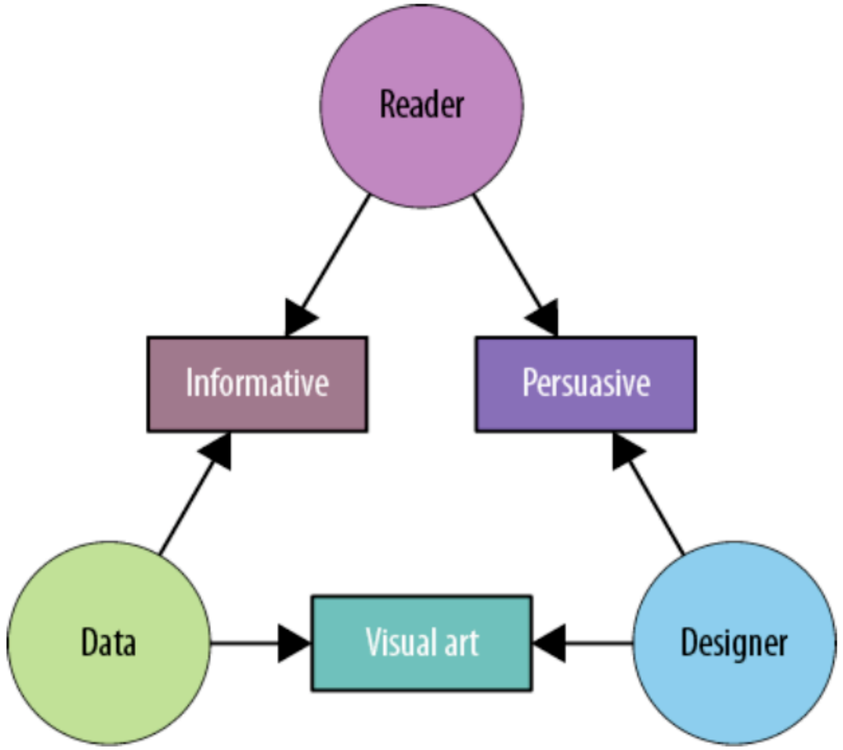
DR. ANDRÁS RUNG
Ergománia
Owner-CEO

BIG DATA VISUALISATION

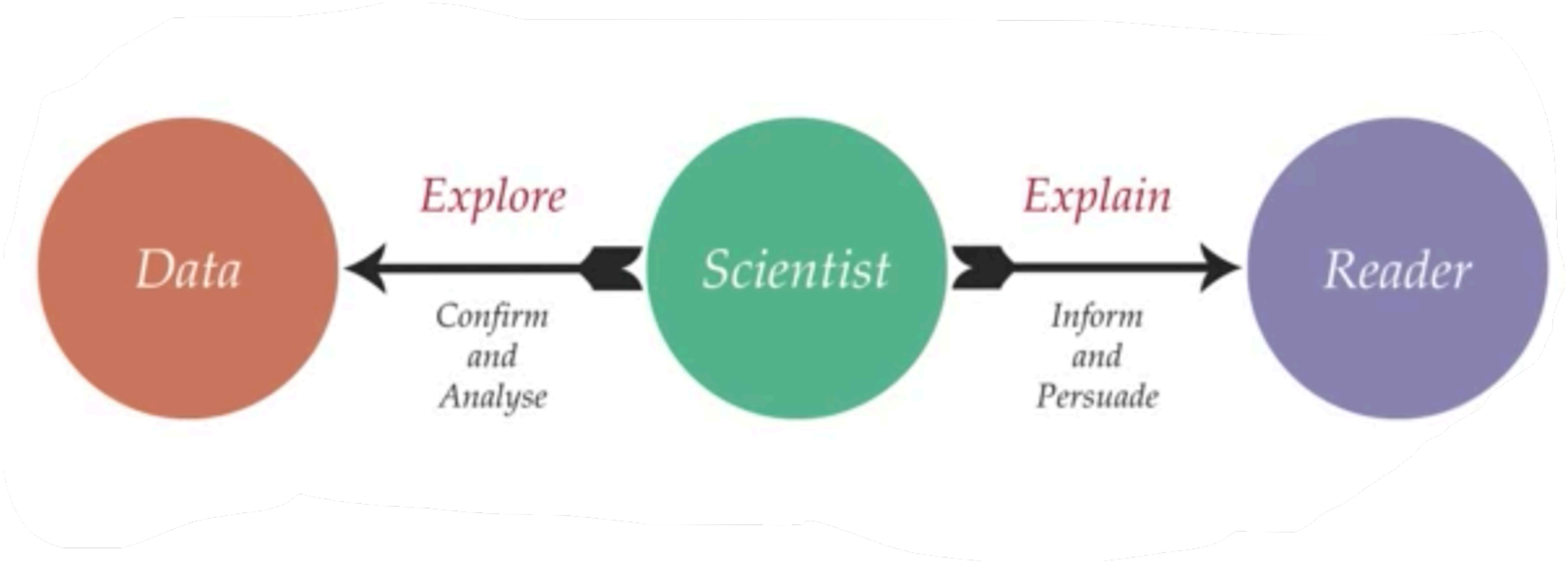
ERGOMANIA

Hungary’s first UX agency
15 years of experience

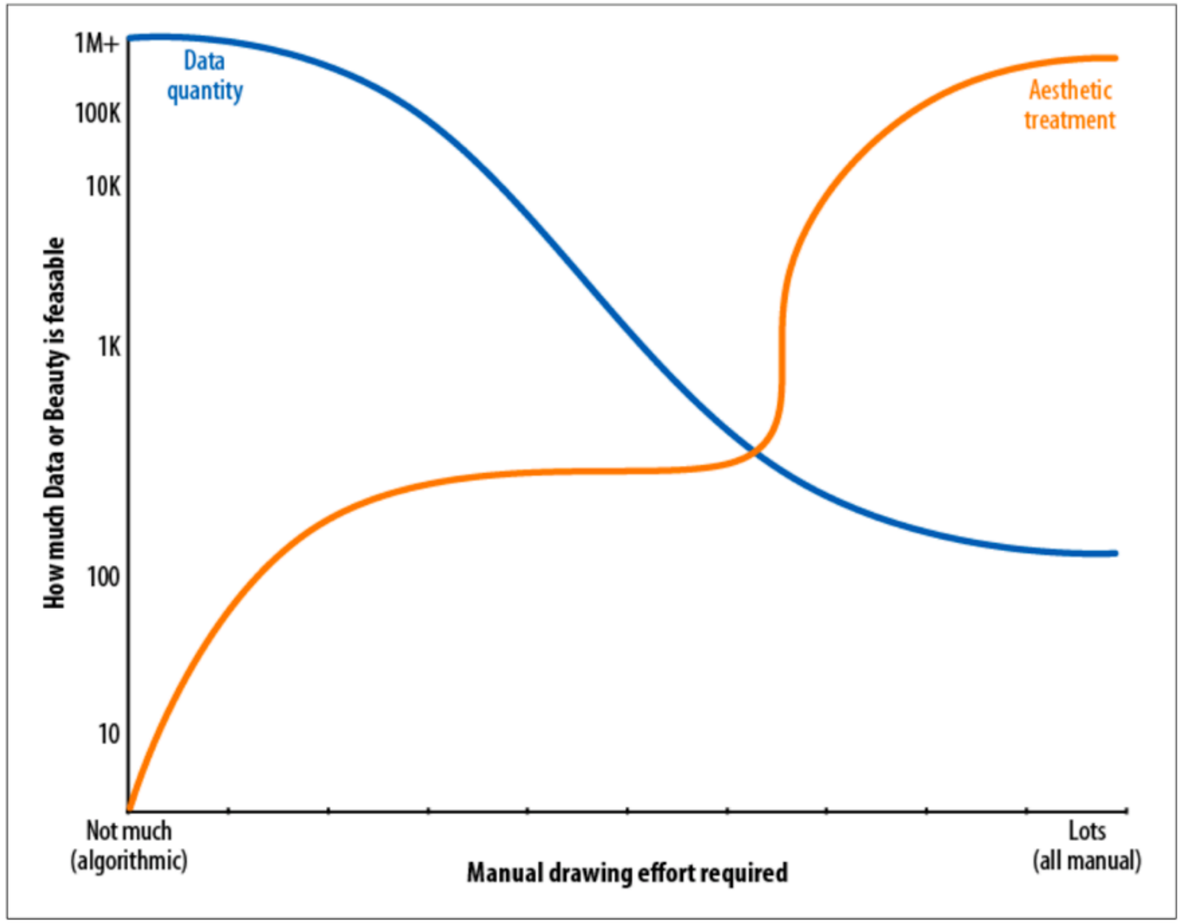
THE DESIGNER-READER-DATA TRINITY



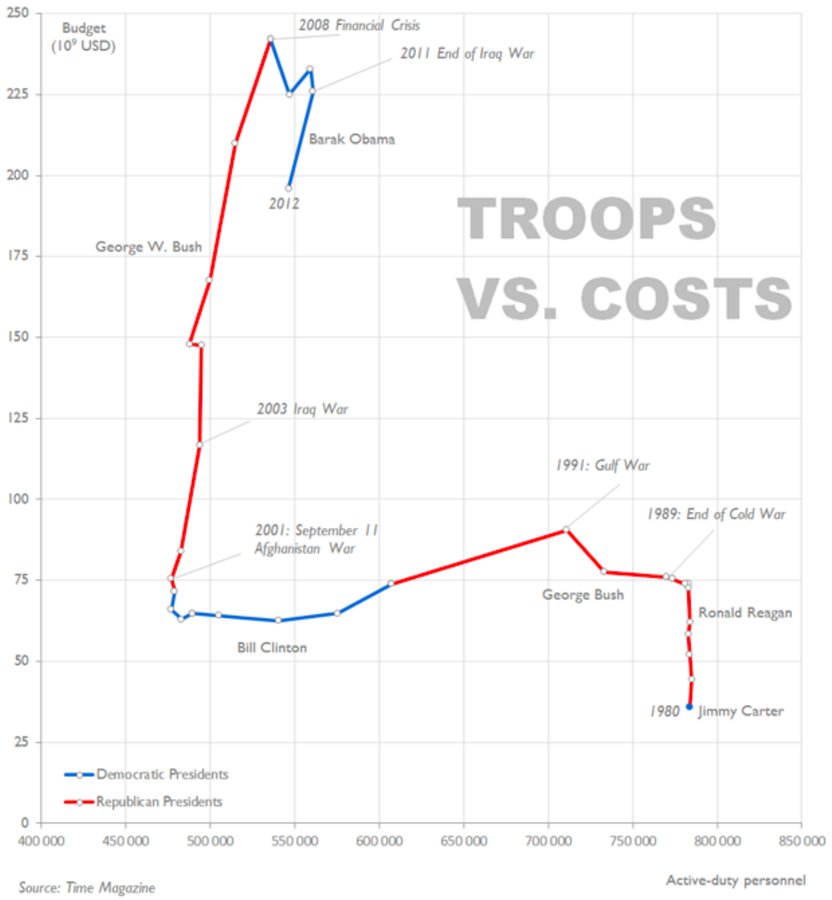
EXPOLARTORY VS EXPLANATORY

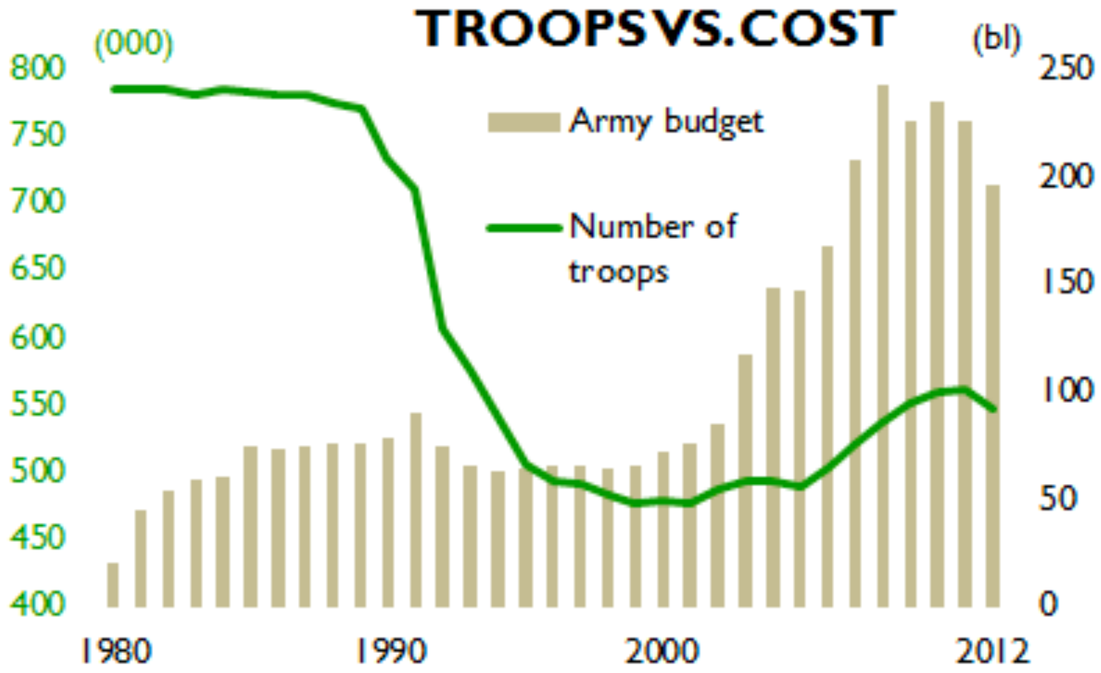


INFOGRAPHIC VS DATA VISUALIZATION



SPARE THE BRAINPOWER



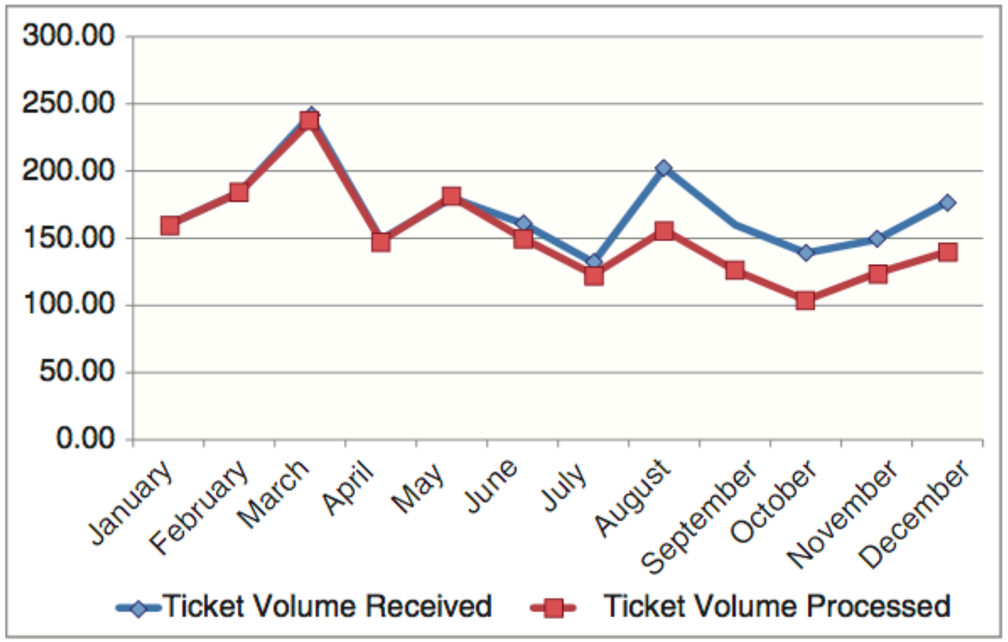


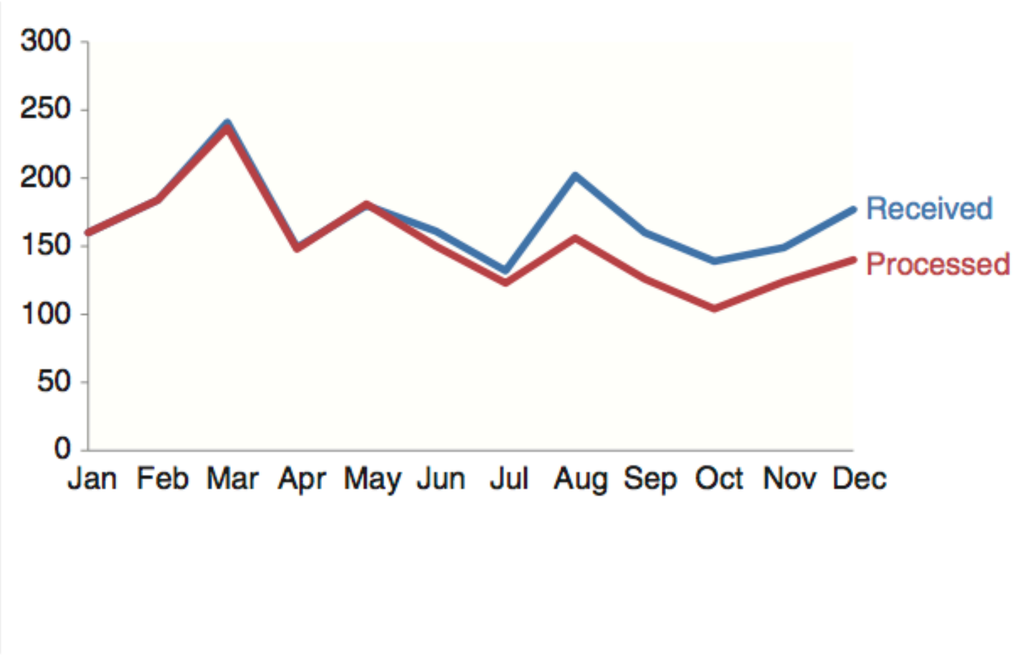
ERGOMANIA.EU

SUMMARIZE INFORMATION

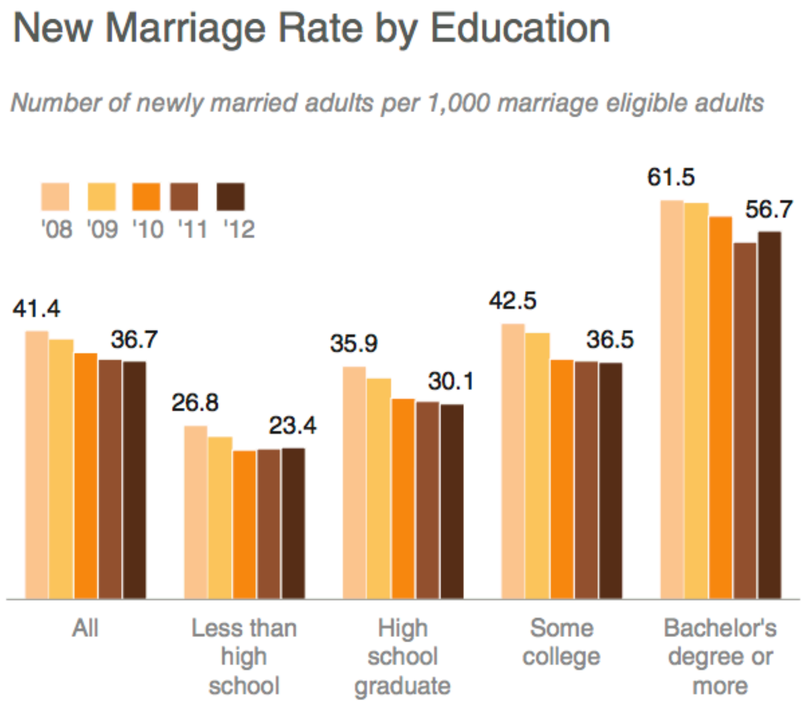
BREAKING CONVENTIONS

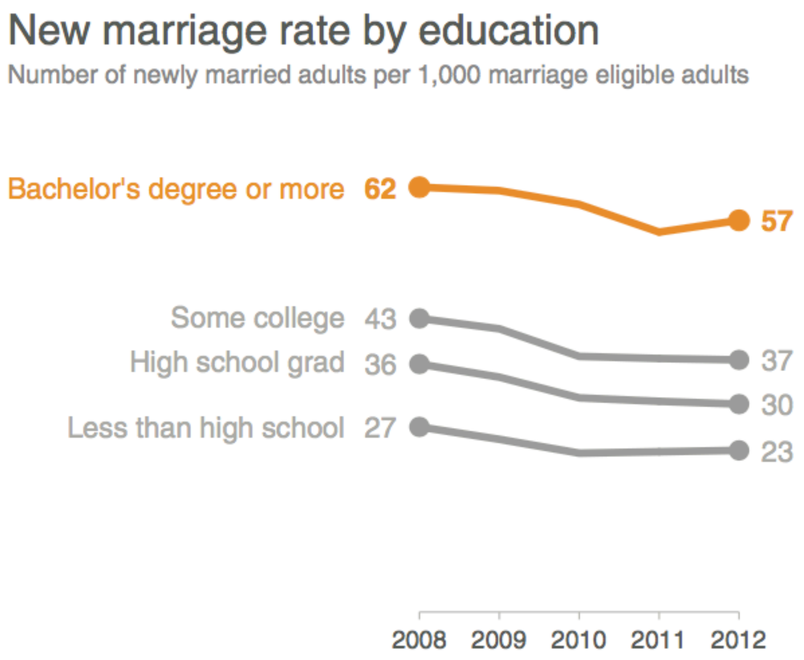
CLEAN IT UP


300.00
250.00
200.00
150.00
100.00
50.00
0.00
January
February
March
April
May
June
July
August
September
October
November
December
Ticket Volume Received
Ticket Volume Processed


