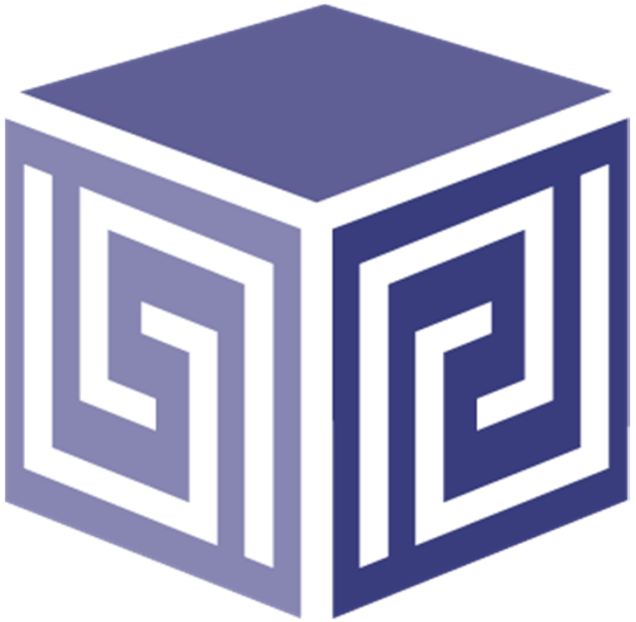
OBI 11g Data Visualization Best Practices

Heartland Oracle User Group 2012



Tim Vlamis
Vlamis Software Solutions
816-781-2880
http://www.vlamis.com

Vlamis Software Solutions

- Founded 20 years ago by Dan Vlamis
- Headquartered in Liberty (Kansas City), MO
- Focused on Oracle Business Intelligence and Analytics
- Completed more than 200 Oracle BI implementations
- OBIEE 11g beta program participant
- Expert presenter at major Oracle conferences
- www.vlamis.com (blog, papers, newsletters, services)

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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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Highlights from Gartner's BI Magic Quadrant Report 2012

- BI and Analytics named as "Top Priority" for 2012
- "Organizations continue to turn to BI as a vital tool for smarter, more agile, and efficient business."
- OBI has highest 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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Data Visualization Usefulness

- Relies on accurate presentations of facts and comparisons
- Demands attention to principles of human cognition
- Should be designed for effectiveness
- Should transparently reveal data selection
- Should be designed around user roles and needs

Many BI Systems Can Create Beautiful Results

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OBI Operates at a Different Scale

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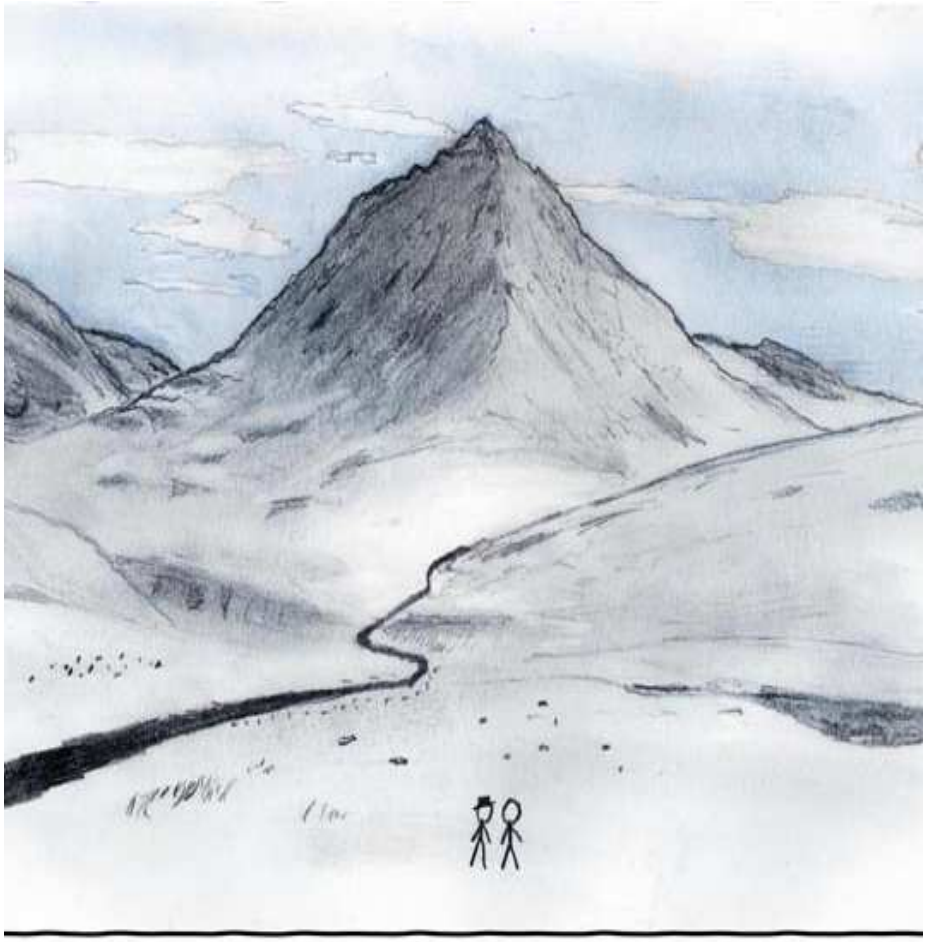
Performance vs. Position

- Business performance refers to change over time.
  - What happened or is likely to happen?
  - Focuses on results and outcomes over a period of time.
  - Implies a narrative (like a movie)
  - Income Statement or Profit and Loss view

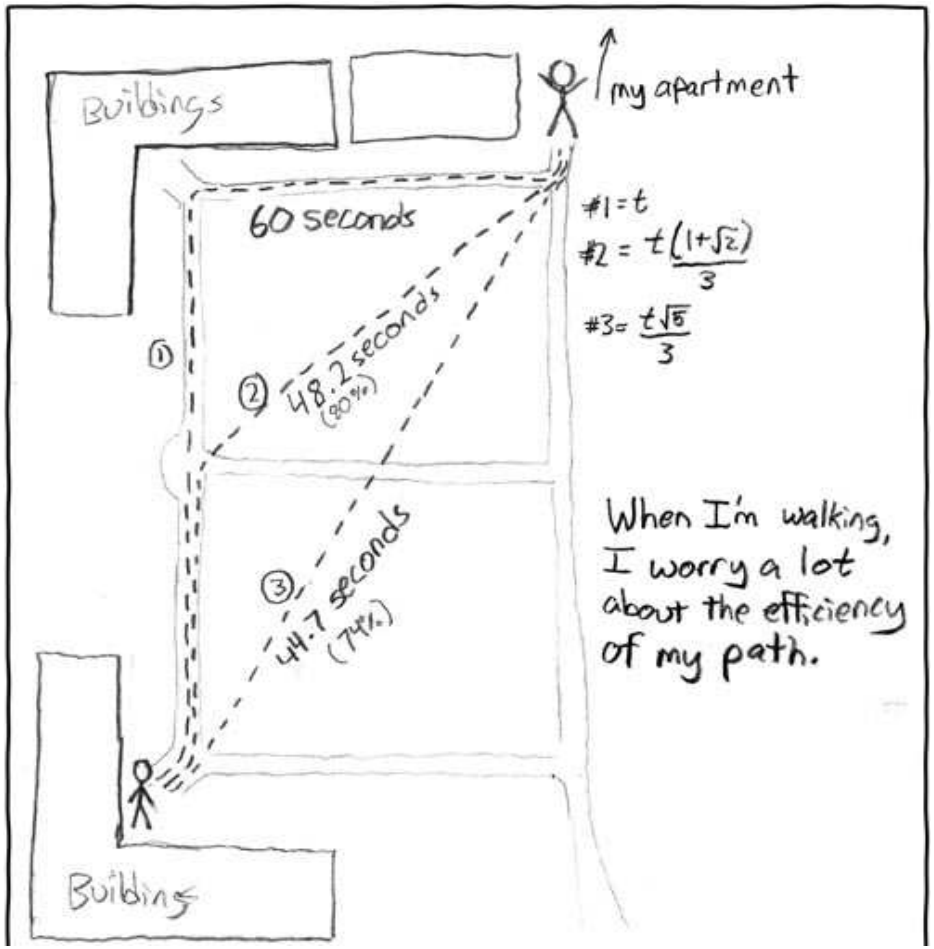
- Business position refers to evaluation at a point in time.
  - What is the state of something
  - Focuses on judgment at a specific moment.
  - Implies a still representation (like a picture)
  - Balance Sheet view

Main Uses of BI Reports & Dashboards

Exploration



Explanation

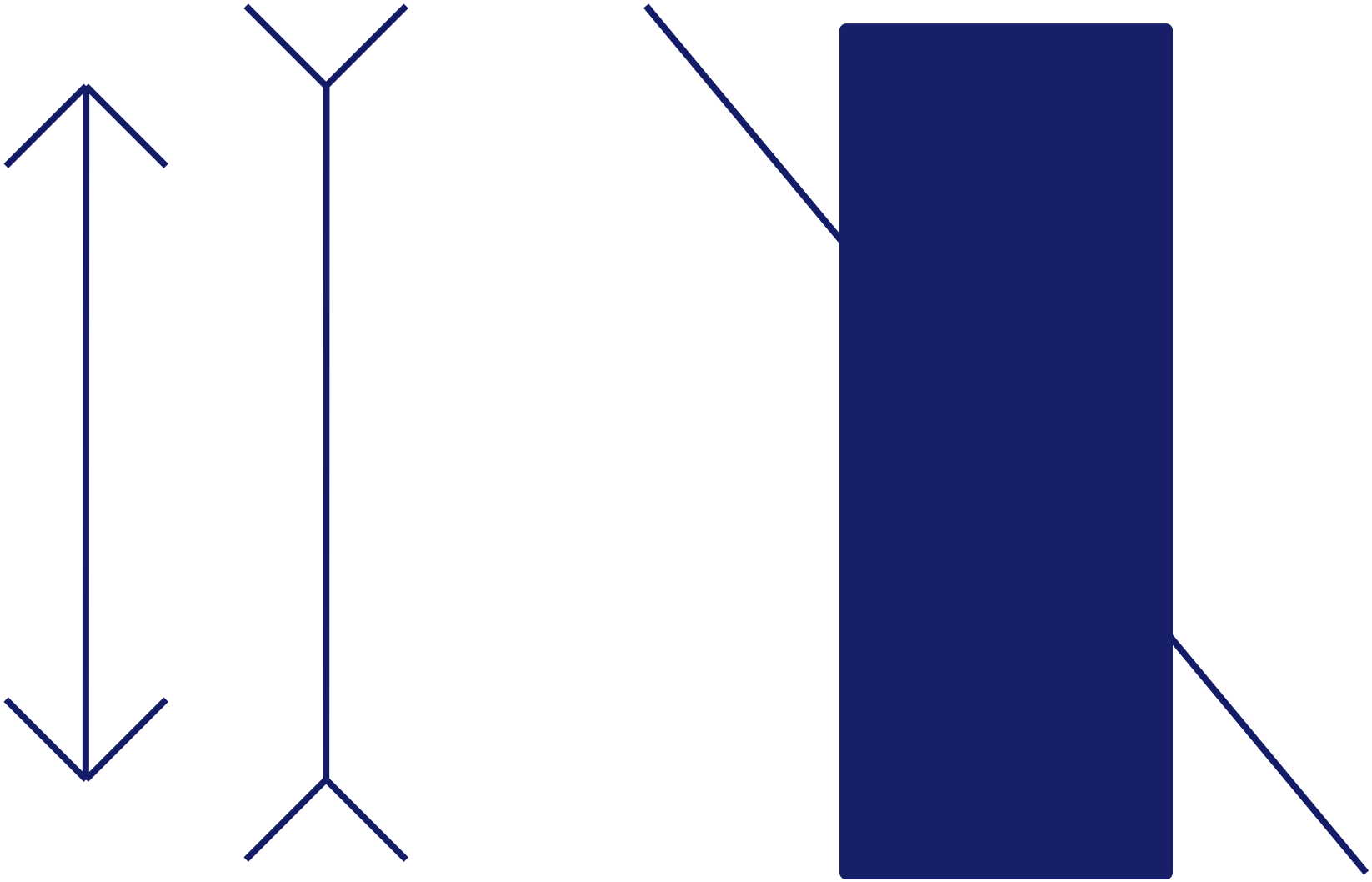


xkcd.com

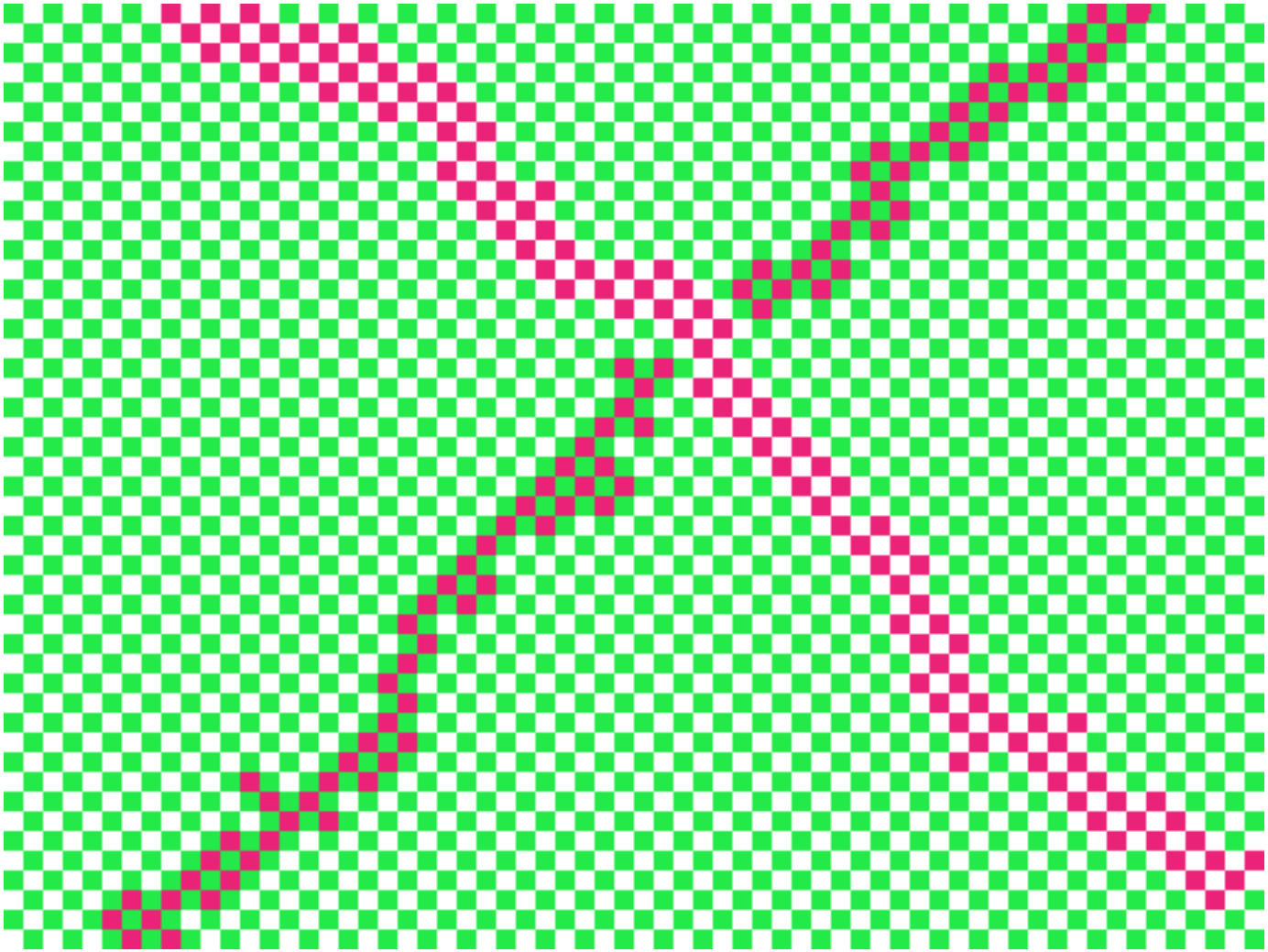
Visualization Fundamentals

- BI reports and dashboards should be viewed primarily as communication devices.
- Both the principles of human cognition and the needs of the individual user should help guide their proper use.
- Humans are pattern seeking creatures.
- All perception is relative.

