Best Practices in Dashboard Design

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Outline

- Who is ZogoTech?
- What KPIs to measure?
- How to store them?
- How to display them?

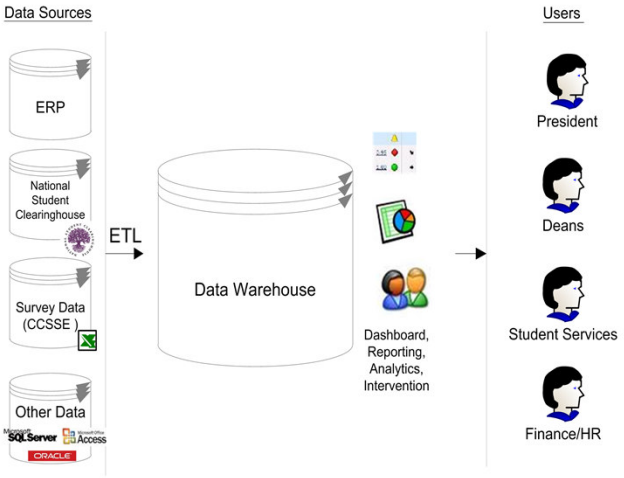
http://www.zogotech.com/recent-webinars/

Outline

- Best examples from outside higher ed
- Previous Work
  - Visualization: Tufte, Few, Wong, John Rome
  - KPIs: Seybert, AACC
  - Data Model: ZT

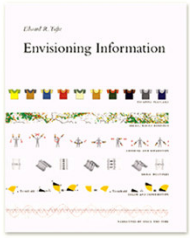
zogotech

ZogoTech Data Warehouse



Less time gathering data, more time analyzing

Boring Charts



"If the statistics are boring, then you've got the wrong numbers"

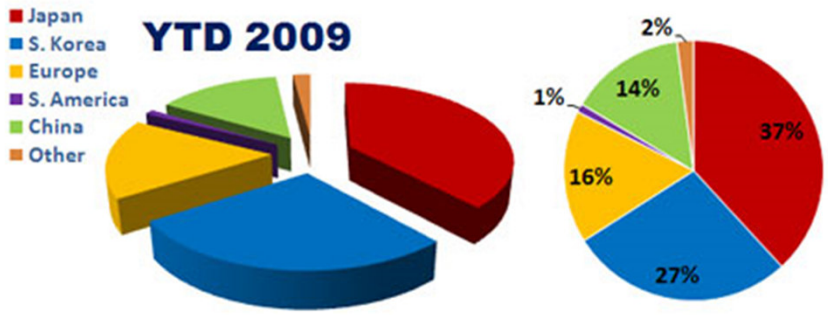
Edward Tufte

People always talk about how boring our charts look, so let's take a minute to explain why

Why does Japan (red) look so much smaller than S. Korea (blue) in the 3D chart on the left?

http://www.powerpointninja.com/charts/curse-of-pac-man-the-danger-of-3d-charts-in-powerpoint/

Because of 3D effects, more pixels are devoted to the blue section so it looks much larger

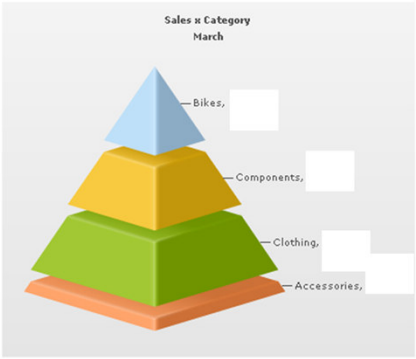


Why does Japan (red) look so much smaller than S. Korea (blue) in the 3D chart on the left?

http://www.powerpointninja.com/charts/curse-of-pac-man-the-danger-of-3d-charts-in-powerpoint/

When we put it in a 2D, it's much easier to see that red is bigger. Adding labels make it even more clear

Test 1: Which one is bigger?

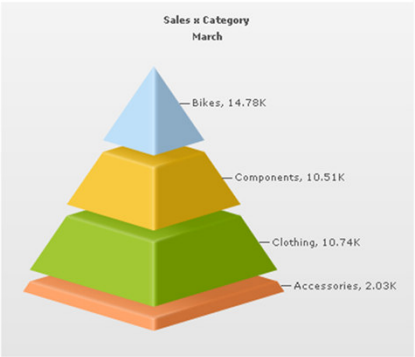


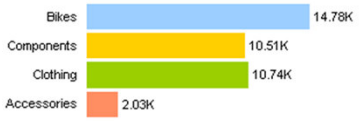
http://peltiertech.com/WordPress/bad-graphics-stacked-pyramid-chart/

Very difficult to see which one is larger. What do you guys think? Here's a hint: the largest one is 7 times larger than the smallest.

Clearly Clothes (green) looks larger than the others maybe followed by Components (yellow). But what about Accessories? If you fold that slice all together is it the same size as Bikes (blue)? Hard to say.

Test 1: Which one is bigger?



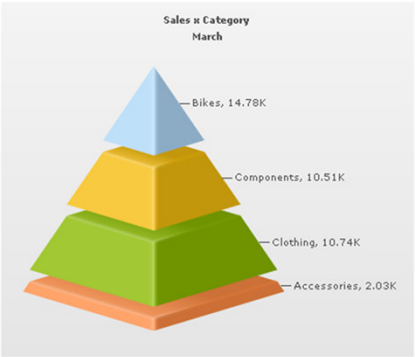


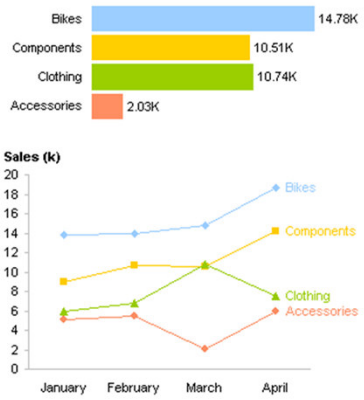
http://peltiertech.com/WordPress/bad-graphics-stacked-pyramid-chart/

When we display this information in a normal, boring bar chart we can see the information much clearer. The problem with these kind of pyramid charts is that the value is only represented by the height of slice, not by the volume. So even though it's showing a 3D image, only the 2D dimension (height) is relevant. This isn't a programming bug – this is by design. No matter how they did it, how would the reader know if folding the bottom slice together would equal the top slice

So in a fraction of the space (with a larger font) we've shown a graphic that is more informative and easier to read. What to do with all the extra space?

Test 1: Which one is bigger?



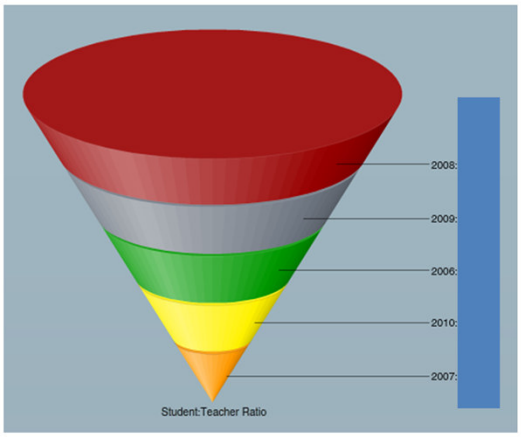


Notes: sorting the bar chart would make it easier to find largest

http://peltiertech.com/WordPress/bad-graphics-stacked-pyramid-chart/

Maybe show a trend over 4 months. We're now showing 4 times as much data in the same amount of space (and showing it much clearer). Is it possible to show more data in a smaller amount of space and also make it more clear?

Test 2: Which one is bigger?

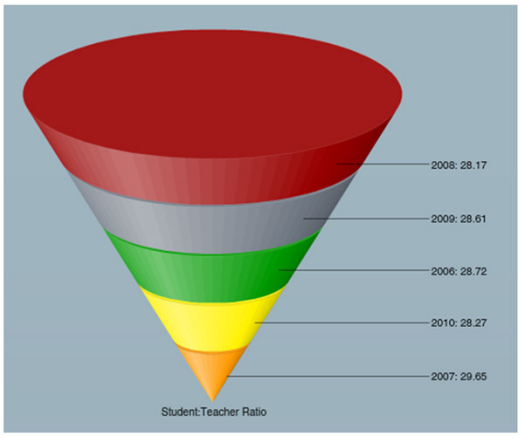


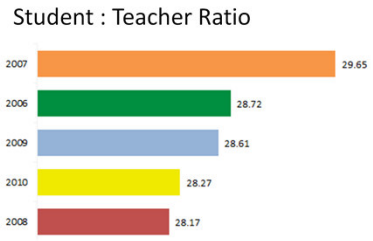
http://www.idashboards.com/Solutions/For-Your-Industry/Education/Higher-Education.aspx

Which one is bigger? You might be tempted to say "red", but you know the trick now: go by the height not the volume. But even with that trick, it's really hard to say.

Before we look at it in a bar chart which has the "answer", let's think about this for a second. These graphics are intended for dashboards where executives should be able to know exactly what's going on in a few seconds, but we can stare at this for an hour and not be sure which one is largest

Test 2: Which one is bigger?

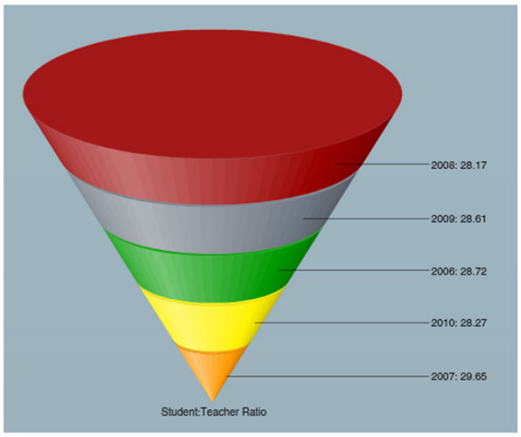


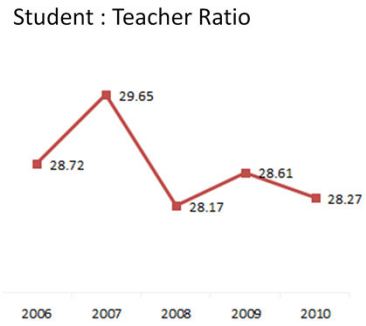


http://www.idashboards.com/Solutions/For-Your-Industry/Education/Higher-Education.aspx

Here's the answer. As a bar chart it's much easier to see which one is largest. But there are other problems here. Do we even need the colors? Also, what are those numbers to the left (2007, 2006, etc)? Years, right? Does it make sense to show years in a cone format that's not even ordered? Or even a bar chart?

Test 2: Which one is bigger?

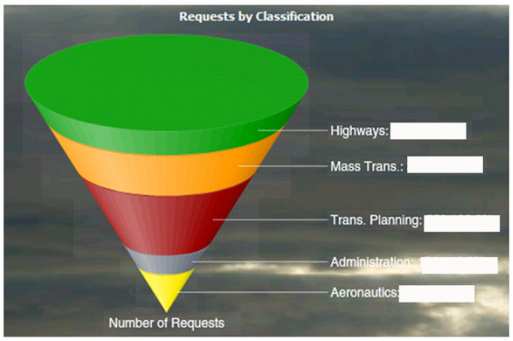


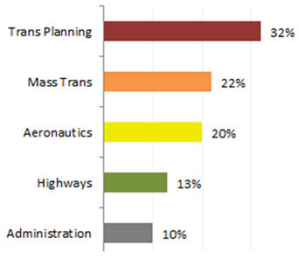


http://www.idashboards.com/Solutions/For-Your-Industry/Education/Higher-Education.aspx

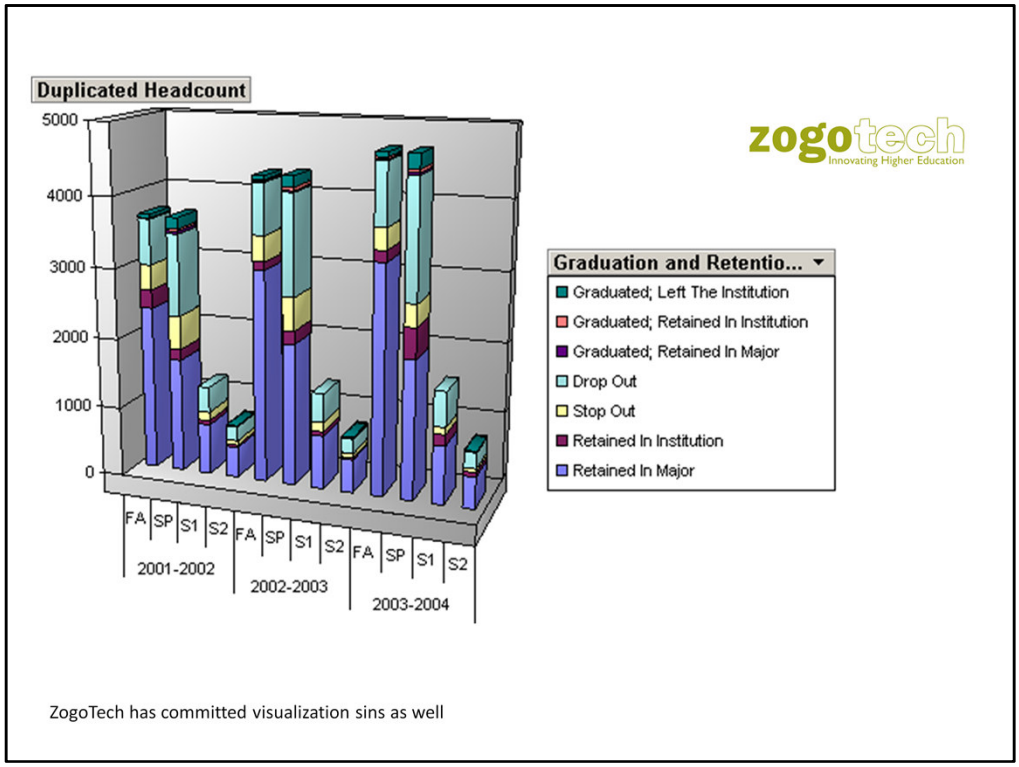
Let's show it in a line graph. Very easy to see a trend. The information is much clearer with less color and less space. This is about as simple as you can get! We don't need new, fancy 3D cones. How long have we had line graphs? Since the 20s? The 1620s!

Test 2: Which one is bigger?