300
250
200
150
100
50
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Received
Processed

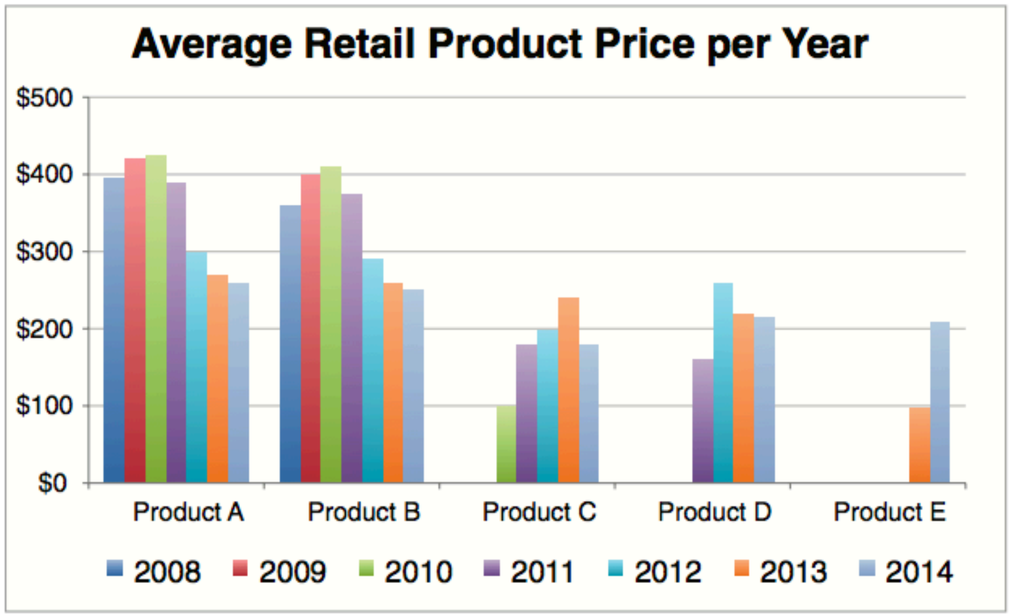
SELECT THE APPROPRIATE TOOL



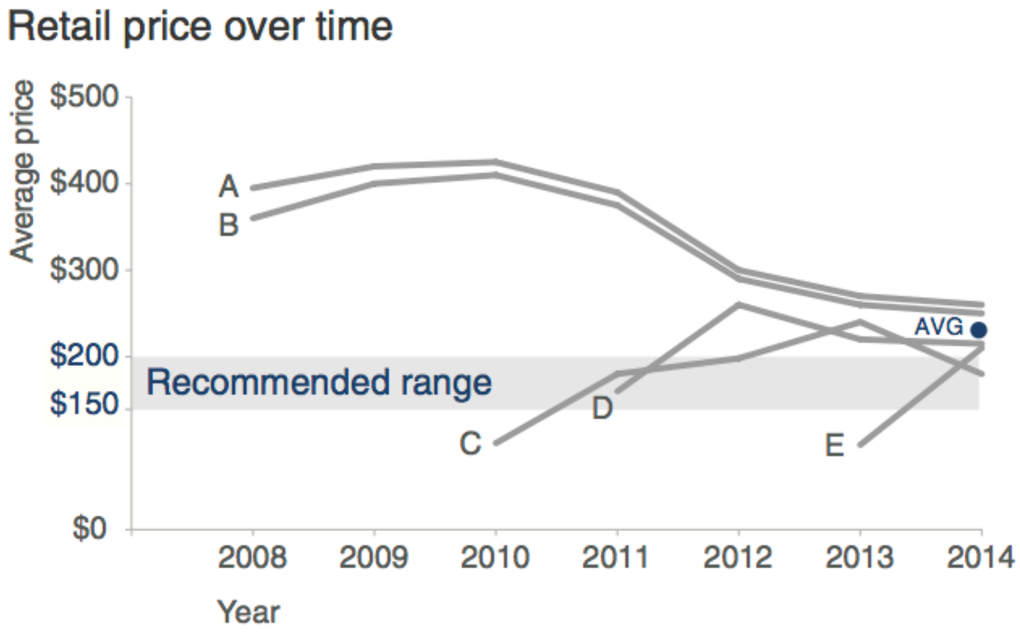


SUPPORT DECISIONS BETTER

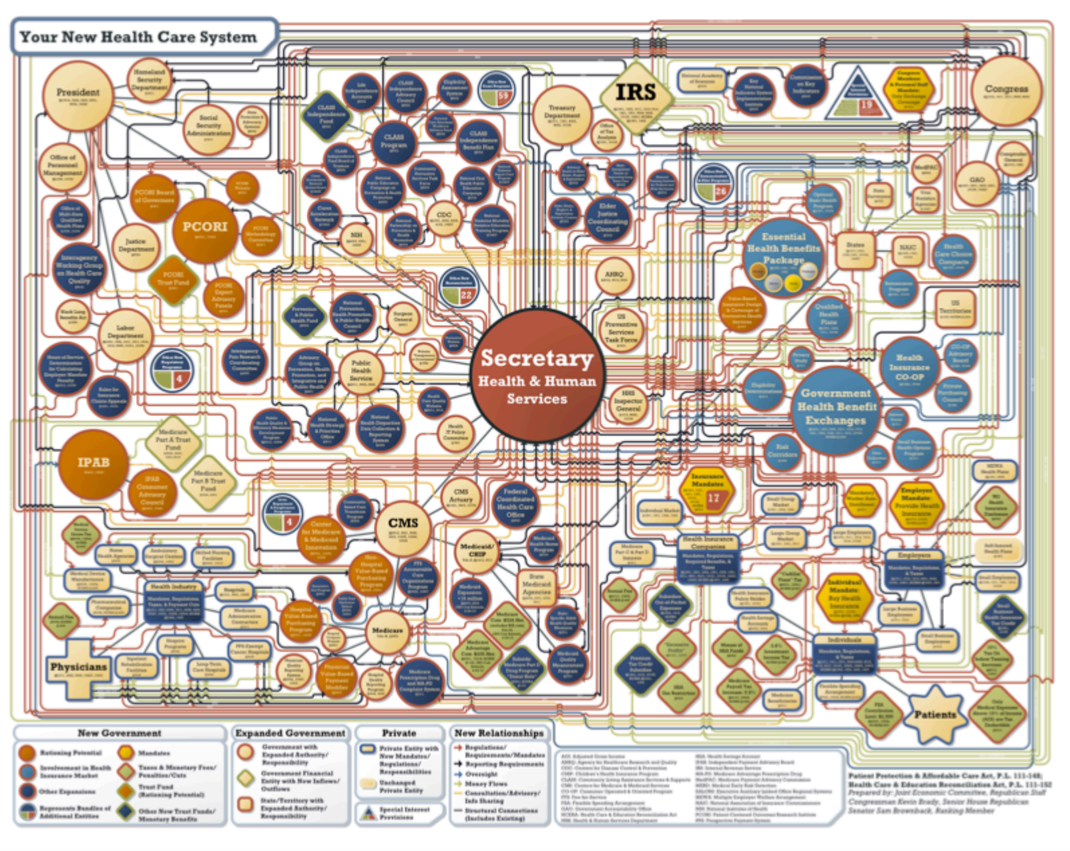
Price has declined for all products on the market since the launch of Product C in 2010

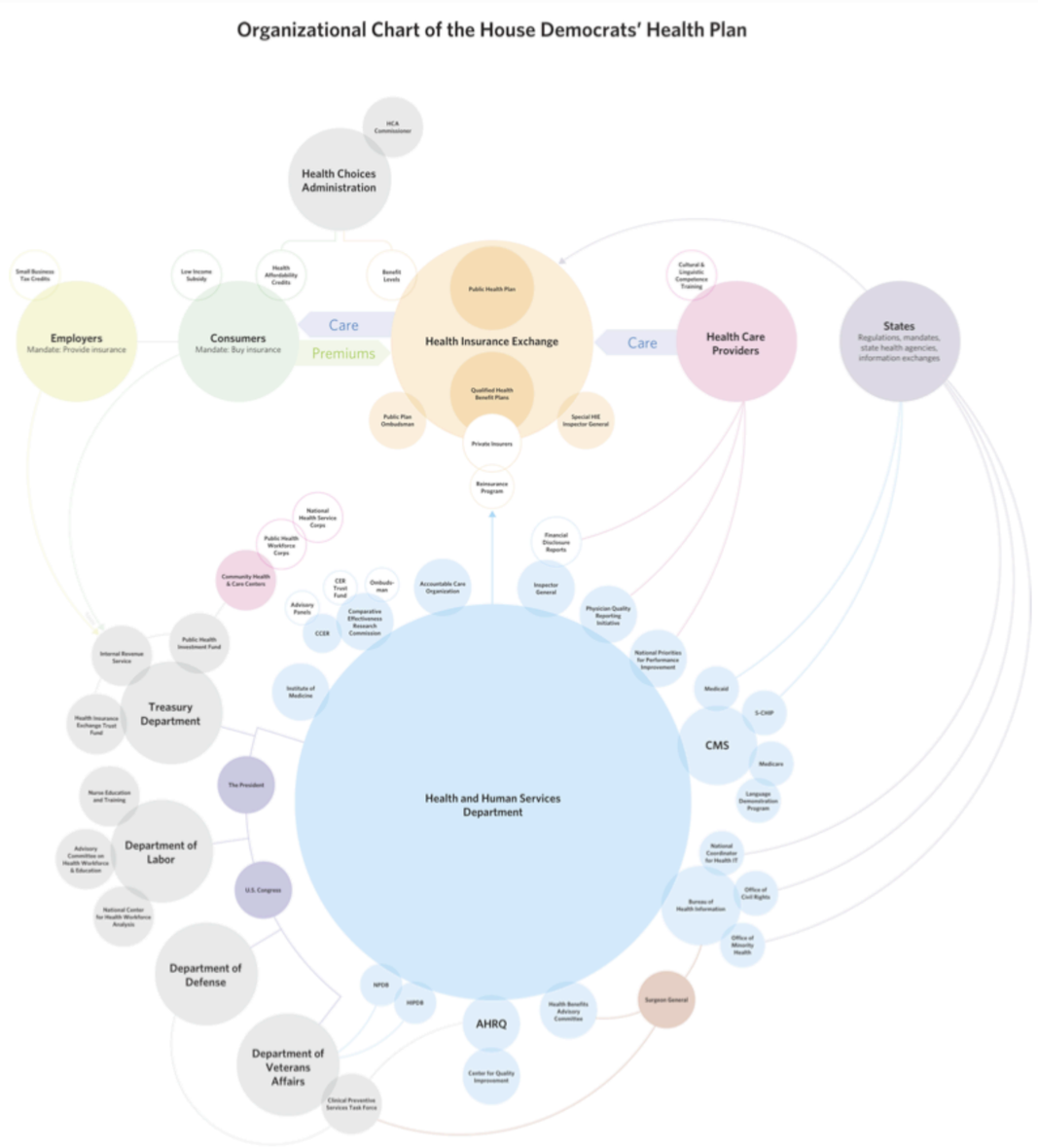


To be competitive, we recommend introducing our product *below the $223 average* price point in the **$150–$200 range**



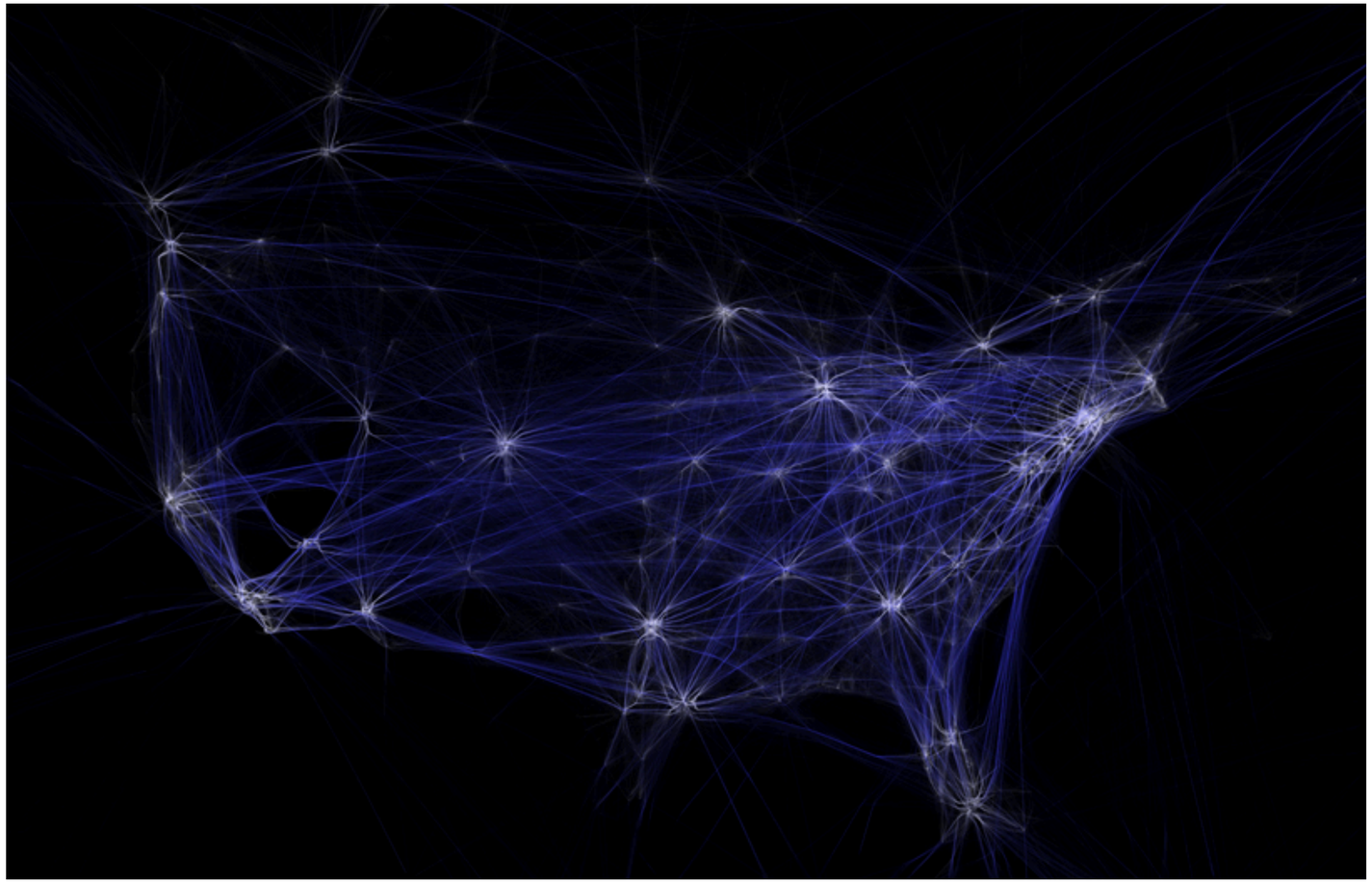
KEEP IT SIMPLE





ERGOMANIA.EU

MINIMIZE NOISE



DEFINE YOUR AUDIENCE

- What do colours mean?
- Which direction the reader used to reading?
- Which icons is the user familiar with?
- Readers are inside or outside industry?

CONTEXT OF USE

- What information do readers need in order to be successful?
- How much detail do they need?
- How long does she have to make it effective?

UNDERSTANDING THE DATA STRUCTURE

- Is it a time-series? A hierarchy?
- How many dimensions does it have?
- Which are the most important ones?
- What sort of relationships do they have (e.g., one-to-one or many-to-many)?
- How variable are they?
- Are the values categorical? Discrete or continuous? Linear or non-linear? How are they bounded?
- How many categories are there?

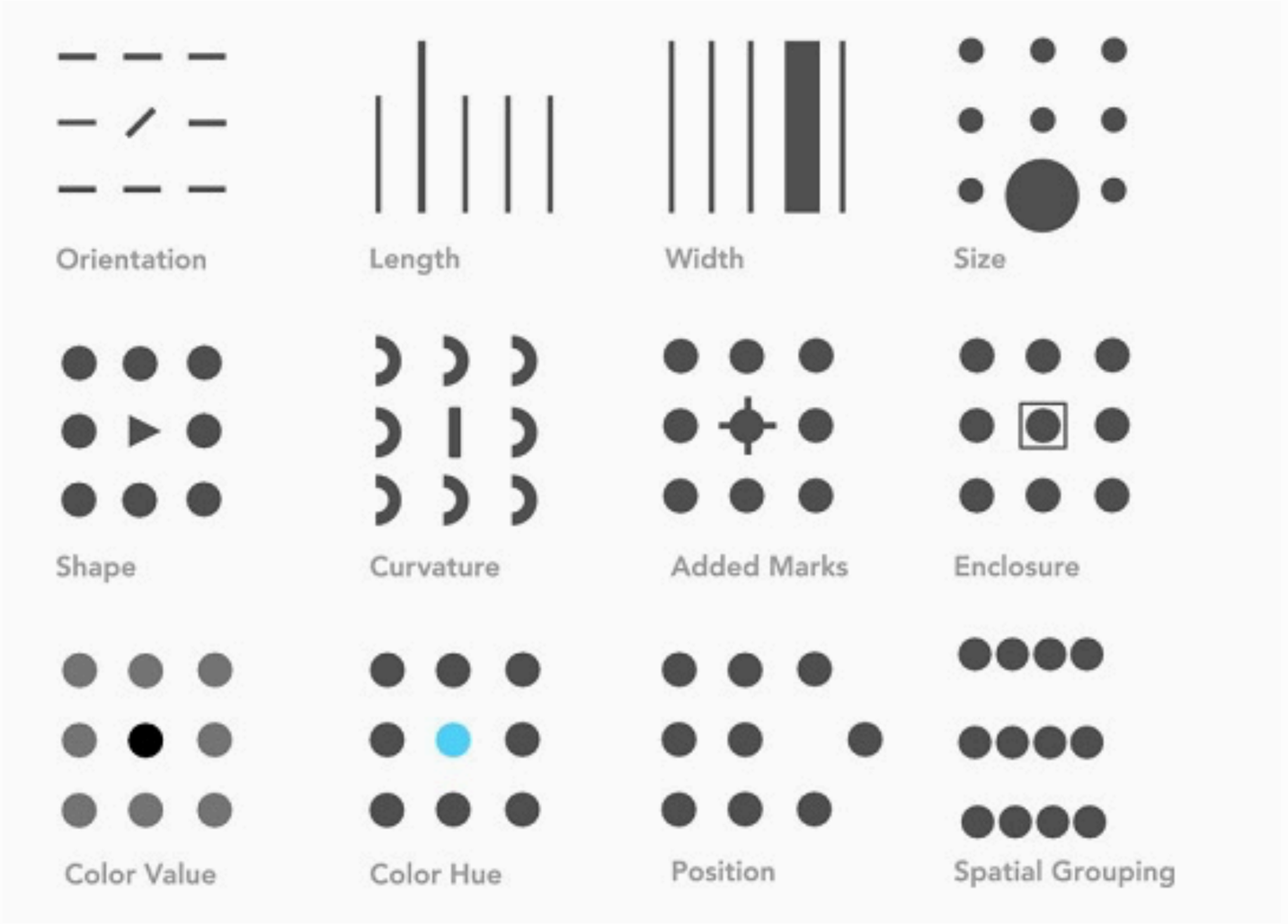
DATA TYPES

- Nominal
- Categorical
- Ordinal
- Interval
- Temporal
- Geographical
- Relational

