



# IBM Cognos 10 Visual Design Best Practices

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April 8, 2013  
Session ID 3121

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## Introduction

- Purpose of this session  
Describe best practices for the visual design of reports and dashboards.
- Benefits of attending this session  
Learn visual design techniques that will greatly improve users' ability to efficiently glean insight from the data to address their questions.

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## Topics

- Why visualize?
- Key visual design considerations
- Example dashboard designs
- Summary
- Helpful Resources
- Q&A

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## Why Visualize?

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# Simple Example

I want to understand...

- ...achievement level distribution of my student population across subject areas
- ...how the distribution has changed over time
- ...how dramatic the change has been
- ...how my subject areas compare

**Student Achievement Trends**

% Students		2006	2007	2008	2009
Communication Arts	Below Basic	12%	10%	13%	5%
	Basic	49%	54%	45%	19%
	Proficient	29%	29%	31%	57%
	Advanced	10%	7%	11%	19%
Mathematics	Below Basic	28%	33%	22%	15%
	Basic	38%	36%	31%	38%
	Proficient	27%	24%	39%	36%
	Advanced	7%	7%	8%	10%

How long does it take to acquire the desired understanding from this (very small) tabular data?

Let's try looking at it visually...

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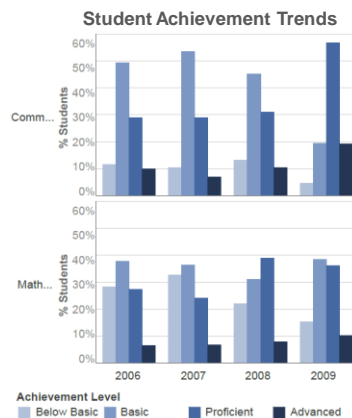
# Simple Example (cont.)

I want to understand...

- ...achievement level distribution of my student population across subject areas
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**Student Achievement Trends**

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Mathematics	Below Basic	28%	33%	22%	15%
	Basic	38%	36%	31%	38%
	Proficient	27%	24%	39%	36%
	Advanced	7%	7%	8%	10%



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## Simple Example *(cont.)*

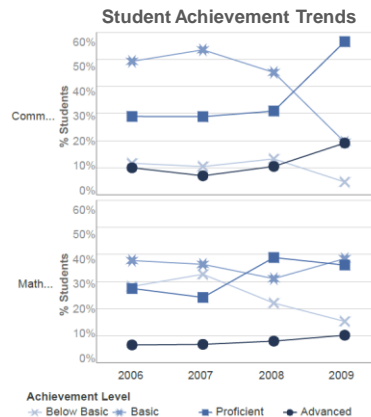
I also want to understand...

...trend of each achievement level

...how the trends compare across subject areas

**Student Achievement Trends**

% Students		2006	2007	2008	2009
Communication Arts	Below Basic	12%	10%	13%	5%
	Basic	49%	54%	45%	19%
	Proficient	29%	29%	31%	57%
	Advanced	10%	7%	11%	19%
Mathematics	Below Basic	28%	33%	22%	15%
	Basic	38%	36%	31%	38%
	Proficient	27%	24%	39%	36%
	Advanced	7%	7%	8%	10%



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## Simple Example *(cont.)*

In addition, I might want to understand...

...how achievement level distribution compares across gender, ethnicity, grade

...how achievement level distribution compares across schools

**Student Achievement Trends – Jefferson H.S.**

% Students		2006	2007	2008	2009
Communication Arts	Below Basic	7%	6%	11%	4%
	Basic	47%	42%	52%	20%
	Proficient	32%	40%	26%	53%
	Advanced	14%	12%	11%	23%
Mathematics	Below Basic	22%	19%	14%	
	Basic	30%	40%	29%	
	Proficient	36%	32%	38%	
	Advanced	12%	8%	19%	

**Student Achievement Trends – Monroe H.S.**

% Students		2006	2007	2008	2009
Communication Arts	Below Basic	8%	8%	8%	8%
	Basic	48%	48%	44%	40%
	Proficient	33%	30%	36%	41%
	Advanced	11%	13%	12%	12%
Mathematics	Below Basic	14%	14%	13%	9%
	Basic	37%	34%	35%	34%
	Proficient	35%	35%	40%	39%
	Advanced	14%	17%	12%	18%