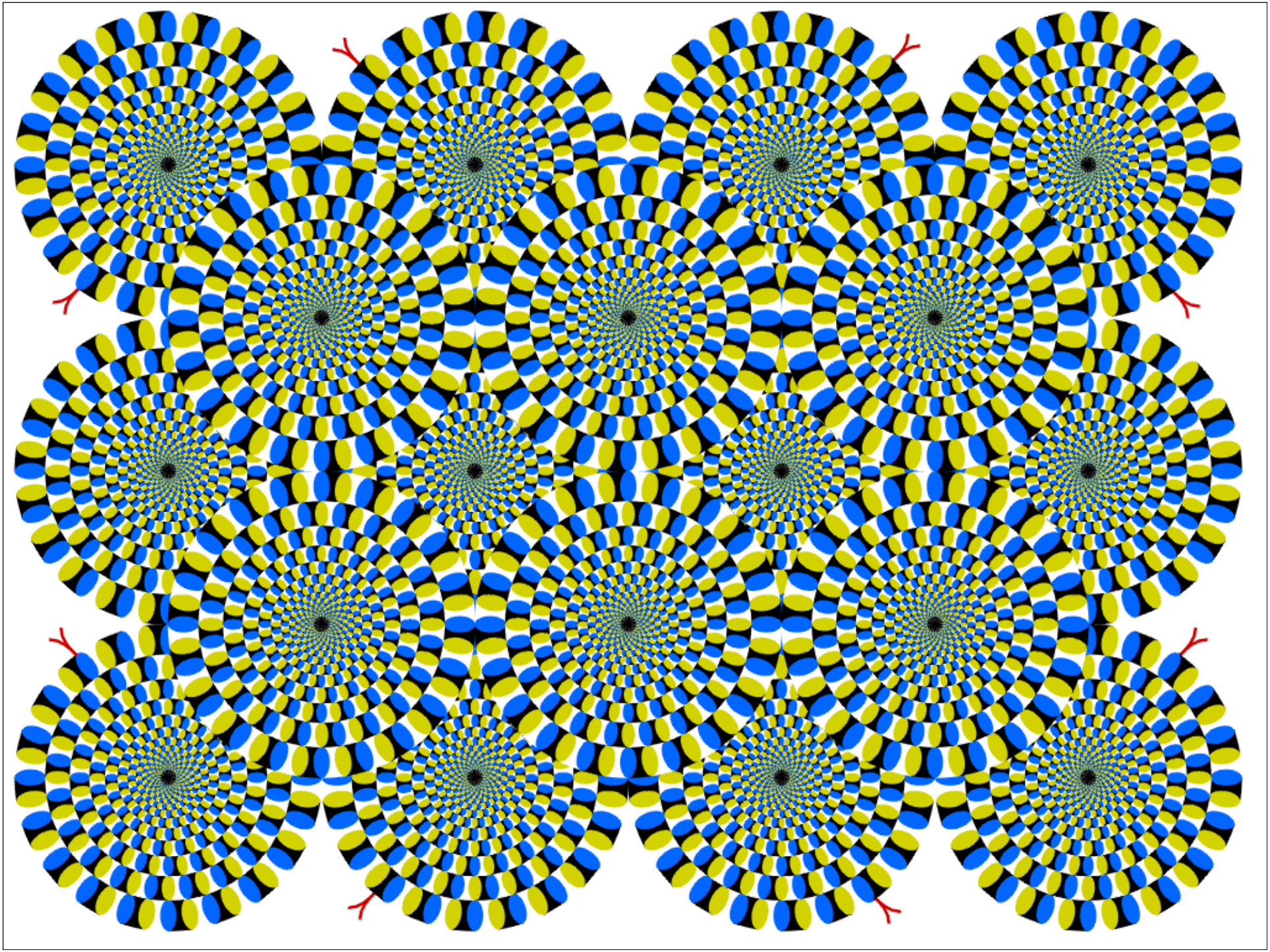
Classic Optical Illusions



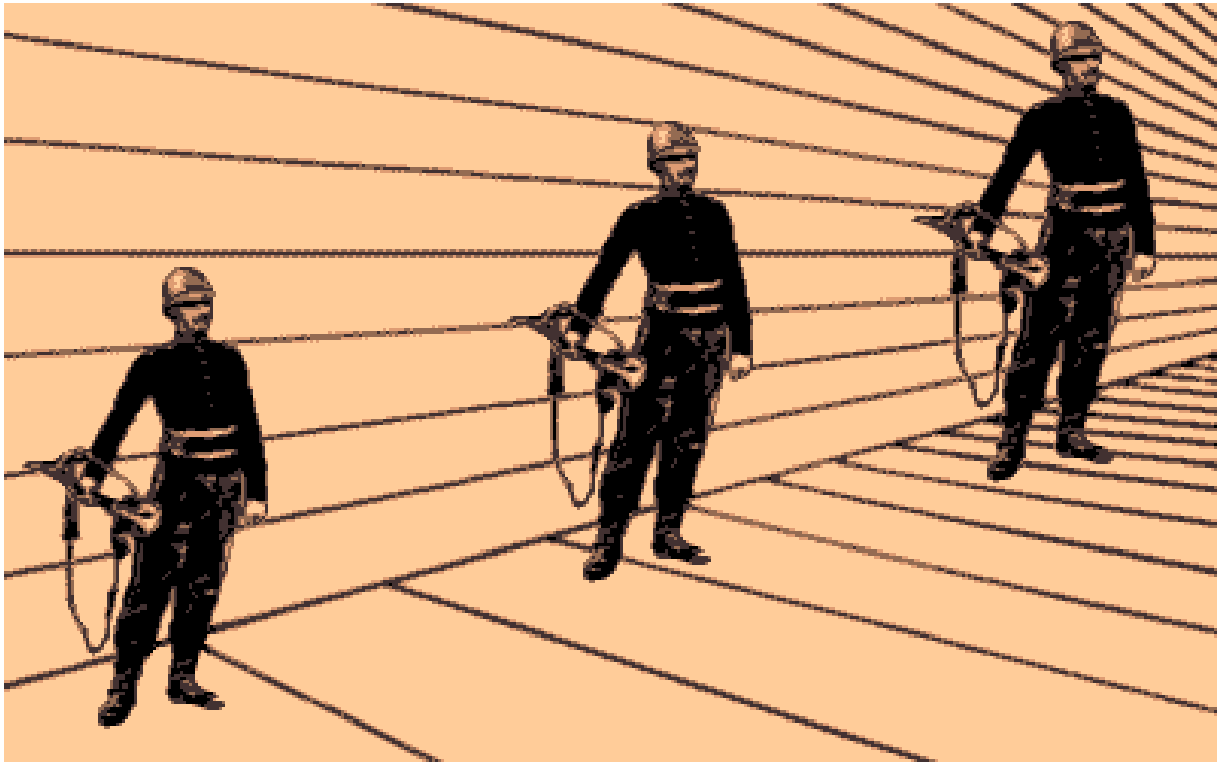
How many colors do you see?



There are only 3 colors: White, green, and pink.
There seem to be two different shades of pink,
but there is only one pink.



Which Soldier is tallest?

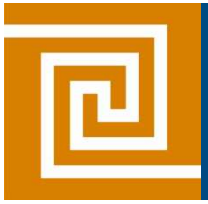


What Attracts Attention

1. Motion
2. Color
3. Size

Strong Foundations

- It’s much easier to misuse BI tools than to use them well.
- Do a few things well and build from there.
- Think through your BI visualizations
  (don’t automatically assume that default settings are fine.)



OBIEE Intro Demo

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Tufte's 5 Principles

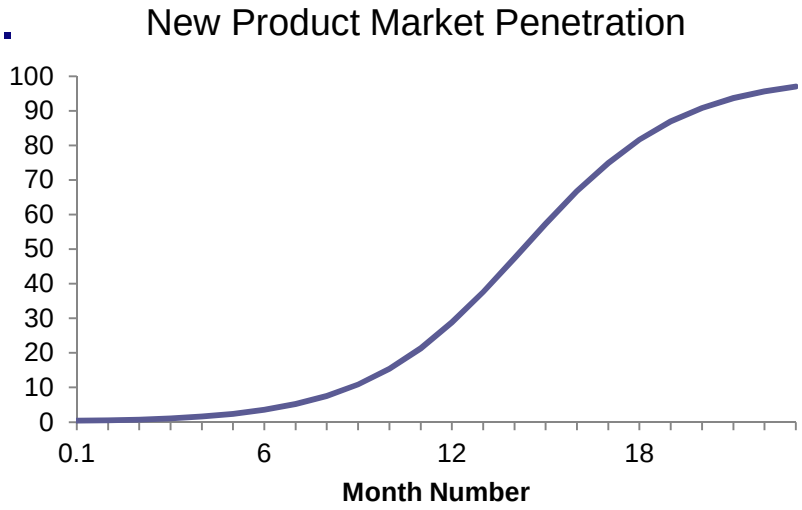
- Above all else show the data.
- Maximize the data to ink ratio.
- Erase non-data ink.
- Erase redundant data ink.
- Revise and edit.

Vlamis' 5 Principles

- Maximize data to ink ratio.
- Match data format with viewer needs, explain or explore.
- Match data precision with data scale.
- Don't misrepresent data.
- Use color carefully.

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

Keys to Effective Tables

- Provide a search interface.
- Avoid scrolling if possible.
- Lock headers and titles if use scrolling.
- Display significant figures.
  - Don’t imply precision that doesn’t exist.
- Judiciously use conditional formatting for data exploration.
- Avoid putting text in color.
- Alignment, proximity, contrast.

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%

Better Table

Widgets to Gadgets Ratio

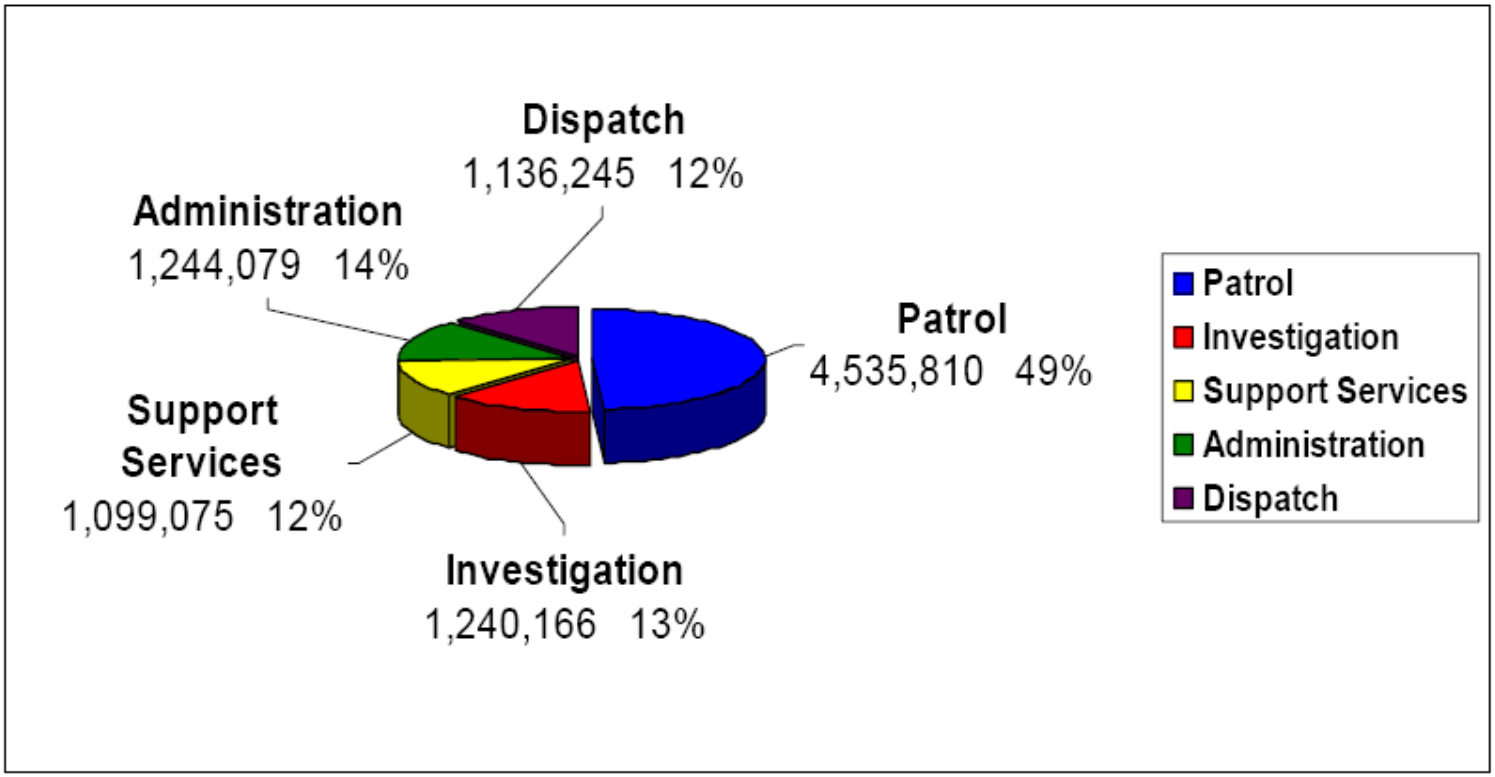
	Electromechanical			Pneumatic		
Period	In-store	Website	Distributor	In-store	Website	Distributor
1	22%	11%	83%	51%	21%	40%
2	21%	15%	81%	74%	21%	32%
3	22%	13%	82%	48%	22%	23%
4	21%	13%	82%	58%	31%	30%
5	22%	13%	81%	52%	19%	28%
6	25%	15%	80%	87%	15%	22%
7	26%	15%	79%	51%	23%	20%
8	27%	13%	80%	44%	22%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

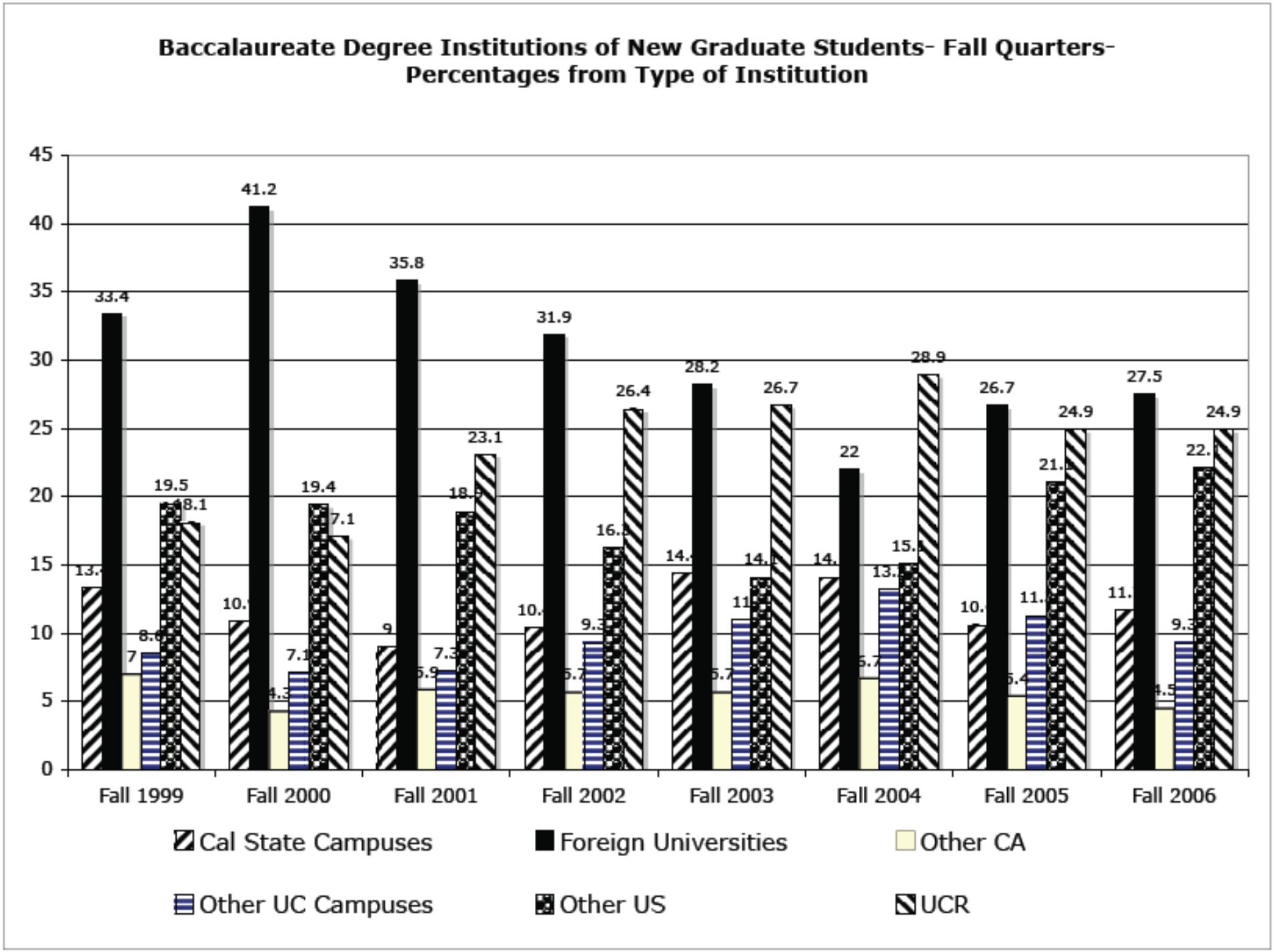
Ratios calculated using check level detail.