DEFINE BETTER GOALS

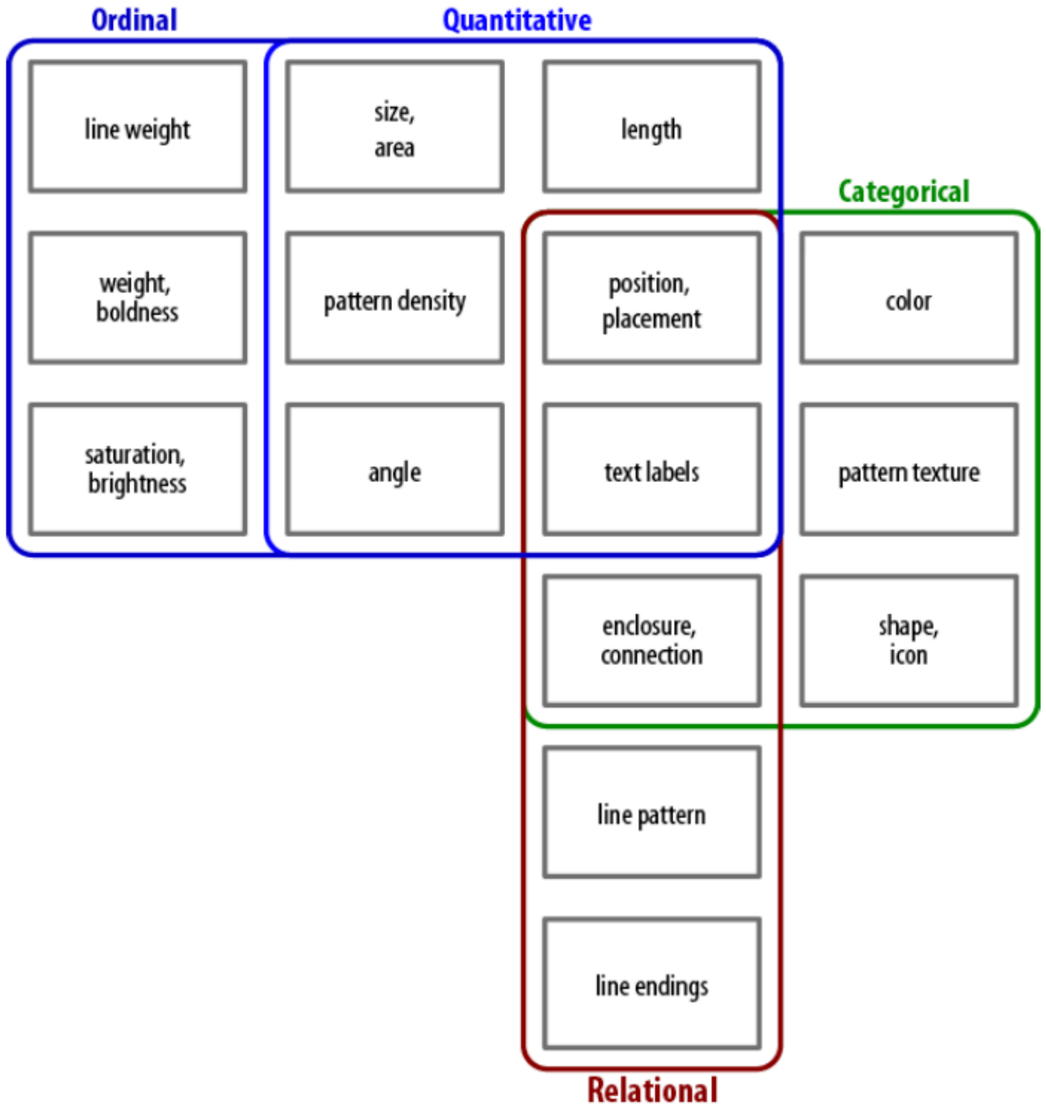
- Show the sales figures / Show which product lines are performing the best and the worst in each region, for each of the last five quarters
- Compare the demographics of Twitter and Facebook users / Compare the ages, education, and income levels of Twitter and Facebook users
- Show a timeline of the performance of every NFL team for the 2011 season / Allow users to compare individual performance metrics for any pair of teams or for the entire league for the 2011 season

PREATTENTIVE FEATURES



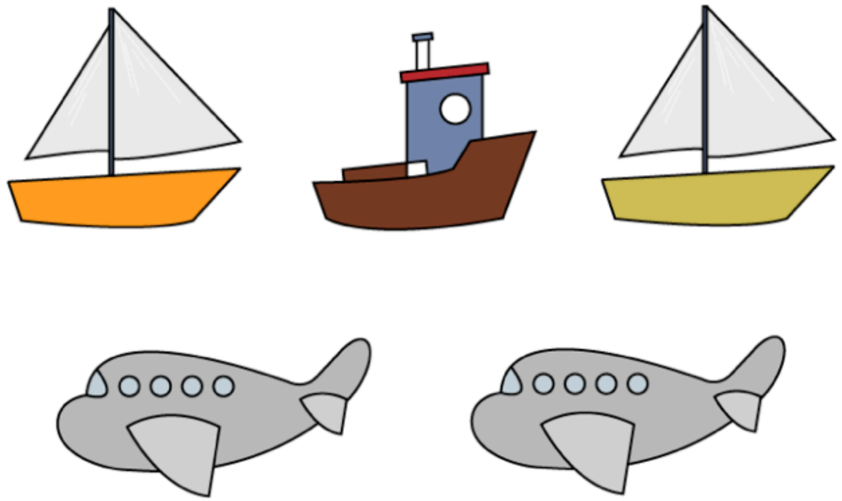
Example	Encoding	Ordered	Useful values	Quantitative	Ordinal	Categorical	Relational
	position, placement	yes	infinite	Good	Good	Good	Good
1, 2, 3; A, B, C	text labels	optional alpha or num	infinite	Good	Good	Good	Good
	length	yes	many	Good	Good		
	size, area	yes	many	Good	Good		
	angle	yes	medium	Good	Good		
	pattern density	yes	few	Good	Good		
	weight, boldness	yes	few		Good		
	saturation, brightness	yes	few		Good		
	color	no	few (<20)			Good	
	shape, icon	no	medium			Good	
	pattern texture	no	medium			Good	
	enclosure, connection	no	infinite			Good	Good
	line pattern	no	few				Good
	line endings	no	few				Good
	line weight	yes	few		Good		

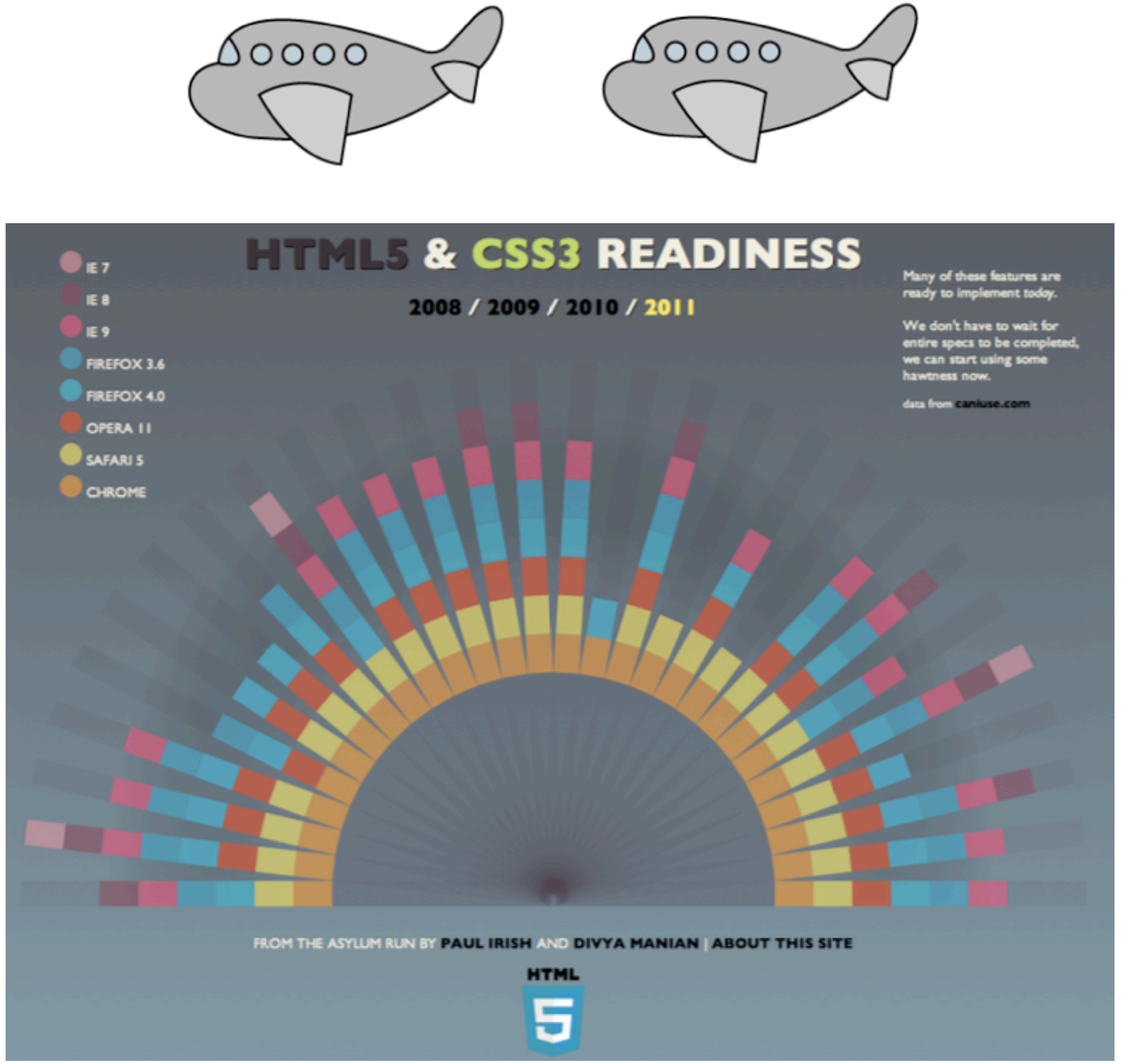
VISUAL PROPERTIES BY TYPES OF DATA



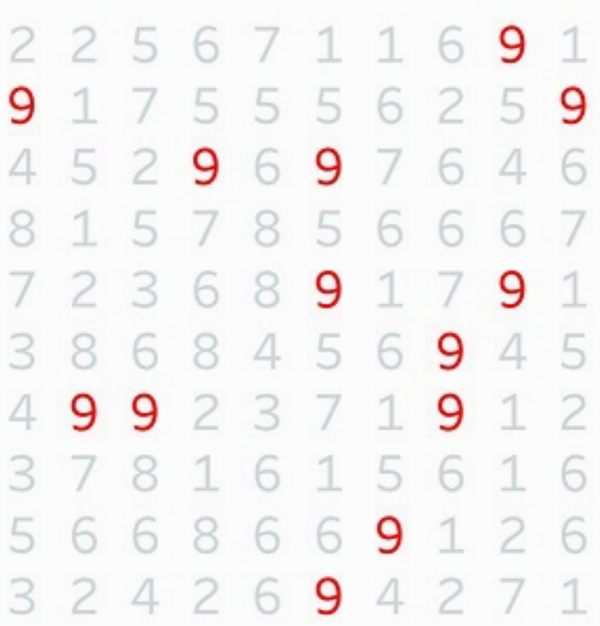
REPRESENATION AND REALITY

- Inherent properties
- Learned conventions

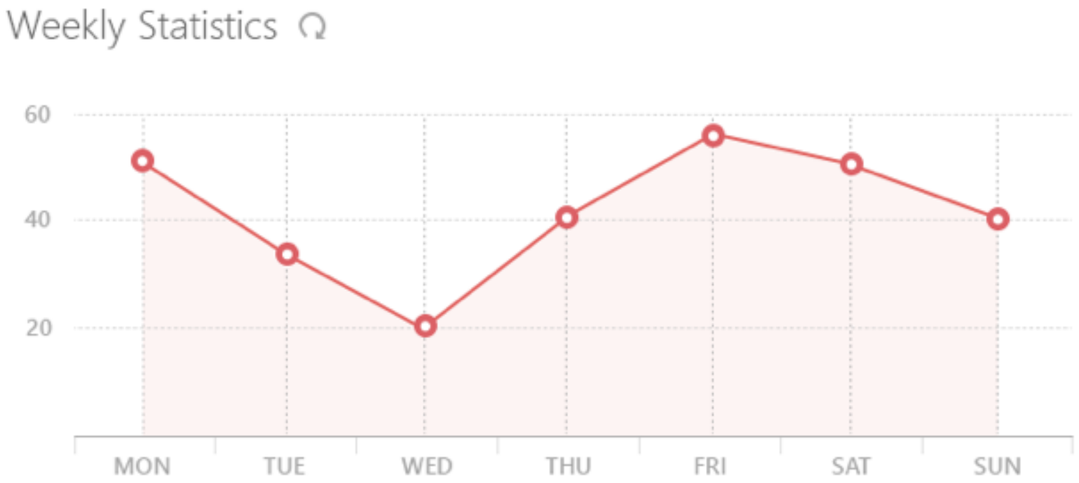


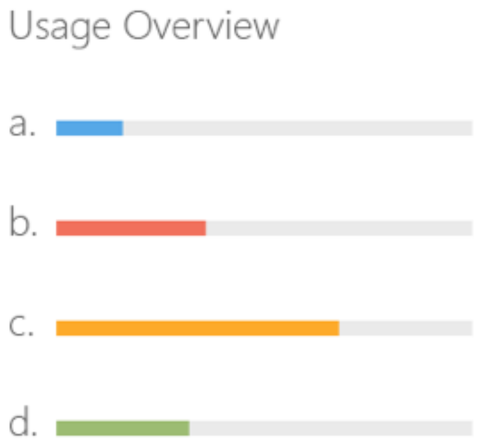


MULTIPLE WAYS TO HIGHLIGHT

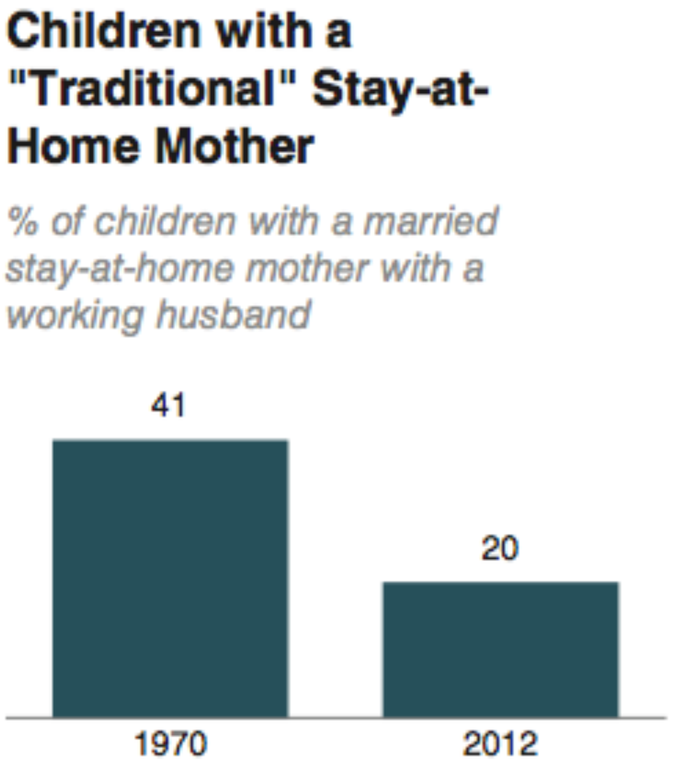


QUANTITATIVE REPRESENTATION BY LENGTH AND POSITION





GRAPH IS NOT OBLIGATORY

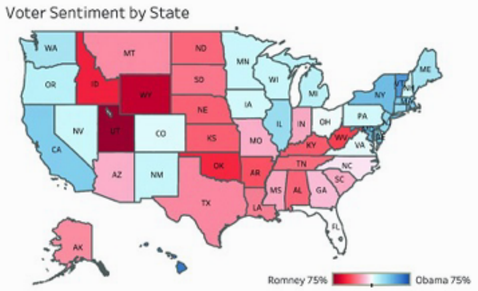


20%

of children had a
traditional stay-at-home mom
in 2012, compared to 41% in 1970

USE OF COLOUR IN DATA VISUALISATION

1	Red
2	Green
3	Yellow
4	Blue
5	Black
6	White
7	Pink
8	Cyan
9	Gray
10	Orange
11	Brown
12	Purple



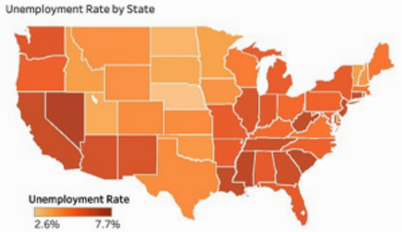
SEQUENTIAL
color is ordered from low to high

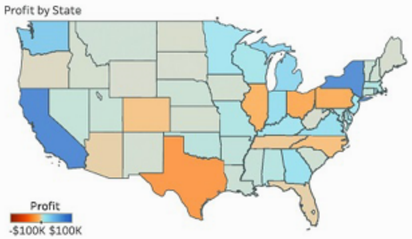
DIVERGING
two sequential colors with a neutral midpoint

CATEGORICAL
contrasting colors for individual comparison

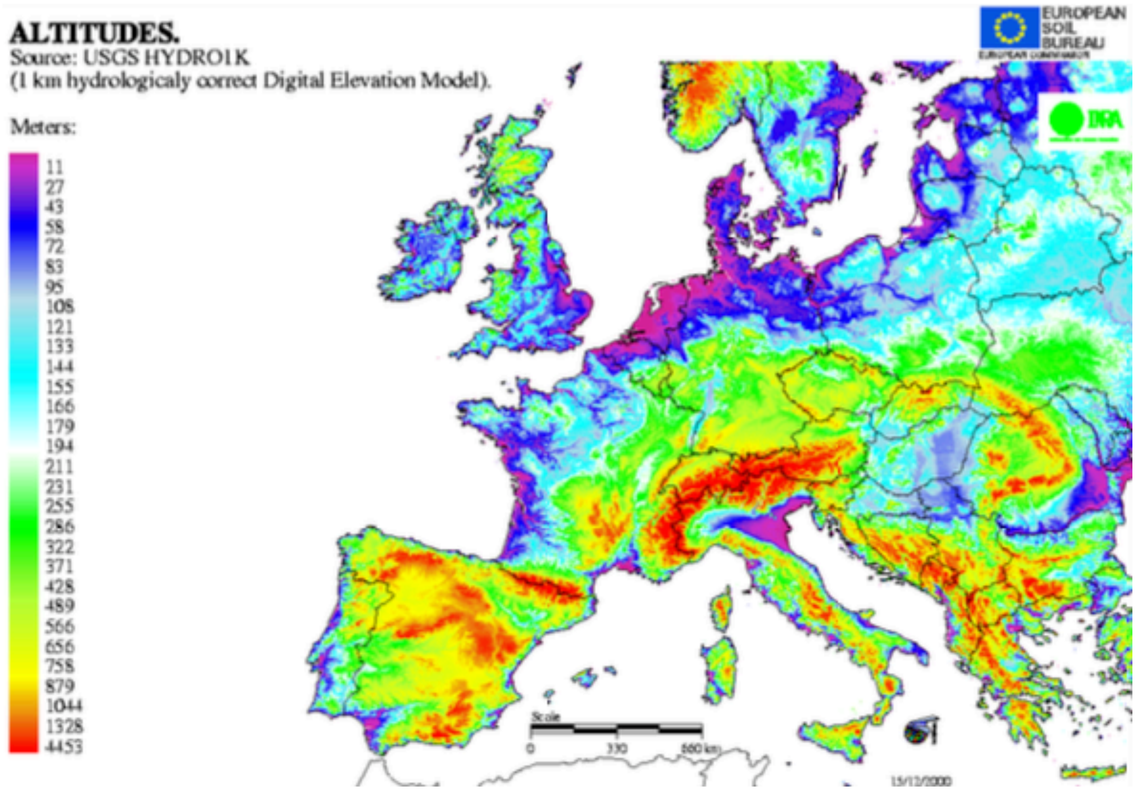
HIGHLIGHT
color used to highlight something