**Student Achievement Trends – Madison H.S.**

% Students		2006	2007	2008	2009
Communication Arts	Below Basic	12%	10%	13%	5%
	Basic	49%	54%	45%	19%
	Proficient	29%	29%	31%	57%
	Advanced	10%	7%	11%	19%
Mathematics	Below Basic	28%	33%	22%	15%
	Basic	38%	36%	31%	38%
	Proficient	27%	24%	39%	36%
	Advanced	7%	7%	8%	10%

Evaluating multiple schools becomes progressively more challenging with tabular data

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## Key Visual Design Considerations

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## Key Visual Design Considerations

- Comparison
- Color
- 3D
- Data-Pixel Ratio
- Information Density
- Screen Layout
- Adornments
- Aesthetics
- Visual Media

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## Comparison



Color  
(Hue)



Color  
(Intensity)



Size



Thickness



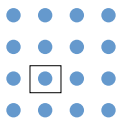
Length



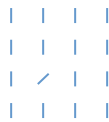
Shape



Added Mark



Enclosure



Orientation



Position



Transparency

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## Comparison *(cont.)*

### Types of data

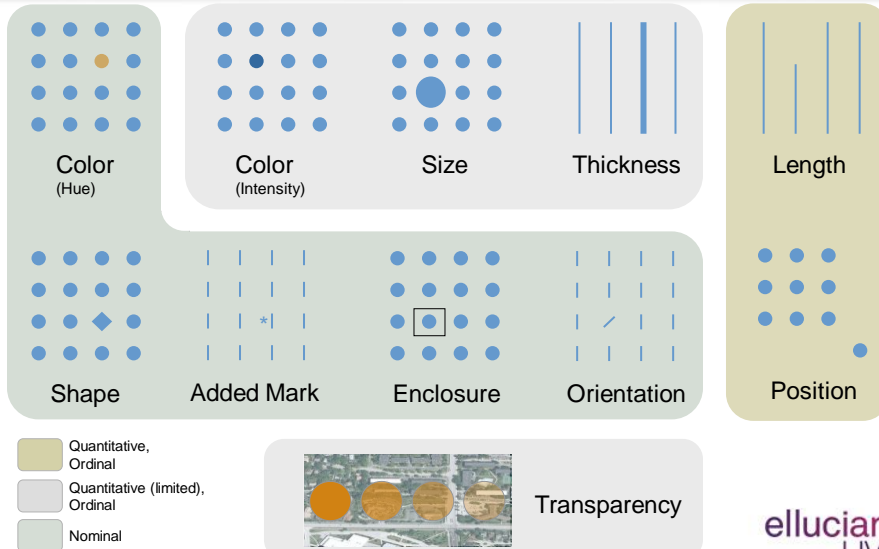
- **Nominal**: Categorical data comprising items that have no meaningful order, e.g., Department, Major
- **Ordinal**: Categorical data comprising items that have a meaningful order, e.g., Academic Period, Age Range
- **Quantitative**: Numeric data comprising values that can be aggregated, e.g., % Students, Test Score

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# Comparison (cont.)



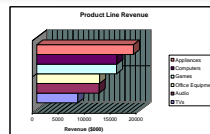
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# Color

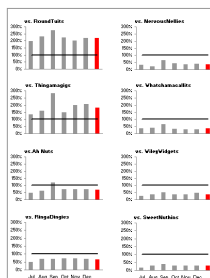
- Purpose
- Comparison
- Exception
- Palette
- Consistency



What purpose does color serve here?



Leverage Color to Compare



Exception



Exception  
Does more color (top crosstab) make it easier?