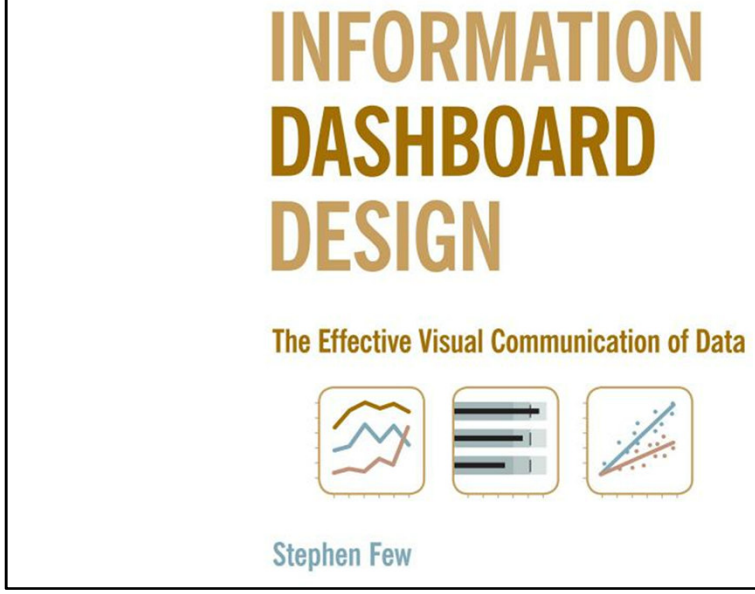


In this one, there are at least 20 times more green pixels than yellow, but actually yellow is twice as big as green.

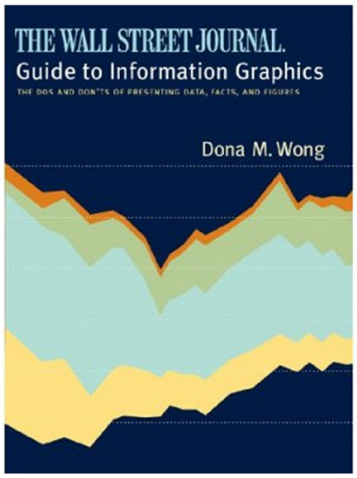


Who did this horrible chart? Oh yeah, it was us.

Visualization Resources



Data Visualization Resources



Wall Street Journal
Guide to Information Graphics

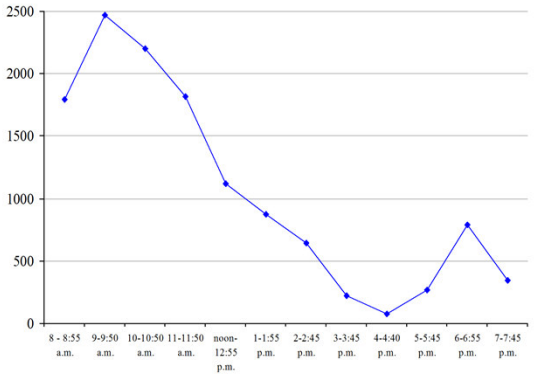
Dona Wong

acmqueue Interactive Dynamics for Visual Analysis

A taxonomy of tools that support the fluent and flexible use of visualizations

Maximum Capacity of Existing Facilities

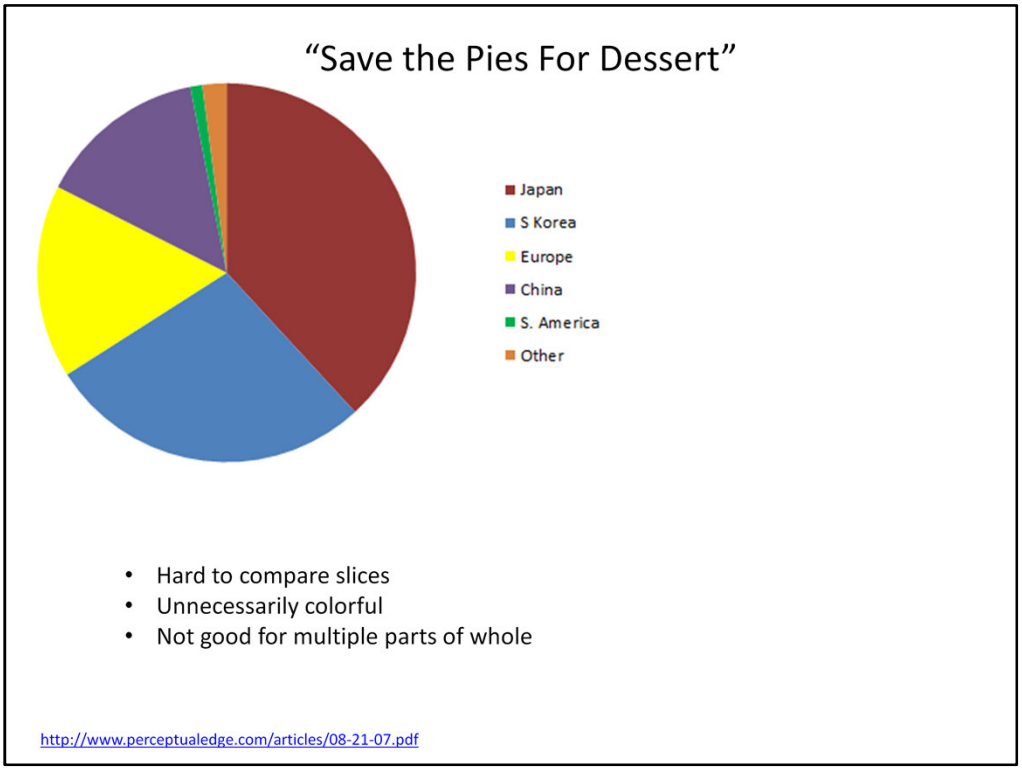
Time	Course Enrollment Growth Potential
Noon – 12:55	2,300
1:00 – 1:55	2,700
2:00 – 2:55	2,700
3:00 – 3:55	2,800
4:00 – 4:55	3,600
Total	**14,600**



Facilities could support an additional **2,000** students if course enrollment was near full capacity during the afternoon hours.*

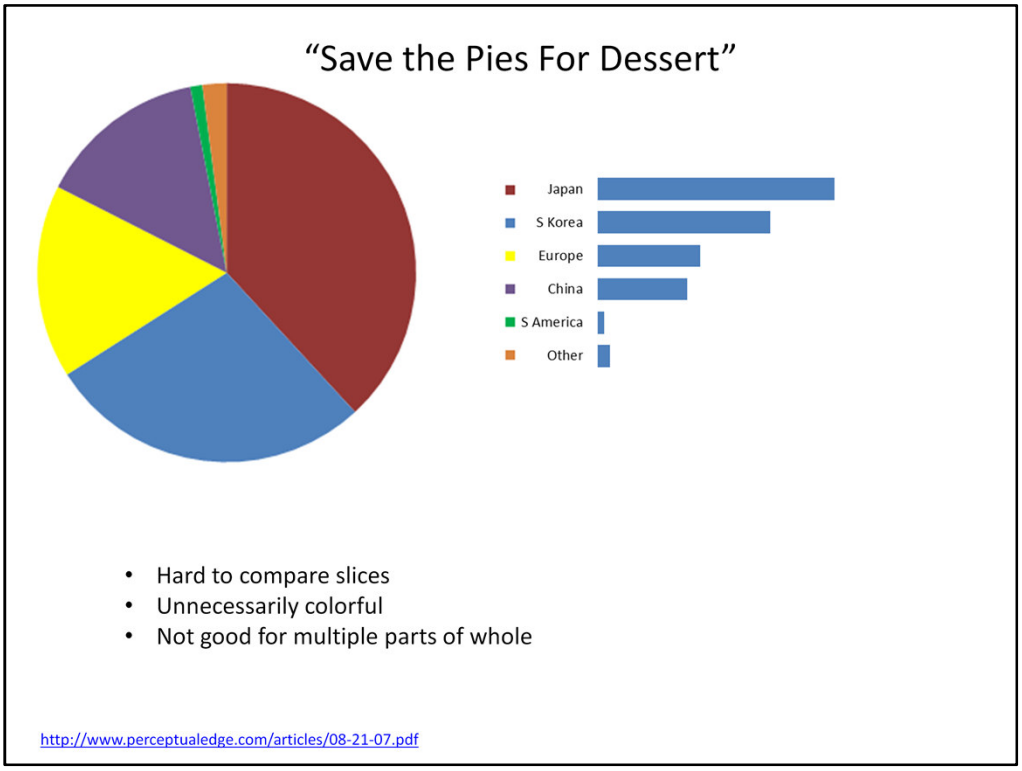
MCLENNAN COMMUNITY COLLEGE

McLennan uses our data warehouse to look at what time of day they could add more sections without adding more facilities



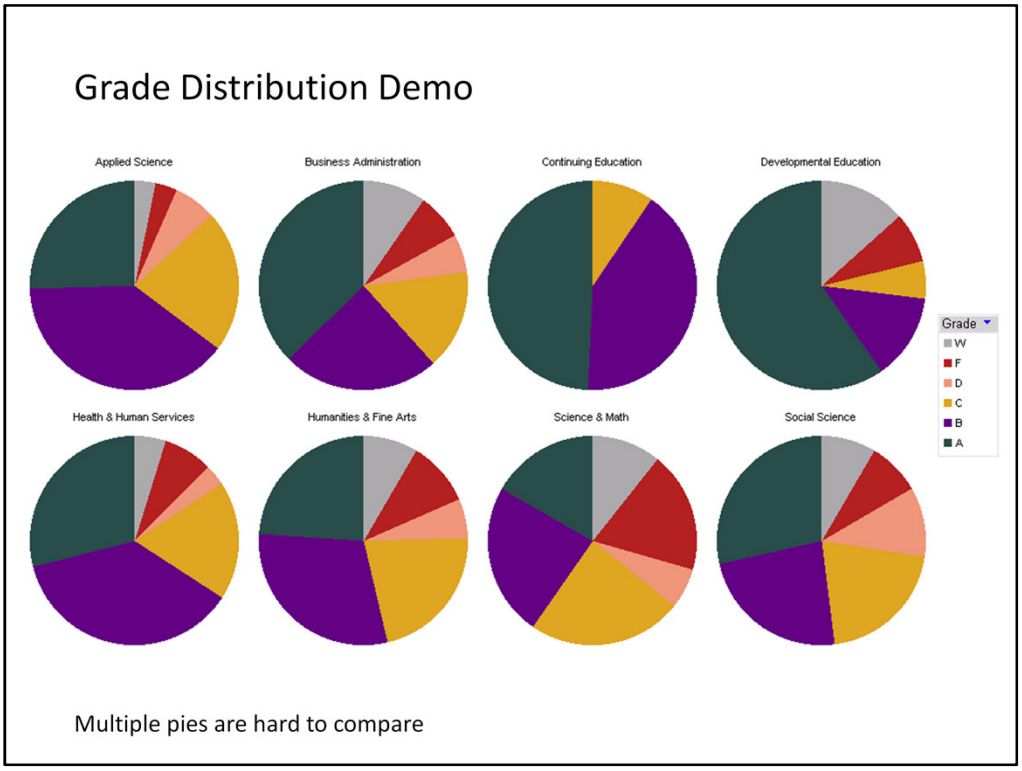
Visualization experts do not like pie charts. It's hard for the human eye to compare

odd shapes with two lines and an arc. Additionally the legend is often separated from the data, so you have to refer back and forth. For example, is Europe bigger than China? Hard to see. They also don't like that you have a lot of color which doesn't add much value.



They prefer bar charts. It's now much easier to see that Europe is larger than China.

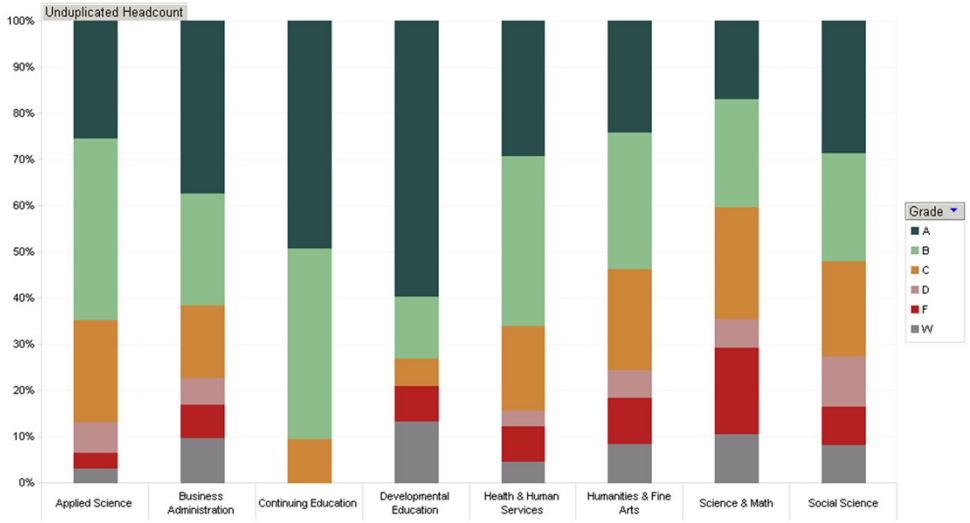
However, I personally believe there is a need for pie charts. One thing pie charts show immediately is that you are looking at parts of a whole. You don't get that from bar charts. It's also much easier to make comparisons on the first slice of a pie chart. For example, looking at the bar chart, does Japan compose at least half of the whole? Really hard to see. But in the pie chart, we can see the red slice and immediately see the answer. I think this is the reason Wong recommends putting the largest (or the most interesting) slice on the first to the right of 12 o'clock and the second largest (or second most interesting) slice to the left of 12 o'clock



Pie charts are also not very good at showing multiple parts of a whole. This is a

visualization from our dashboards showing that users can choose whatever visualizations they prefer

Grade Distribution Demo



Stacked columns are easier to identify which one has highest # of A's

A stacked bar chart is easier to see. But it's not perfect. We can see that the # A's

(dark green) for humanities and fine arts is lower than health and human services and that the #W's is higher because those are at the edge of the axes, but you can't really see whether the C's, D's or F's are larger.

