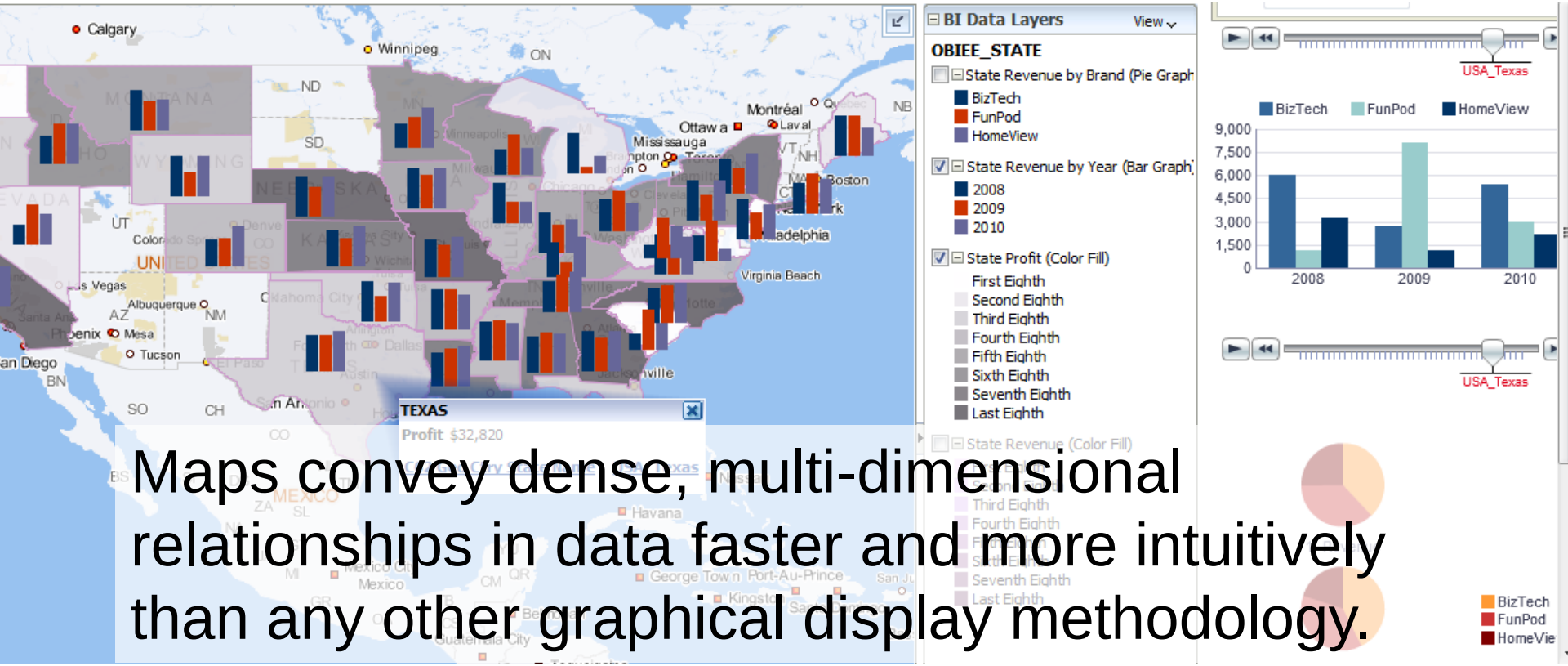
Humans Think Spatially

Why Maps are Powerful



Maps convey dense, multi-dimensional relationships in data faster and more intuitively than any other graphical display methodology.

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What is Spatial Data?

- Business data that contains or describes location
  - Street and postal address (customers, stores, factory, etc.)
  - Sales data (sales territory, customer registration, etc.)
  - Assets (cell towers, pipe lines, electrical transformers, etc.)
  - Geographic features (roads, rivers, parks, etc.)
- Anything connected to a physical location

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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?

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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

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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…

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Map Definitions, cont'd.