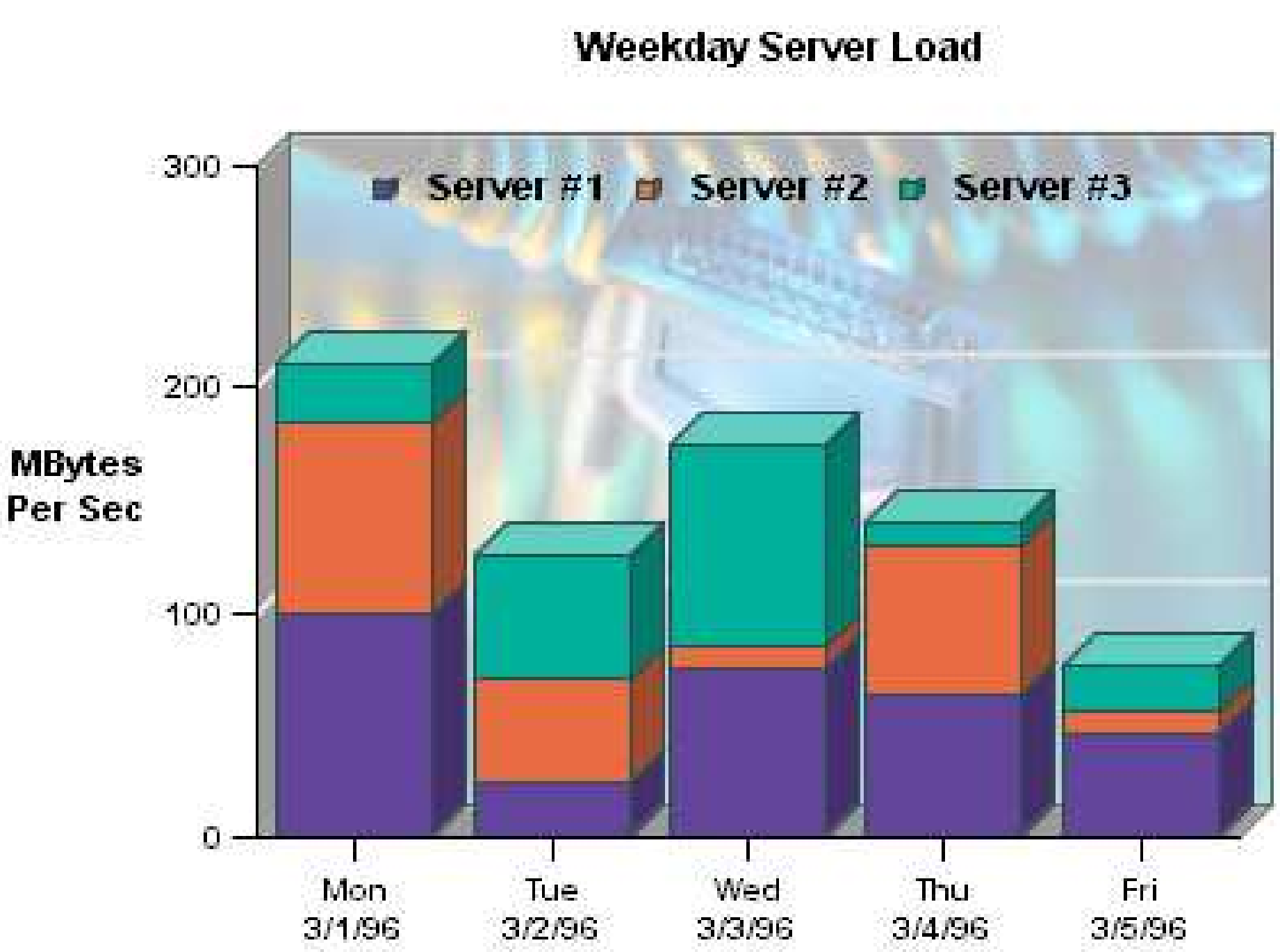
Periods include Jan - Oct 2007

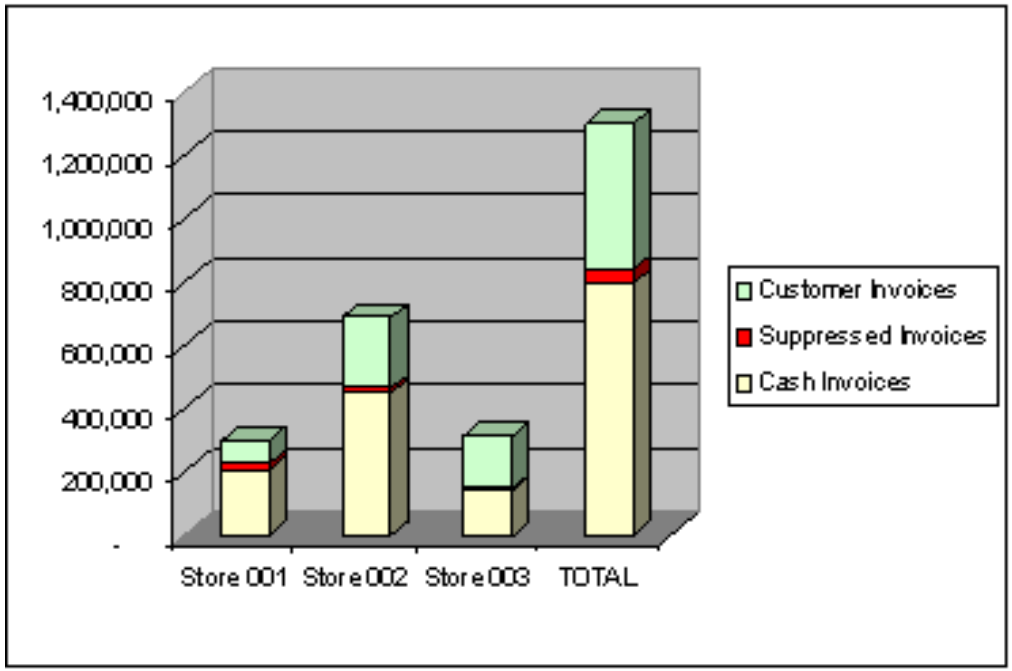
2004 - 2005 Budget

Budget By Division



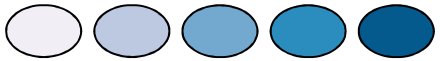

Baccalaureate Degree Institutions of New Graduate Students- Fall Quarters-
Percentages from Type of Institution
45
40
35
30
25
20
15
10
5
0
33.4
41.2
35.8
31.9
26.4
28.2
26.7
22
28.9
26.7
27.5
24.9
24.9
23.1
19.5
19.4
18.1
7.1
Fall 1999
Fall 2000
Fall 2001
Fall 2002
Fall 2003
Fall 2004
Fall 2005
Fall 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



	Store 001	Store 002	Store 003	TOTAL
Total Invoices	298,943	687,091	313,140	1,299,174
less				
Cash Invoices	207,256	449,064	141,305	797,625
leaves				
Non-cash Invoices	91,687	238,027	171,835	501,549
consisting of				
Suppressed Invoices	18,888	15,527	6,501	40,916
and				
Customer Invoices	72,799	222,500	165,334	460,633
for purchases from				
Suppressed Customer Names	2,123	4,306	870	7,299
and				
Active Customer Names	2,103	14,747	8,342	25,192
which include				
Duplicate Customer Names	70	693	619	1,382
leaving				
Unique Customer Names	2,033	14,054	7,723	23,810
which include				
Bad Addresses	1,055	5,759	2,406	9,220
leaving				
Mailable Customer Names	978	8,295	5,317	14,590

Using Color Effectively

- Consciously choose a color palate.
- ColorBrewer2.org
  - Sequential schemes 
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  - Divergent schemes 
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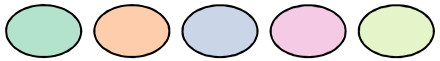
  - Qualitative schemes 
    - Used for nominal and categorical data where magnitude differences between classes should not be emphasized.

Dashboards Defined

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

- Stephen Few, Intelligent Enterprise

Dashboards Defined

A Dashboard is a visual presentation of current summary information needed to manage and guide an organization or activity.

- Dashboards should be customized to the needs of individual users and groups.
- Dashboards should maintain and reflect organizational standards so that they can be properly understood by others in the organization.
- Dashboards should reveal their selection and transformation of data in a transparent manner.
- Dashboards should be purposefully designed and optimized for effectiveness.

OBIEE Dashboard Best Practices

- Dashboards should be customized to the needs of individual users and groups.
- Dashboards should maintain and reflect organizational standards so that they can be properly understood by others in the organization.
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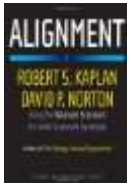
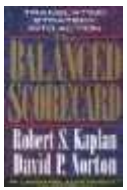
Dashboard Standards

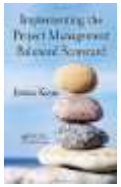
- Before starting it is a good idea to establish some Guidelines and Standards
- For example, what colors are used for which products, or what is the typical screen size so a standard number of section columns can be determined
- Standards help with:
  - Providing professional look and feel, which instill user confidence
  - Standards help reduce development time and improve productivity and consistency.

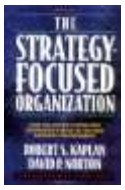
OBI Scorecard & Strategy Management

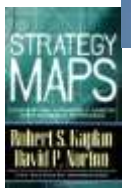
- Integrated toolset in OBIEE
- Follows “Balanced Scorecard” methodology
- Enables corporate goals and objectives to be monitored and managed
- Includes strategy maps, strategy trees, KPI watch lists, and cause and effect maps

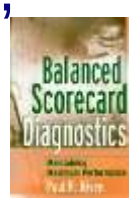


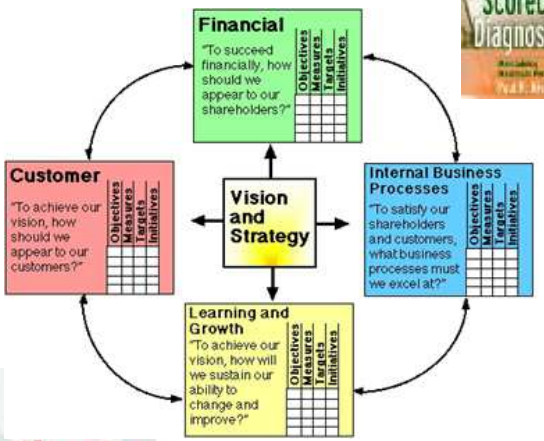


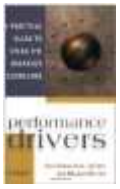


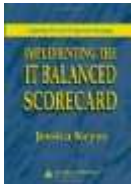


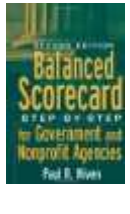












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OBIEE Demo

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Humans Think Spatially

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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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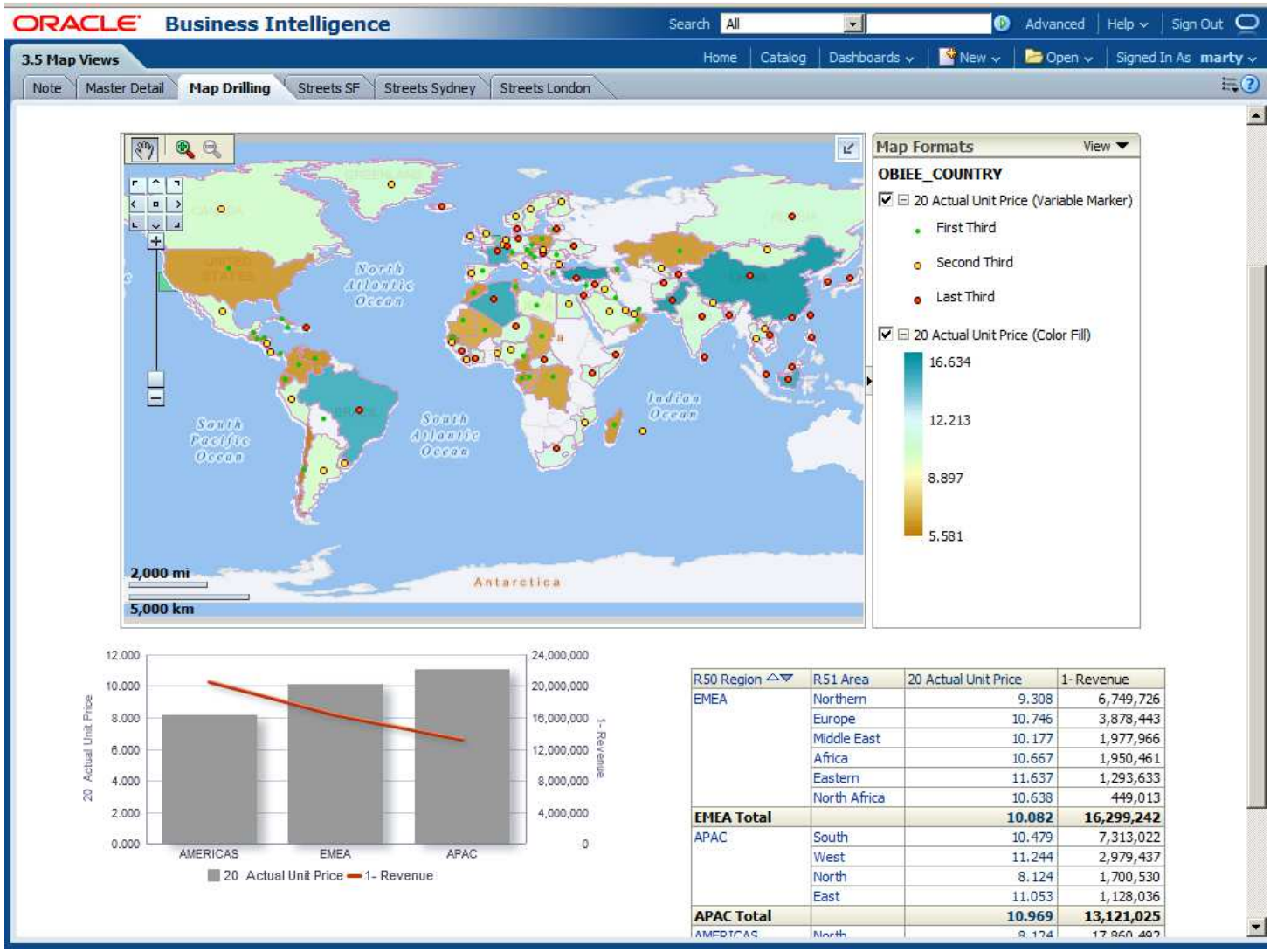
Quick Demo of Oracle BI 11g Maps



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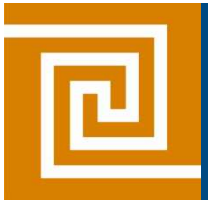

Tufte Quote

"Clutter is not an attribute of information, clutter is a failure of design… fix the design rather than stripping all the detail out of the map."