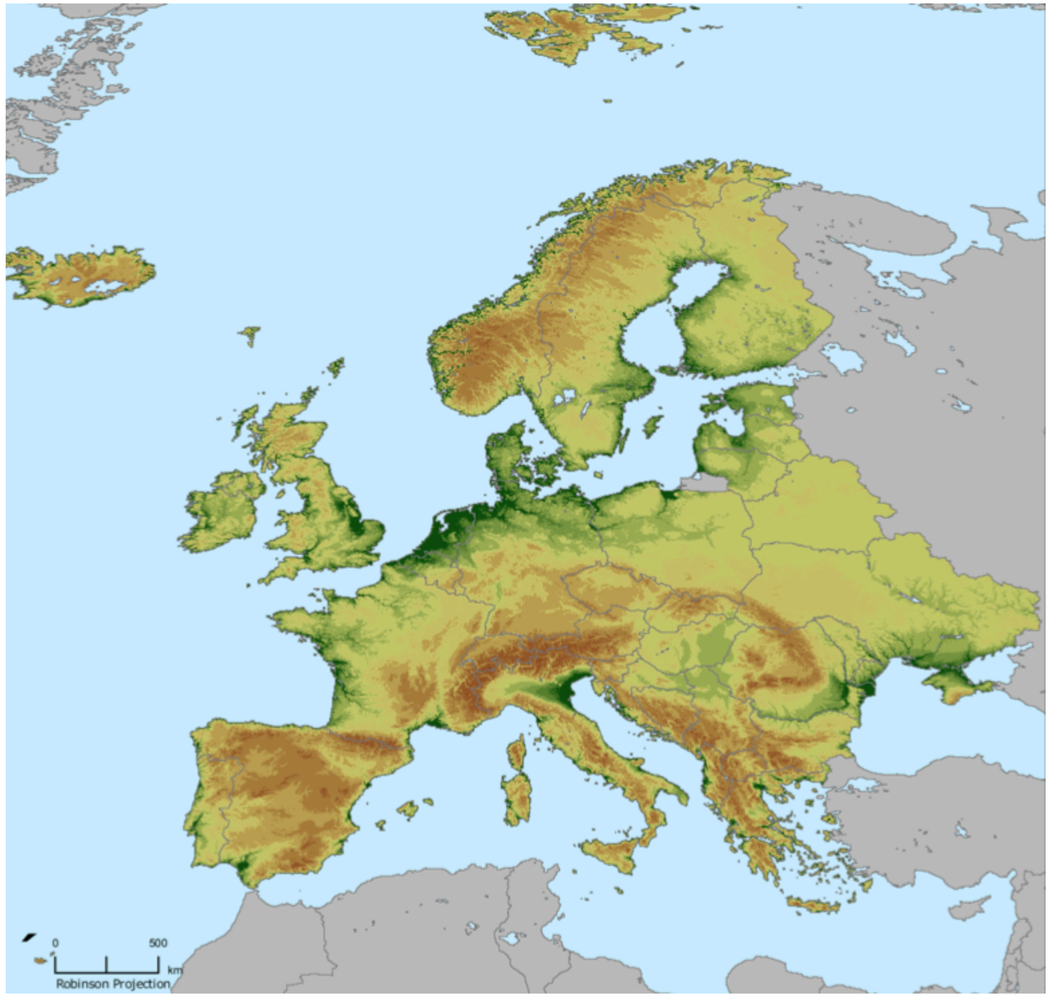
ALERT
color used to alert or warn reader