- 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

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Map Interactivity in OBI 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

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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

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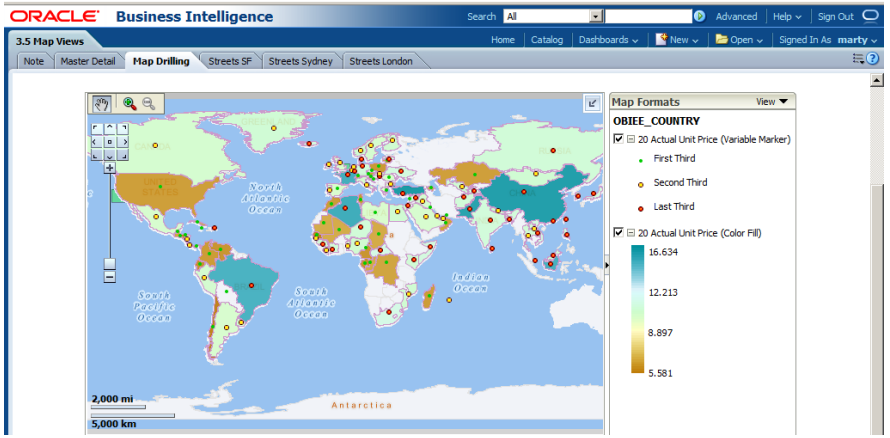
NAVTEQ Data

- NAVTEQ is the leading global provider of digital map, traffic and location data that enables navigation and location-based platforms around the world.
- NAVTEQ data is licensed direct or through a reseller.
- Licenses are use specific.
- NAVTEQ data resides inside your own Oracle Database.
- NAVTEQ publishes an ODF (Oracle Data Format) version of its data designed specifically for use in an Oracle Database.



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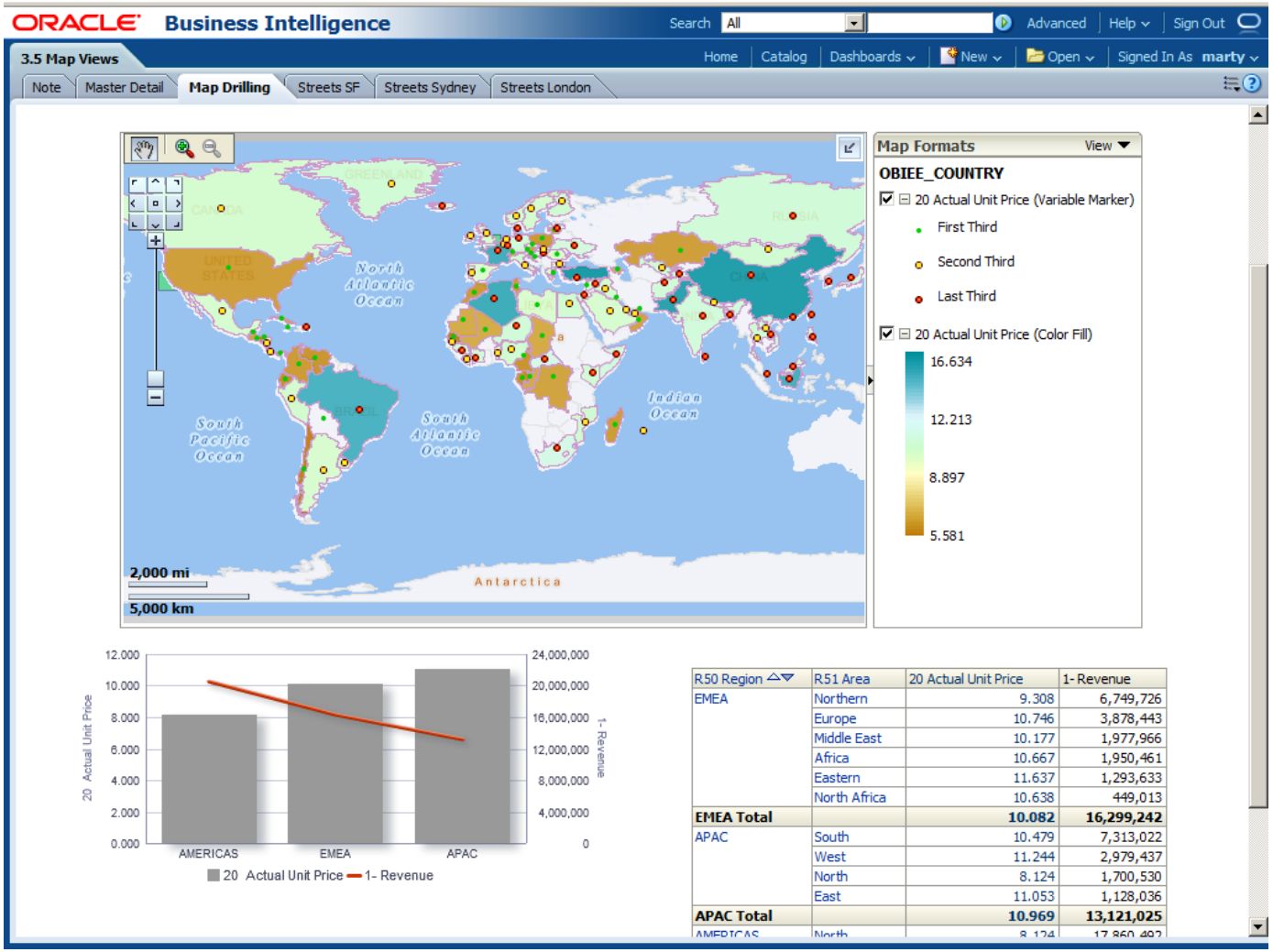
Demo of Oracle BI 11g Maps