Edward Tufte

The Visualization of Quantitative Information

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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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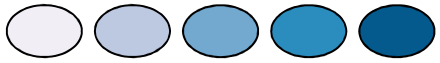
Map View Tips

- 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

Using Color Effectively

- Consciously choose a color palette.
- ColorBrewer2.org
  - Sequential schemes 
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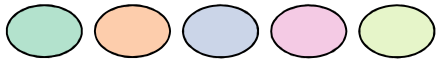
  - Qualitative schemes 
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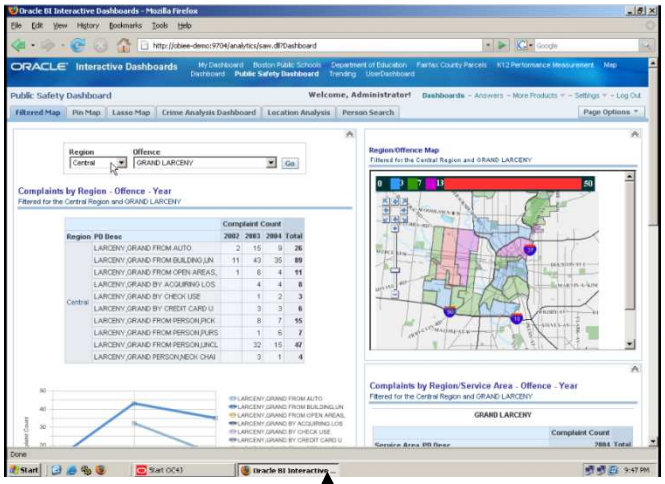
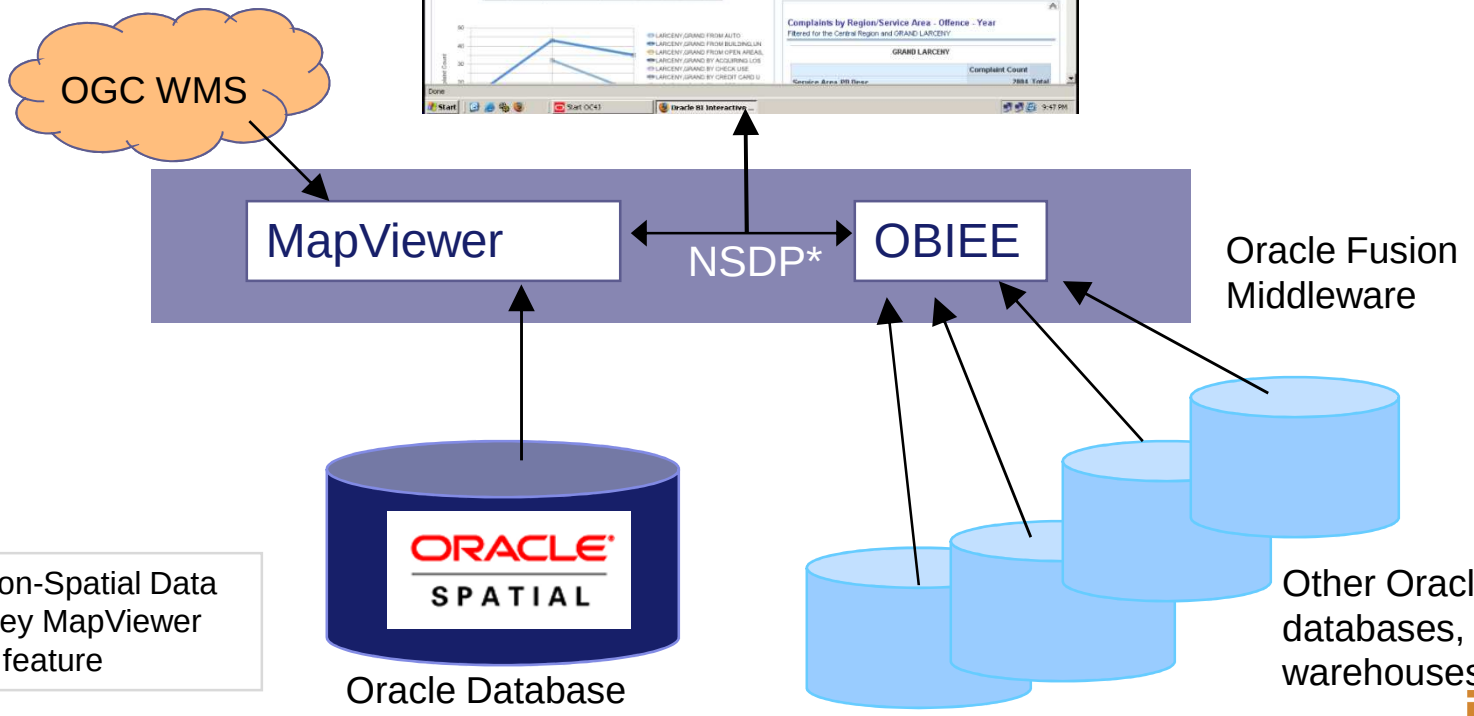
Integration Framework

OBI EE and MapViewer





* NSDP (Non-Spatial Data Provider) key MapViewer integration feature

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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…
- 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

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Oracle Locator and Oracle Spatial

- Oracle Locator is a **feature** of both Oracle Standard and Enterprise Database Editions.
- Oracle Locator provides basic location functionality.
  - Point, line, and polygon spatial locations (SDO_GEOMETRY)
  - Spatial indexing
  - Spatial operators that use the spatial index for performing spatial inquiries.

- Oracle Spatial is an **option** for Oracle Database Enterprise Edition
  - Provides extensive support for advanced spatial processing and analytics including routing, vector and raster data, topology and network models, and more.

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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 instance.

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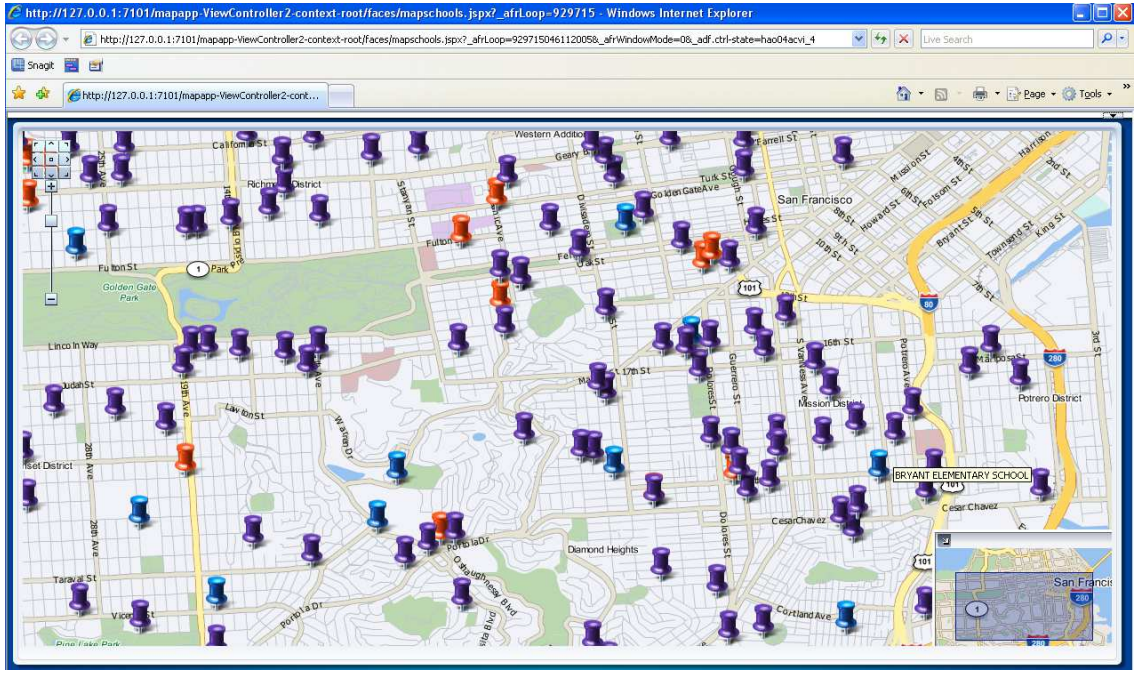
NAVTEQ Content for OBI

- Geocoding
- Points of Interest



AIRPORT
ALTERNATE FUEL STATION
AMUSEMENT PARK
ATM
ATTORNEY
AUTO DEALERSHIP-USED CARS
AUTO DEALERSHIPS
AUTO PARTS
AUTO SERVICE AND MAINTENANCE
AUTOMOBILE CLUB
BANK
BANQUET HALL
BAR OR PUB
BOATING
BOOKSTORE
BORDER CROSSING
BOWLING ALLEY
BOWLING CENTRE
BUS STATION
BUS STOP
BUSINESS FACILITY
BUSINESS SERVICE
CAMPING
CAR WASH/DETAILING
CARGO CENTRE
CASINO
CEMETERY
CHECK CASHING SERVICE
CHURCH
CINEMA
CITY HALL
CIVIC/COMMUNITY CENTRE
CLEANING AND LAUNDRY
CLOTHING STORE
COCKTAIL LOUNGE
COFFEE SHOP
COMMUTER RAIL STATION
COMPUTER AND SOFTWARE
CONSUMER ELECTRONICS STORE
CONVENIENCE STORE
CONVENTION/EXHIBITION CENTRE

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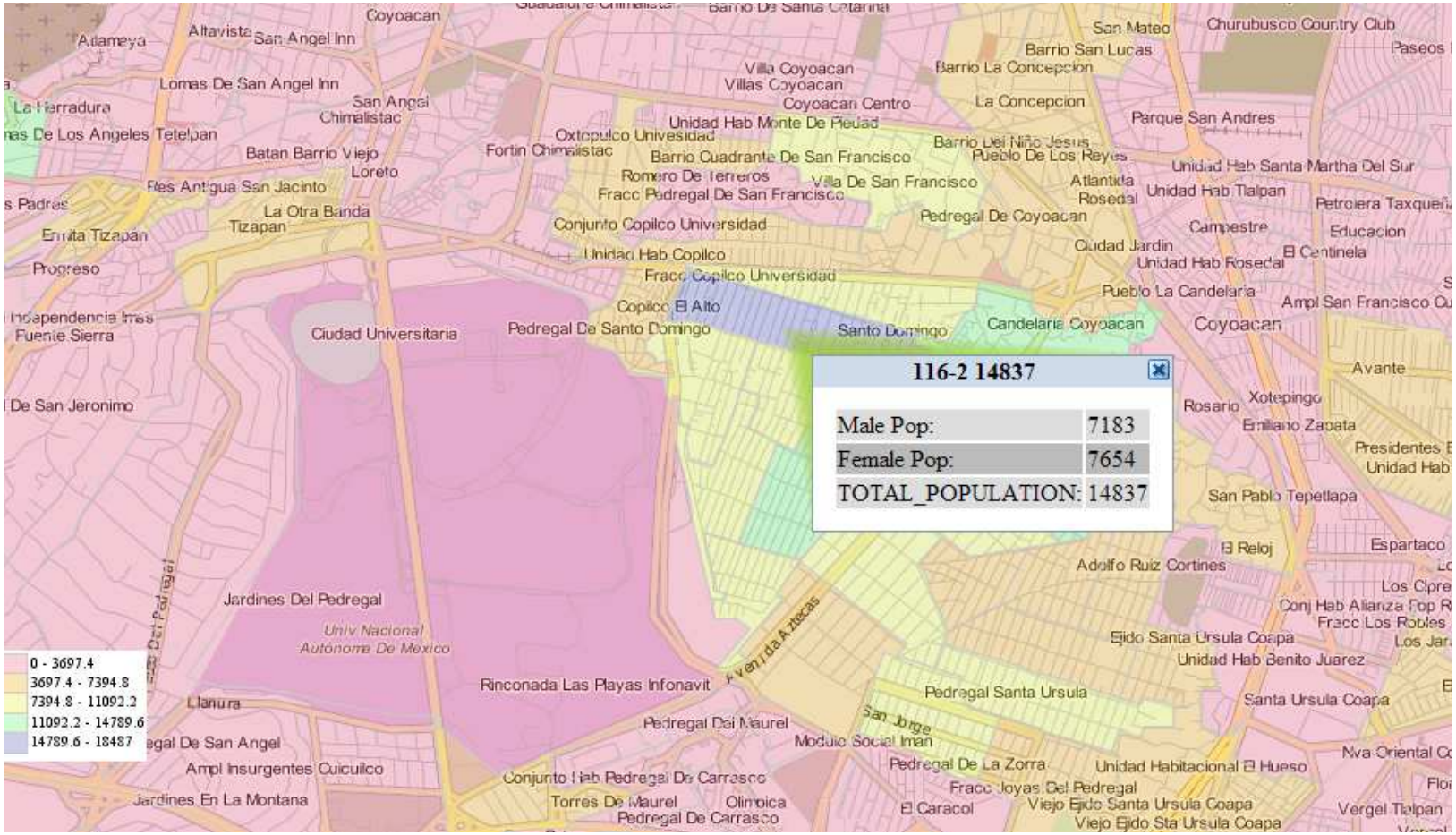
NAVTEQ Content for OBI