REAL Dashboards

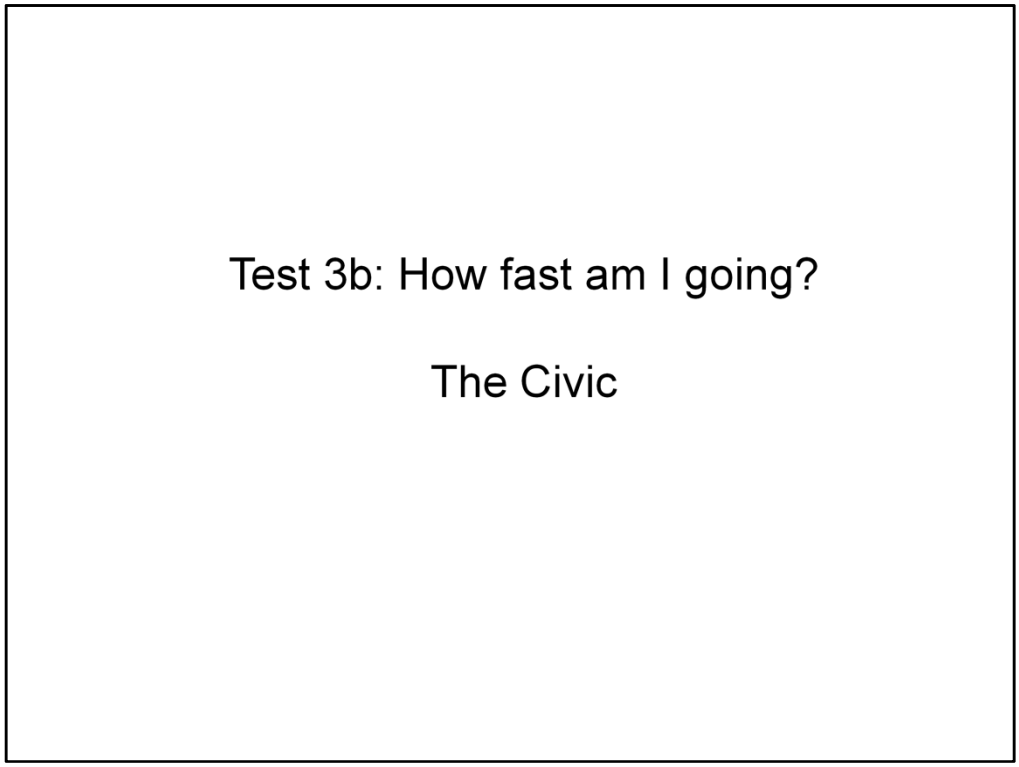
civics, fords, etc.

Let’s look at real dashboards from cars

Test 3a: How fast am I going?

I am going to show you a picture of a car's dashboard. I'll give you 2 seconds to look at it. Try to figure out how fast I'm going


0
20
40
60
80
100
120
MPH



Now I'm going to show my wife's car dashboard. She has an old Honda civic. I'll show it for half the time (1 second)


F
30
mph
mpg

Which one conveys information most efficiently?

The only additional information the dashboard on the left shows that the one on the right does not is that the maximum speed of this car is 120 mph and the minimum speed is 0. It also shows the speed in Km/hour. Do we even need that??

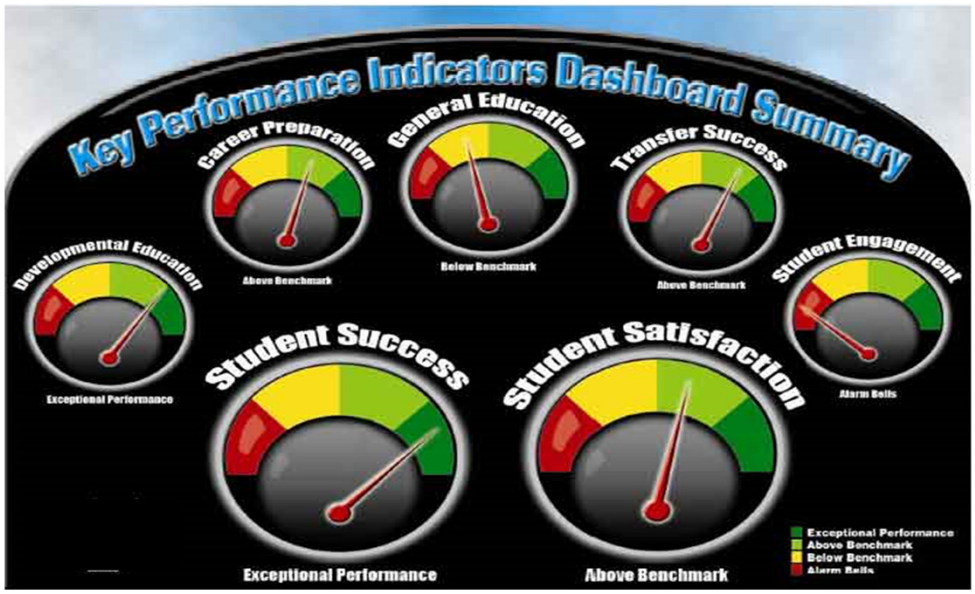
So the typical dashboard is a terrible conveyer of information.

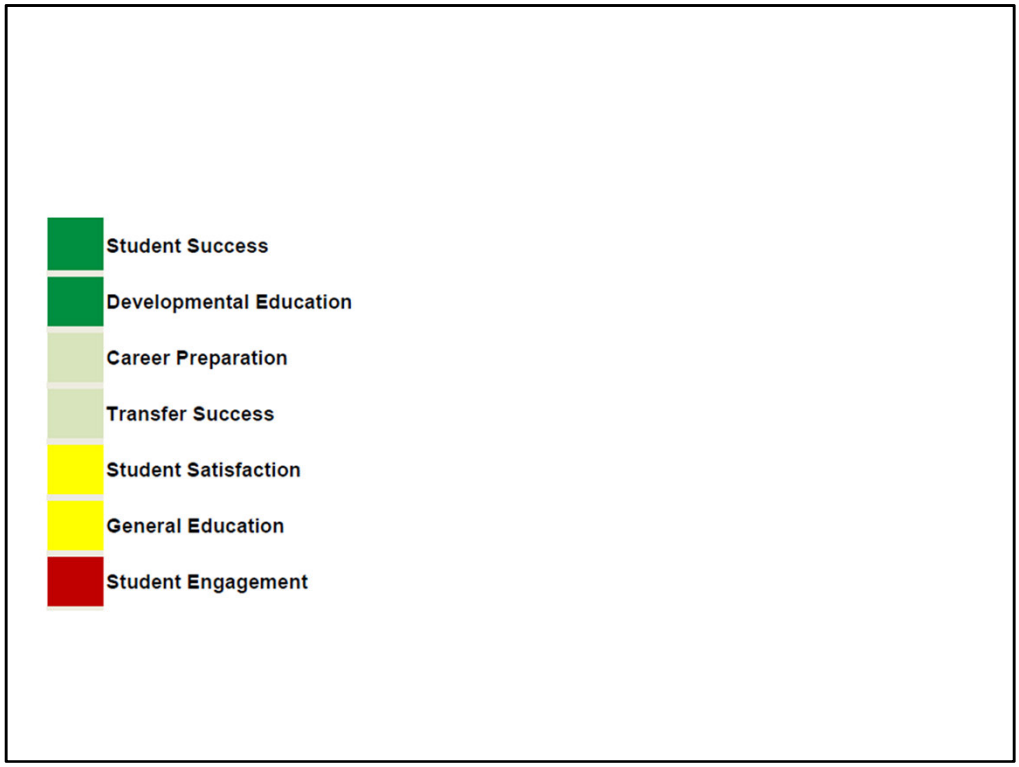
Nevertheless the metaphor persists …

Yet we still see them everywhere

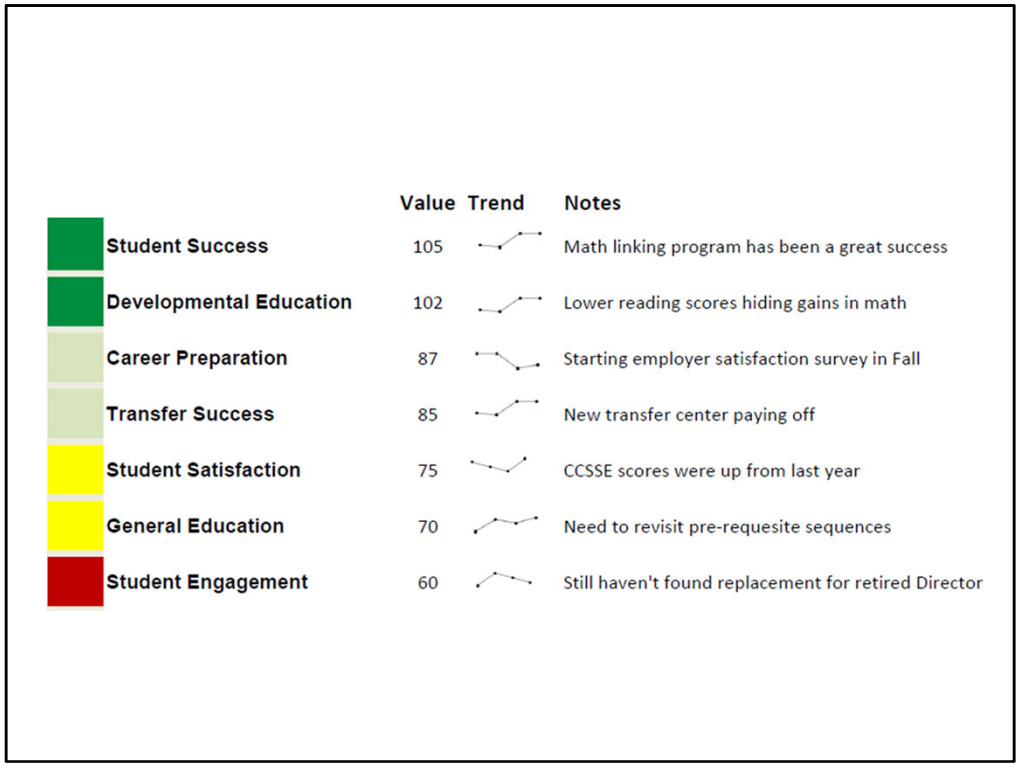
Test 4

This next slide is a dashboard from a community college I found online. Take a look at it for 3 seconds and identify which areas are red (poor performance) and which ones are green (exceptional performance)

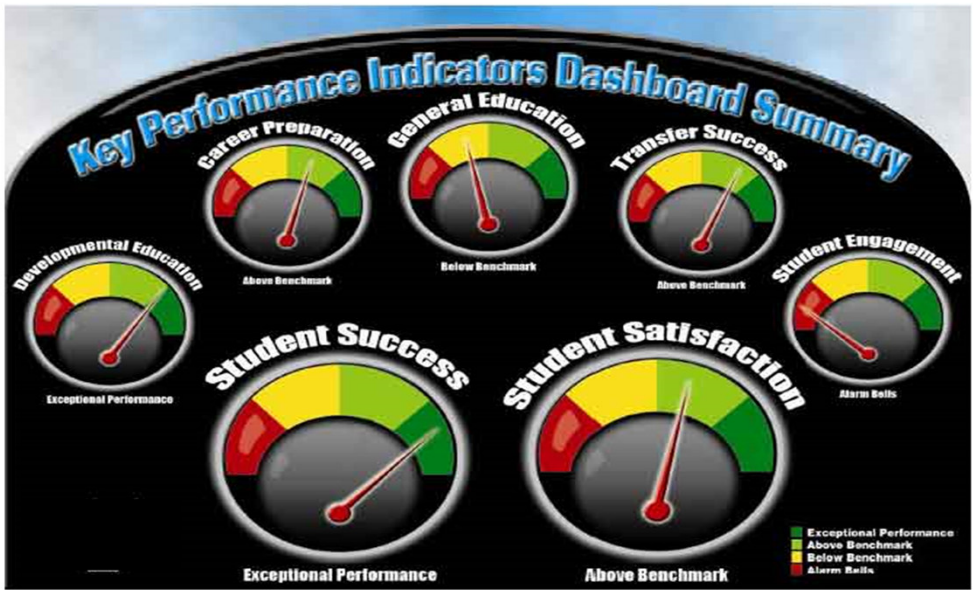

Key Performance Indicators Dashboard Summary
Career Preparation
Above Benchmark
General Education
Below Benchmark
Transfer Success
Above Benchmark
Developmental Education
Exceptional Performance
Student Engagement
Alarm Bells
Student Success
Exceptional Performance
Student Satisfaction
Above Benchmark
Exceptional Performance
Above Benchmark
Below Benchmark



There is no additional information that the previous dashboard conveys that this one does not, but this one is much clearer. What to do with all of that space?



How about showing the actual value plus trend lines and some qualitative information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Above Benchmark
Developmental Education
Exceptional Performance
Student Engagement
Alarm Bells
Student Success
Exceptional Performance
Student Satisfaction
Above Benchmark
Exceptional Performance
Above Benchmark
Below Benchmark

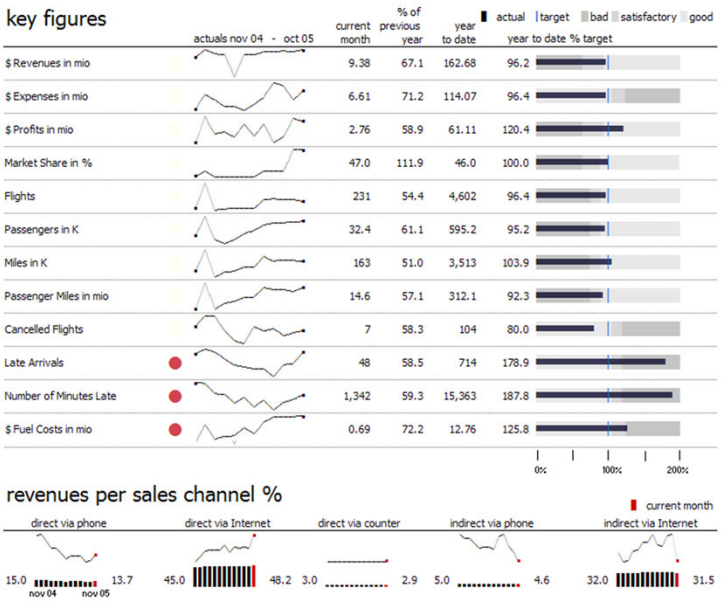
Why not this?