R50 Region	R51 Area	20 Actual Unit Price	1- Revenue
EMEA	Northern	9.308	6,749,726
	Europe	10.746	3,878,443
	Middle East	10.177	1,977,966
	Africa	10.667	1,950,461
	Eastern	11.637	1,293,633
	North Africa	10.638	449,013
EMEA Total		**10.082**	**16,299,242**
APAC	South	10.479	7,313,022
	West	11.244	2,979,437
	North	8.124	1,700,530
	East	11.053	1,128,036
APAC Total		**10.969**	**13,121,025**

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Customizing OBI

- Why?
  - Many of the visuals in OBI contribute to the look and feel and *effectiveness* of your dashboard
    - Branding Elements
    - Customization for different analyses
- How?
  - Two aspects:
    - Personalization directly from the Browser
      - Chart types / Colors
      - Dashboard Look and Feel
    - Skinning and Styling by Altering Configuration Files
      - Change Logos
      - Alter the color and style of elements

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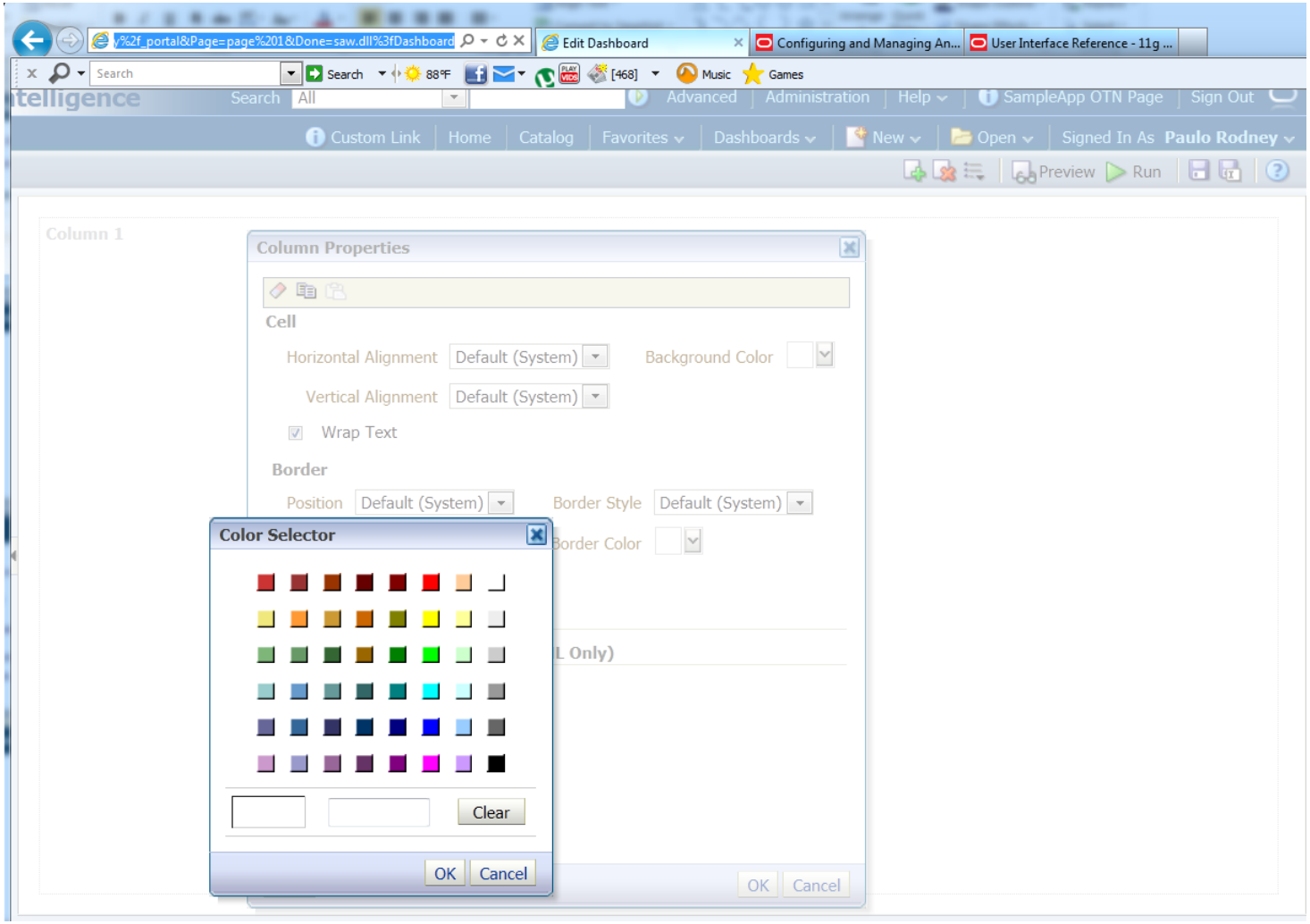
Customizing from the browser