Use for emphasis, special cases



Use for normal cases



Color Palette Choices

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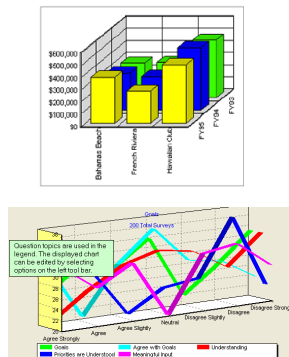
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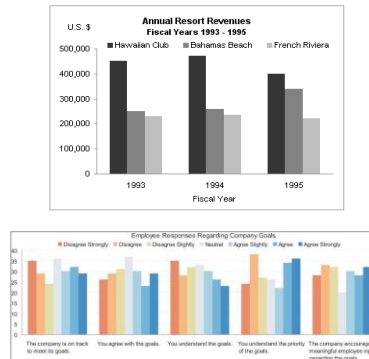
## 3D

- 3D often difficult to compare
- Occlusion is common

Bad



Good



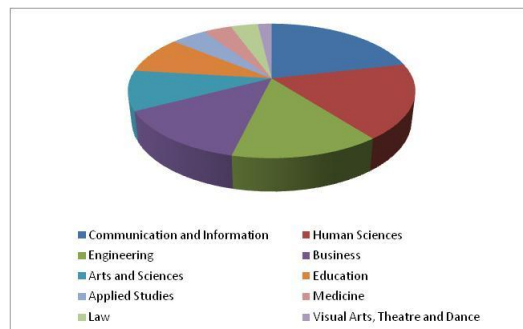
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Source: <http://www.perceptualedge.com/examples.php>  
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## 3D (cont.)

Which slice is the biggest, and by how much?



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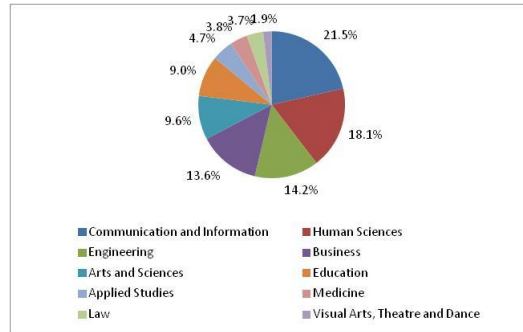
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## 3D *(cont.)*

Alternative: 2D Pie Chart



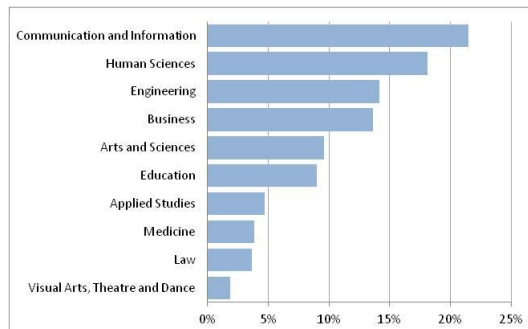
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## 3D *(cont.)*

Alternative: 2D Bar Chart



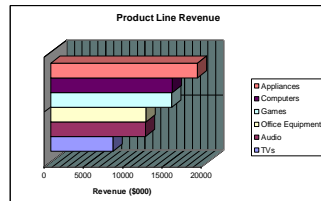
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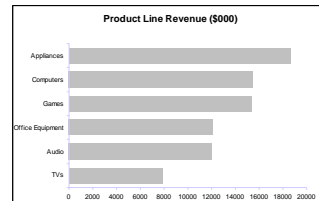
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# Data-Pixel Ratio

- Proportion of pixels devoted to the non-redundant display of data  
or  $1 - \text{proportion of pixels that can be "erased" without loss of data}$
- Want to eliminate or de-emphasize non-data pixels
- Want to enhance data pixels
- Eliminate unnecessary data pixels
- Highlight important data pixels