This dashboard shows several hundred variables. Eye immediately gravitates towards the red dots indicating problems

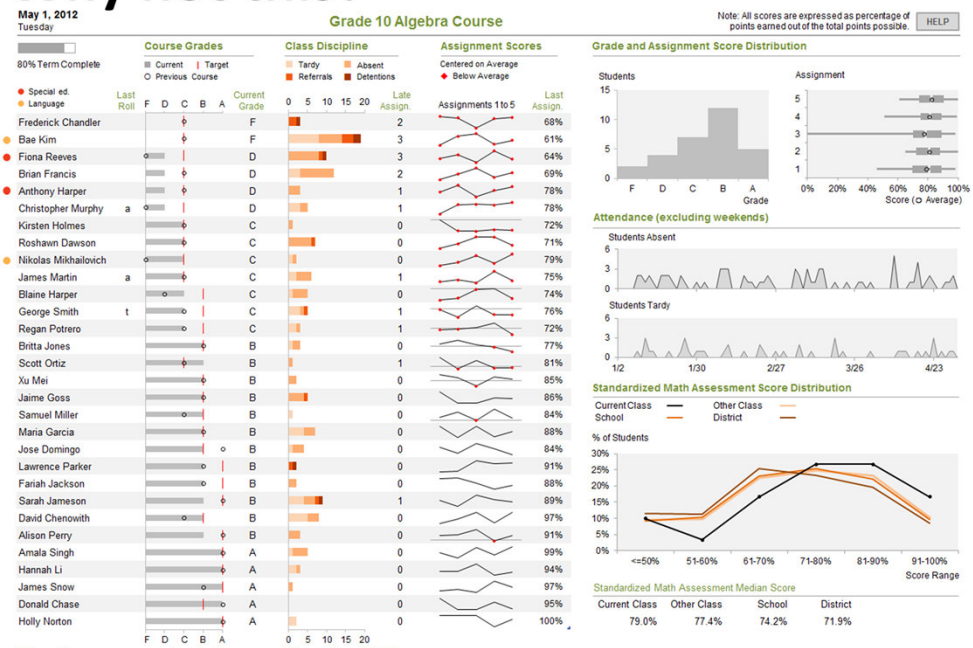
Bullet Graphs display the same information as speedometers but much more efficiently
http://en.wikipedia.org/wiki/Bullet_graph

Cons
- red used for 2 purposes

Dashboard Spy
http://bit.ly/xsTfa5



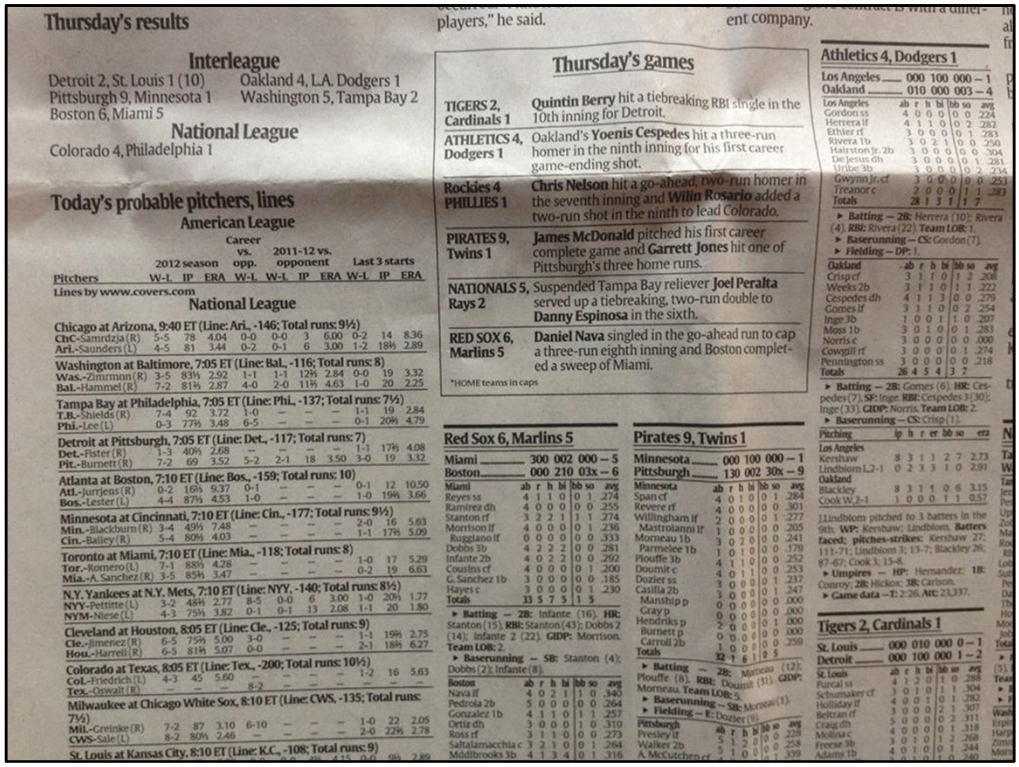
Why not this?



http://www.perceptualedge.com/blog/?p=1374

“But people can’t handle that much information”

This is the objection I hear, but every morning millions of adults, kids in the US seek out an information display that is hundreds of times more dense than the average executive dashboard



Thursday's results

Interleague

Detroit 2, St. Louis 1 (10)
Oakland 4, L.A. Dodgers 1
Pittsburgh 9, Minnesota 1
Washington 5, Tampa Bay 2
Boston 6, Miami 5

National League

Colorado 4, Philadelphia 1

Today's probable pitchers, lines

American League

Pitchers	2012 season W-L	IP	ERA	Career vs. opp. W-L	IP	ERA	2011-12 vs. opponent W-L	IP	ERA	Last 3 starts W-L	IP	ERA
Lines by www.covers.com												

National League

Chicago at Arizona, 9:40 ET (Line: Ari., -146; Total runs: 9½)
ChC.-Samrdzja (R) 5-5 78 4.04 0-0 0-0 3 6.00 0-2 14 8.36
Ari.-Saunders (L) 4-5 81 3.44 0-2 0-1 6 3.00 1-2 18⅓ 2.89

Washington at Baltimore, 7:05 ET (Line: Bal., -116; Total runs: 8)
Was.-Zimrmnn (R) 3-5 83⅓ 2.92 1-1 1-1 12⅓ 2.84 0-0 19 3.32
Bal.-Hammel (R) 7-2 81⅓ 2.87 4-0 2-0 11⅓ 4.63 1-0 20 2.25

Tampa Bay at Philadelphia, 7:05 ET (Line: Phi., -137; Total runs: 7½)
T.B.-Shields (R) 7-4 92 3.72 1-0 – – – 1-1 19 2.84
Phi.-Lee (L) 0-3 77⅓ 3.48 6-5 – – – 0-1 20⅔ 4.79

Detroit at Pittsburgh, 7:05 ET (Line: Det., -117; Total runs: 7)
Det.-Fister (R) 1-3 40⅔ 2.68 – – – – 1-1 17⅓ 4.08
Pit.-Burnett (R) 7-2 69 3.52 5-2 2-1 18 3.50 3-0 19 3.32

Atlanta at Boston, 7:10 ET (Line: Bos., -159; Total runs: 10)
Atl.-Jurrjens (R) 0-2 16⅔ 9.37 0-1 – – – 0-1 12 10.50
Bos.-Lester (L) 4-4 87⅓ 4.53 1-0 – – – 1-0 19⅓ 3.66

Minnesota at Cincinnati, 7:10 ET (Line: Cin., -177; Total runs: 9½)
Min.-Blackburn (R) 3-4 49⅔ 7.48 – – – – 2-0 16 5.63
Cin.-Bailey (R) 5-4 80⅓ 4.03 – – – – 1-1 17⅓ 5.09

Toronto at Miami, 7:10 ET (Line: Mia., -118; Total runs: 8)
Tor.-Romero (L) 7-1 88⅓ 4.28 – – – – 1-0 17 5.29
Mia.-A. Sanchez (R) 3-5 85⅓ 3.47 – – – – 0-2 19 6.63

N.Y. Yankees at N.Y. Mets, 7:10 ET (Line: NYY, -140; Total runs: 8½)
NYY-Pettitte (L) 3-2 48⅓ 2.77 8-5 0-0 6 3.00 1-0 20⅓ 1.77
NYM-Niese (L) 4-3 75⅓ 3.82 0-1 0-1 13 2.08 1-1 20 1.80

Cleveland at Houston, 8:05 ET (Line: Cle., -125; Total runs: 9)
Cle.-Jimenez (R) 6-5 75⅓ 5.00 3-0 – – – 1-1 19⅓ 2.75
Hou.-Harrell (R) 6-5 81⅓ 5.07 0-0 – – – 2-1 18⅓ 6.27

Colorado at Texas, 8:05 ET (Line: Tex., -200; Total runs: 10½)
Col.-Friedrich (L) 4-3 45 5.60 – – – – 1-2 16 5.63
Tex.-Oswalt (R) – – – 8-2 – – – – – –

Milwaukee at Chicago White Sox, 8:10 ET (Line: CWS, -135; Total runs: 7½)
Mil.-Cretinke (R) 7-2 87 3.10 6-10 – – – 1-0 22 2.05
CWS-Sale (L) 8-2 80⅔ 2.46 – – – – 2-0 22⅓ 2.78

St. Louis at Kansas City, 8:10 ET (Line: K.C., -108; Total runs: 9)

players," he said. ent company.

Thursday's games

TIGERS 2, Cardinals 1 — **Quintin Berry** hit a tiebreaking RBI single in the 10th inning for Detroit.

ATHLETICS 4, Dodgers 1 — Oakland's **Yoenis Cespedes** hit a three-run homer in the ninth inning for his first career game-ending shot.

Rockies 4 PHILLIES 1 — **Chris Nelson** hit a go-ahead, two-run homer in the seventh inning and **Wilin Rosario** added a two-run shot in the ninth to lead Colorado.

PIRATES 9, Twins 1 — **James McDonald** pitched his first career complete game and **Garrett Jones** hit one of Pittsburgh's three home runs.

NATIONALS 5, Rays 2 — Suspended Tampa Bay reliever **Joel Peralta** served up a tiebreaking, two-run double to **Danny Espinosa** in the sixth.

RED SOX 6, Marlins 5 — **Daniel Nava** singled in the go-ahead run to cap a three-run eighth inning and Boston completed a sweep of Miami.

*HOME teams in caps

Red Sox 6, Marlins 5

Miami ..... 300 002 000 — 5
Boston ..... 000 210 03x — 6

Miami	ab	r	h	bi	bb	so	avg
Reyes ss	4	1	1	0	0	1	.274
Ramirez dh	4	0	0	0	0	0	.255
Stanton rf	3	2	2	1	1	1	.274
Morrison lf	4	0	0	0	0	1	.236
Ruggiano lf	0	0	0	0	0	0	.333
Dobbs 3b	4	2	2	2	0	0	.281
Infante 2b	4	0	2	2	0	0	.292
Cousins cf	4	0	0	0	0	1	.200
G. Sanchez 1b	3	0	0	0	0	0	.185
Hayes c	3	0	0	0	0	1	.230
Totals	33	5	7	5	1	5	

▸ **Batting** — 2B: Infante (16). HR: Stanton (15). RBI: Stanton (43); Dobbs 2 (14); Infante 2 (22). GIDP: Morrison. Team LOB: 2.
▸ **Baserunning** — SB: Stanton (4); Dobbs (2); Infante (8).

Boston	ab	r	h	bi	bb	so	avg
Nava lf	4	0	2	1	1	0	.340
Pedroia 2b	5	0	0	0	0	0	.264
Gonzalez 1b	4	1	1	0	1	1	.257
Ortiz dh	3	0	0	0	1	0	.310
Ross rf	3	1	1	0	0	0	.273
Saltalamacchia c	3	2	1	0	0	1	.264
Middlbrooks 3b	4	1	3	4	0	1	.316

Pirates 9, Twins 1

Minnesota ..... 000 100 000 — 1
Pittsburgh ..... 130 002 30x — 9

Minnesota	ab	r	h	bi	bb	so	avg
Span cf	4	0	1	0	0	1	.284
Revere rf	4	0	0	0	0	0	.301
Willingham lf	2	0	0	0	0	1	.277
Mastrolanni lf	1	0	0	0	0	0	.205
Morneau 1b	3	0	2	0	0	0	.241
Parmelee 1b	1	0	1	0	0	0	.179
Plouffe 3b	4	1	1	0	0	0	.252
Doumit c	4	0	1	1	0	0	.253
Dozier ss	3	0	0	0	0	1	.237
Casilla 2b	3	0	0	0	0	1	.247
Marshlip p	0	0	0	0	0	0	.000
Gray p	0	0	0	0	0	0	.000
Hendriks p	2	0	0	0	0	1	.000
Burnett p	0	0	0	0	0	0	.000
Carroll 2b	1	0	0	0	0	0	.250
Totals	32	1	6	1	0	5	

▸ **Batting** — 2B: Morneau (12); Plouffe (8). RBI: Doumit (31). GIDP: Morneau. Team LOB: 5.
▸ **Baserunning** — SB: Morneau (1).
▸ **Fielding** — E: Dozier (9).

Pittsburgh	ab	r	h	bi	bb	so	avg
Presley lf	5	1	2	1	0	0	.228
Walker 2b	5	1	2	0	0	0	.258
A. McCutchen cf	5	1	0	0	0	1	.339

Athletics 4, Dodgers 1

Los Angeles ..... 000 100 000 — 1
Oakland ..... 010 000 003 — 4

Los Angeles	ab	r	h	bi	bb	so	avg
Gordon ss	4	0	0	0	0	0	.224
Herrera lf	4	1	1	0	0	2	.282
Ethier rf	3	0	0	0	0	1	.283
Rivera 1b	3	0	2	1	0	0	.250
Hairston Jr. 2b	3	0	0	0	0	0	.304
De Jesus dh	3	0	0	0	0	1	.281
Uribe 3b	3	0	0	0	0	2	.234
Gwynn Jr. cf	3	0	0	0	0	0	.233
Treanor c	2	0	0	0	1	1	.283
Totals	28	1	3	1	1	7	

▸ **Batting** — 2B: Herrera (10); Rivera (4). RBI: Rivera (22). Team LOB: 1.
▸ **Baserunning** — CS: Gordon (7).
▸ **Fielding** — DP: 1.