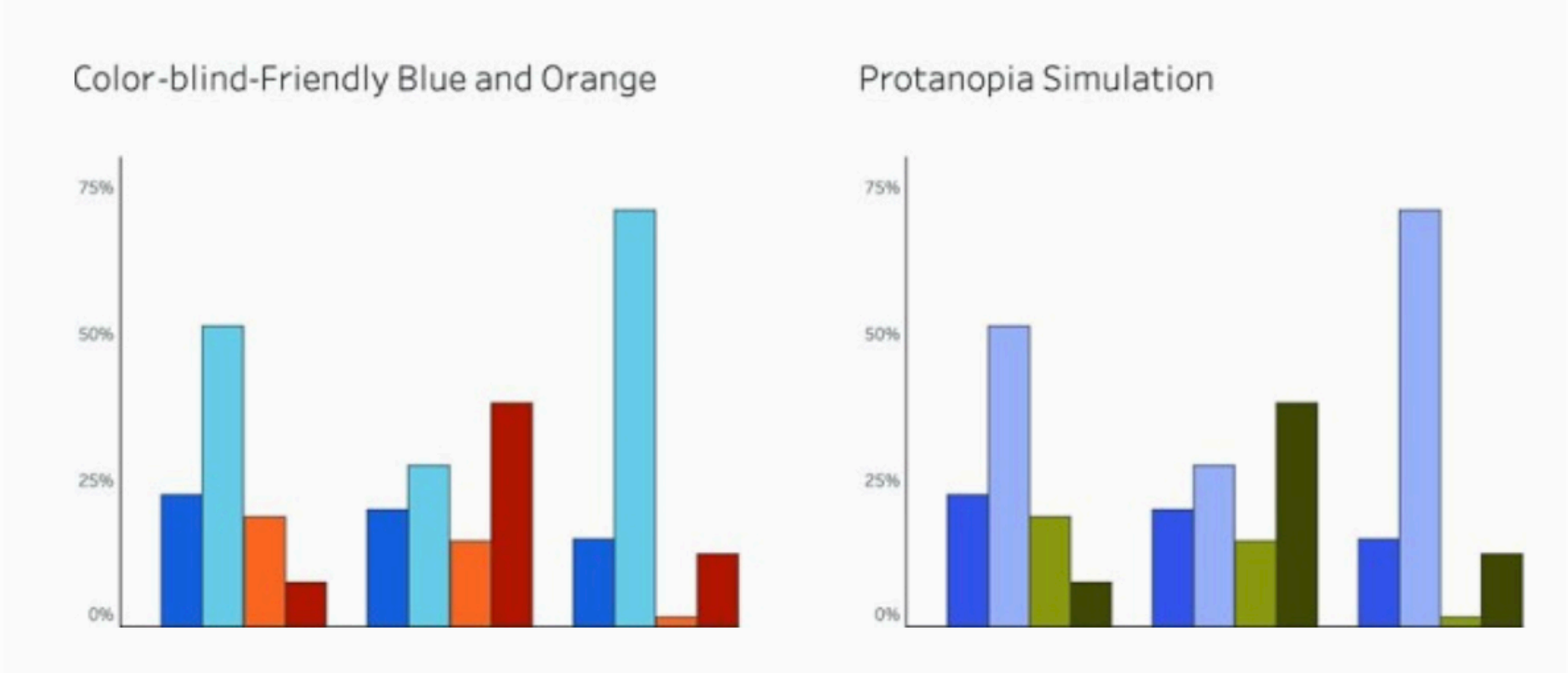
COLOR IS NOT ORDERED



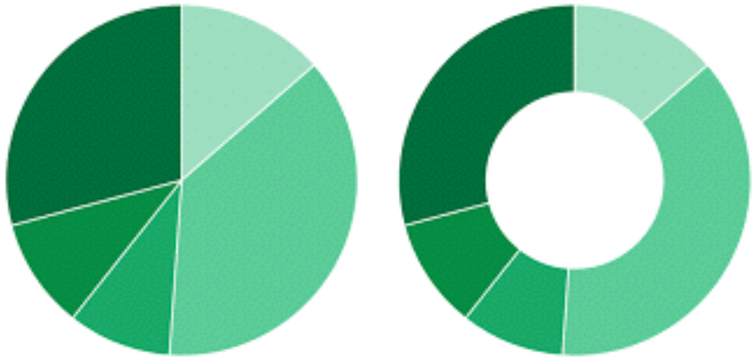


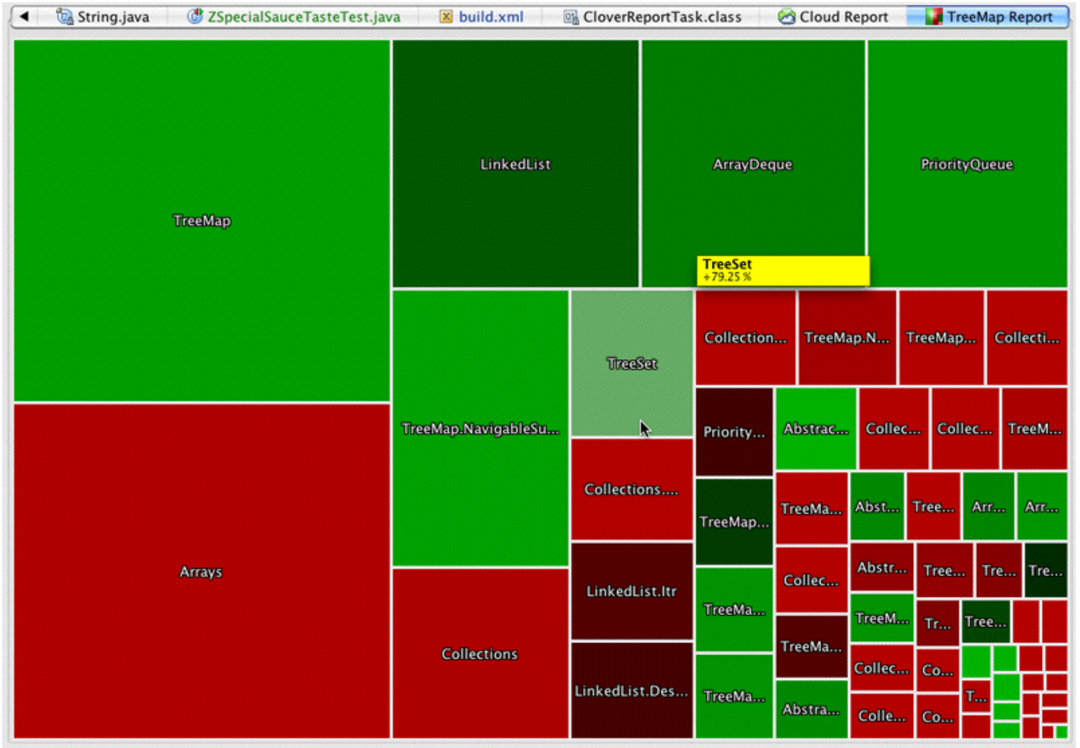
ERGOMANIA.EU

HIGHLIGHTS FOR COLOUR-BLIND PEOPLE

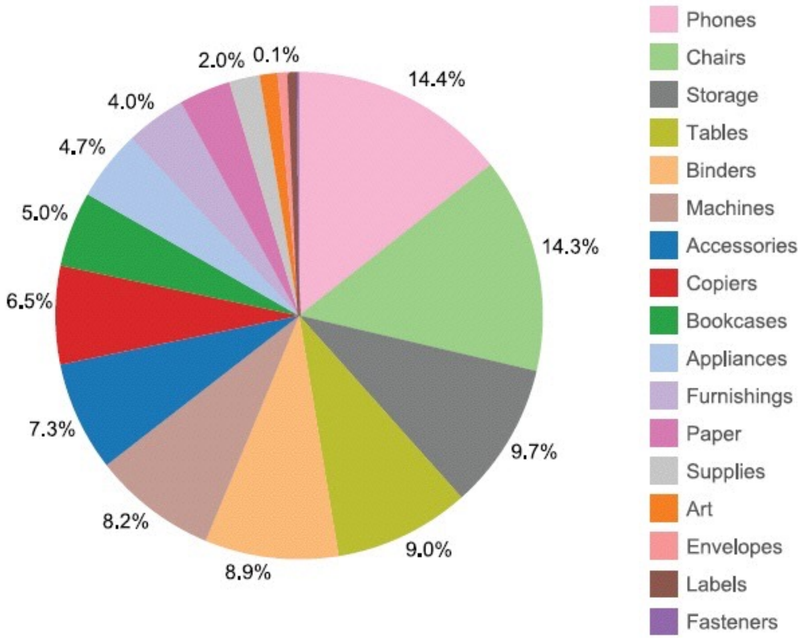


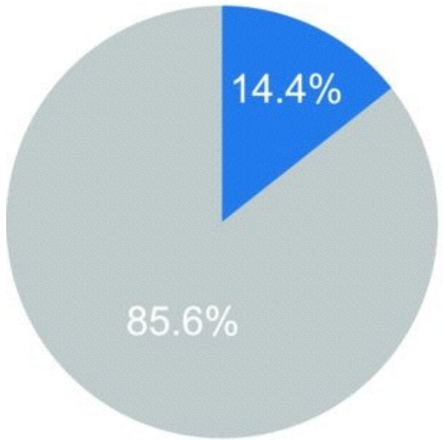
PIE, DONUT AND TREEMAP FOR HIGH LEVEL

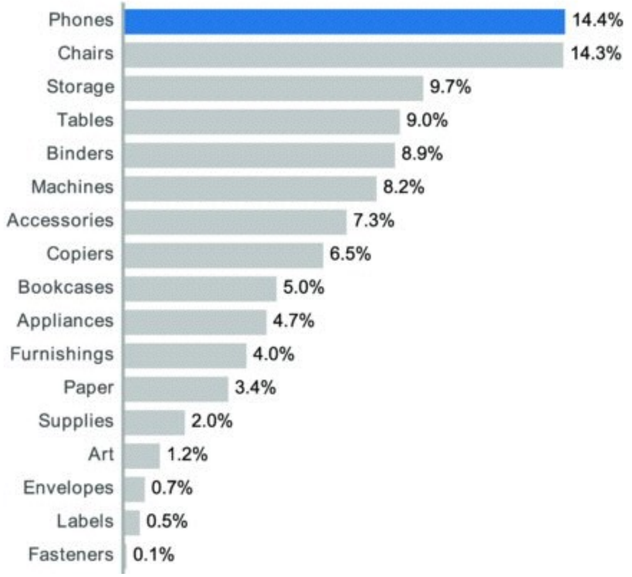




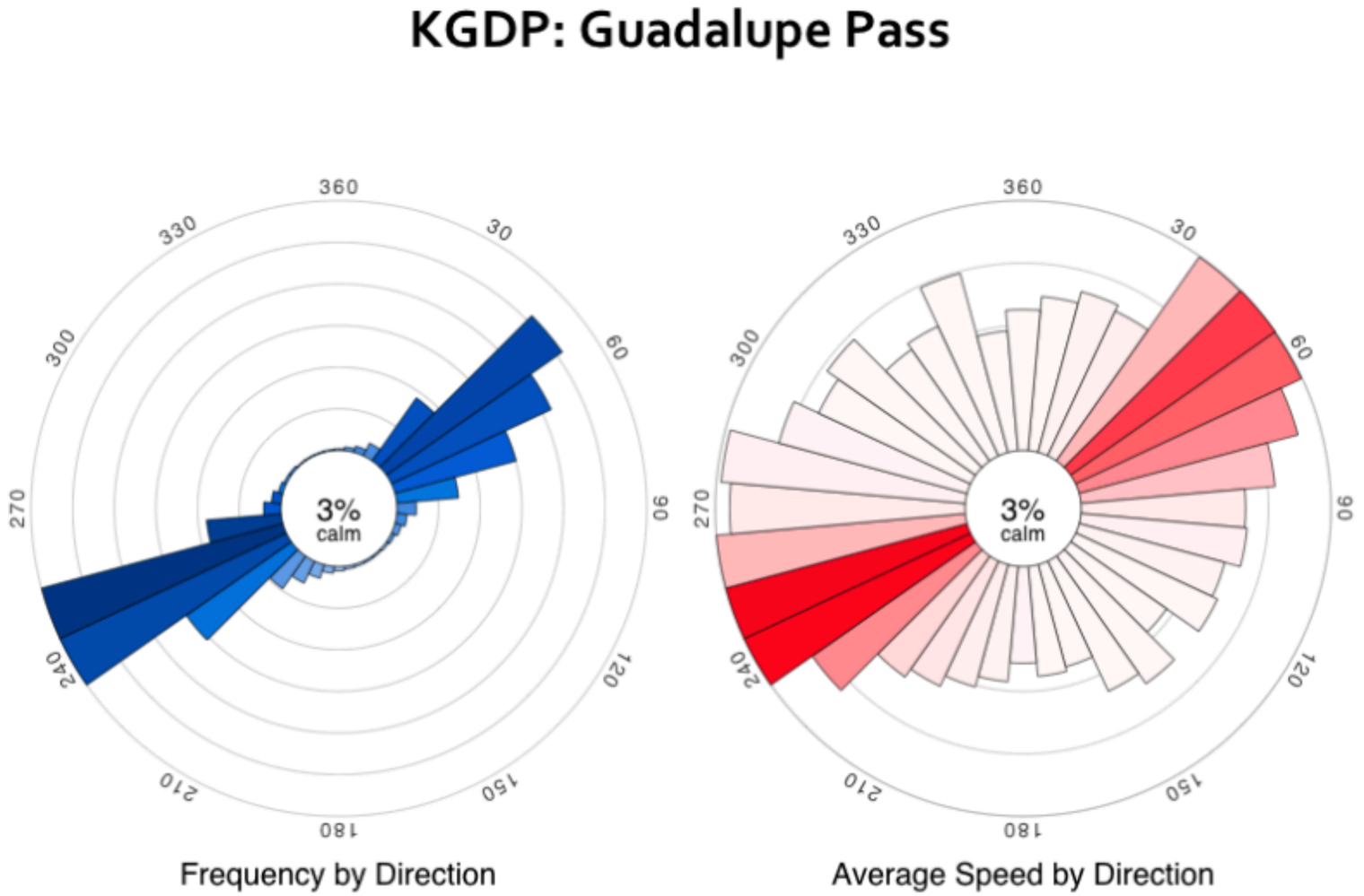
HOW TO MAKE PIE CHARTS USEFUL



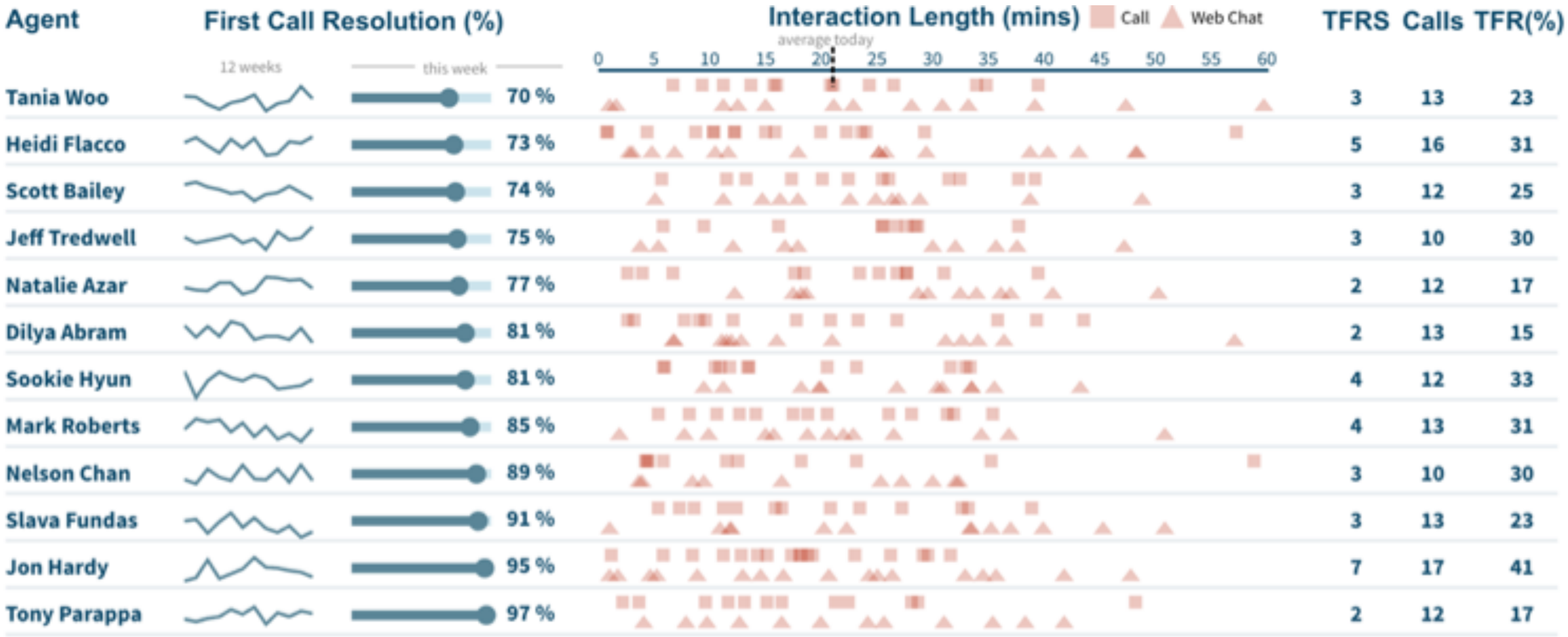




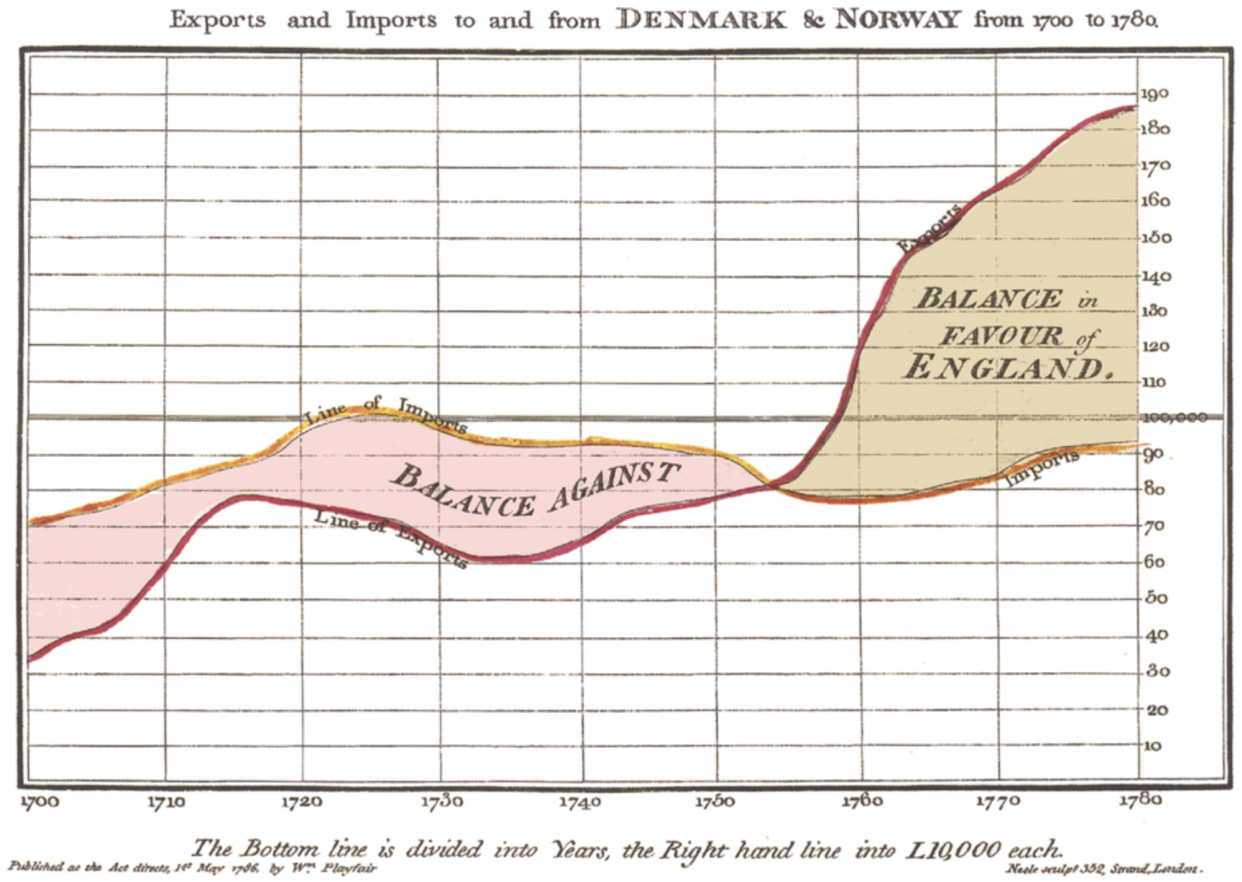
CYCLICAL REALATIONSHIPS AND DIRECTION



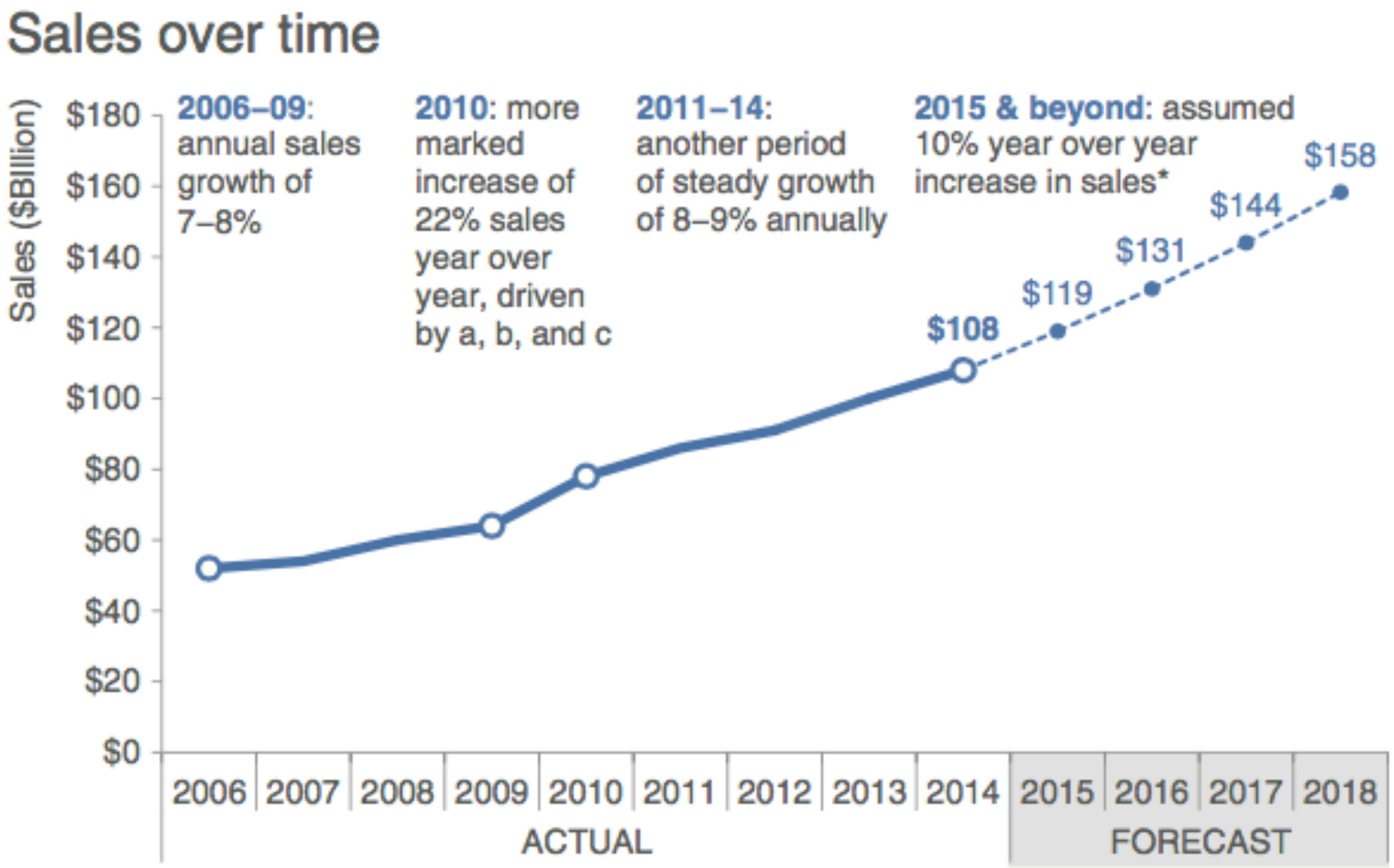
COMBINING FEATURES



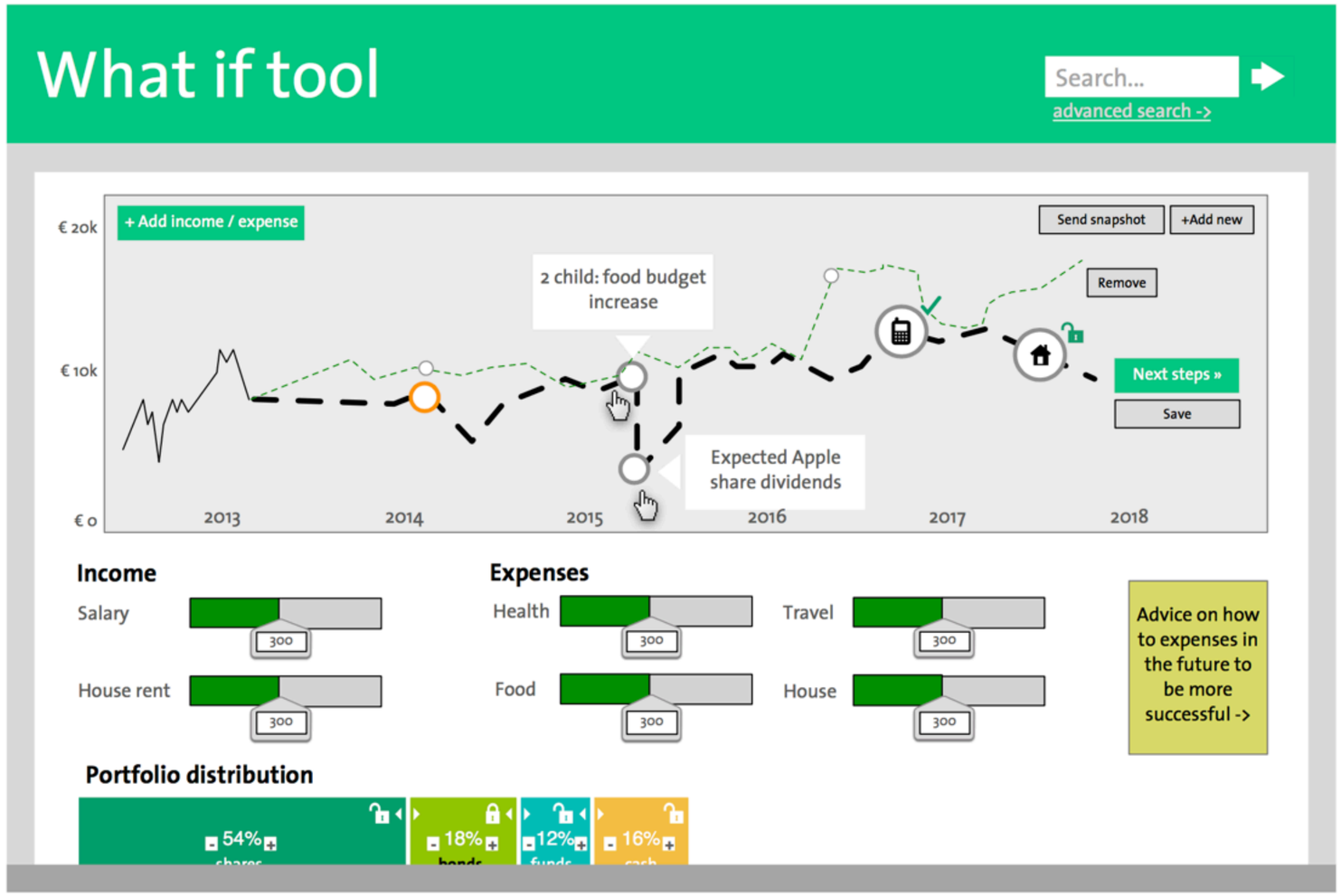
VISUALISING TIME



FORECAST


Sales over time
Sales ($Billion)
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
2006–09: annual sales growth of 7–8%
2010: more marked increase of 22% sales year over year, driven by a, b, and c
2011–14: another period of steady growth of 8–9% annually
2015 & beyond: assumed 10% year over year increase in sales*
$108
$119
$131
$144
$158
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
ACTUAL
FORECAST

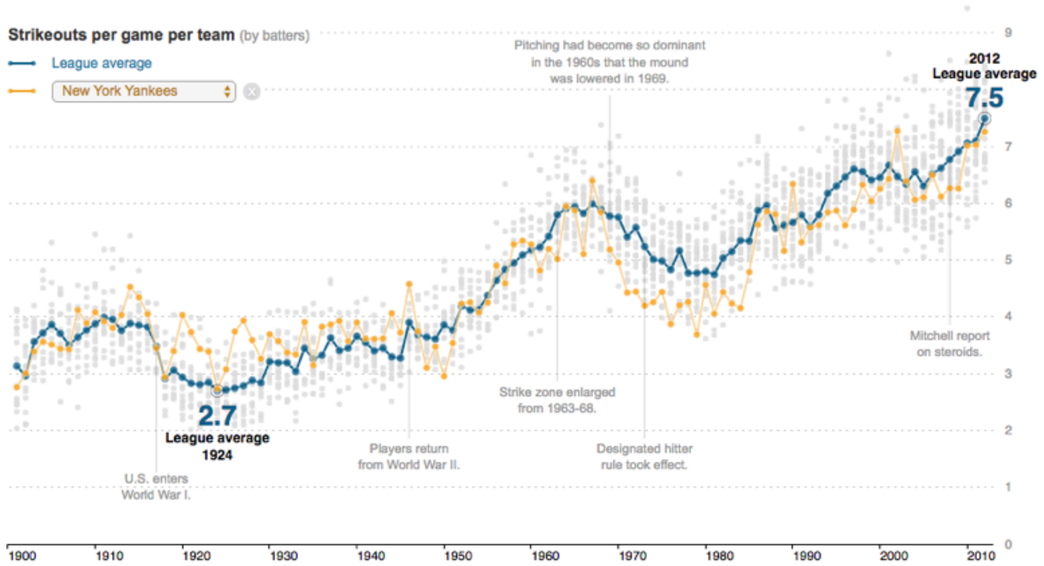
WHAT IF TOOL


What if tool
Search...
advanced search ->
+ Add income / expense
Send snapshot
+Add new
Remove
€ 20k
€ 10k
€ 0
2 child: food budget increase
Expected Apple share dividends
Next steps »
Save
2013
2014
2015
2016
2017
2018
Income
Salary
300
House rent
300
Expenses
Health
300
Travel
300
Food
300
House
300
Advice on how to expenses in the future to be more successful ->
Portfolio distribution
54%
18%
12%
16%

SHOWING AVARAGE

Strikeouts on the Rise

There were more strikeouts in 2012 than at any other time in major league history.



Last season, teams struck out at a rate never before seen: 7.5 times for each team every game, an increase of nearly 20 percent from 2005. Ten of the 30 major league teams set franchise records for strikeouts last season and most came close.

Strikeouts per game, 2012

NATIONAL LEAGUE BATTERS

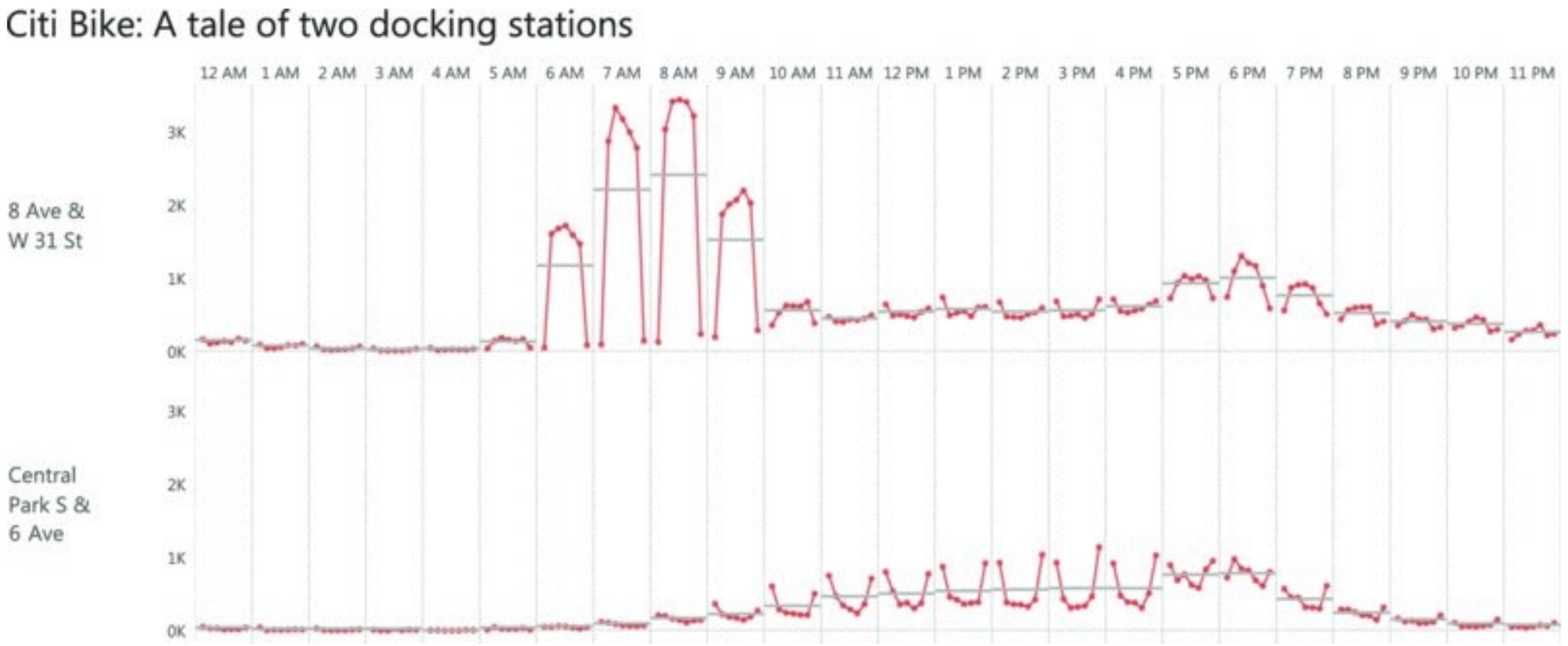
Houston Astros	8.4	Record
Pittsburgh Pirates	8.4	Record
Washington Nationals	8.2	2nd most
Atlanta Braves	8.0	Record
Arizona Diamondbacks	7.8	4th most
Cincinnati Reds	7.8	4th most
New York Mets	7.7	Record
Milwaukee Brewers	7.7	3rd most
San Diego Padres	7.6	4th most
Chicago Cubs	7.6	3rd most
Miami Marlins	7.6	6th most
Colorado Rockies	7.5	3rd most
St. Louis Cardinals	7.4	3rd most
Los Angeles Dodgers	7.1	3rd most
San Francisco Giants	6.8	7th most
Philadelphia Phillies	6.8	15th most