- Postal Codes
- Census Boundaries



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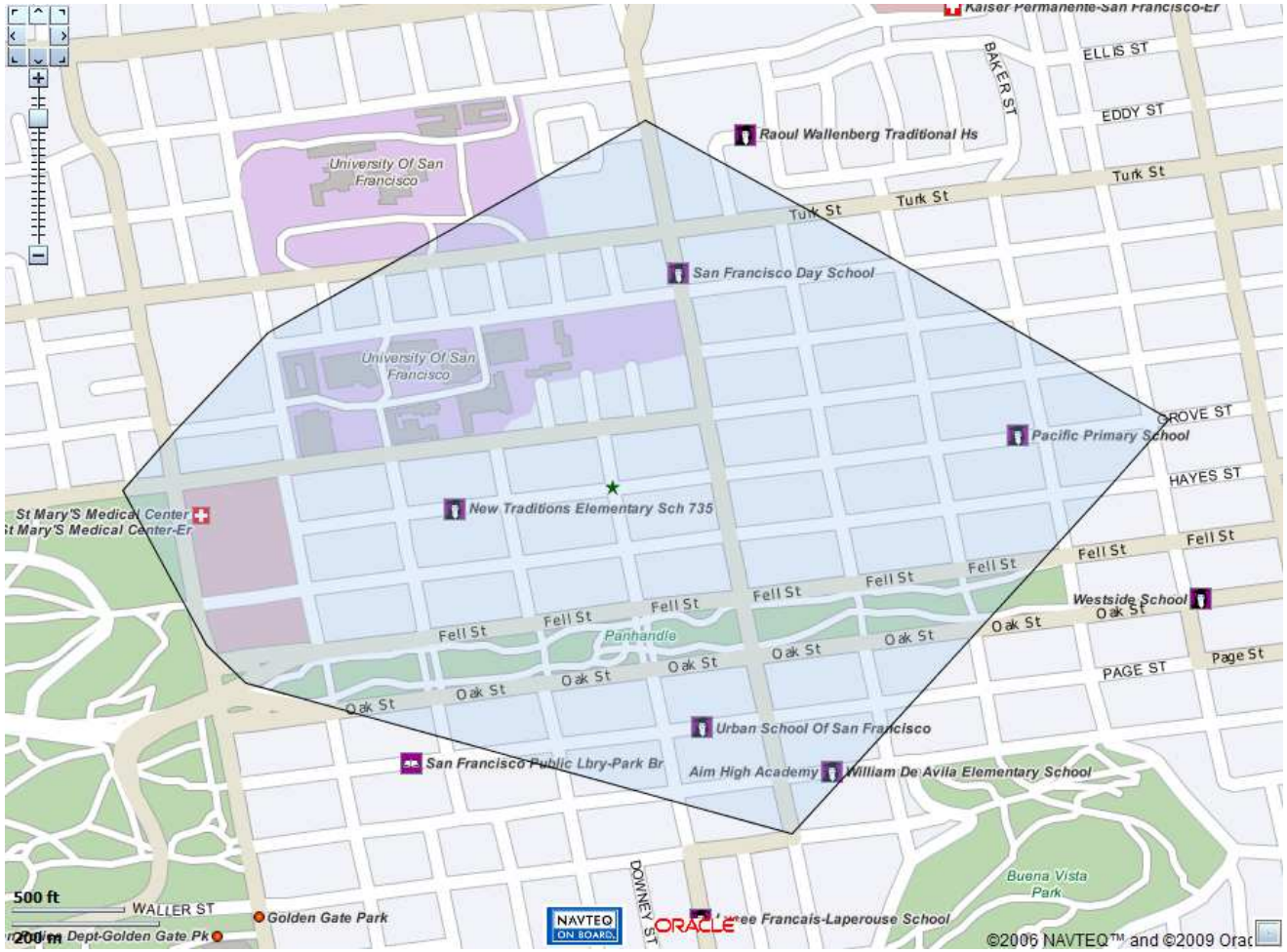
NAVTEQ Content for OBI

- Routing data for drive time/drive distance polygons



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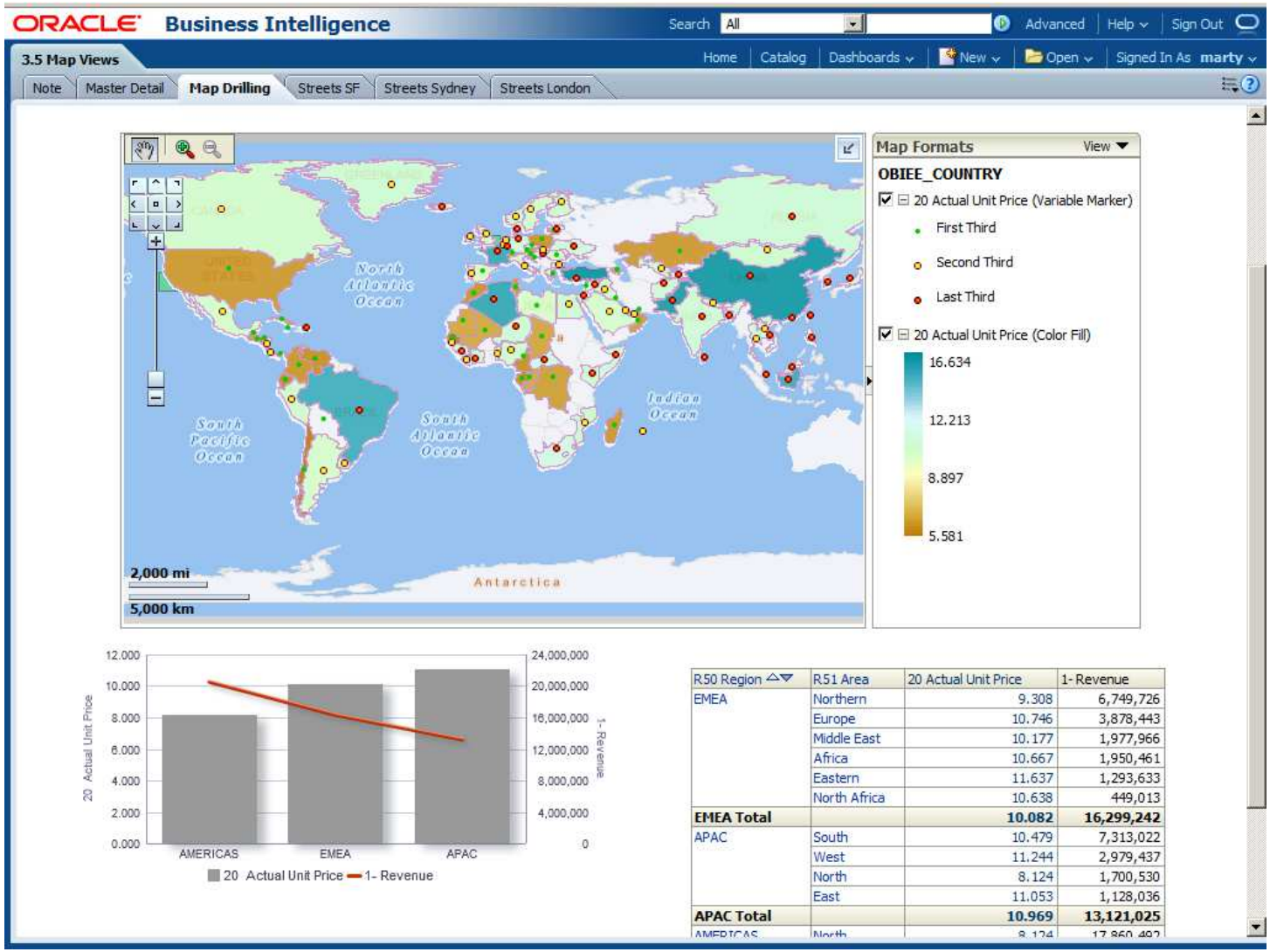
Demo of Oracle BI 11g Maps



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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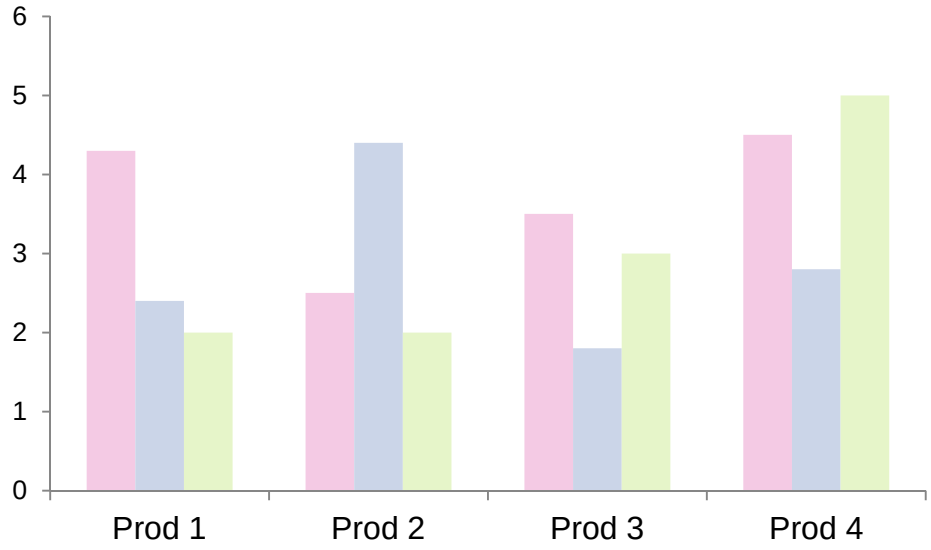
Bar Charts



- Show nominal data values in comparison to one another.
- Start with zero.
- If use a logarithmic scale, clearly notate.

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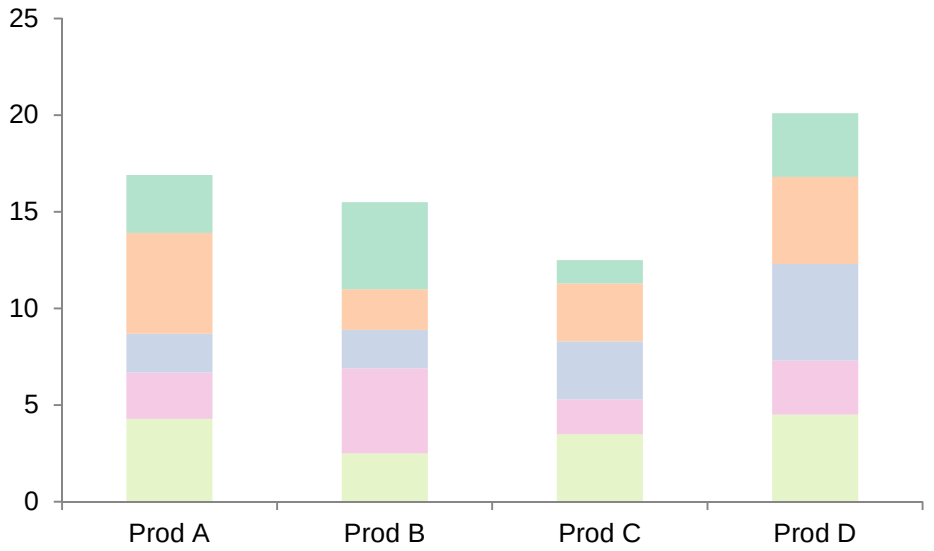
Stacked Bar Chart



- 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.

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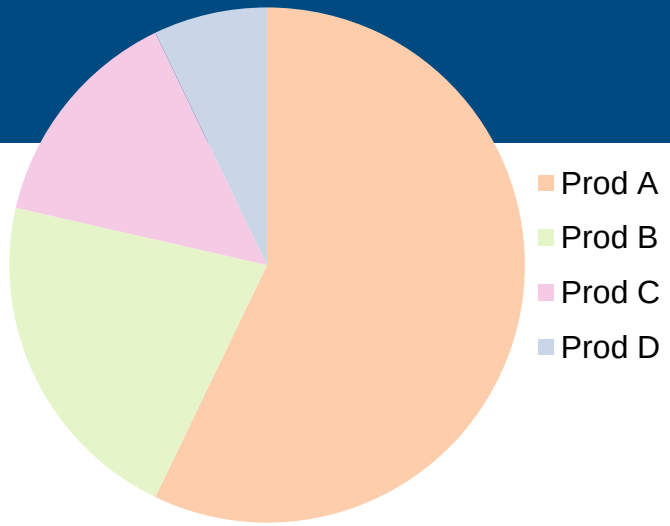
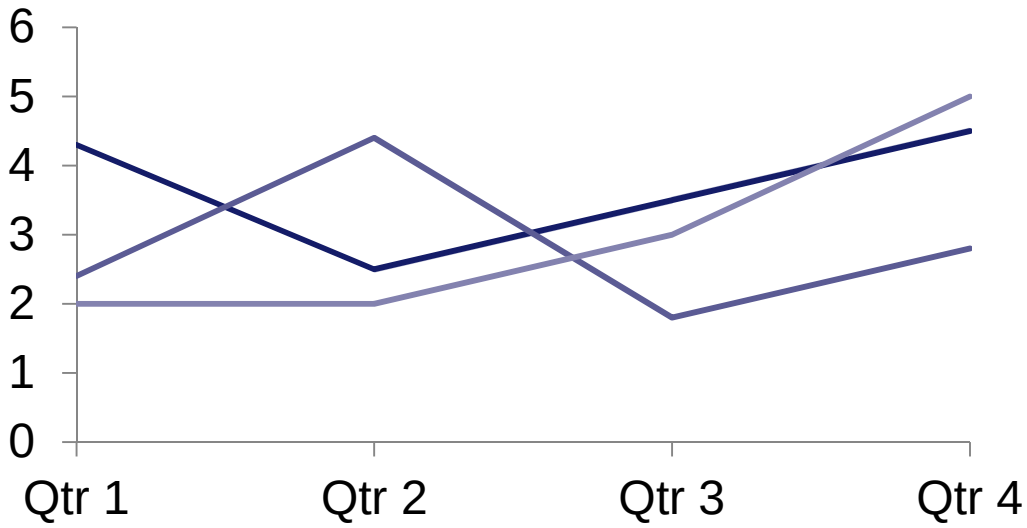
Pie Charts



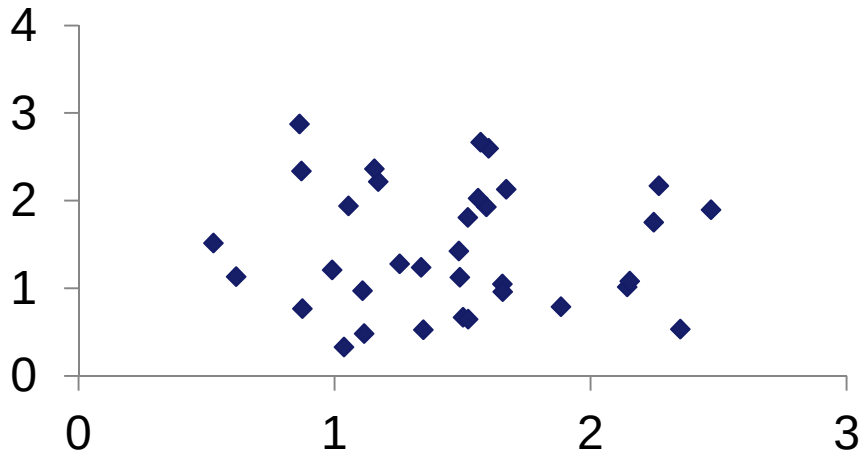
- Typically used for showing parts of whole by percentage.
- Not great for piece to piece comparisons.
- Limit number of pieces.
- Can be interesting to show lots of pies together if significant differences exist.
- Stephen Few hates them.
- Do not use 3-D.

Line Chart



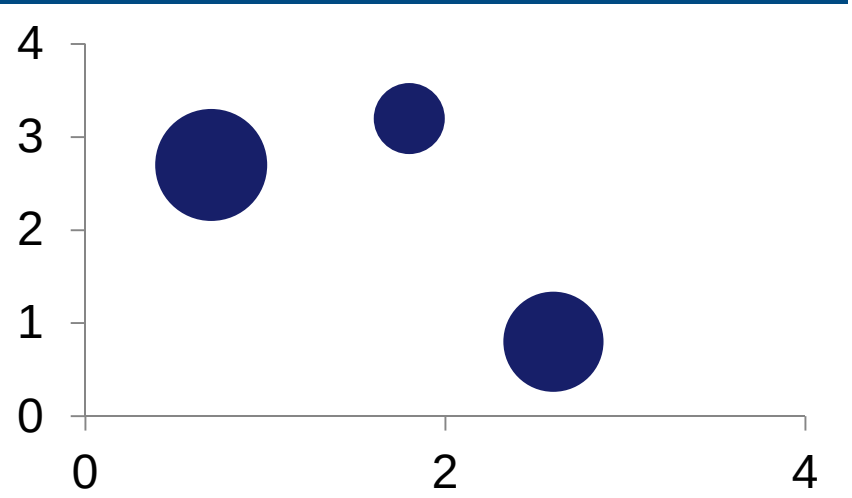
- Show a pattern or progression over a continuous range or period.
- Can be valued within a range to highlight a particular pattern (careful!).
- Maintain a rectangular shape close to golden proportion.