Oakland	ab	r	h	bi	bb	so	avg
Crisp cf	3	1	1	0	1	2	.208
Weeks 2b	3	1	1	0	1	1	.222
Cespedes dh	4	1	1	3	0	0	.279
Gomes lf	3	1	1	0	0	2	.254
Inge 3b	1	0	0	1	1	0	.207
Moss 1b	3	0	1	0	0	1	.283
Norris c	3	0	0	0	0	0	.000
Cowgill rf	3	0	0	0	0	1	.274
Pennington ss	3	0	0	0	0	0	.218
Totals	26	4	5	4	3	7	

▸ **Batting** — 2B: Gomes (6). HR: Cespedes (7). SF: Inge. RBI: Cespedes 3 (30); Inge (33). GIDP: Norris. Team LOB: 2.
▸ **Baserunning** — CS: Crisp (1).

Pitching	ip	h	r	er	bb	so	era
Los Angeles							
Kershaw	8	3	1	1	2	7	2.73
Lindblom L,2-1	0	2	3	3	1	0	2.91
Oakland							
Blackley	8	3	1	1	0	6	3.15
Cook W,2-1	1	0	0	0	1	1	0.57

JLindblom pitched to 3 batters in the 9th. WP: Kershaw; Lindblom. Batters faced: pitches-strikes: Kershaw 27; 111-71; Lindblom 3; 13-7; Blackley 26; 87-67; Cook 3; 13-8.
▸ **Umpires** — HP: Hernandez; 1B: Conroy; 2B: Hickox; 3B: Carlson.
▸ **Game data** — T: 2:26. Att: 23,337.

Tigers 2, Cardinals 1

St. Louis ..... 000 010 000 0 — 1
Detroit ..... 000 100 000 1 — 2

St. Louis	ab	r	h	bi	bb	so	avg
Furcal ss	4	1	2	0	1	0	.288
Schumaker cf	3	0	1	0	1	1	.304
Holliday lf	4	0	0	1	0	1	.282
Beltran rf	3	0	0	0	2	1	.307
Craig dh	5	0	0	0	0	2	.311
Molina c	4	0	0	0	0	1	.318
Freese 3b	3	0	1	0	1	2	.268
Adams 1b	4	0	1	0	0	1	.244

The sports page. Note the mix of dense tables, qualitative information, trend information. Would be nice if they had some charts, but we'll look at that

Sports fans use an incredible amount of data. You ever follow how those fantasy sports leagues are? I was reading these forums and they're talking about using data mining and predictive analytics to find the best players to draft!

Dense data

CENTRAL	W	L	PCT	GB	HOME	ROAD	RS	RA	DIFF	STRK
Cincinnati	32	25	.561	-	17-11	15-14	239	221	+18	Won 1
Pittsburgh	30	27	.526	2	17-11	13-16	183	203	-20	Won 2
St. Louis	30	29	.508	3	13-12	17-17	304	248	+56	Lost 1
Milwaukee	27	31	.466	5.5	15-16	12-15	256	274	-18	Won 3
Houston	25	33	.431	7.5	18-14	7-19	249	270	-21	Won 1
Chicago Cubs	19	39	.328	13.5	12-15	7-24	211	262	-51	Lost 3

Glossary

W: Wins
L: Losses
PCT: Winning percentage
GB: Games back
HOME: Home record
ROAD: Road record
RS: Runs scored
RA: Runs allowed
DIFF: Run differential
STRK: Current streak
L10: Last 10 games
POFF: % chance of making the Playoffs

http://espn.go.com/mlb/standings

This is from espn's website. Nice table, even a data dictionary at the bottom. Let's look at Runs Scored and Runs Allowed.

Pittsburgh has scored 20 runs fewer than their opponents. St Louis has scored 56 runs more than their opponents, but Pittsburgh is ahead of St Louis in the standings! How?

Sports Visualizations

Pittsburgh (30-27)

St Louis (30-29)

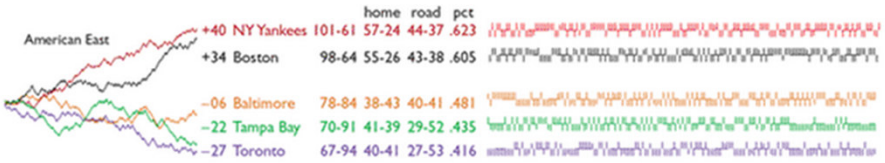
When Pittsburgh **won**, they barely did (short bars).
When they **lost**, they lost big (long bars).

http://www.baseball-reference.com/teams/PIT/2012-schedule-scores.shtml

Or an example from Edward Tufte:

We can show the result of all home and away games by adding in another sparkline at the end of each team (wins are marks above the line, losses below). The horizontal line appears for home games and no line for away games.

You can see the big win streak Boston went on at the end of the season to almost catch up with the Yankees.



This shows the result of 162 games for 5 teams including whether the game was played at home or away. The numbers +40, +34 are the number of games above / below .500

Are sports fans smarter than managers?

Why management reports need more information density and dashboards are based on a misunderstanding.

If you are a sports fan, the first thing you probably do each morning after grabbing a cup of coffee is reach for the sports section of the morning paper. Psychologists even say that one of the easiest ways to fight your daily doldrums is to route for your local team. But as non-native of Nuremberg, I try to be careful. I follow basketball (gasp!) instead of soccer.
This Monday's paper shows the results of the German Basketball League (Bundesliga), including the scores from the 6 games of the weekend as well as overall ranking of the 18 teams in the league. That's a total of 108 numbers on an 8th of a regular-sized page.

Basketball-Bundesliga

Braunschweig - TBB Trier	77:80
Ulm - Baskets Bamberg	72:87
Quakenbrück - Leverkusen	88:80
Tübingen - Baskets Bonn	77:68
Gießen46ers - Alba Berlin	57:74
Frankfurt - Ludwigsburg	65:80
Bremerhaven - Karlsruhe	94:75
Oldenburg - Baskets Nürnberg	74:64
Köln - Paderborn Baskets	70:65

1. Ludwigsburg	6	523:438	12:0

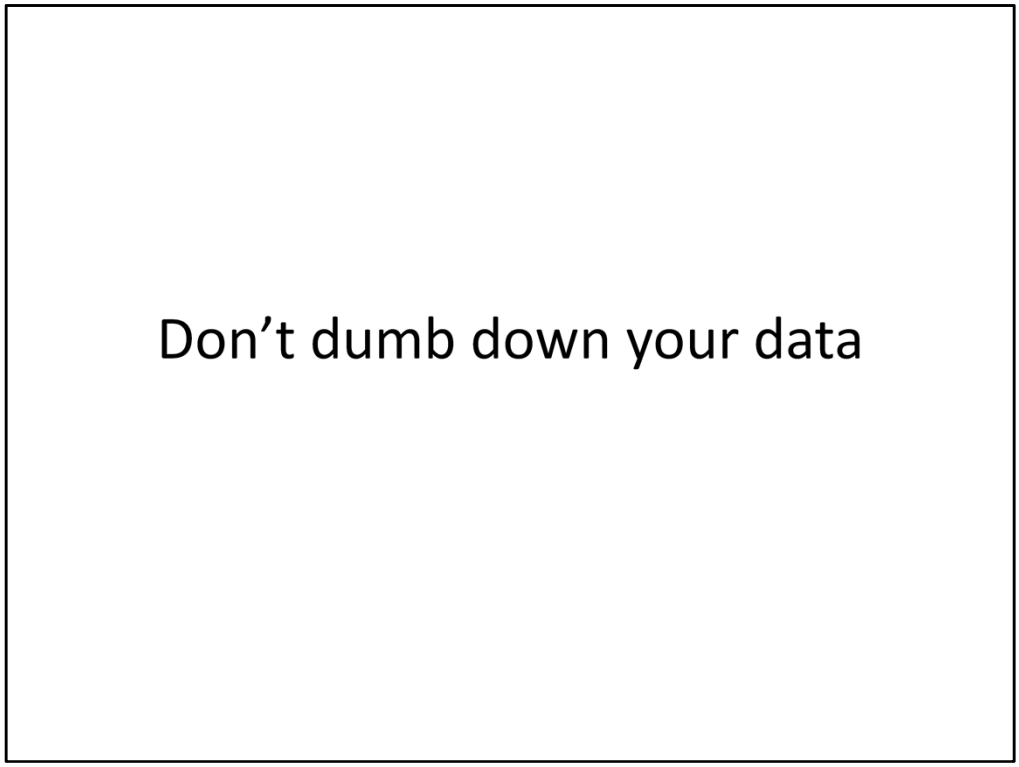
Dashboard with 60 values and 7 % of the density of the basketball table

Dashboard with 12 values and 1 % of the density of the basketball table

Dashboard with 44 values and 5 % of the density of the basketball table

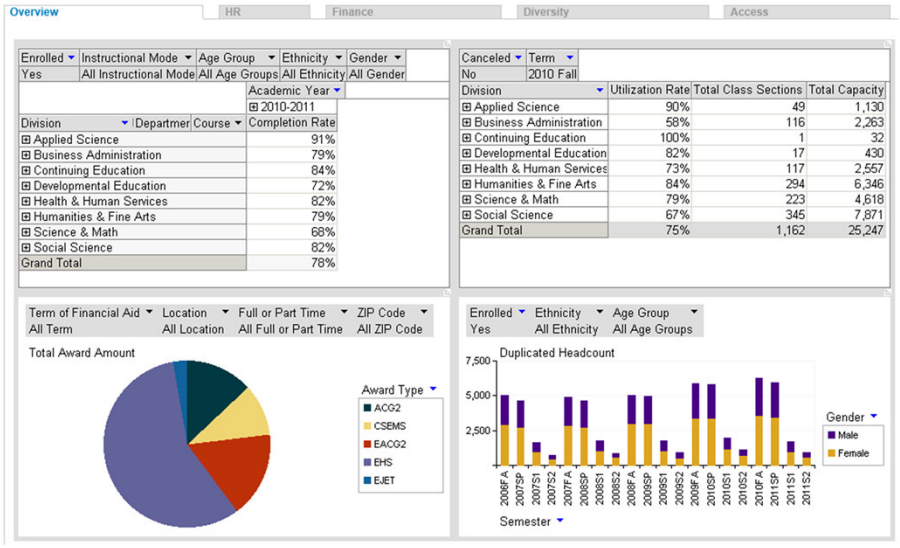
http://blog.bissantz.com/sportsfans

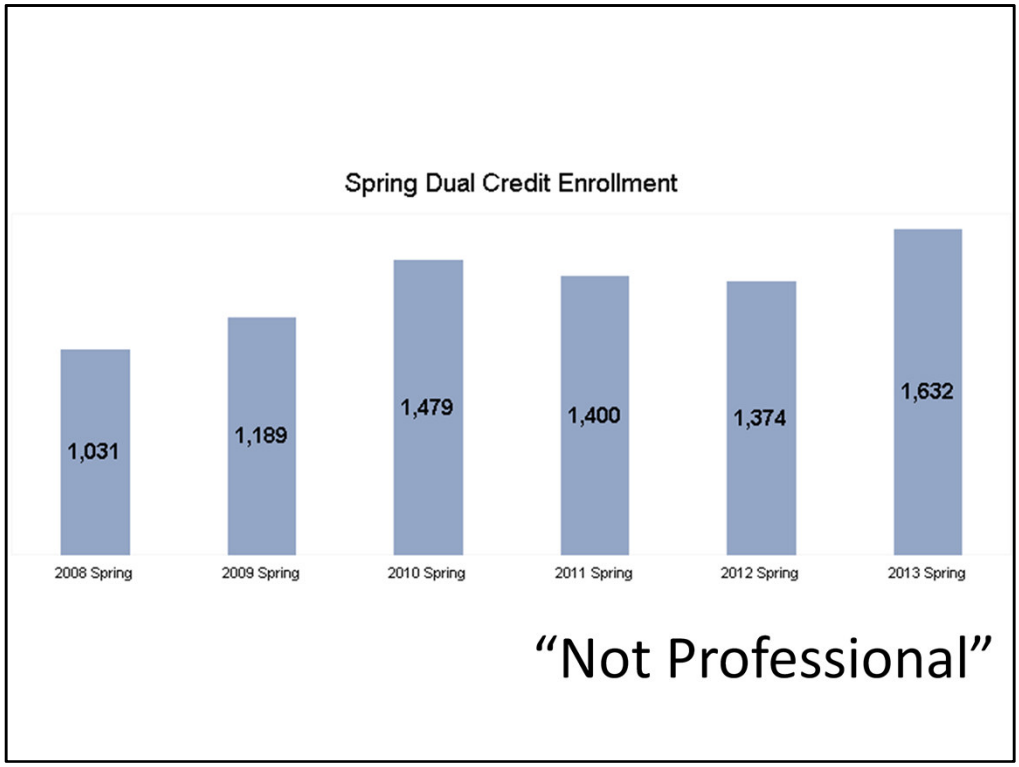
If sports fans can understand this level of data density, why do we assume our leaders of higher ed can't?