AMERICAN LEAGUE BATTERS

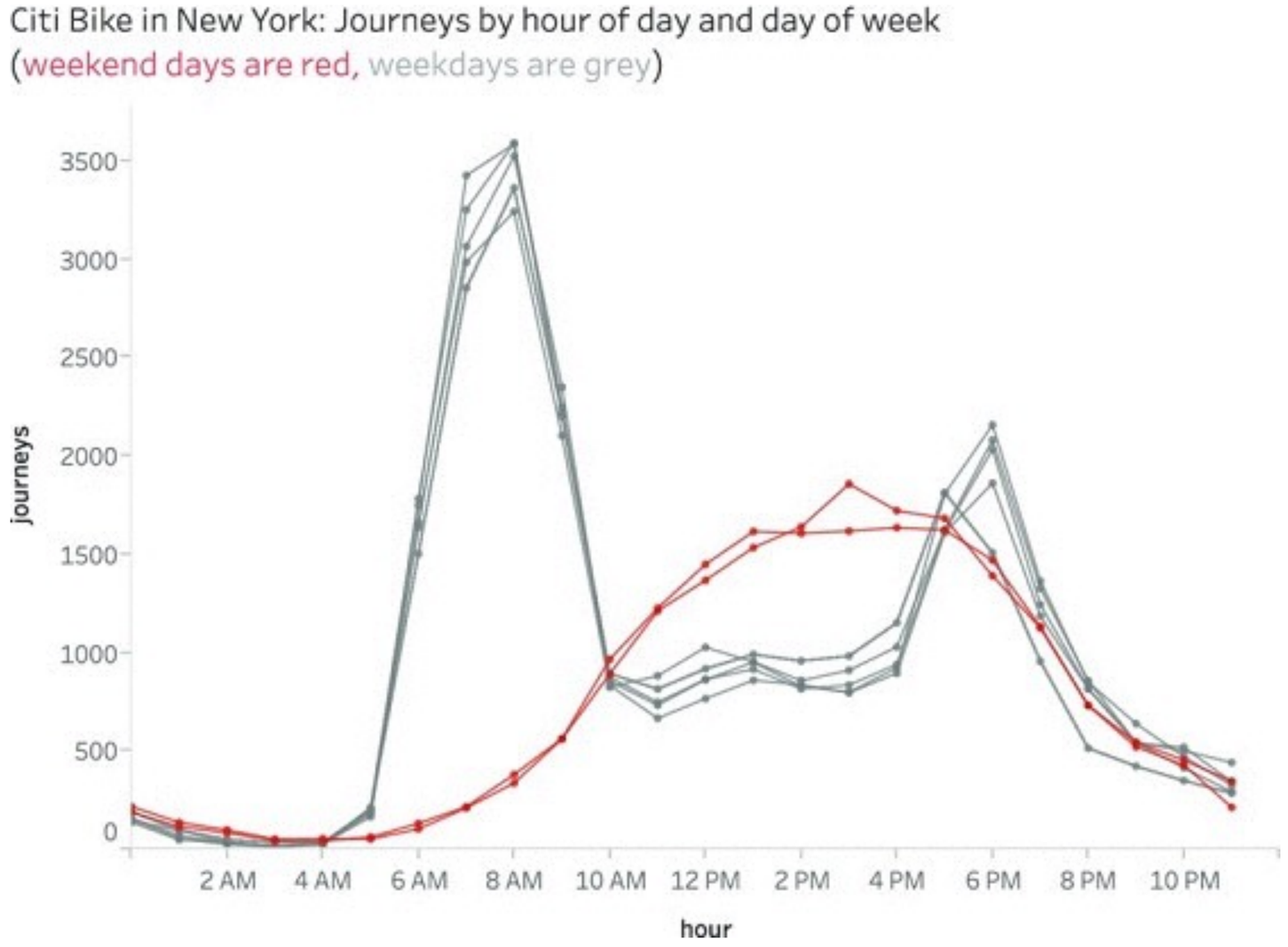
Oakland Athletics	8.6	Record
Tampa Bay Rays	8.2	2nd most
Baltimore Orioles	8.1	Record
Seattle Mariners	7.8	2nd most
Toronto Blue Jays	7.7	Record
Chicago White Sox	7.4	Record
Boston Red Sox	7.4	Record
New York Yankees	7.3	2nd most
Los Angeles Angels of Anaheim	6.9	Record
Texas Rangers	6.8	8th most
Detroit Tigers	6.8	12th most
Cleveland Indians	6.7	10th most
Minnesota Twins	6.6	4th most
Kansas City Royals	6.4	7th most

SUMMARIZING REPEATING INFORMATION

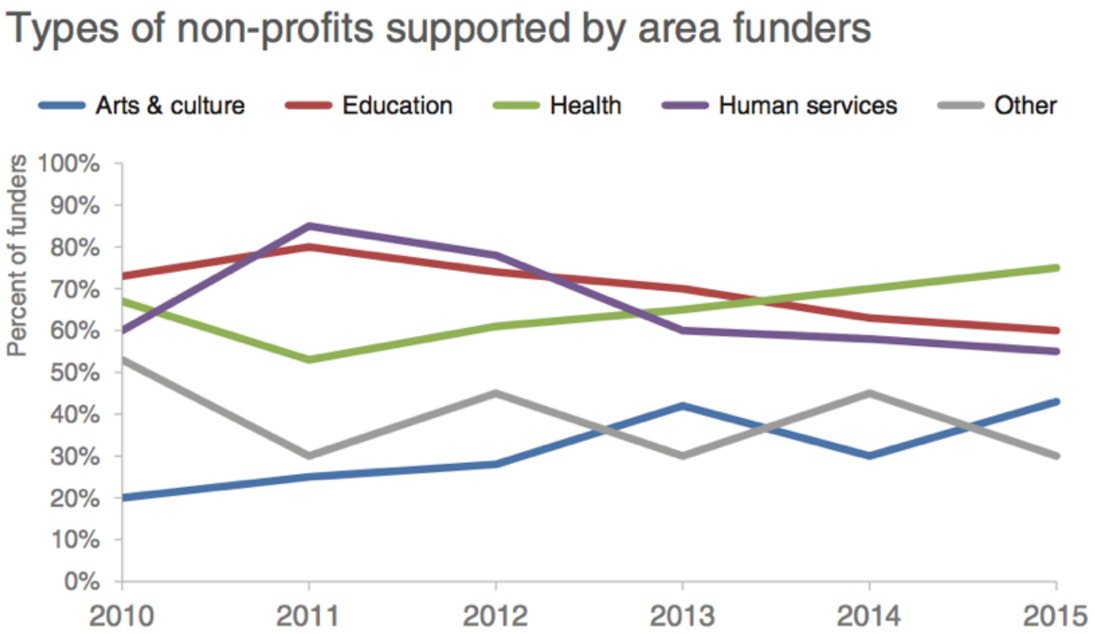
COMPARISION OF CITY BIKE STATIONS

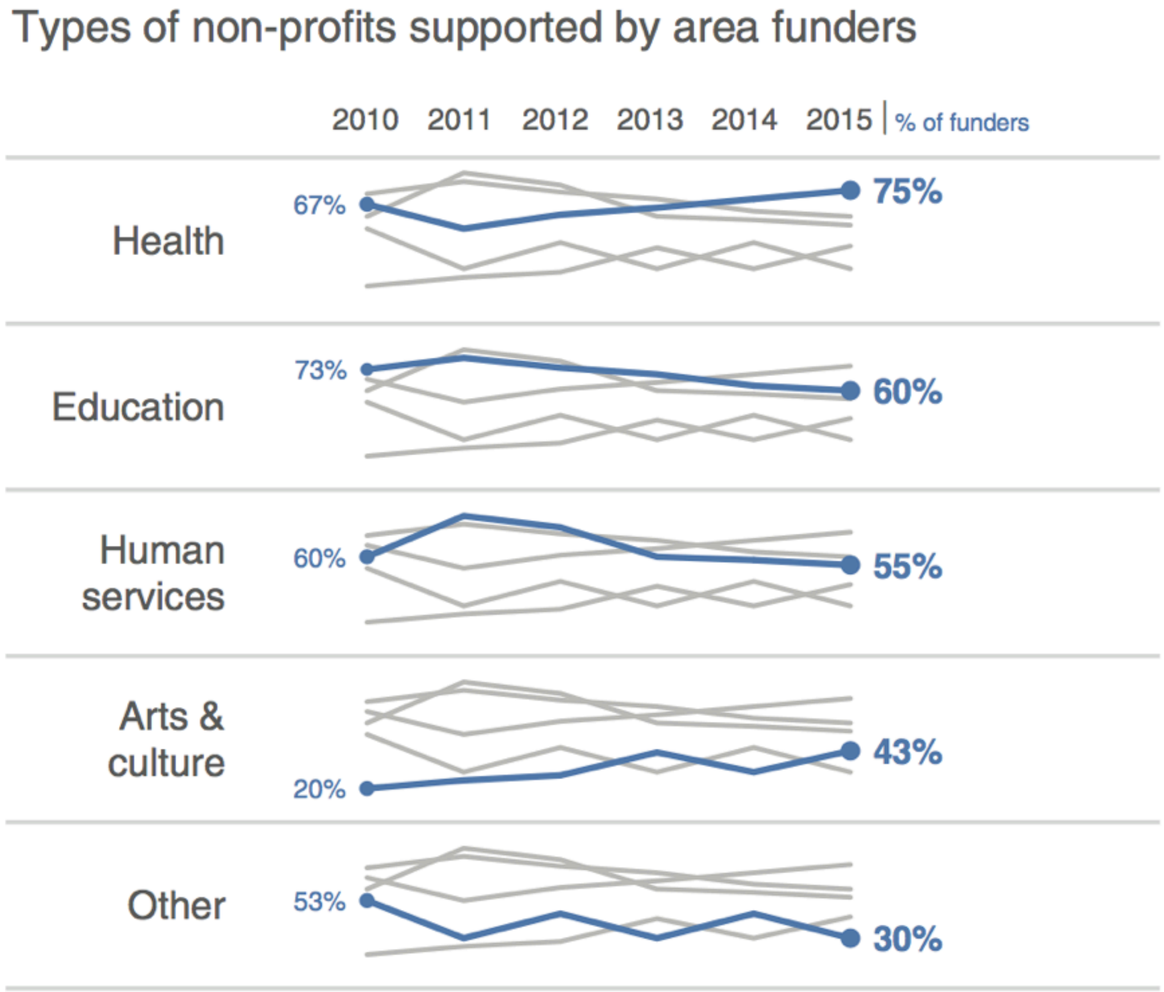


COMPARING WEEKDAYS AND WEEKENDS

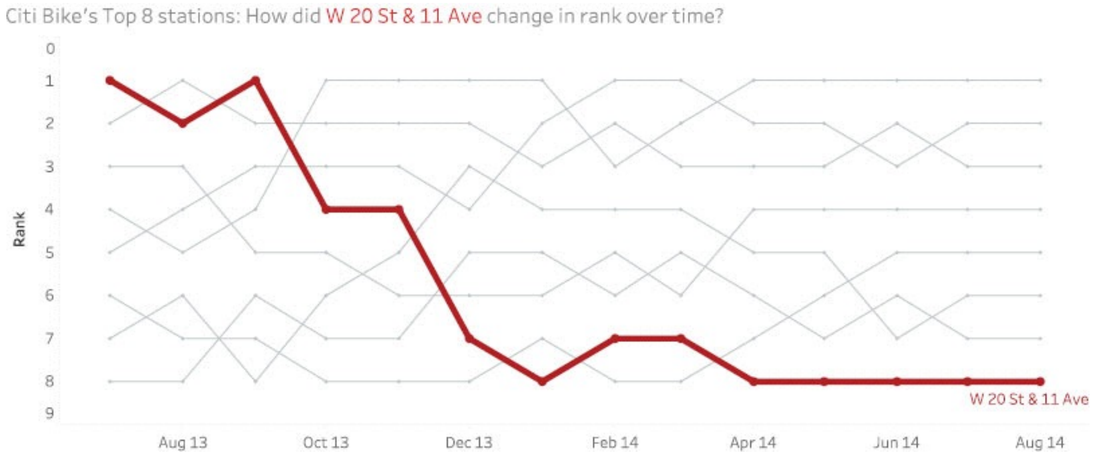


AVOID THE SPHAGETTI GRAPH



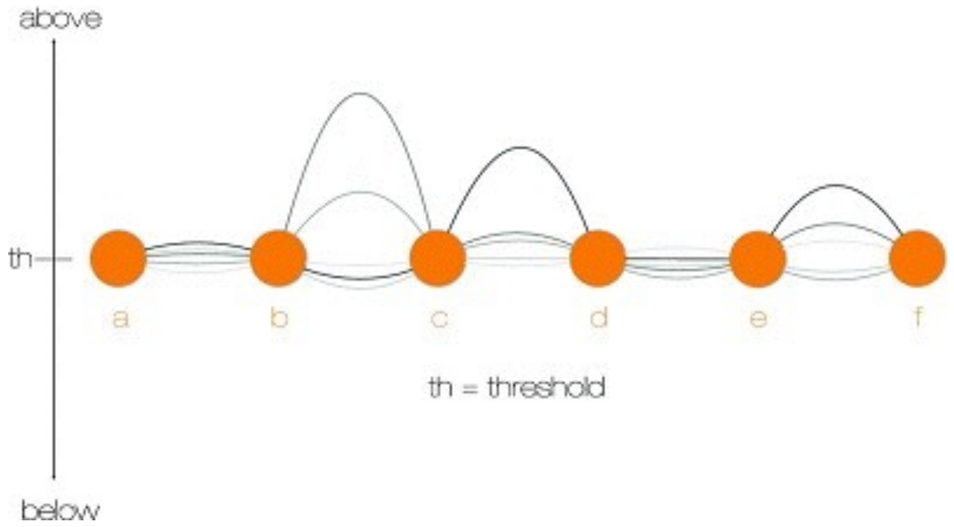


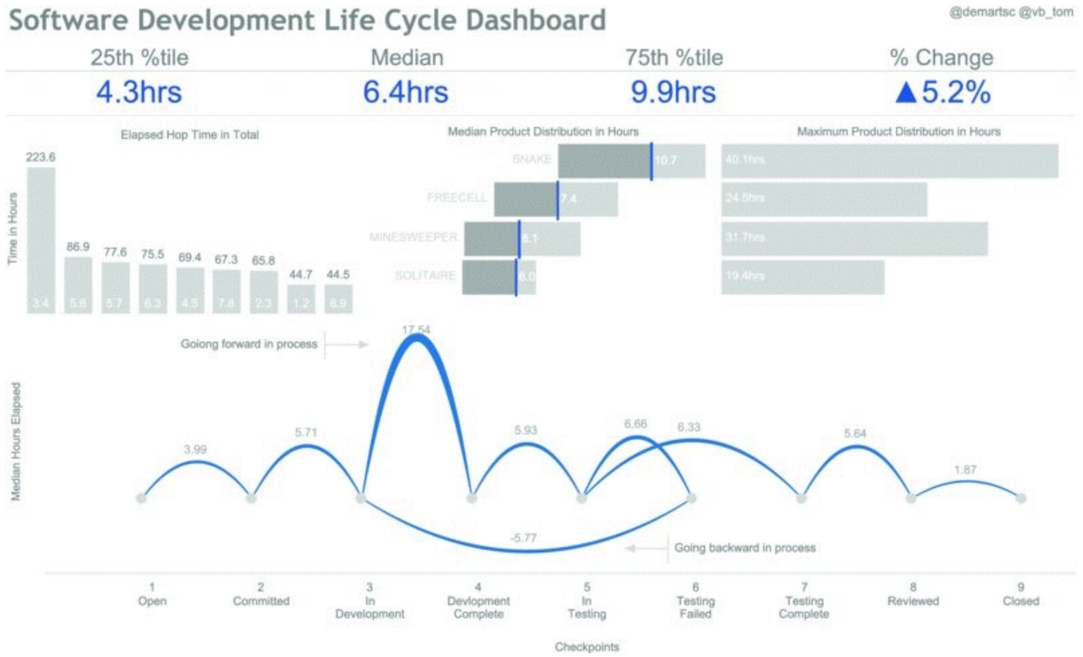
BUMP CHARTS TO SHOW RANK CHANGES



ERGOMANIA.EU

JUMP PLOT


above
th
below
a
b
c
d
e
f
th = threshold


Software Development Life Cycle Dashboard
@demartsc @vb_tom
25th %tile
4.3hrs
Median
6.4hrs
75th %tile
9.9hrs
% Change
▲5.2%
Elapsed Hop Time in Total
Median Product Distribution in Hours
Maximum Product Distribution in Hours
Time in Hours
223.6
86.9
77.6
75.5
69.4
67.3
65.8
44.7
44.5
SNAKE
FREECELL
MINESWEEPER
SOLITAIRE
40.1hrs
24.5hrs
31.7hrs
19.4hrs
Goiong forward in process
Median Hours Elapsed
17.54
3.99
5.71
5.93
6.66
6.33
5.64
1.87
-5.77
Going backward in process
1 Open
2 Committed
3 In Development
4 Devlopment Complete
5 In Testing
6 Testing Failed
7 Testing Complete
8 Reviewed
9 Closed
Checkpoints