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 for seeing the patterns in comparisons of two variables.
- Trend lines are often added.
- Clearly notate if use logarithmic scale(s).

Bubble Chart

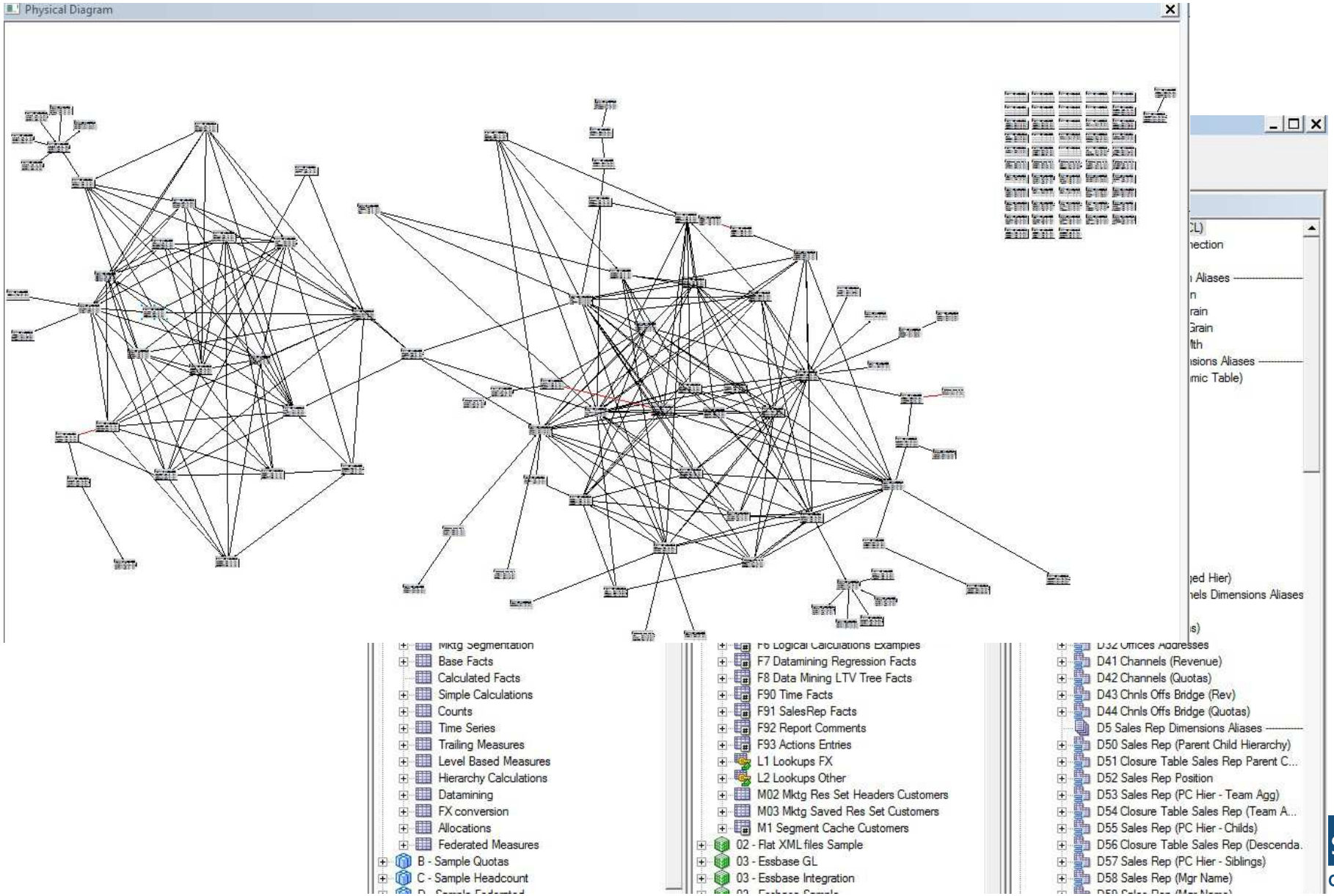


- Special type of scatter plot.
- Size of bubble is related to a third variable.
- Greatly reduces number of points that can be depicted.
- Best for depicting approximate values and comparisons.

Data Mashups are important

- Heterogeneous data sources are expanding
- Systems need to handle massive amounts of data
- Need a single “launching pad” for analytical info
- Believability, usability, and Calvin Mooers

Can Bring New Data Sources into OBI



Can Publish OBI Dashboards

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Publish Other Information in OBI

- Creates a single “landing page” for analytic info.
- OBI can publish anything in HTML.
- OBI can interact with other websites either in frame or in new window.

Questions and Observations

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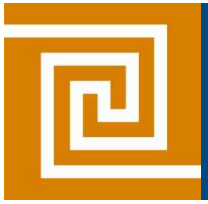

Maps, Movement, and Mashups

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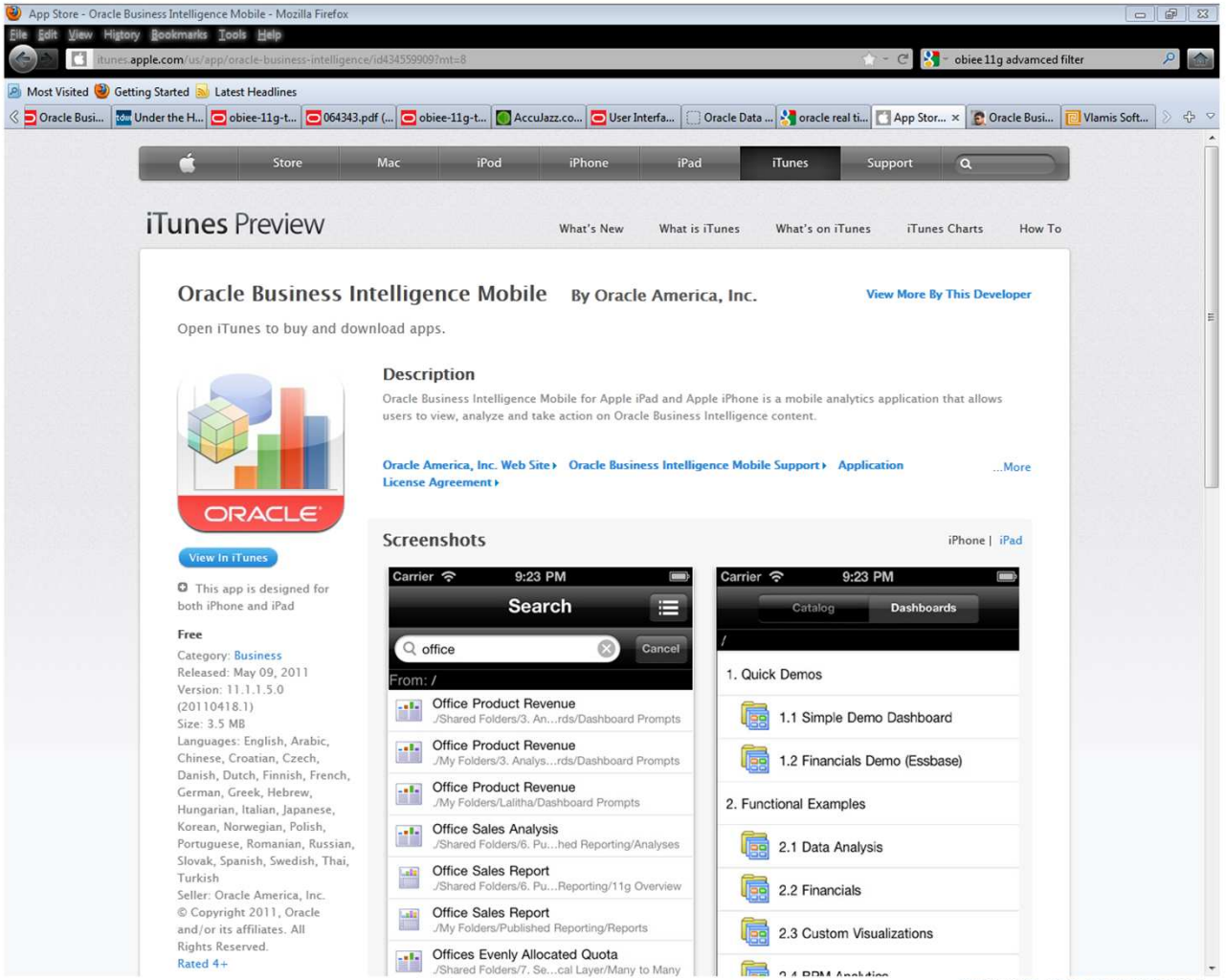
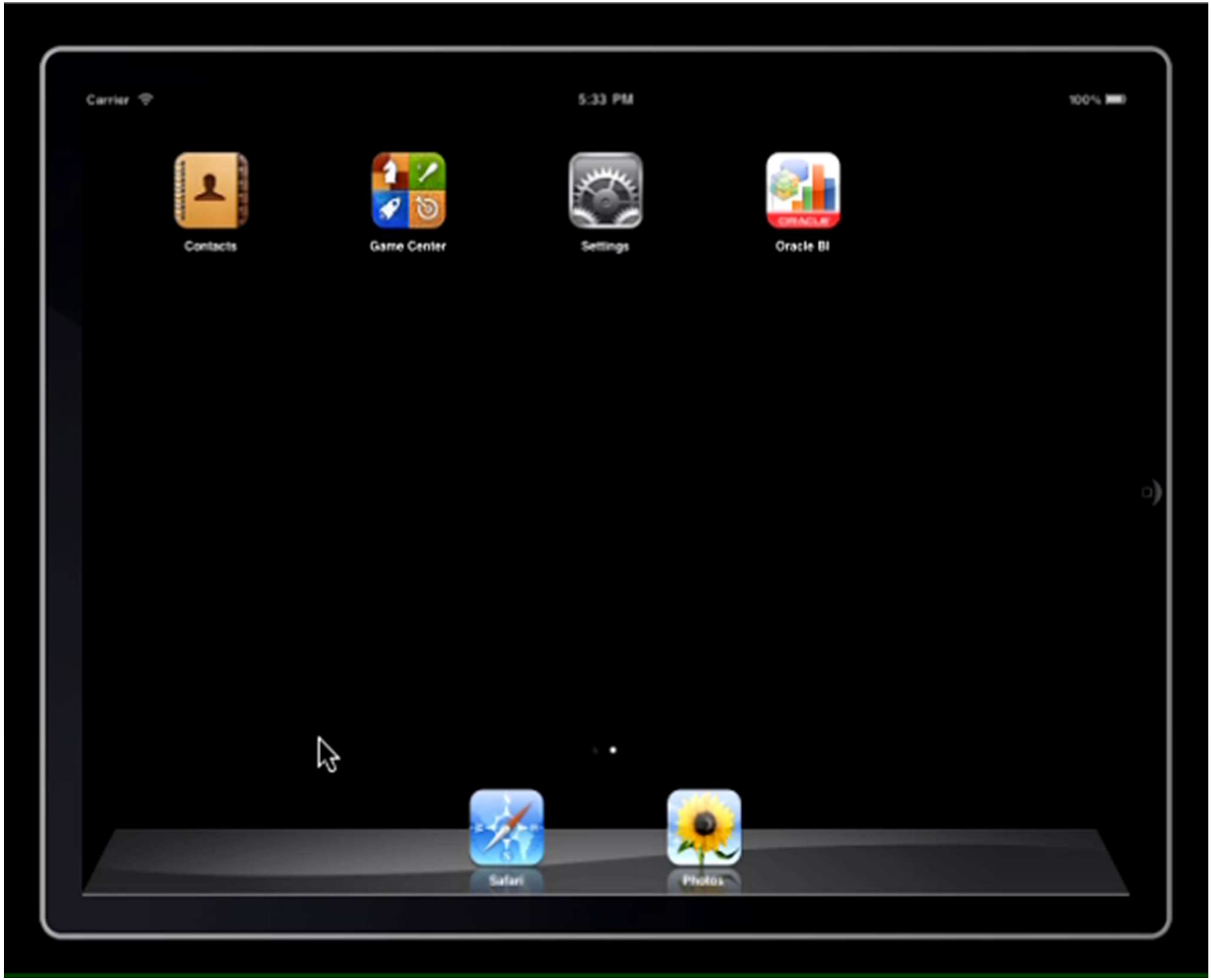
Oracle Business Intelligence Mobile

- Apps currently available from Apple for iPhone and iPad.
- Android soon




Carrier
5:33 PM
100%
Contacts
Game Center
Settings
Oracle BI
Safari
Photos

Oracle BI Publisher

- Tool for creating and editing “pixel perfect” reports.
- Excellent for generating configurable report “blasts”
- Full integration with OBIEE 11g,
  - Publisher can use the same data model.
  - Publisher uses the same catalog as OBIEE.
  - Publisher files can be used on OBI Dashboards
- Publishers reports in the following formats:
  - MS Word
  - MS PowerPoint
  - MS Excel
  - Adobe Acrobat
  - Adobe Flexbuilder
  - HTML, RTF, XSL, eText (EDI or EFT)
  - Flash

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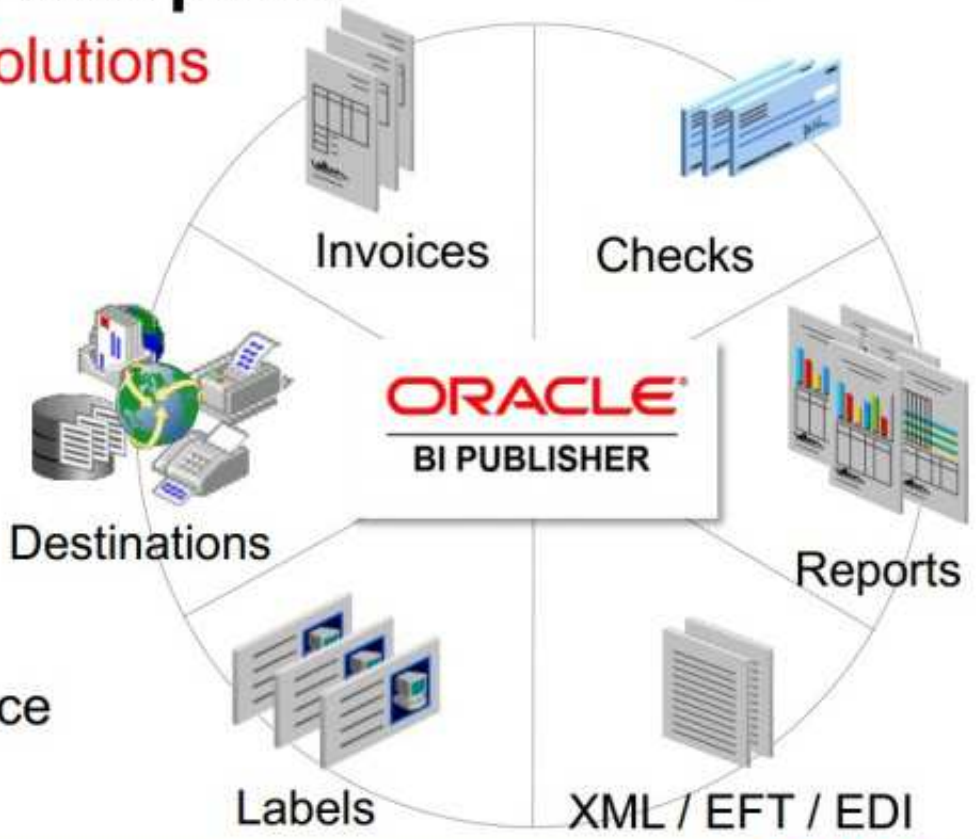
Oracle BI Publisher

Oracle BI Publisher Enterprise

Eliminate Multiple-point Solutions

- One Environment
  - Author
  - Generate
  - Deliver
- Benefits
  - Eliminate complexity
  - Simplify report development & maintenance
  - Reduce costs