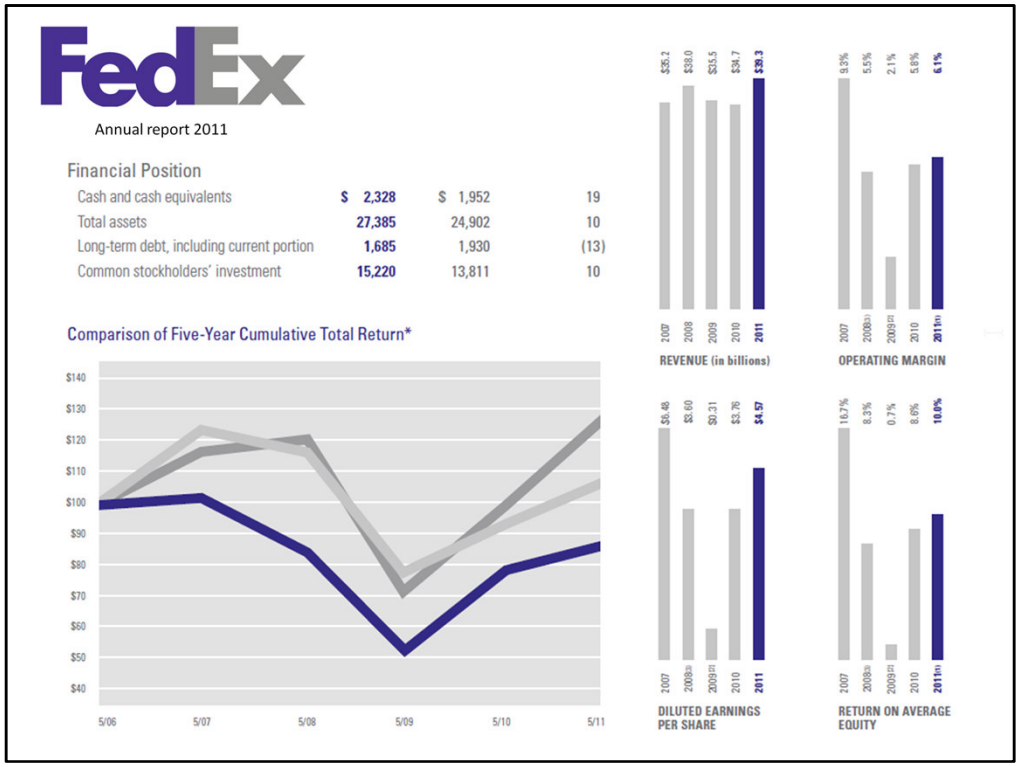
I’m a sports fan and I can say on behalf of the entire group …

ZT Dashboards

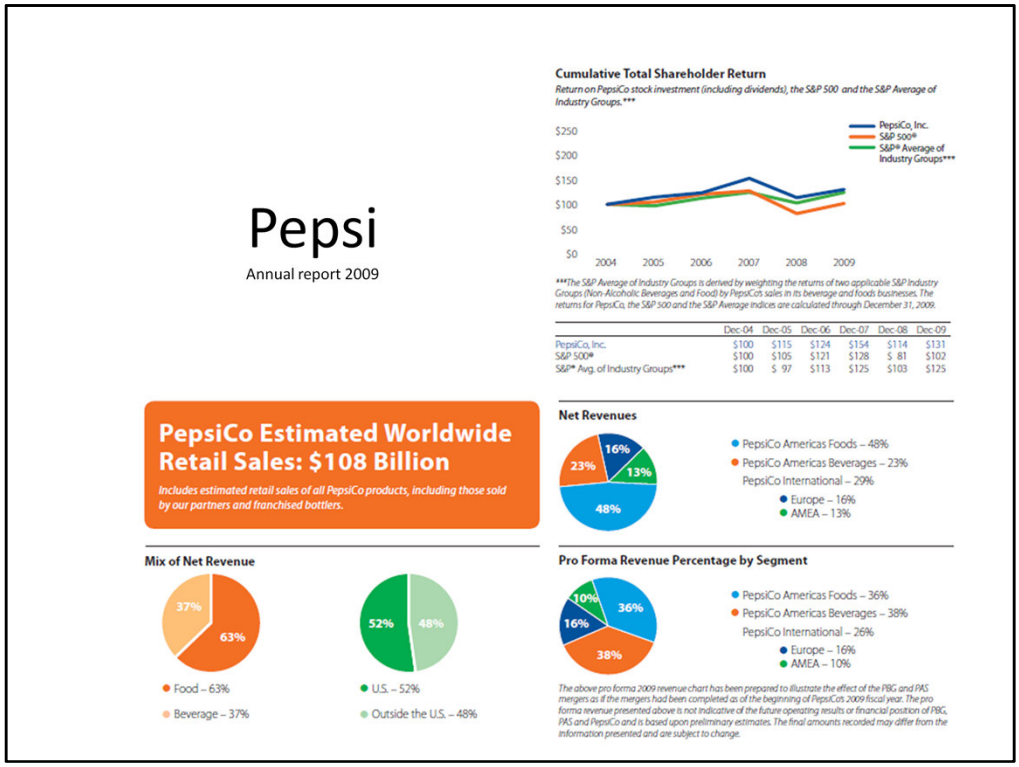




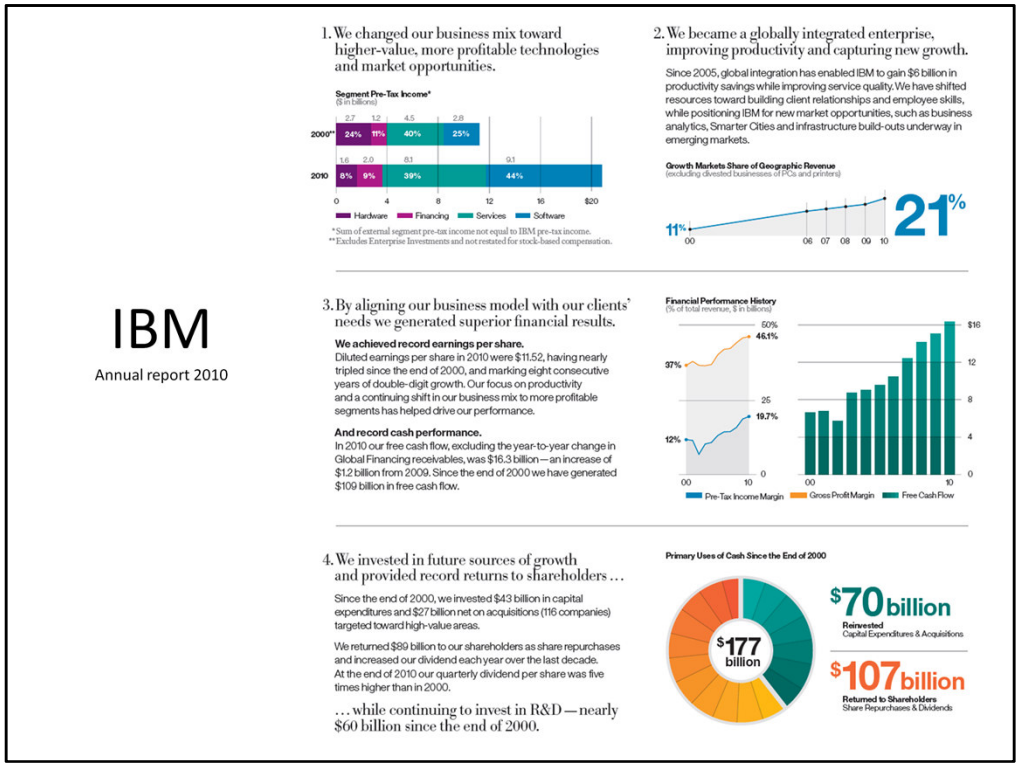
When we showed our new, simple charts to clients, the response was “not professional” … That made me wonder how Fortune 500 companies display data, so I pulled their annual reports



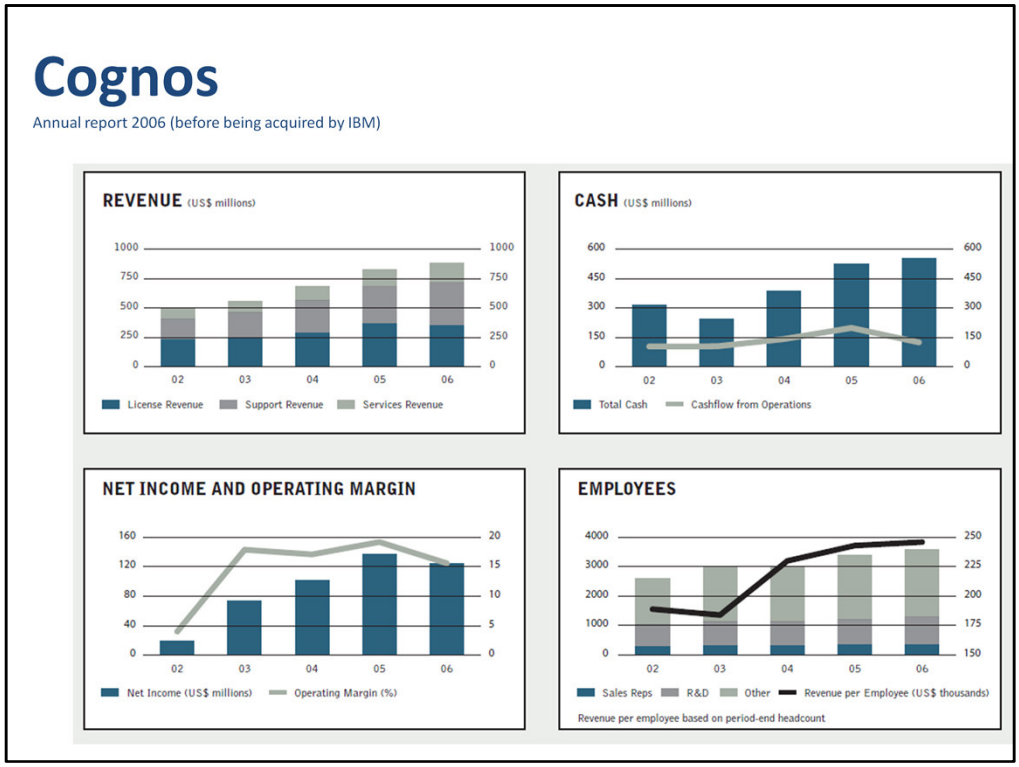
Look at the charts on the right: there aren't even axes! Emphasis on the data



Very simple, no 3D



IBM nicely merges qualitative information with quantitative and with charts to display those numbers. Note in the top left instead of showing 2 pies, they use stacked bars



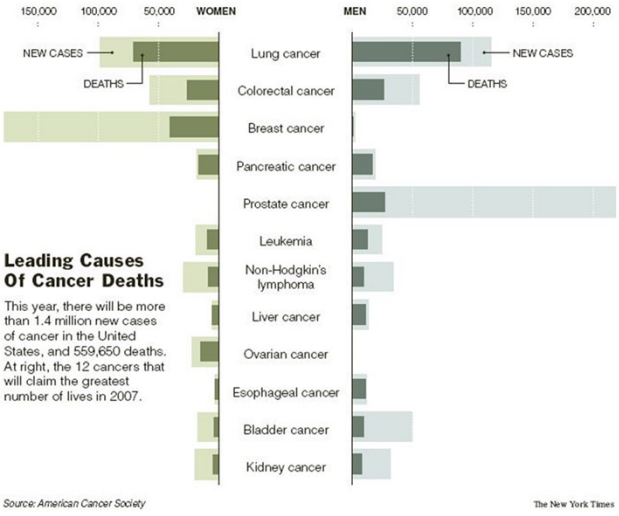
Cognos doesn't even use its own 3D charts. Probably don't need the heavy grid lines or chart borders, but still very simple. In 3 of the charts they show multiple measures on different axes. Since those measures are related to each other (# employees & revenue per employee) this works to tell a good story. The axes could be more clear though.

The New York Times

Note the combination of narrative and data.

Showing the new cases and the number of deaths gives an idea of the fatality rate of the cancer.

For example, while there are a large number of breast and prostate cancer cases, the fatality rates are relatively low.



NYT avoids pie graphs since it is hard for people to compare different pie slices.

Instead they show percentages of a whole as stacked bars (right)

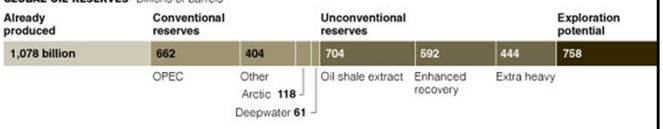
You will never see a 3D bar / pie chart in a NY Times graphic.

The New York Times

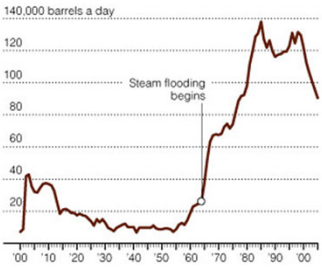
The Reports of Oil's Demise Are Greatly Exaggerated

For decades, there have been warnings that oil would run out soon. But advanced technologies have made it possible to recover more oil from fields like Kern River in Bakersfield, Calif., that otherwise would have been exhausted long ago. Some experts say that sources that are not economical to develop when oil prices are low become commercially viable as prices rise, allowing for the recovery of huge amounts of oil that are not in current estimates of conventional reserves.