Unfavorable data-pixel ratio



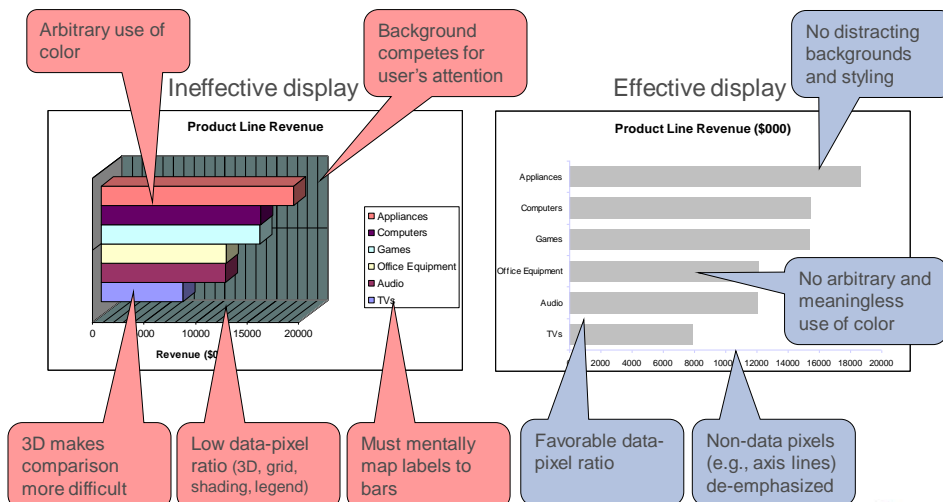
Favorable data-pixel ratio

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Source: "Information dashboard Design", Stephen Few, 2006  
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# Simple Example



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# Information Density

- The ratio of information conveyed per display area
  - Applies to data analysis, web sites, printed media, etc.
  - Want to maximize the information density
  - Detail increases graphical integrity, reduces summary “deceit”
  - Give viewers control of the information, not designers
- What about clutter and information overload when packing a lot of information onto one display?
  - “Clutter and confusion are failures of design, not attributes of information.”  
*Edward Tufte, “Envisioning Information”, 2003*
- What about simpleness = clarity?
  - “Simpleness is another aesthetic preference, not an information display strategy, not a guide to clarity.”  
*Edward Tufte, “Envisioning Information”, 2003*

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## Information Density (cont.)

Low information density



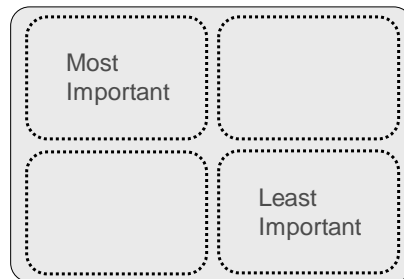
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## Information Positioning on Screen

- Most important information should be in upper left of screen, or directly in the middle
- 2<sup>nd</sup> most important area is top right, then bottom left
- Right bottom is least prominent
- Varies across cultures
- Single screen w/o scrolling
- Align related information



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## Adornments

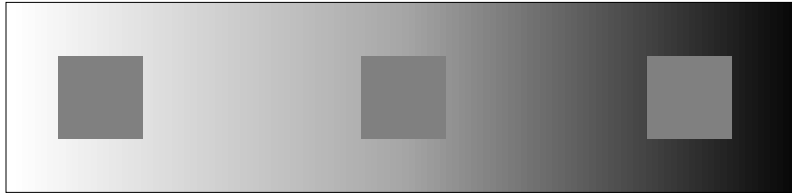
- Avoid adornments
  - Background colors, including gradients
  - Gratuitous images
- If you include adornments,
  - Position in less prominent space (e.g., lower right corner of screen)
  - Use subdued colors (reduce saturation)
  - Minimize size

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## Adornments (cont.)



Which small box is lightest?



Which HELLO text font is brighter?

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Source: "Information dashboard Design", Stephen Few, 2006  
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## Aesthetics

*"If a dashboard is not designed in an aesthetically pleasing way, the unpleasant experience that results for the viewer undermines the dashboard's ability to communicate."*

Stephen Few, Information Dashboard Design, 2006 (p169)

- Want dashboard to appeal to users
- But not peppered with adornments and styling that are distracting or mask the data
  - Good to allow for some styling, e.g., match corporate brand standard
- Apply basic principles of visual aesthetics
  - Good color choices, e.g., minimize use of highly saturated colors; use off-white background color
  - Choose legible fonts
  - Placement and spacing, leverage white space