ORACLE

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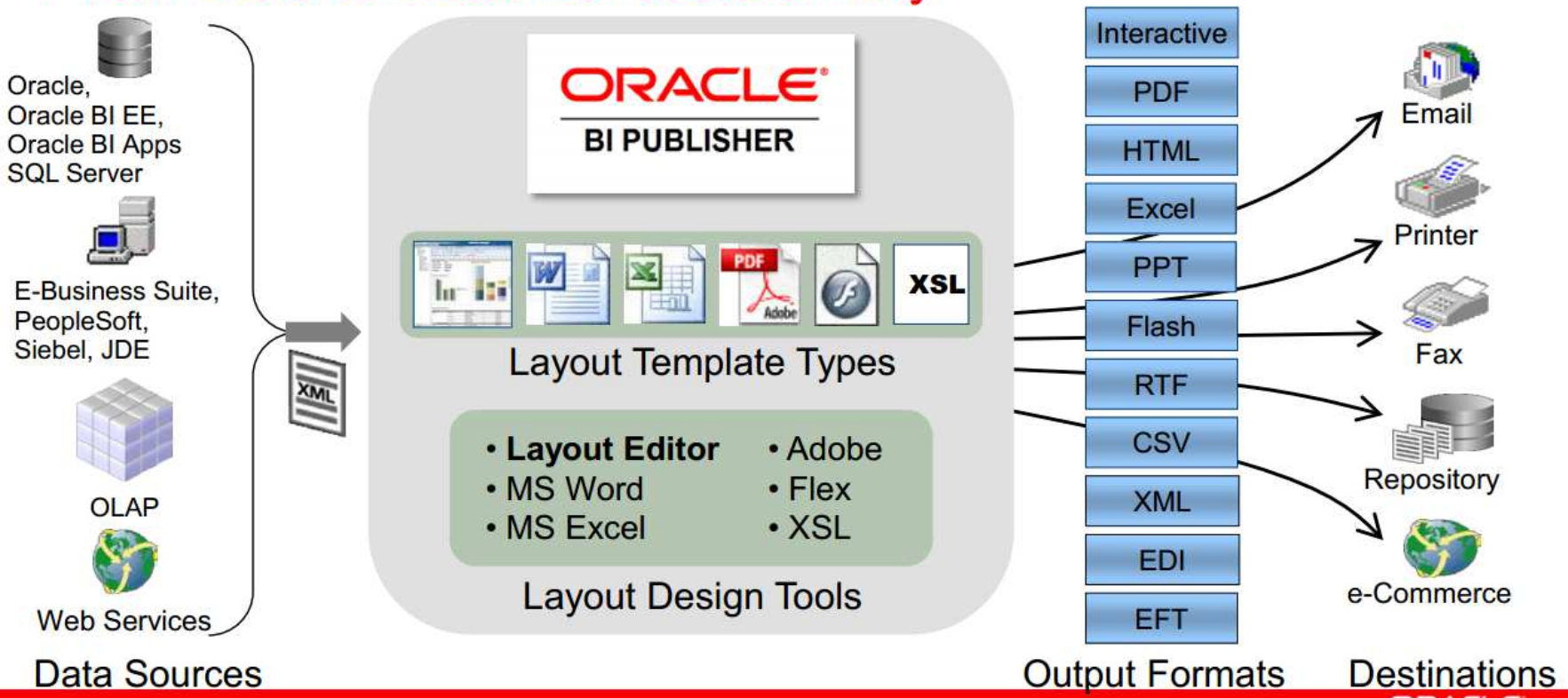
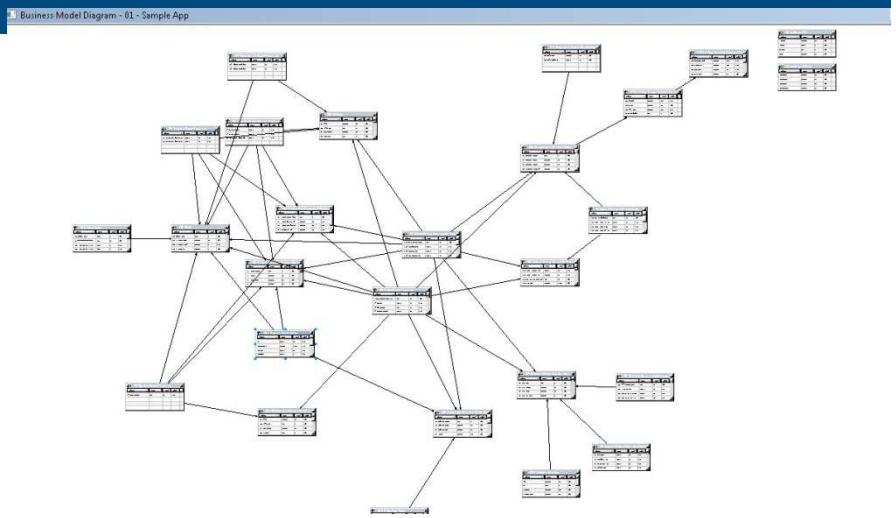
Oracle BI Publisher

Oracle BI Publisher Enterprise

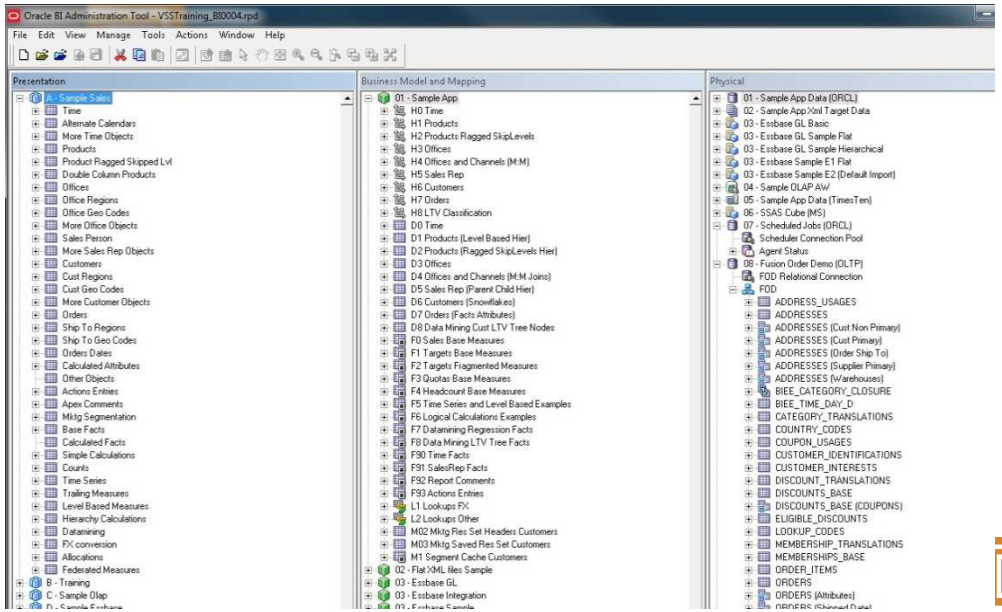
From Data to Document to Delivery



BI Server



- Data model
- Security and configurability
- Federated data sources
- Single version of the truth
- Important foundation for all BI ad-hoc analyses
- Broad uses.



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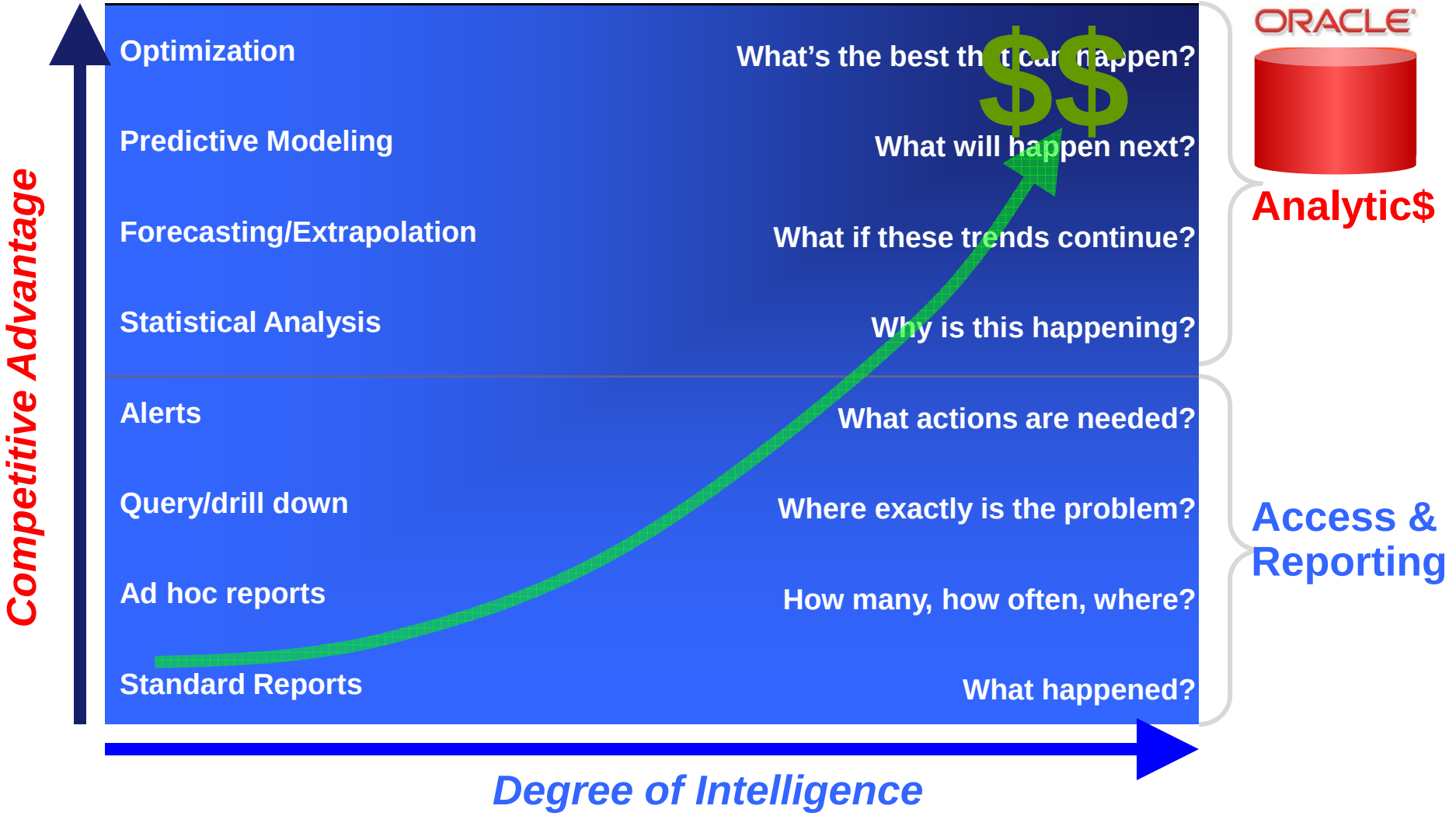
Competitive Advantage of BI & Analytics



Source: Competing on Analytics, by T. Davenport & J. Harris

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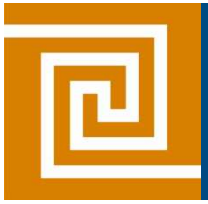

Spectrum of Oracle DB BI & Analytics

OLAP	Data Mining	Spatial
Summaries, trends and forecasts	Knowledge discovery of hidden patterns	Spatial relationships between data
"Analysis"	*"Insight & Prediction"*	*"Location"*
What is the average **duration** of phone calls, by region, by year?	**Who** is **likely** to **answer the phone** at certain times of day and why?	**Where were** stores with the highest answer rates in the last 3 years?

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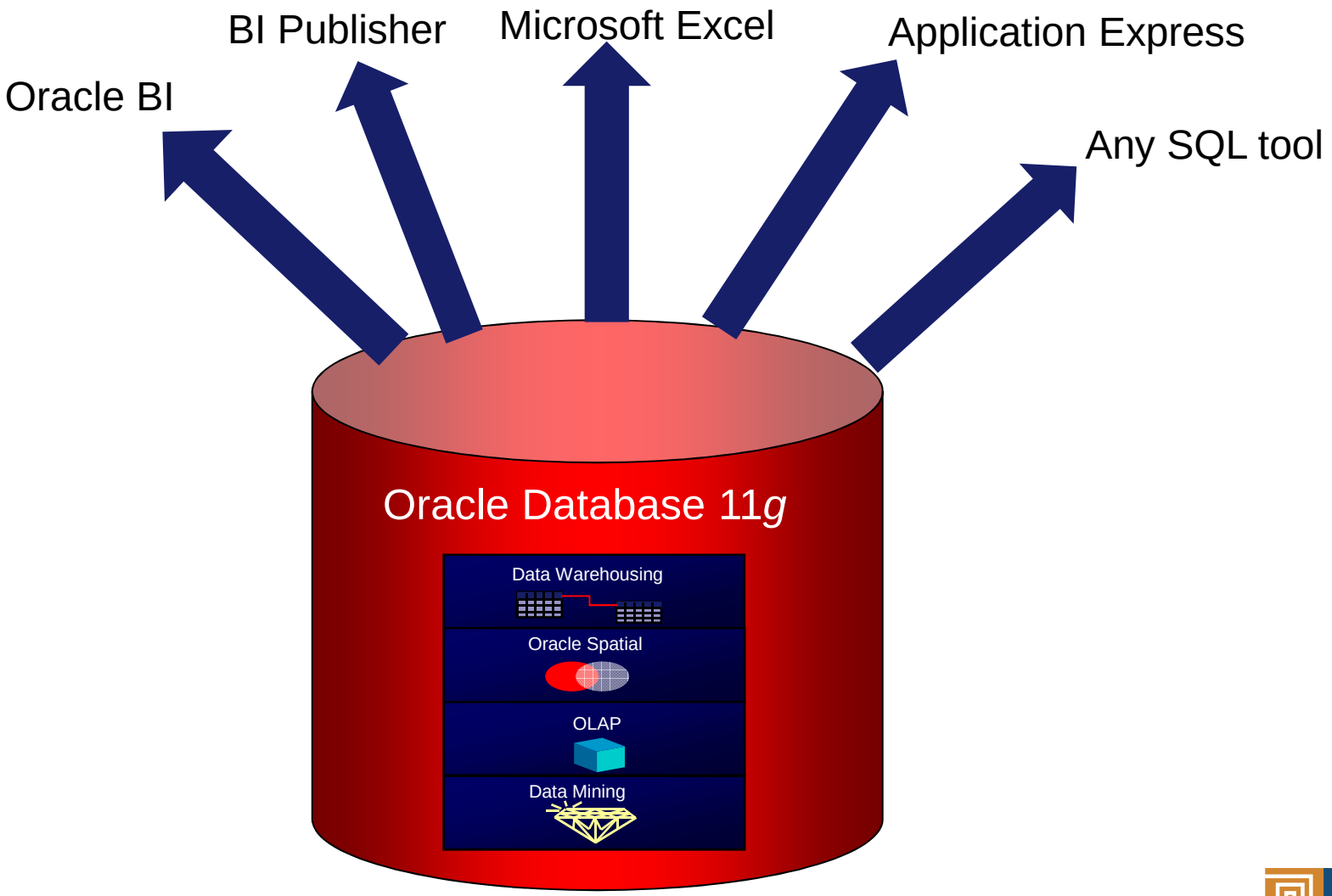
Same Data, Multiple Frontends