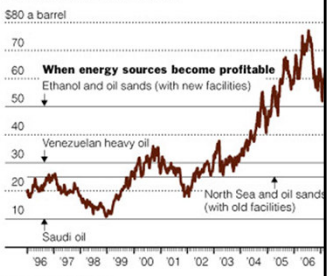
GLOBAL OIL RESERVES *Billions of barrels*



KERN RIVER FIELD OIL PRODUCTION *Bakersfield, Calif.*



OIL PRICE *Near-month contracts*

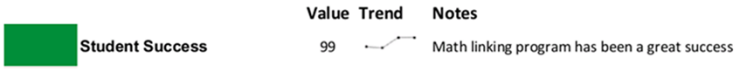


Sources: Cambridge Energy Research Associates; Chevron; Simmons & Co.; Bloomberg Financial Markets

The New York Times

Visualization Best Practices

- Avoid 3D
- Use color judiciously
- Don’t be scared of data density
- Mix qualitative and quantitative
- “Save the Pies for Dessert”



Sources of Indicators

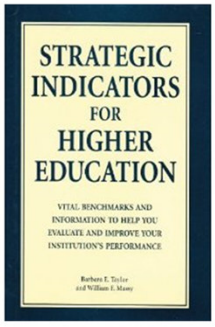
Indicators

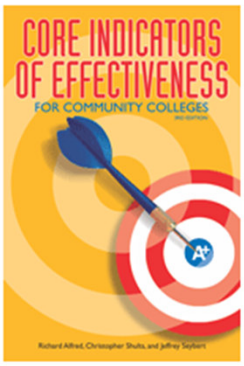
Use what already works

Menu of indicators from other sources (AtD schools, AACC, etc)

See Webinars

http://www.zogotech.com/





AIR Professional File

Table 7

Student Engagement

Group (Number of indicators in group)	Number of Dashboards Using (N=66)	Percent of Dashboards Using
Student Body Engagement (39)	**38**	**57.6%**
Study abroad	8	12.1%
Honors in major	5	7.6%
% of undergraduates living on campus	4	6.1%

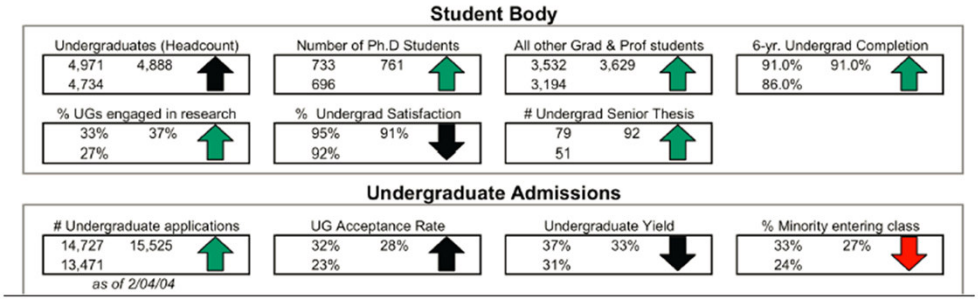
Table 8

Academic Information

Group (Number of indicators in group)	Number of Dashboards Using (N=66)	Percent of Dashboards Using
Student/Faculty Contact (9)	**36**	**54.5%**
Student/faculty ratio	36	54.5%
Classes < 20 students	19	28.8%
Classes > 50 students	12	18.2%
Academic Information (68)	**31**	**47.0%**
No. of fellowships	4	6.1%
Course sections offered	3	4.5%
ARL ranking of library	3	4.5%

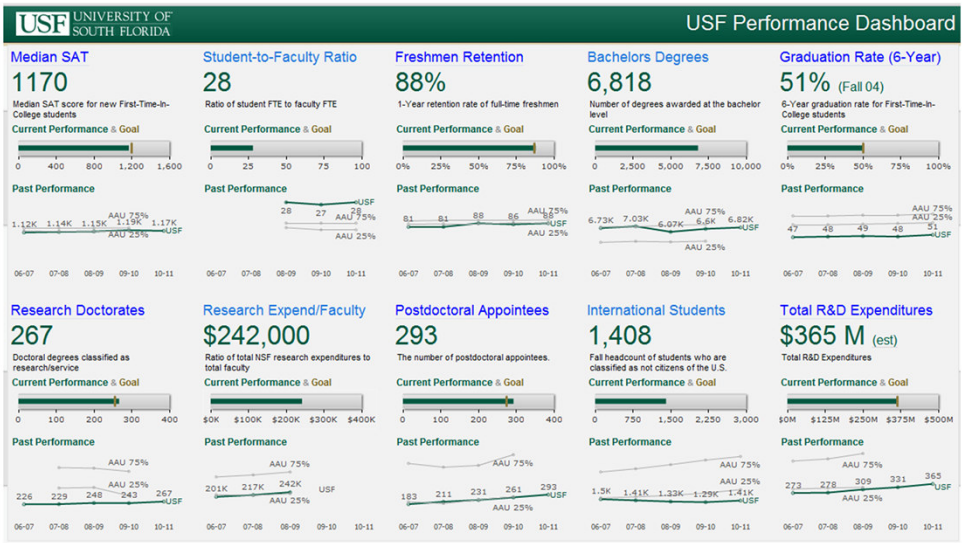
Higher Ed Examples

Tufts



Pros
- Simple, focus on the data

Cons
- Hard to understand without legend
- Boxes



Pros
- Celebrates the data
- Easy to understand
- Interactive

Cons
- Larger than one page
- Line charts labels are busy

http://www.ods.usf.edu/Plans/PPA/dashboard.htm

St. Charles Community College

SCC PI Report: Executive Dashboard Summary

Student Success

1	●	Persistence Rate Fall To Fall[1,2]
2	○	Occupational-Technical Degree Satisfaction[3]
3	○	Transfer-Degree Satisfaction[4]

Career Preparation

4	●	Licensure Pass Rate[5]
5	●	Placement Rate In Workforce[3]

Student Satisfaction

6	○	Overall Student Satisfaction[6]
7	○	Student Services[6]
8	○	Academic Services[6]
9	○	Administrative Services[6]
10	○	Non-Academic Facilities[6]
11	○	Academic Facilities[6]

Developmental Education

12	●	Math[2]
13	●	English[2]

Student Self-Assessment Of General Education Gains

19	◐	Personal/Social Gains[7]
20	○	General Education Gains[7]
21	●	Practical Competencies[7]

Transfer Success

22	○	Transfer Rate[1,8]
23	●	Academic Success After Transfer[1,8,9]
24	○	Persistence After Transfer[1,8]

Best Educational Practices

14	●	Active And Collaborative Learning[7]
15	○	Student Effort[7]
16	○	Academic Challenge[7]
17	●	Student-Faculty Interaction[7]
18	◐	Support For Learners[7]

PI Standard

- ● Exceptional performance
- ○ Above Benchmark
- ◐ Below Benchmark
- ● Alarm Bells

Richland College

	Overall Score		Prev. Month Score	End of Year 07/08 Score
Richland College Monthly Key Performance Index Score	9.6		9.6	9.4

Strategic Priorities for Student Learning				
Key Performance Indices (Weighting Factors)	Monthly Score		Prev. Month Score	End of Year 07/08 Score
Identify and Meet Community Educational Needs (20%)	9.7		9.4	9.5
Enable All Students to Succeed (35%)	9.7		9.6	9.3
Enable All Employees to Succeed (20%)	8.9		9.4	9.8
Ensure Institutional Effectiveness (25%)	9.8		9.8	9.2

All scores based on a scale of 10. **Green** = Within target range, **Yellow** = 89.99% - 85.00% of of target range, **Red** = Less than 85% of target range

1. Identify and Meet Community Educational Needs	Monthly Score		Previous Month Score	End of Year 10/11 Score
Four Key Performance Indicators				
1.1 Initiate relationships for sustainable community building (5%)	6.65		6.65	9.15
1.2 Increase market share of key student segments (30%)	9.70		9.70	9.14
1.3 Provide business and industry work force training (15%)	9.81		9.81	9.18
1.4 Respond to community educational needs (50%)	9.82		9.82	9.93

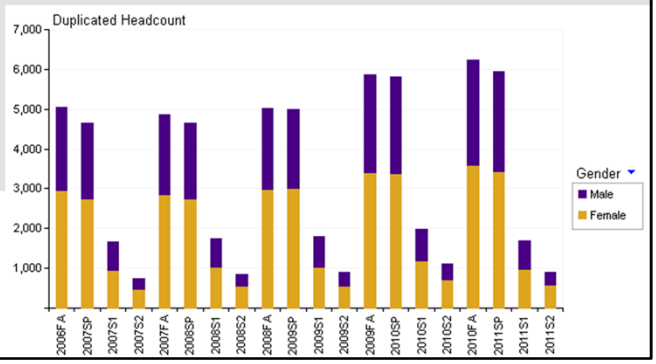
	1. Identify and Meet Community Educational Needs		2011-2012 Target Range		Performance as of April 2012	Score	Adjusted Score	Maximum Score	COMMENTS
1.1	**Initiate relationships for sustainable community building**		**90%**	**100%**					
T/L	1.1.1 # of service hours in Service Learning	≥	21,600	24,000	6,834	7.12	7.12	10	RCHS=6,166
T	1.1.2 Annual RLC SECC contributions	≥	$103,500	$115,000	$66,372	5.77	5.77	10	FINAL
1.2	**Increase APRket share of key student segments**		**90%**	**100%**					
T/L	1.2.1 % of local service area public high school graduates within one-year enrolled as credit students	≥	27.90	31.00	29.01	9.36	9.36	10	SS11-SP12
T/L	1.2.2 Contact hours from dual credit and concurrent	≥	582,936	647,707	538,573	10.39	10.00	10	80%
T/L	1.2.3 % of local service area (lsa) market enrolled as students	≥	3.60	4.00	3.62	11.31	10.00	10	80%
T/L	1.2.4 % of Dallas County market enrolled as students (outside lsa)	≥	0.73	0.81	0.67	10.34	10.00	10	80%
T/L	1.2.5 % of unduplicated credit enrollments outside of Dallas County	=	19.08	21.20	20.65	9.74	9.74	10	FALL 11 - SPR 12

Pros
- Well-thought out
- Lots of data
- Data model supports decision support

Cons
- Heavy grid lines
- Not interactive

Problems with Dashboards

- Context?
- Goal?
- Improvement?



Recommended Process

Process

1. IR Develops KPIs, Present
2. Collaborative Creation, moderated by IR

Scorecards involve value judgments – may help to have third party moderator

Political Hot Potato ->

Dr. Jeff Seybert

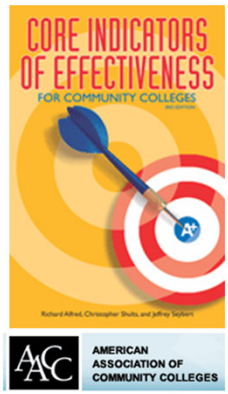
- Director of NCCBP, Extensive consulting experience
- Co-Author of Core Indicators of Effectiveness
- Resume
- Personality

Who's Involved

- Scorecard Development Team
  - Senior leadership
  - IR
  - Key constituencies (Faculty, Student Affairs, others)
  - Team solicits input from affected work groups and administrators
- Senior leadership (president's cabinet?)

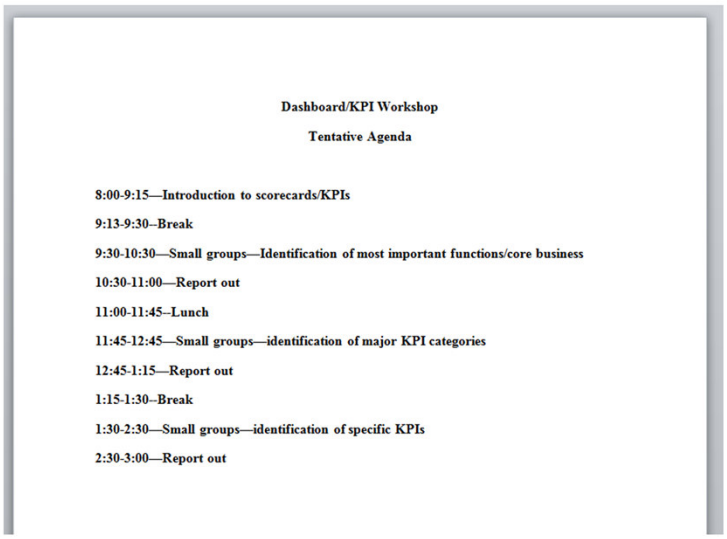
  makes final determination

Prep Work



- Review Core Indicators Book
- Watch Dashboard Webinar (Part 1)

Agenda



Dashboard/KPI Workshop

Tentative Agenda

8:00-9:15—Introduction to scorecards/KPIs

9:13-9:30--Break

9:30-10:30—Small groups—Identification of most important functions/core business

10:30-11:00—Report out

11:00-11:45--Lunch

11:45-12:45—Small groups—identification of major KPI categories

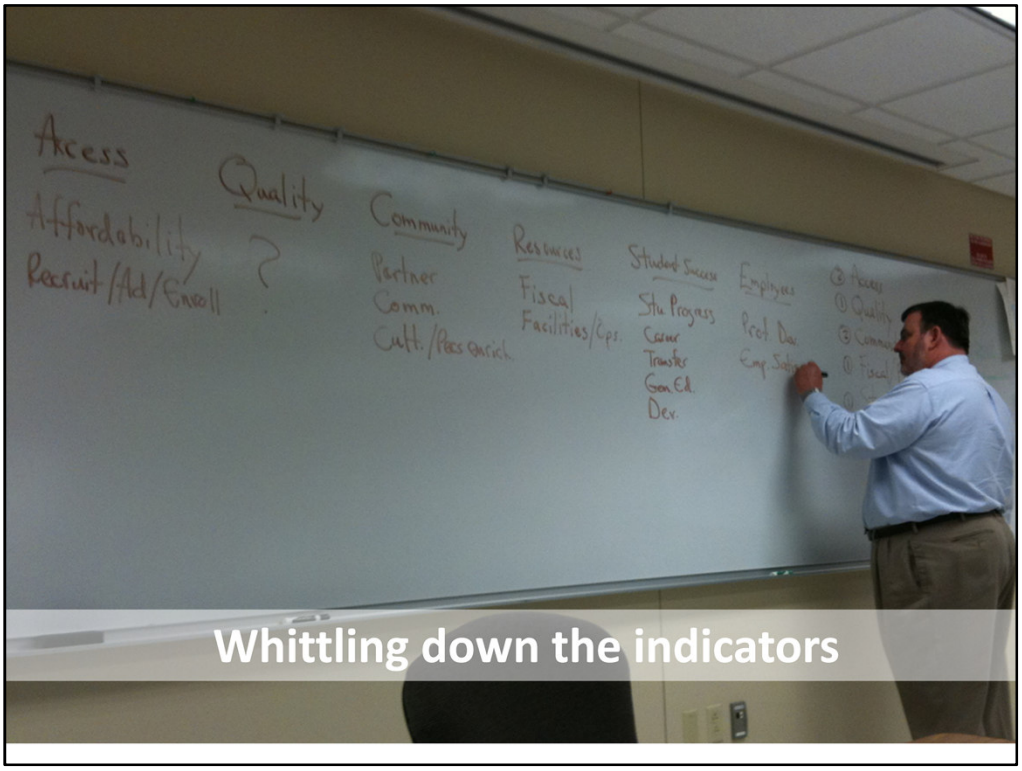
12:45-1:15—Report out

1:15-1:30--Break

1:30-2:30—Small groups—identification of specific KPIs

2:30-3:00—Report out

Group Report Out


Acess
Affordability
Recruit/Ad/Enroll
Quality
?
Community
Partner
Comm.
Cultt./Pers enrich.
Resources
Fiscal
Facilities/Eqs.
Student Success
Stu Progress
Career
Transfer
Gen Ed.
Dev.
Employees
Prof. Dev
Whittling down the indicators