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# Visual Media

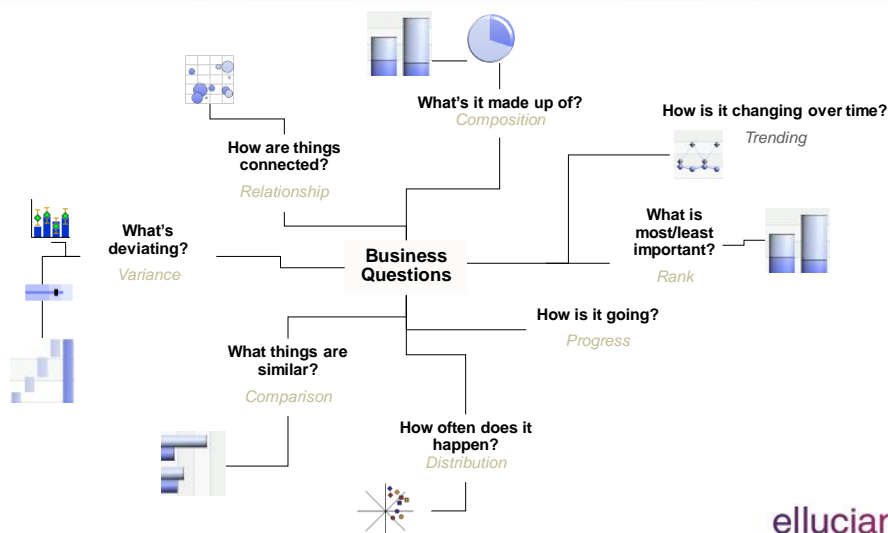
- Don't use a chart just because you can
- Choosing the wrong chart can
  - Make it difficult to understand the information
  - Cause a misinterpretation of the information
- The correct chart is determined by
  - Type of data to be visualized
  - The questions you are trying to address

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## Choosing the Right Display Type

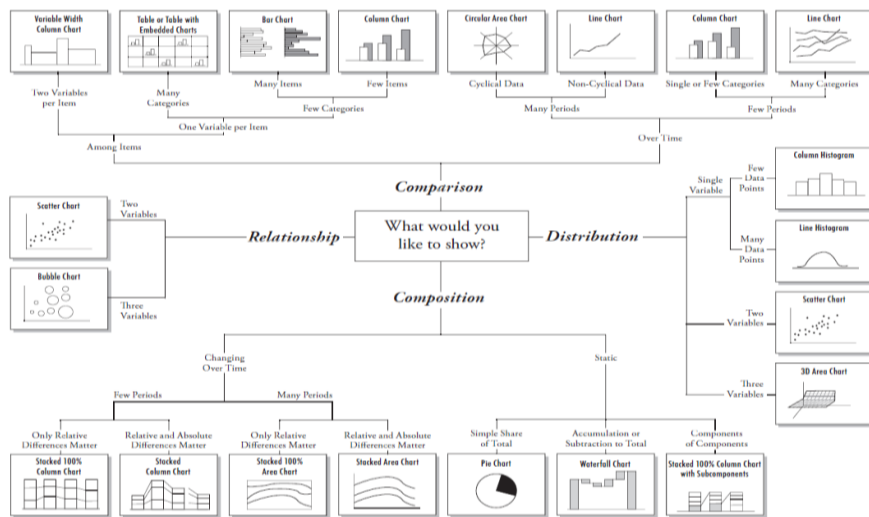


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## Choosing the Right Display Type (cont.)



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Source: <http://www.extremepresentation.com/design/charts/>