TIME HEATMAP

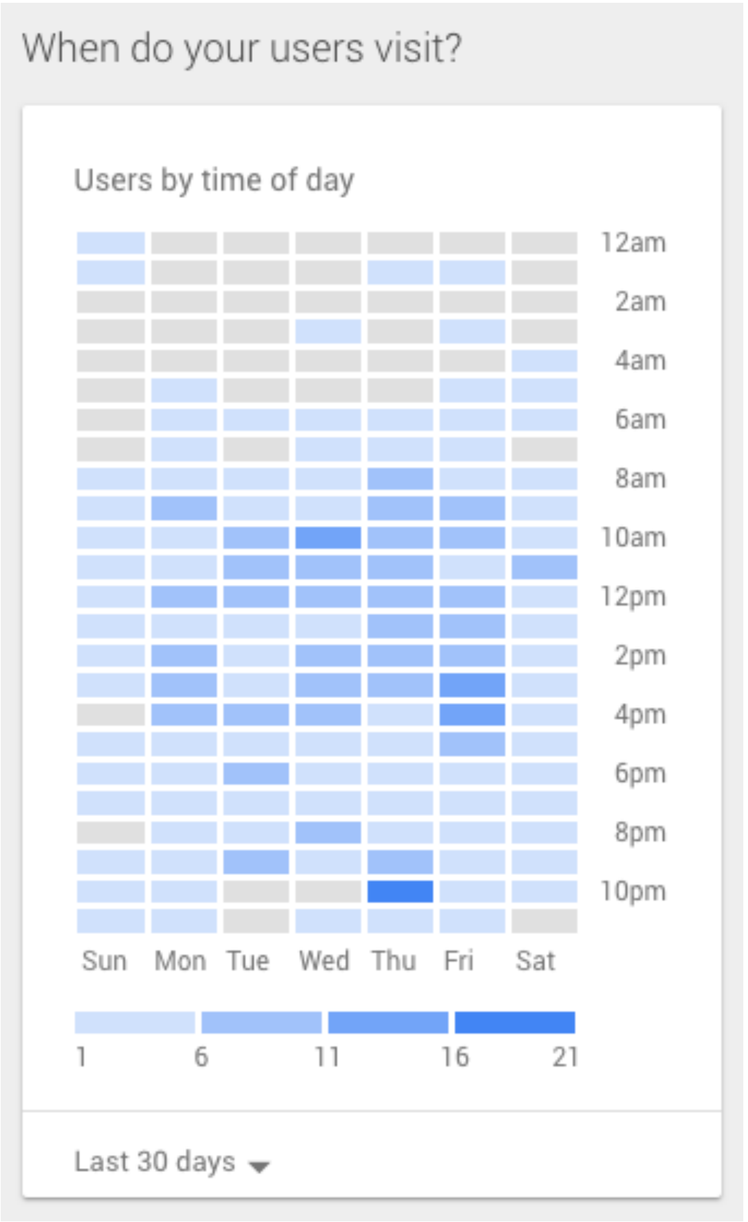
Table

	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%

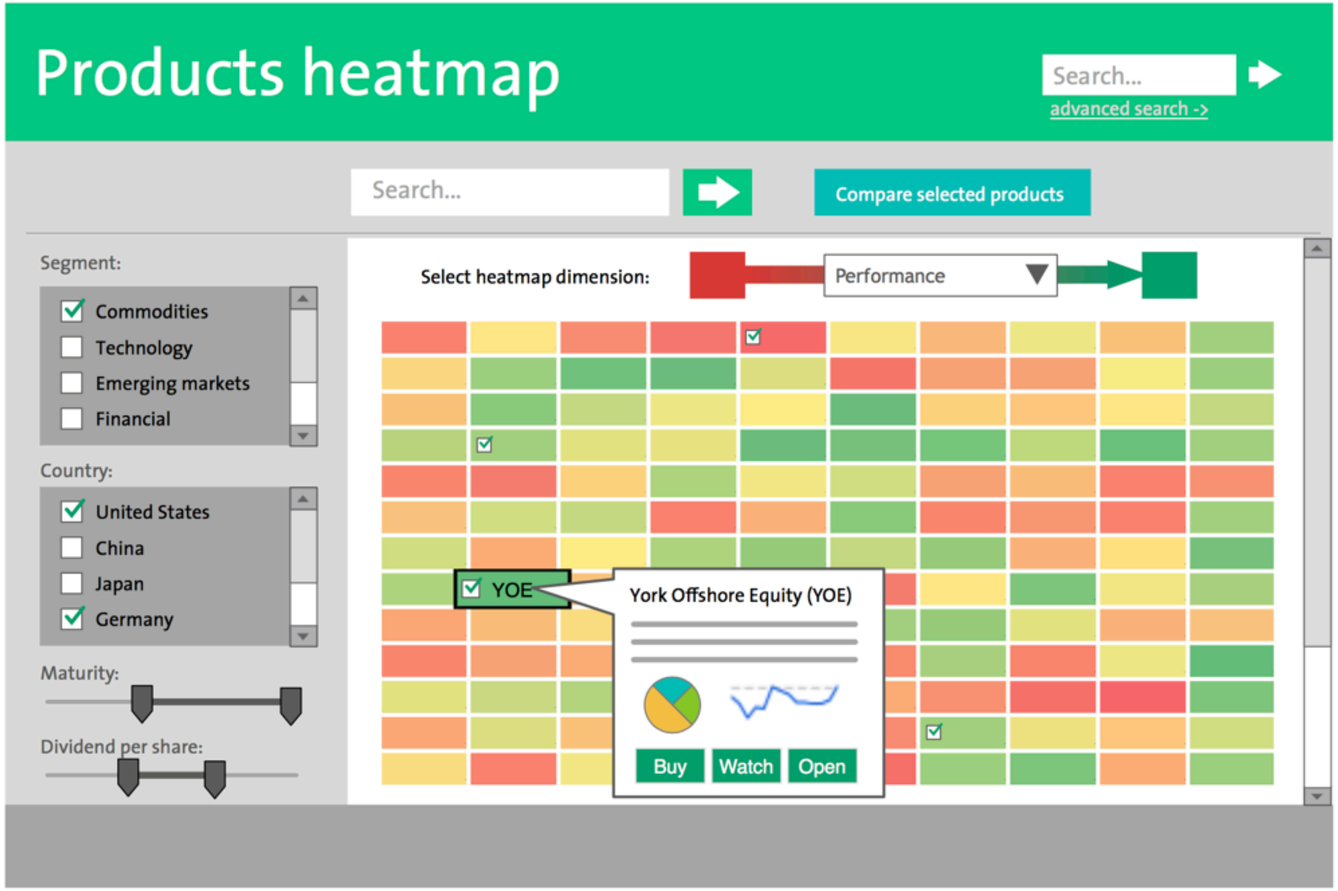
Heatmap

LOW-HIGH

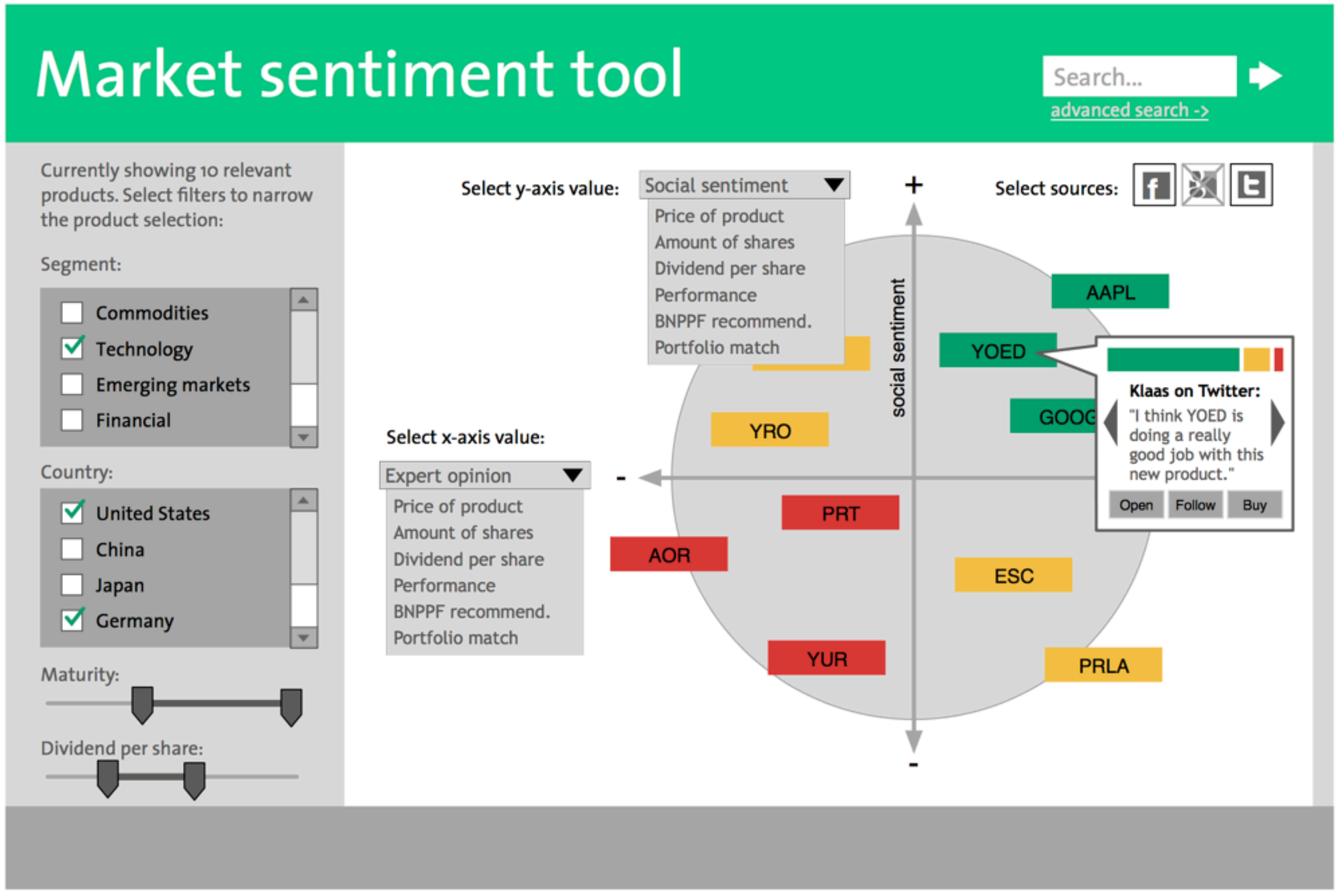
	A	B	C
Category 1	15%	22%	42%
Category 2	40%	36%	20%
Category 3	35%	17%	34%
Category 4	30%	29%	26%
Category 5	55%	30%	58%
Category 6	11%	25%	49%



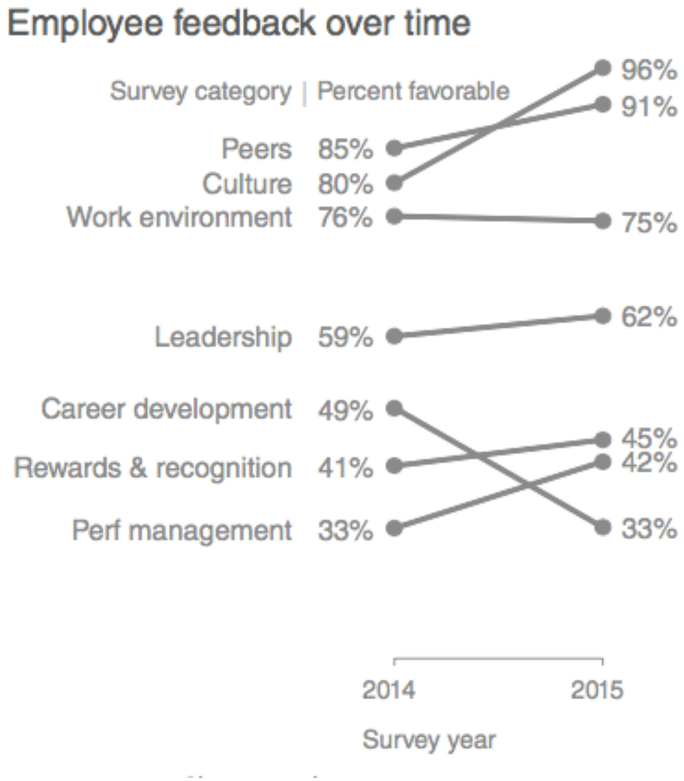
INTERACTIVE HEATMAP

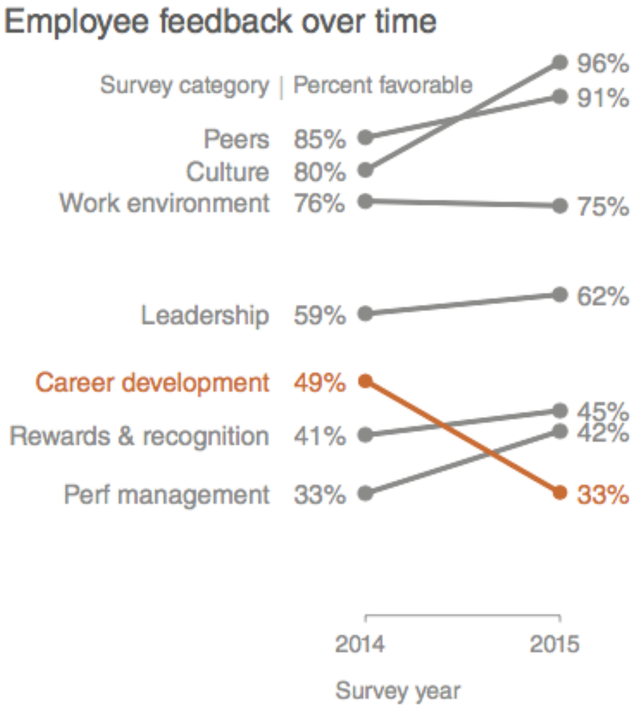


INTERACTIVE SCATTERPLOT

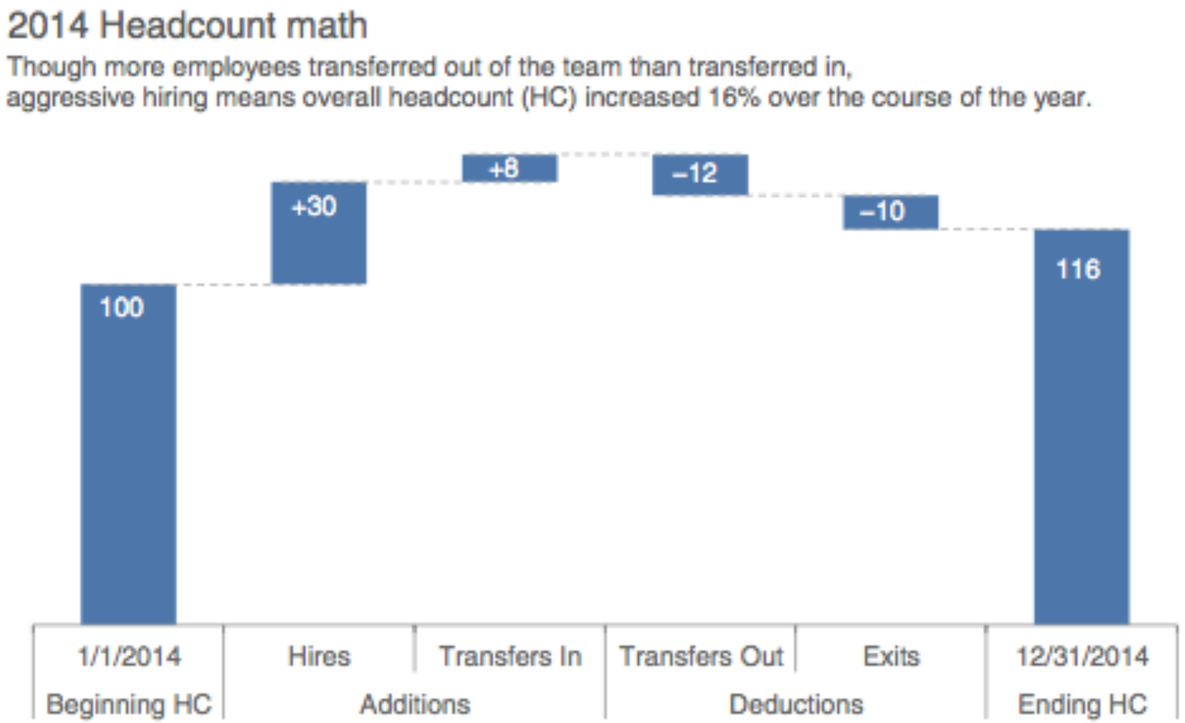


SLOPEGRAPH


Employee feedback over time
Survey category | Percent favorable
Peers 85%
Culture 80%
Work environment 76%
Leadership 59%
Career development 49%
Rewards & recognition 41%
Perf management 33%
96%
91%
75%
62%
45%
42%
33%
2014
2015
Survey year


Employee feedback over time
Survey category | Percent favorable
Peers 85%
Culture 80%
Work environment 76%
Leadership 59%
Career development 49%
Rewards & recognition 41%
Perf management 33%
96%
91%
75%
62%
45%
42%
33%
2014
2015
Survey year

WATERFALL


2014 Headcount math
Though more employees transferred out of the team than transferred in,
aggressive hiring means overall headcount (HC) increased 16% over the course of the year.
100
+30
+8
−12
−10
116
1/1/2014
Beginning HC
Hires
Transfers In
Additions
Transfers Out
Exits
Deductions
12/31/2014
Ending HC

AVOID SECONDARY AXIS

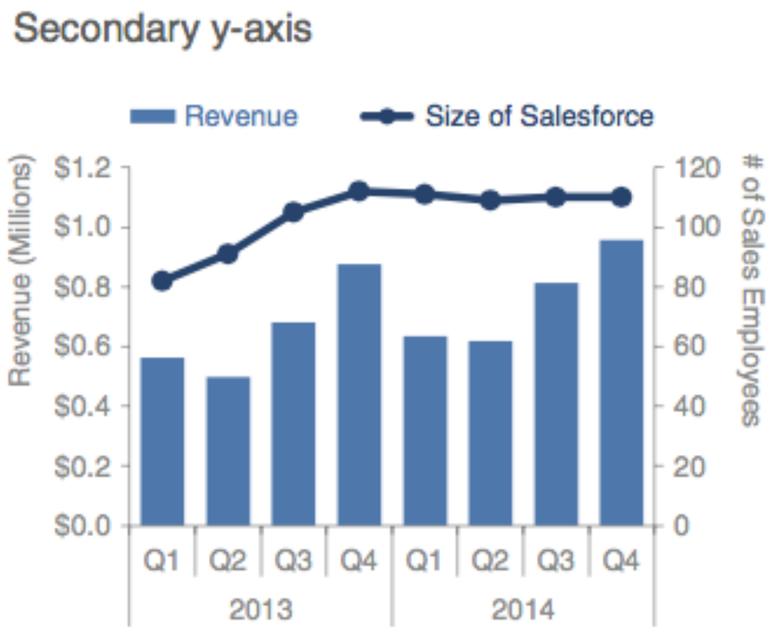
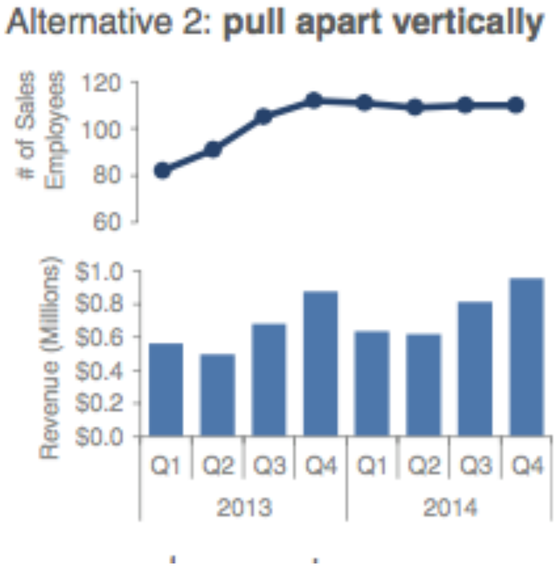


FIGURE 2.26 Secondary *y*-axis



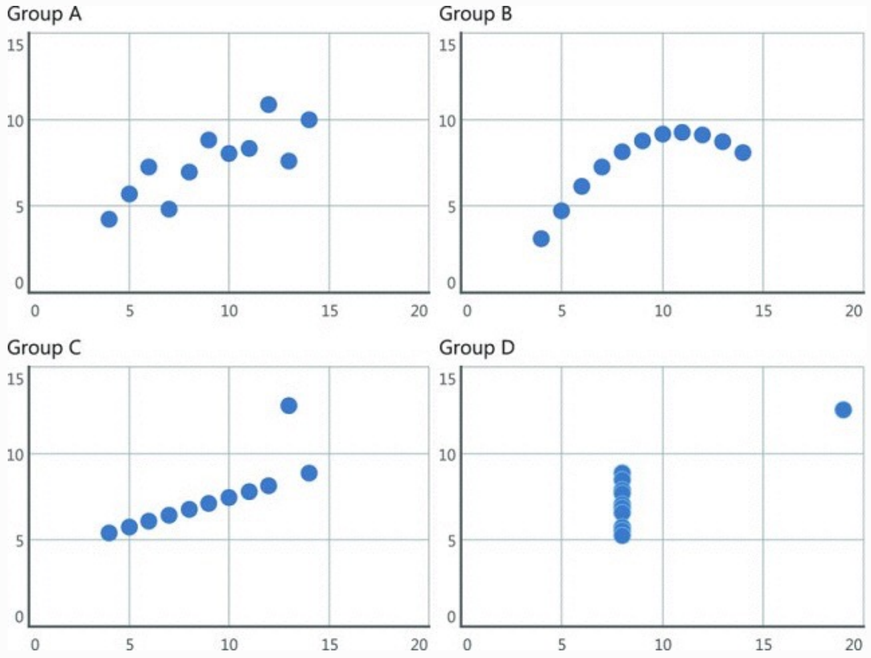
WHAT IS A DASHBOARD?

- Visual display of data
- Monitor conditions
- Facilitate understanding

ERGOMANIA

ergomania.eu

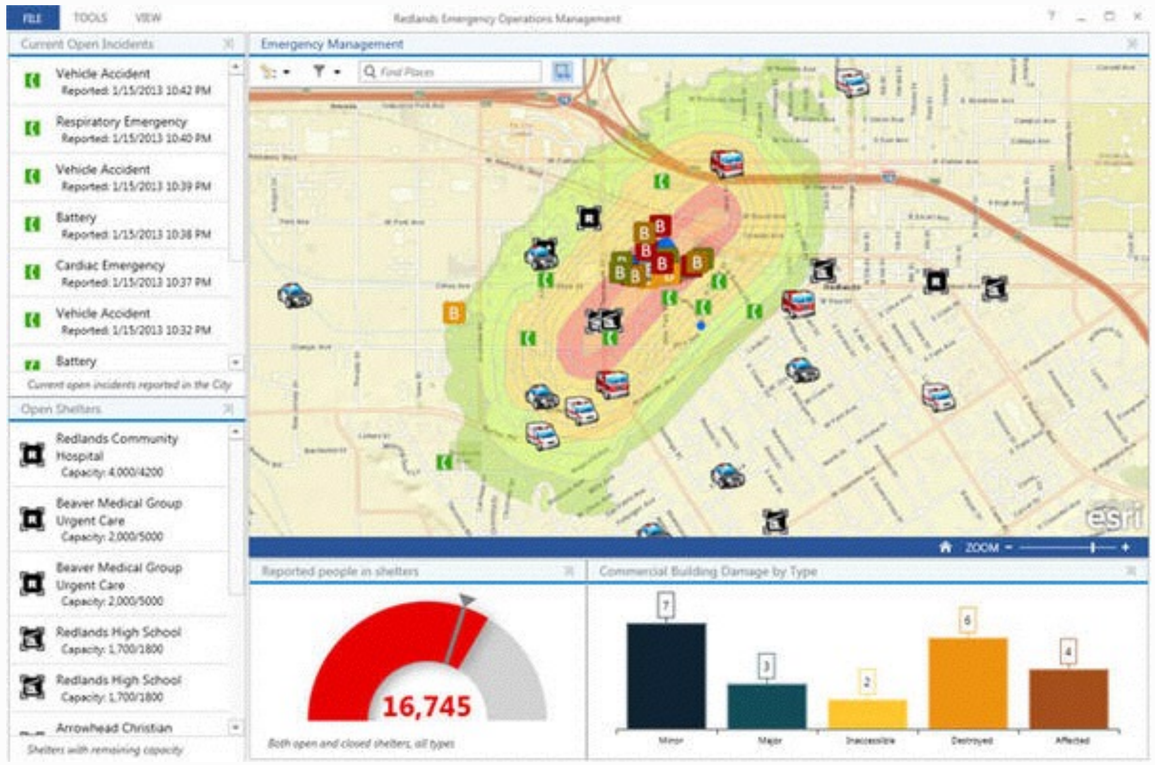
Group A		Group B		Group C		Group D	
x	y	x	y	x	y	x	y
10.00	8.04	10.00	9.14	10.00	7.46	8.00	6.58
8.00	6.95	8.00	8.14	8.00	6.77	8.00	5.76
13.00	7.58	13.00	8.74	13.00	12.74	8.00	7.71
9.00	8.81	9.00	8.77	9.00	7.11	8.00	8.84
11.00	8.33	11.00	9.26	11.00	7.81	8.00	8.47
14.00	9.96	14.00	8.10	14.00	8.84	8.00	7.04
6.00	7.24	6.00	6.13	6.00	6.08	8.00	5.25
4.00	4.26	4.00	3.10	4.00	5.39	19.00	12.50
12.00	10.84	12.00	9.13	12.00	8.15	8.00	5.56
7.00	4.82	7.00	7.26	7.00	6.42	8.00	7.91
5.00	5.68	5.00	4.74	5.00	5.73	8.00	6.89