Day 1 Outcome

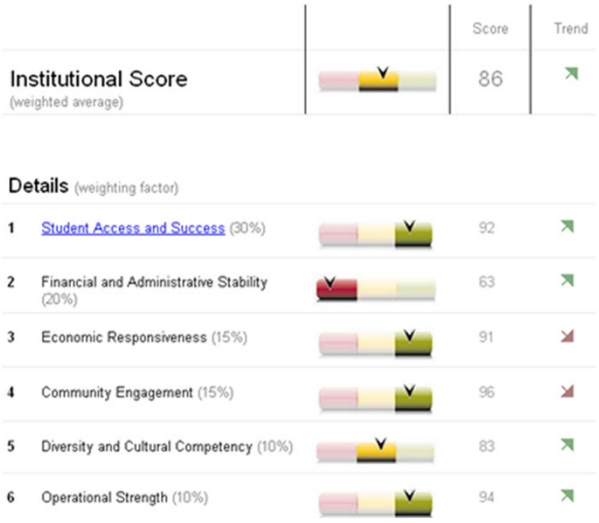
Access	Community	Employees	Student Success	Resources
• Affordability • Enrollment / recruitment / admissions	• Partnerships • Engagement • Personal & Cultural Enrichment	• Professional Development • Employee satisfaction	• Student Progress • Career Development • Transfer Prep • General Education • Developmental • Engagement? • Satisfaction?	• Fiscal • Facilities / operations • Human Resources

Next Steps

ID	Name	Weight	IsHigherBetter?	Goal	Units	2007	2008	2009	2010
1	**Access**								
1.1	Tuition and Fees per Credit Hour (indistrict)	17%	yes	$56.00	$	43	45	45	46
1.2	% of non-white students	17%	yes	34.2%	%	24.2%	23.7%	25.3%	31.2%
1.3	Enrollment	17%	yes	9800	#	7444	8108	9156	9462
1.4	% High School Graduates Enrolling at Institution	17%	yes	21.26%	%	13.41%	13.19%		
1.5	Credit Student Penetration Rate	17%	yes	3.12%	%		1.73%	1.74%	1.84%
1.6	CCSSE Active and Collaborative Learning	17%	yes	49.5	#			42.1	42.6
2	**Student Achievment**								
2.1	CCSSSE Student Effort	25%	yes	49.9	#			44.1	45.3
2.2	Withdrawal within Term	25%	no	10.10%	%		19.18%	17.23%	14.98%
2.3	% Completed in Three Years								
2.3.1	Full-time, First-time in Fall	13%	yes	18.24%	%		8.79	7.62%	8.30%
2.3.2	Part-time, First-time in Fall	13%	yes	5.42%	%		3.12		2.95%
2.4	Fall to Fall Retention Rate	25%	yes	49.73%	%		33.27%	41.60%	44.13%
3	**Resources**								
3.1	Average Credit Section Size	50%	no	18.91	#		25.42	20.75	22.64
3.2	% of classes killed	50%	no	9.5	%	19.7%	9.8%	12.5%	11.9%
4	**Employee Achievment**								
4.1	CCSSE Employee Engagement								
4.1.1	CCSSE Academic Challenge	20%	Yes	49.7	#			44.4	44.6
4.1.2	CCSSE Student-Faculty Interaction	20%	Yes	50.8	#			42.5	44.7
4.1.3	CCSSE Support for Learners	20%	yes	49.5	#			44.9	45.4
4.2	Retirements and Departures								
4.2.1	Retirements Rate	20%	Yes	1.68%	%		2.87%	1.11%	1.15%
4.2.2	Departures Rate	20%	no	4.77%	%		7.38%	9.26%	9.58%
5	**College Readiness**								
5.1	Credit Developmental/ Remedial Student Retention and Success in First College-level Courses								
5.1.1	Math Enrollee Success Rate	25%	yes	66.67%	%		40.44%	37.88%	30.28%
5.1.2	Writing Enrollee Success Rate	25%	yes	71.17%	%		62.75%	63.16%	55.81%
5.1.3	Math Completer Success Rate	25%	yes	78.48%	%		63.95%	61.98%	49.43%
5.1.4	Writing Completer Success Rate	25%	yes	80.60%	%		84.21%	88.89%	64.86%

After coming up with the initial indicators, colleges develop the second level (the example above is from a different college than Day 1)

ZT Scorecard: Iteration 1

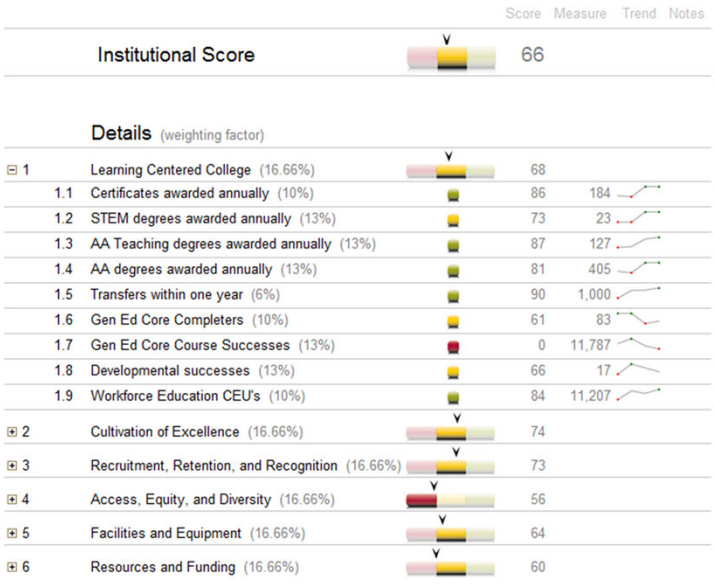


		Score	Trend
Institutional Score (weighted average)		86	
Details (weighting factor)			
1 Student Access and Success (30%)		92	
2 Financial and Administrative Stability (20%)		63	
3 Economic Responsiveness (15%)		91	
4 Community Engagement (15%)		96	
5 Diversity and Cultural Competency (10%)		83	
6 Operational Strength (10%)		94	

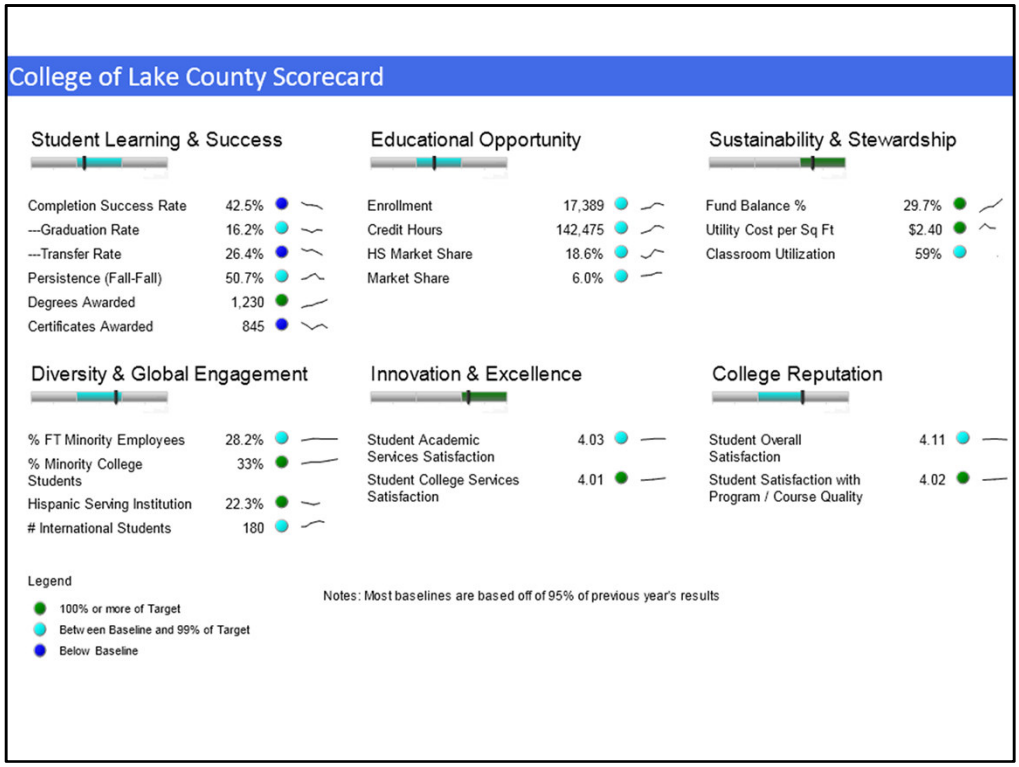
Above: Dashboard based on work done by AACC, Richland College, and others

Trend arrows are ambiguous. What time period?

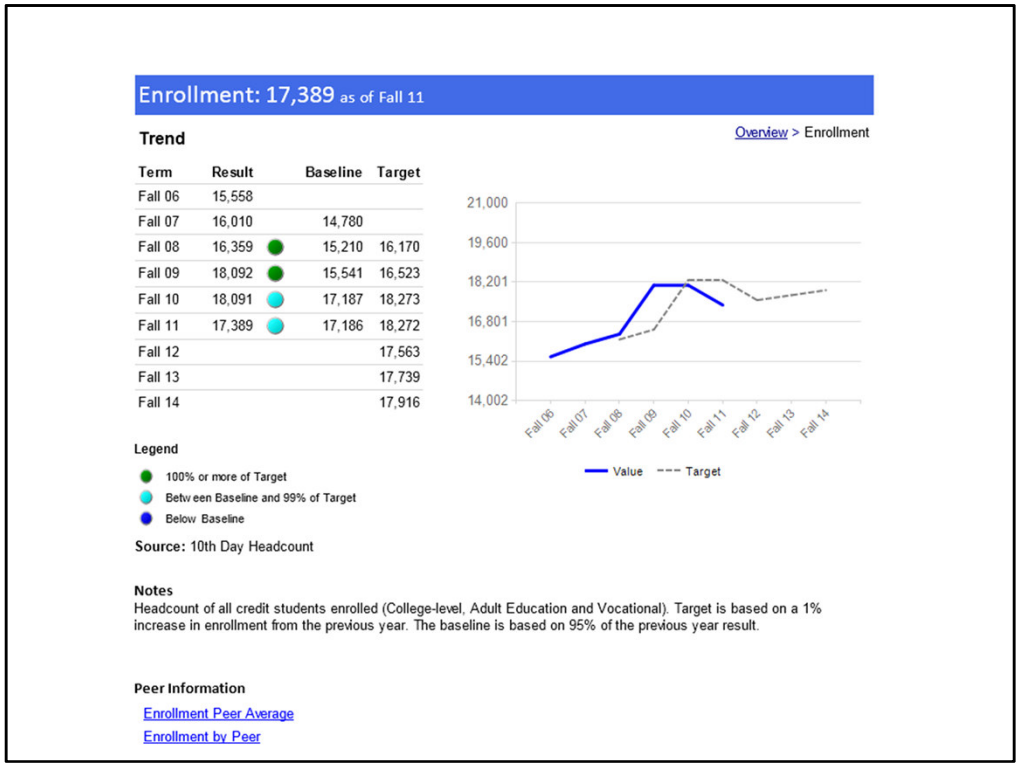
ZT Scorecard: Iteration 2



			Score	Measure	Trend	Notes
		Institutional Score	66			
		Details (weighting factor)				
⊟ 1		Learning Centered College (16.66%)	68			
	1.1	Certificates awarded annually (10%)	86	184		
	1.2	STEM degrees awarded annually (13%)	73	23		
	1.3	AA Teaching degrees awarded annually (13%)	87	127		
	1.4	AA degrees awarded annually (13%)	81	405		
	1.5	Transfers within one year (6%)	90	1,000		
	1.6	Gen Ed Core Completers (10%)	61	83		
	1.7	Gen Ed Core Course Successes (13%)	0	11,787		
	1.8	Developmental successes (13%)	66	17		
	1.9	Workforce Education CEU's (10%)	84	11,207		
⊞ 2		Cultivation of Excellence (16.66%)	74			
⊞ 3		Recruitment, Retention, and Recognition (16.66%)	73			
⊞ 4		Access, Equity, and Diversity (16.66%)	56			
⊞ 5		Facilities and Equipment (16.66%)	64			
⊞ 6		Resources and Funding (16.66%)	60			



College of Lake County did not want to use red for problem areas because it was political



Enrollment: 17,389 as of Fall 11

Overview > Enrollment

Trend

Term	Result	Baseline	Target
Fall 06	15,558		
Fall 07	16,010	14,780	
Fall 08	16,359	15,210	16,170
Fall 09	18,092	15,541	16,523
Fall 10	18,091	17,187	18,273
Fall 11	17,389	17,186	18,272
Fall 12			17,563
Fall 13			17,739
Fall 14			17,916

Legend

- 100% or more of Target
- Between Baseline and 99% of Target
- Below Baseline

Source: 10th Day Headcount

Notes

Headcount of all credit students enrolled (College-level, Adult Education and Vocational). Target is based on a 1% increase in enrollment from the previous year. The baseline is based on 95% of the previous year result.

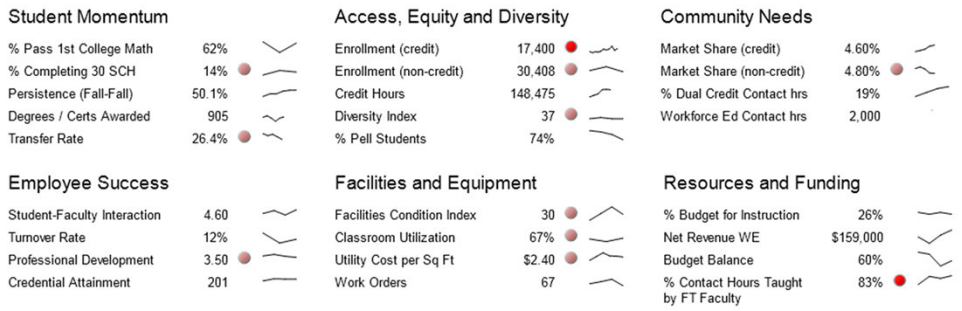
Peer Information

Enrollment Peer Average

Enrollment by Peer

Detail view

Scorecard: Another Configuration



Scorecard Best Practices

- Process critical
- Research other institutions
- Value judgments
- Layer complexity / Interactive drill-down
- Data model complex (DW)
- Use best practices in visualization (Tableau)

What if you were driving and instead of this, we saw this <click>

Thanks!

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The Best Dashboard Ever?

http://www.coconino.edu/research/Pages/CollegeDashboard.aspx

This dashboard is clearly tongue-in-cheek (clicking on some of the links shows well-thought-out metrics). If people are asking for dashboards but the reason is just to say "we have a dashboard" and the dashboard will never be used to improve the institution, have some fun with it.