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www.ExtremePresentation.com  
© 2009 A. Ahlert — a.ahlert@extremepresentation.com  
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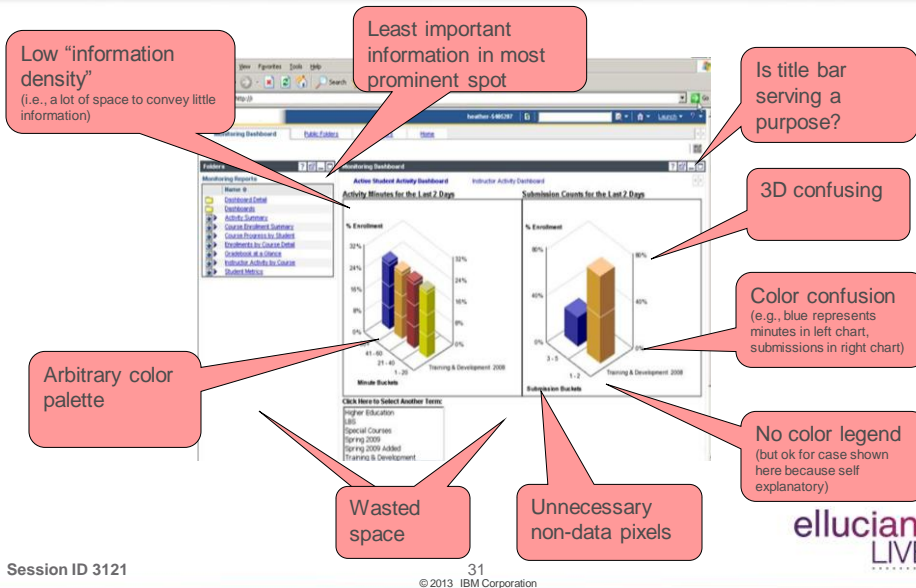
## Dashboard Examples

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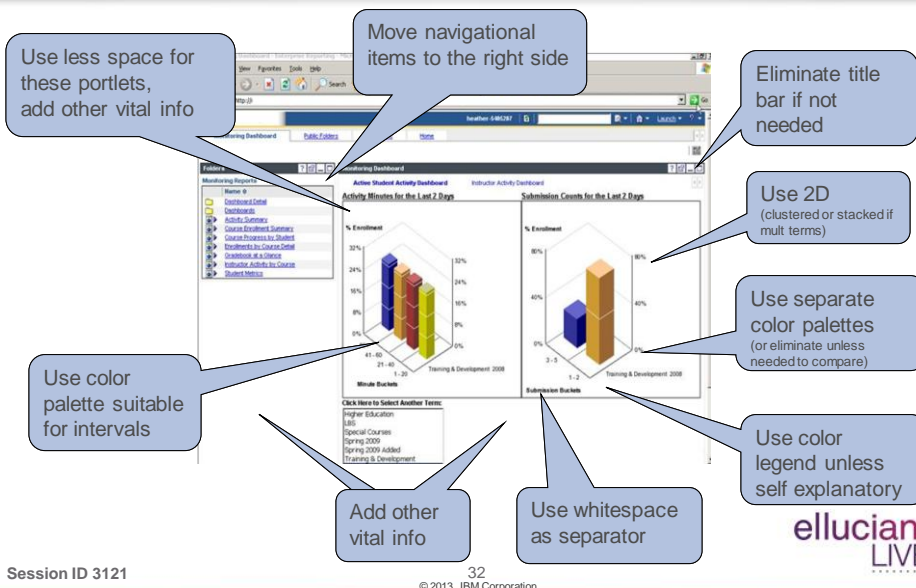
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## Dashboard Example: Poor Design