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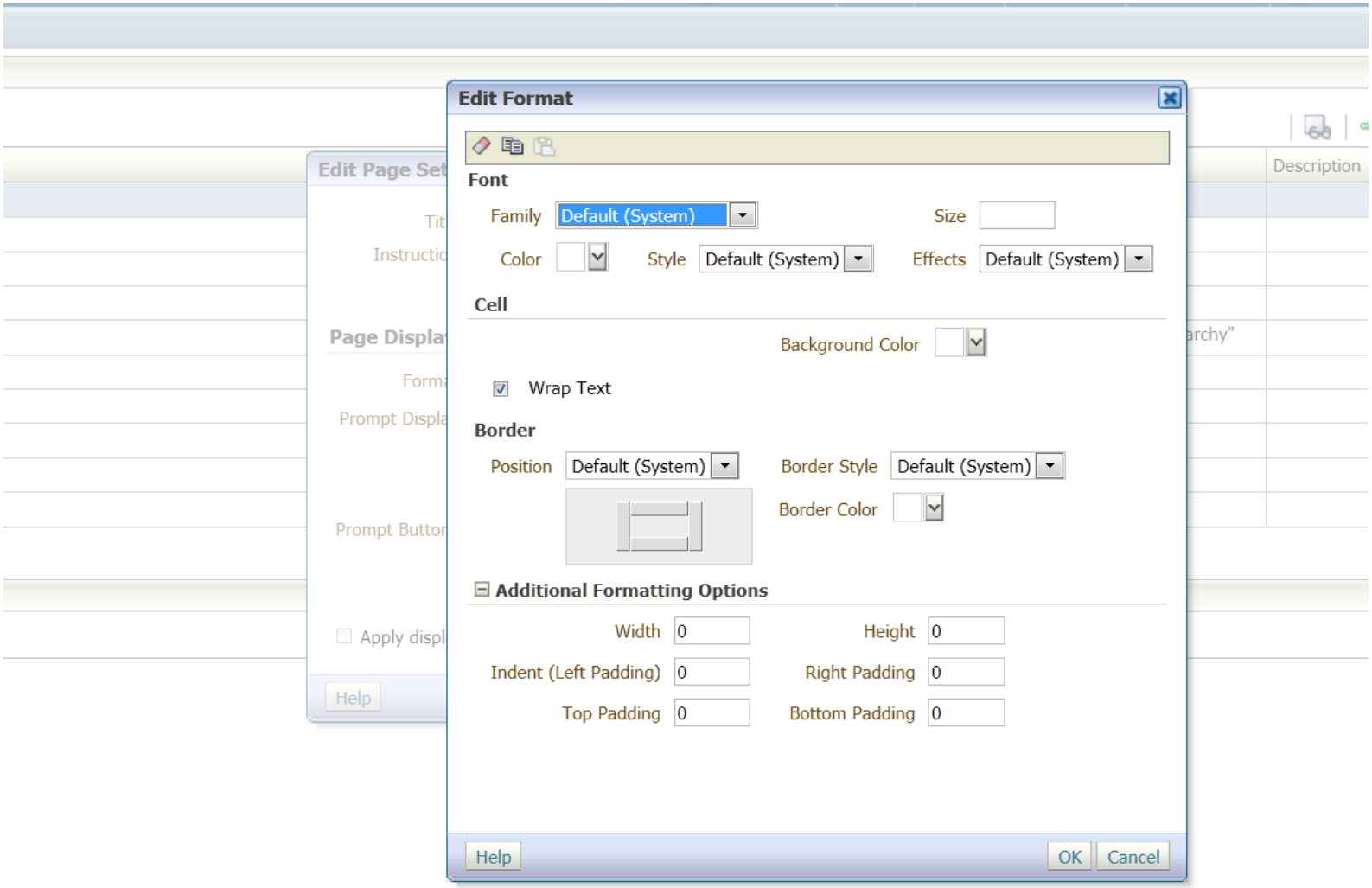
Customize Existing Dashboard Pages