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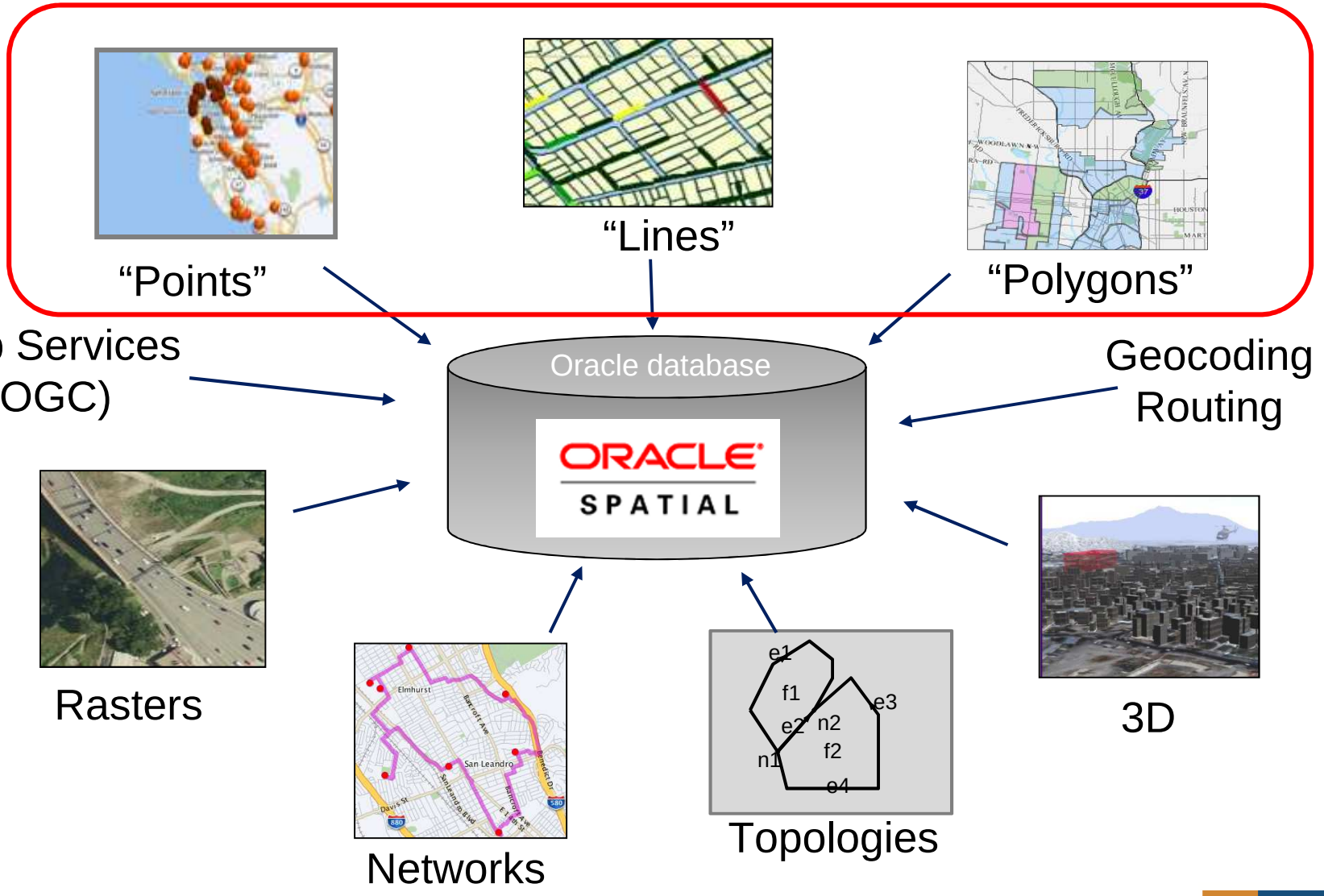
What is Spatial Data?

- 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
- Any data sets that contain “link and node” relationships between data objects. Can be directional or non-directional.

Natively Manage All Geospatial Data



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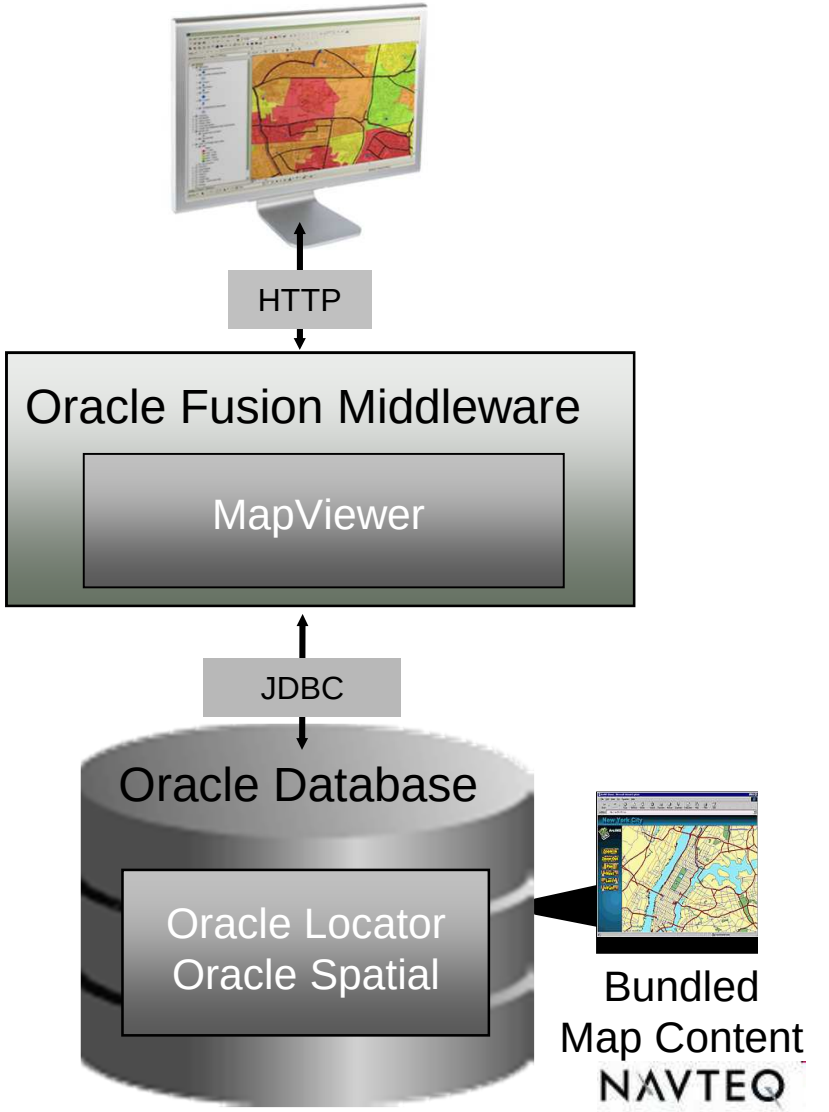
Oracle Spatial Technologies

- **Oracle Locator**: Feature of Oracle Database XE, SE, EE
- **Oracle Spatial**: Priced option to Oracle Database EE
- **MapViewer**: Java application and map rendering feature of Oracle Fusion Middleware
- **Workspace Manager**: Long transactions feature of Oracle Database SE, EE
- **Bundled Map Content**: Major roads, administrative boundaries (city, county, state, country) - worldwide coverage from Navteq



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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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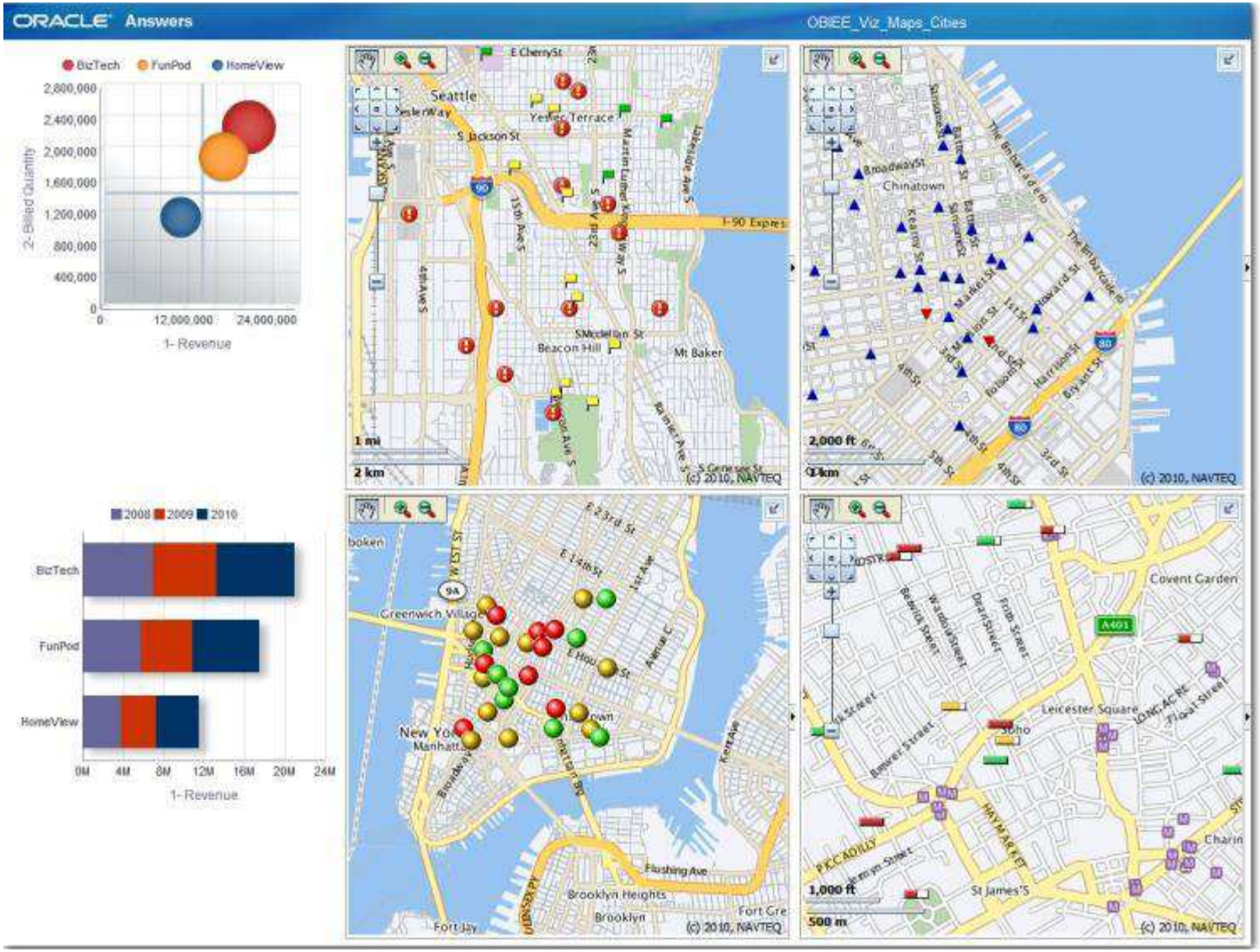
Depict and Detect Spatial Relationships



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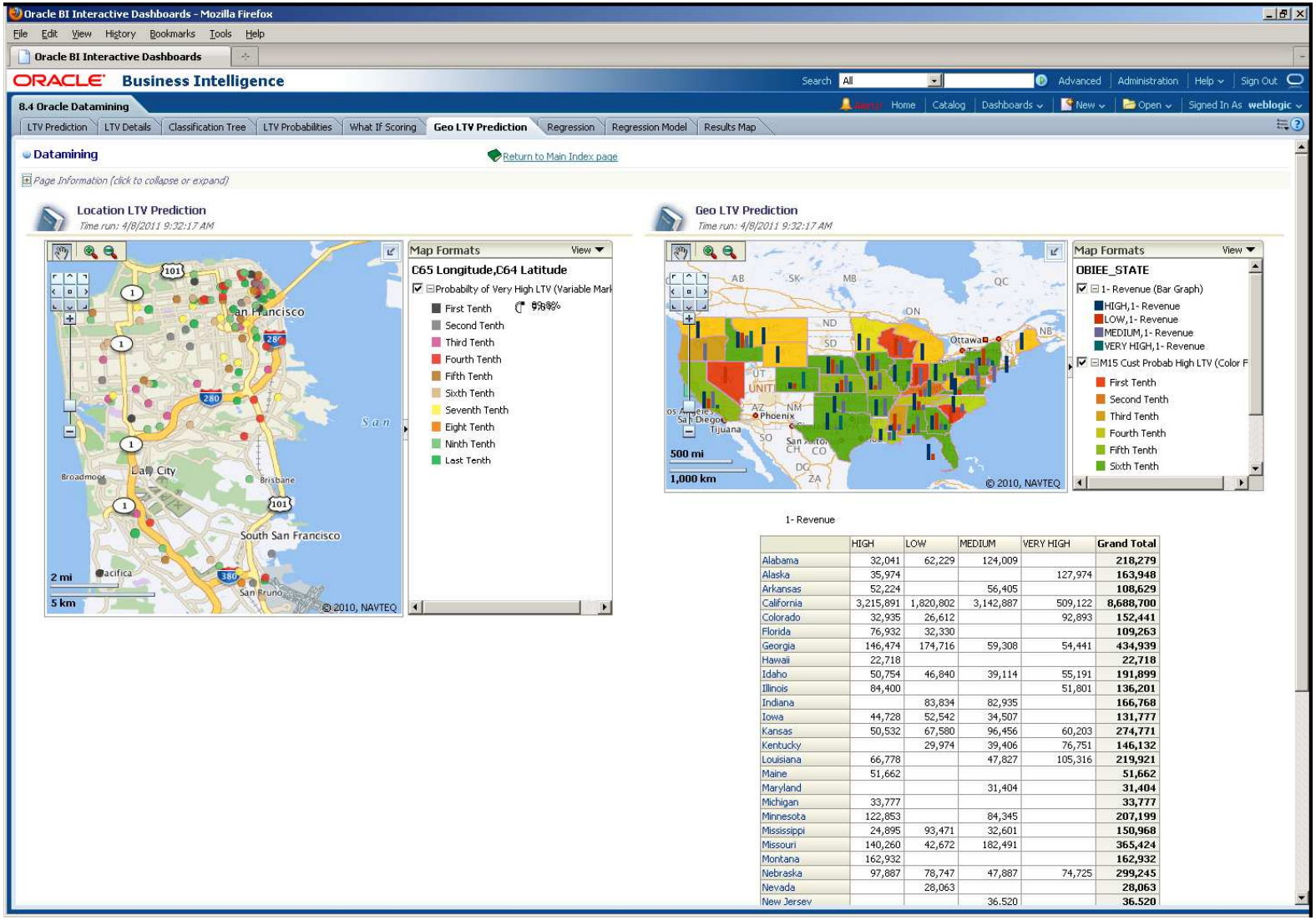
Combination of Data Mining and Spatial

- In-database data mining builds predictive models that predict customer behavior
- OBIEE's integrated spatial mapping shows where



	HIGH	LOW	MEDIUM	VERY HIGH	Grand Total
Alabama	32,041	62,229	124,009		218,279
Alaska	35,974			127,974	163,948
Arkansas	52,224		56,405		108,629
California	3,215,891	1,820,802	3,142,887	509,122	8,688,700
Colorado	32,935	26,612		92,893	152,441
Florida	76,932	32,330			109,263
Georgia	146,474	174,716	59,308	54,441	434,939
Hawaii	22,718				22,718
Idaho	50,754	46,840	39,114	55,191	191,899
Illinois	84,400			51,801	136,201
Indiana		83,834	82,935		166,768
Iowa	44,728	52,542	34,507		131,777
Kansas	50,532	67,580	96,456	60,203	274,771
Kentucky		29,974	39,406	76,751	146,132
Louisiana	66,778		47,827	105,316	219,921
Maine	51,662				51,662
Maryland			31,404		31,404
Michigan	33,777				33,777
Minnesota	122,853		84,345		207,199
Mississippi	24,895	93,471	32,601		150,968
Missouri	140,260	42,672	182,491		365,424
Montana	162,932				162,932
Nebraska	97,887	78,747	47,887	74,725	299,245
Nevada		28,063			28,063
New Jersey			36,520		36,520

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