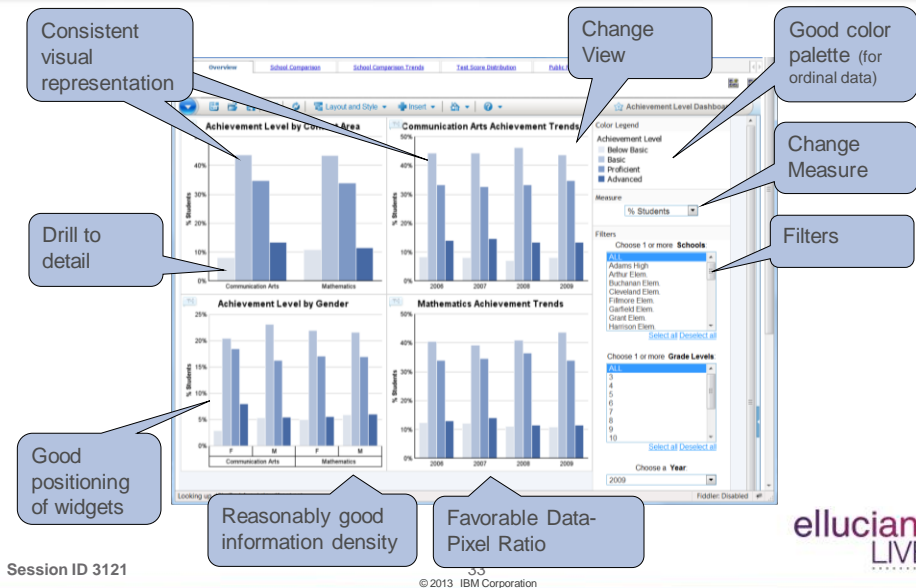


## Dashboard Example: Possible Improvements





## Dashboard Example – Good Practices



## Summary

### Practices to avoid

- Overuse and/or arbitrary use of color
- Ineffective exception highlighting
- Unsuitable display media
- Meaningless variety (charts, styles, etc)
- Unnecessary use of 3D
- Useless decoration
- Visually unappealing design
- Inadequate or unnecessary/redundant context for the data
- Excessive detail or precision
- Exceeding the boundaries of a single screen
- Poor layout

## Summary *(cont.)*

### Practices to adopt

- Ensure color has a purpose, is used consistently
- Choose properties appropriate for the type of data for comparison (color intensity/hue, length, position, size, etc)
- Minimize non-data pixels, leverage whitespace
- Maximize information density
- Consider the importance and relationship of the information when designing layouts
- Make your content aesthetically pleasing, not distracting
- Use meaningful display media

*Poor visual design is seldom a limitation of the tool*

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## Helpful resources

- Blogs
  - Chart Porn - <http://chartporn.org>
  - Junk Charts - [http://junkcharts.typepad.com/junk\\_charts](http://junkcharts.typepad.com/junk_charts)
  - Excel Charts - <http://www.excelcharts.com/blog/>
  - DataVisualization.ch - <http://www.datavisualization.ch>
  - FlowingData - <http://flowingdata.com>
  - Dashboard Spy - <http://dashboardspy.com>
  - Information is Beautiful - <http://www.informationisbeautiful.net>
- Websites
  - IBM Many Eyes - <http://www.ibm.com/software/analytics/manyeyes/>
  - Prefuse Toolkit - <http://www.prefuse.org>
  - Perceptual Edge (Stephen Few) - <http://www.perceptualedge.com>
  - Simile Widgets - <http://www.simile-widgets.org>
  - University of Maryland HCI Lab - <http://www.cs.umd.edu/hcil>

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## Helpful Resources *(cont.)*

- Wikipedia
  - Information Design: [http://en.wikipedia.org/wiki/Information\\_design](http://en.wikipedia.org/wiki/Information_design)
  - Dashboard: [http://en.wikipedia.org/wiki/Dashboards\\_\(management\\_information\\_systems\)](http://en.wikipedia.org/wiki/Dashboards_(management_information_systems))
  - Knowledge Visualization: [http://en.wikipedia.org/wiki/Knowledge\\_visualization](http://en.wikipedia.org/wiki/Knowledge_visualization)
  - Graphicacy: <http://en.wikipedia.org/wiki/Graphicacy>
  - Balanced Scorecard: [http://en.wikipedia.org/wiki/Balanced\\_scorecard](http://en.wikipedia.org/wiki/Balanced_scorecard)
  - Infographic: <http://en.wikipedia.org/wiki/Infographic>
  - HSL and HSV: [http://en.wikipedia.org/wiki/HSL\\_color\\_space](http://en.wikipedia.org/wiki/HSL_color_space)
- Books
  - Information Dashboard Design, Stephen Few, 2006  
Great for dashboard design concepts.
  - Now you see it, Stephen Few, 2009  
Great for understanding how to analyze the data and how to choose the correct display medium for specific analytic purposes.
  - The Visual Display of Quantitative Information, Edward Tufte, 2002  
Design of statistical graphics for understanding quantitative information.
  - Envisioning Information, Edward Tufte, 2003  
Design principles and strategies for displaying complex data.

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## Q & A

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Thank You!

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