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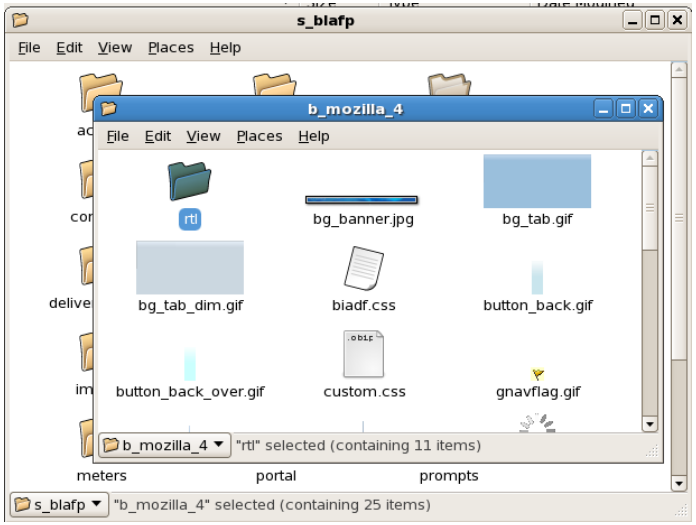
Customizing Skins and Styles

NOTE: Don't attempt this without proper research and always BACKUP your original directories

- Two directory trees of interest:

  s_blafp (styles) --*actual location may vary by installation*

  $BI_HOME/Oracle_BI1/bifoundation/web/app/res/**s_blaf/…**



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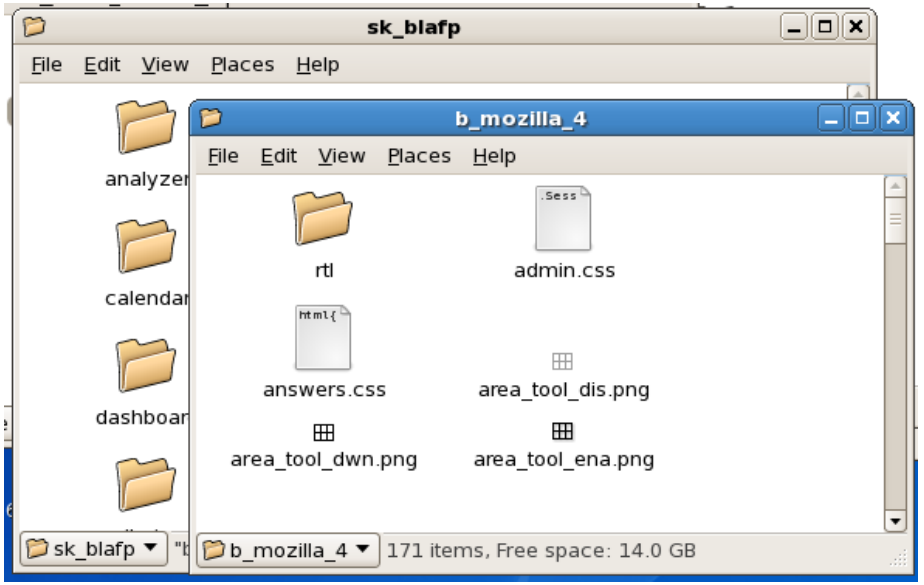
Customizing Skins and Styles

- You can also set an env. variable
- Two directory trees of interest:

sk_blafp (skins) *--actual location may vary by installation*

$BI_HOME/Oracle_BI1/bifoundation/web/app/res/**sk_blaf/…**



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Data Visualization Best Practices in Oracle Business Intelligence Session 12633

THANK YOU!

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