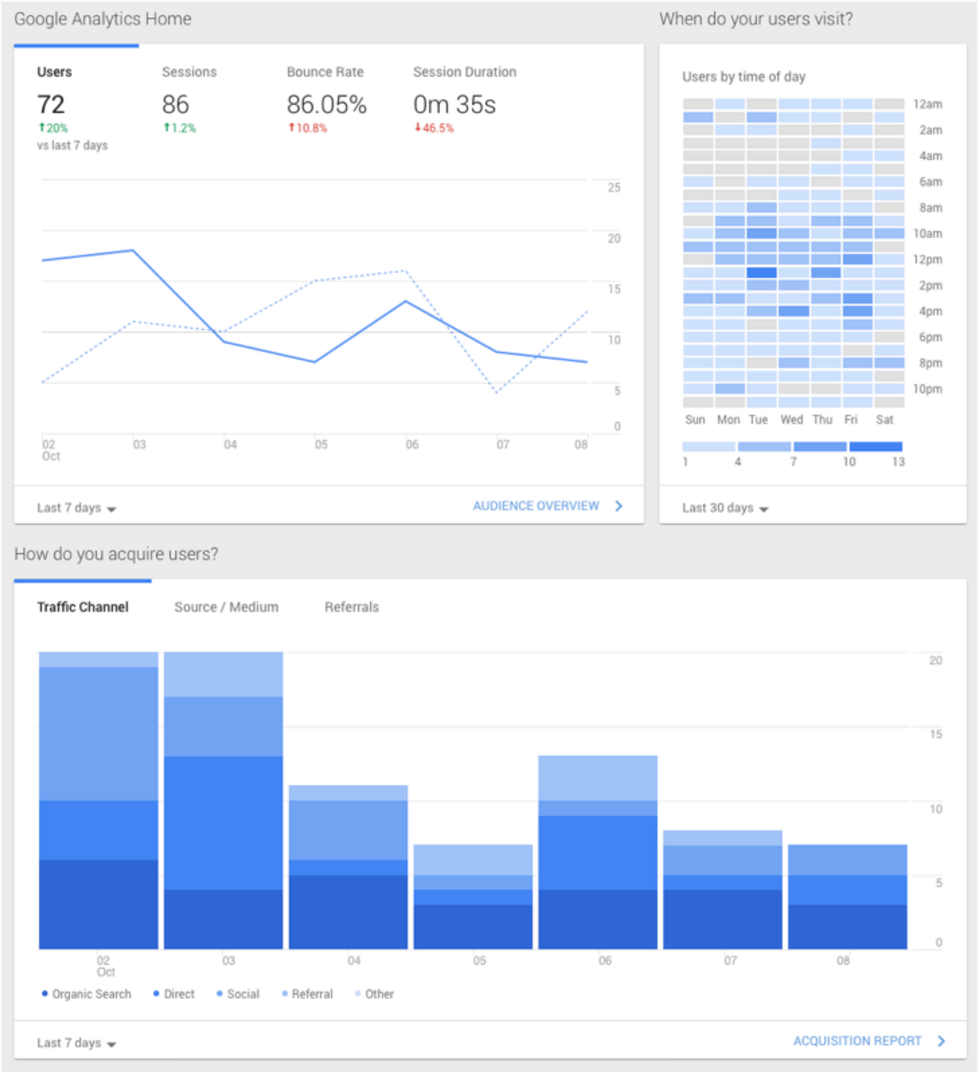


PSYCHOLOGICAL MOTIVATION

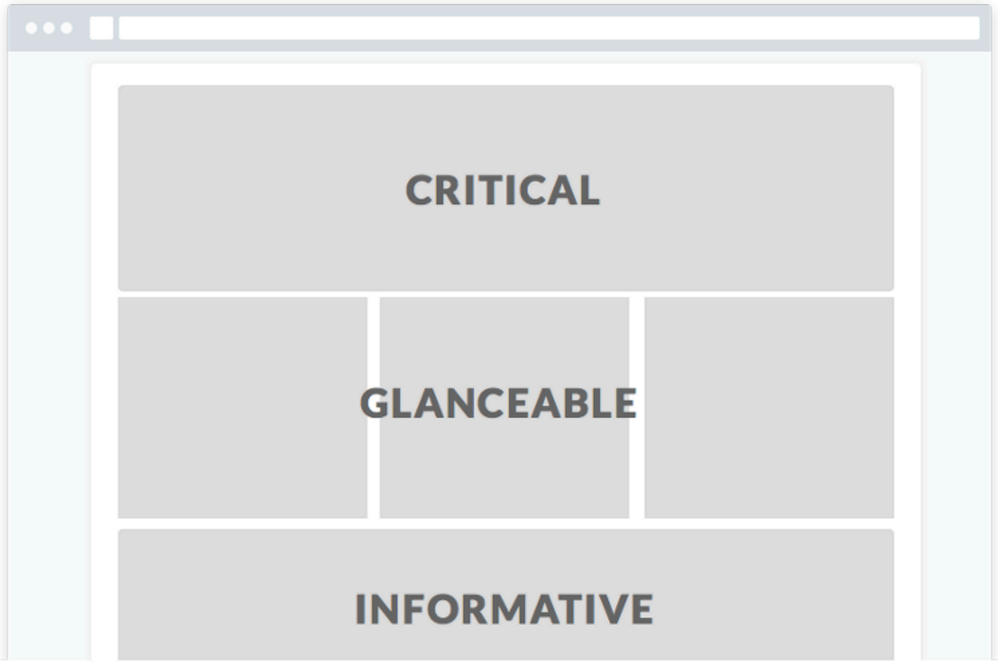
- Desire to control
- Short term memory / single screen
- Option to drill down
- Splitting info between tabs

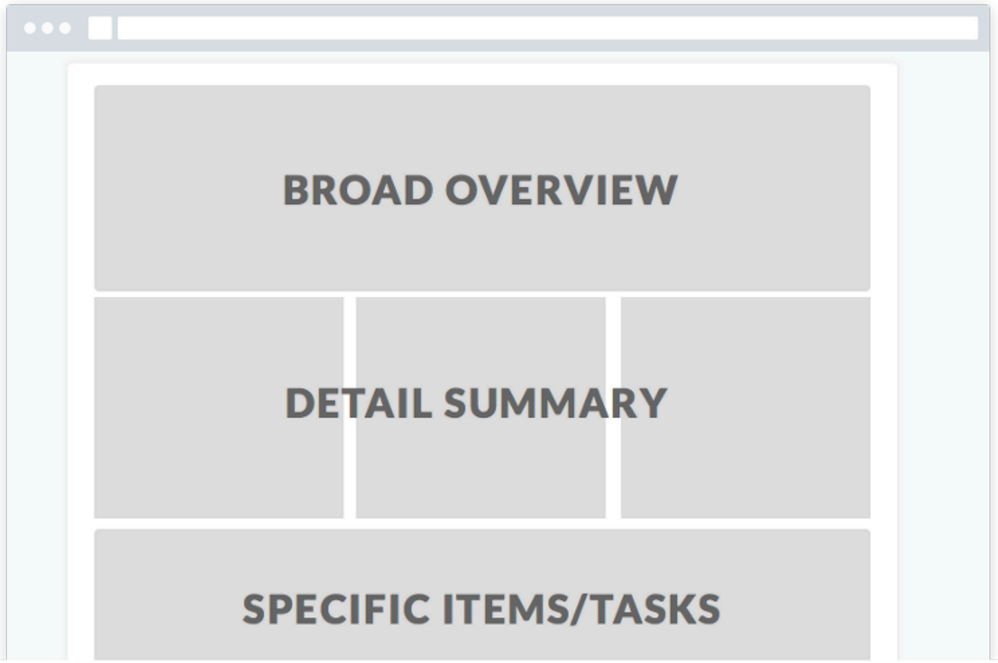
OPERATIONAL VS. ANALYTICAL DASHBOARDS



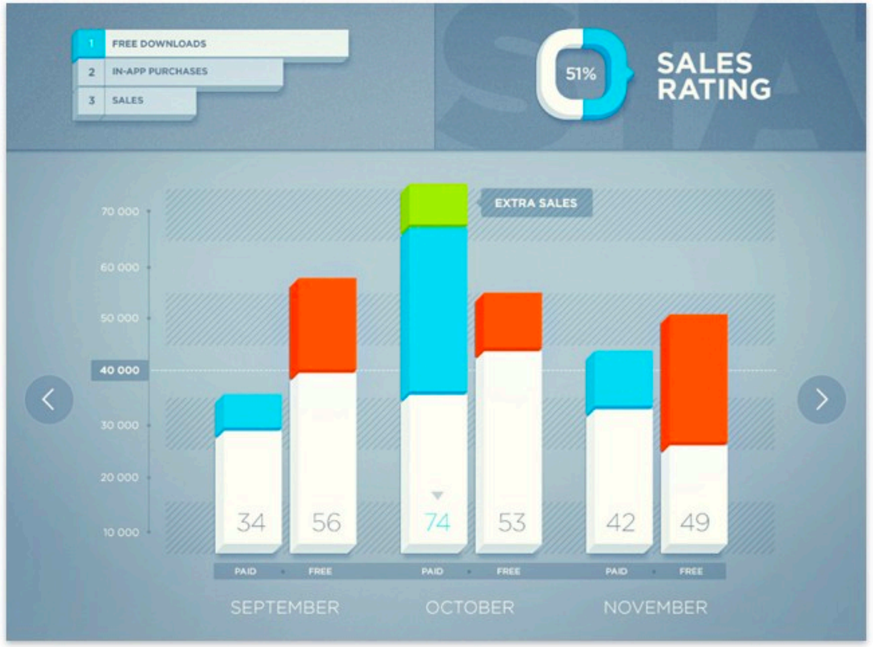


GOOD STRUCTURE

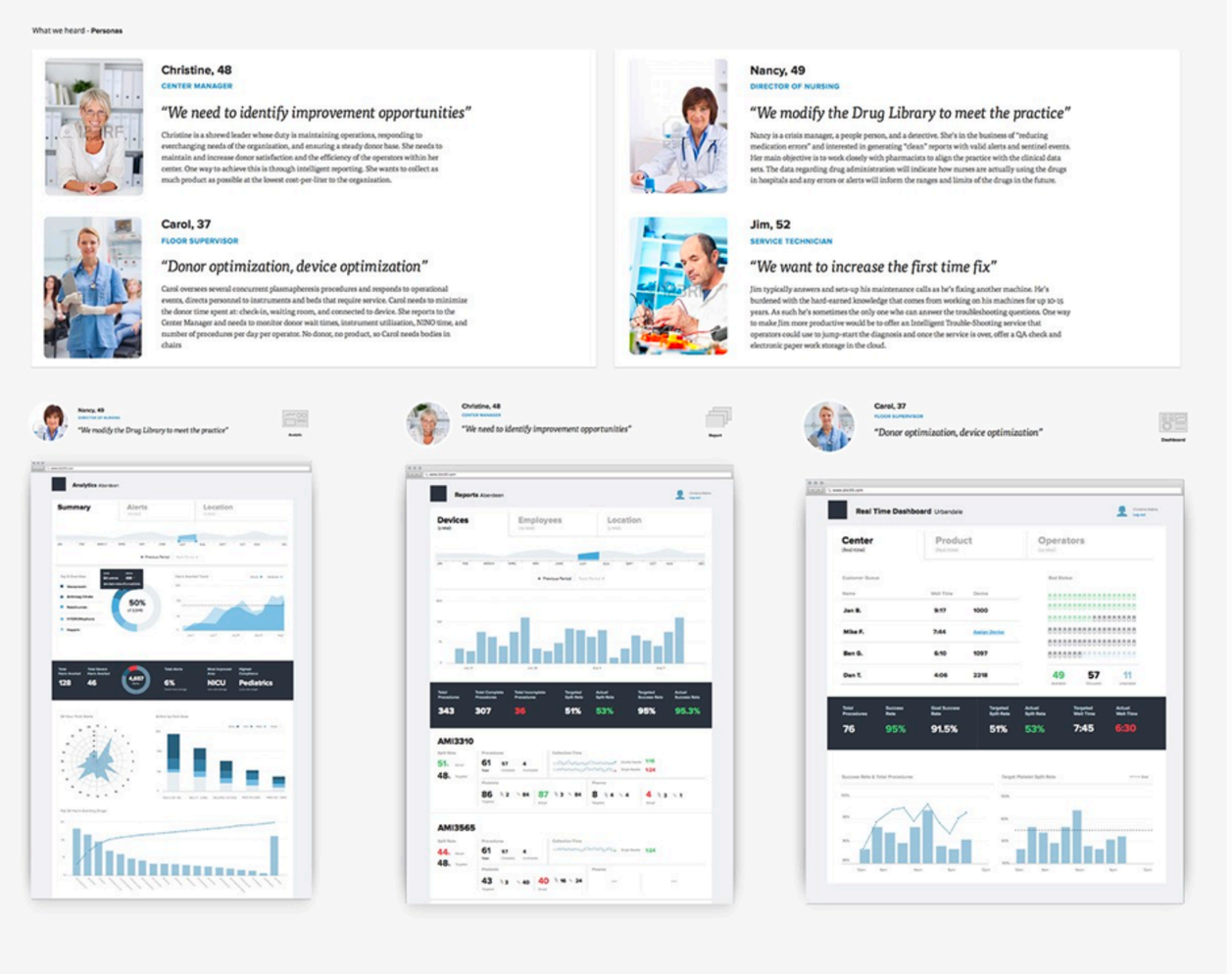




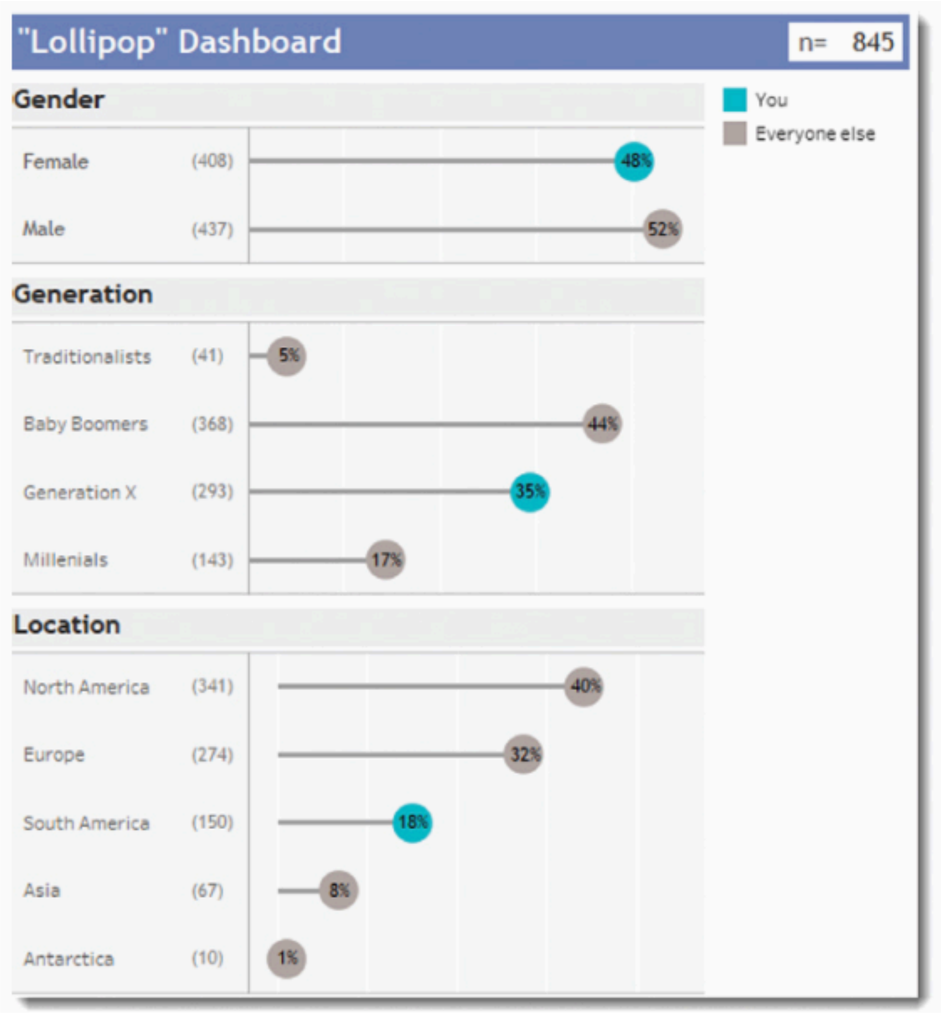
OWERWELHIMING, TOO DECORATED



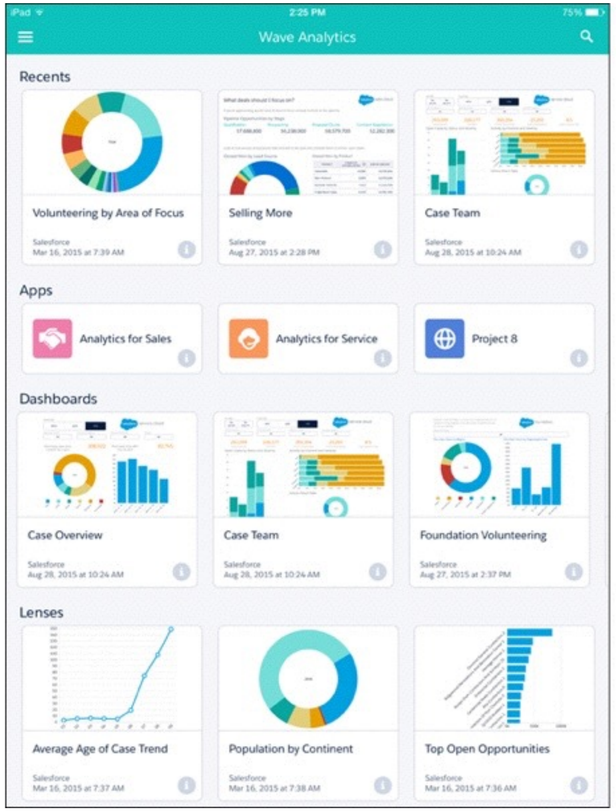
PERSONALIZATION

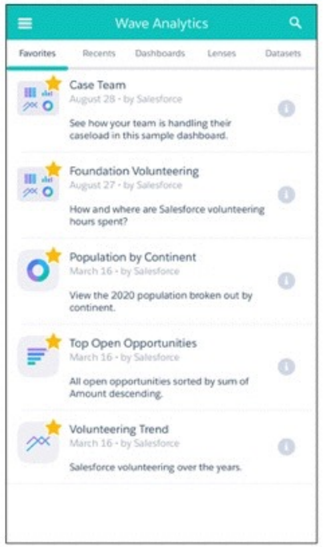


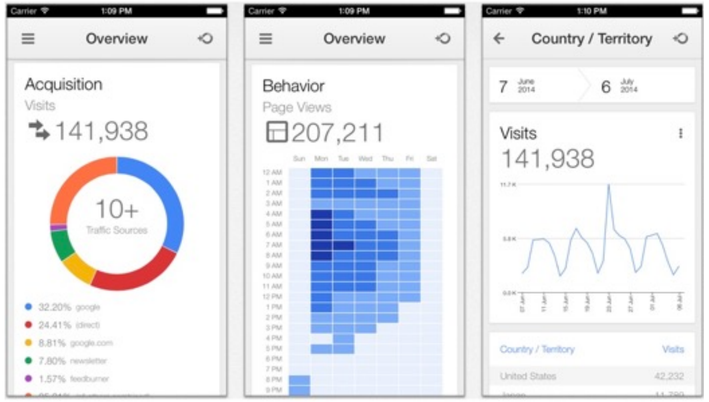
PERSONALISED DASHBOARDS

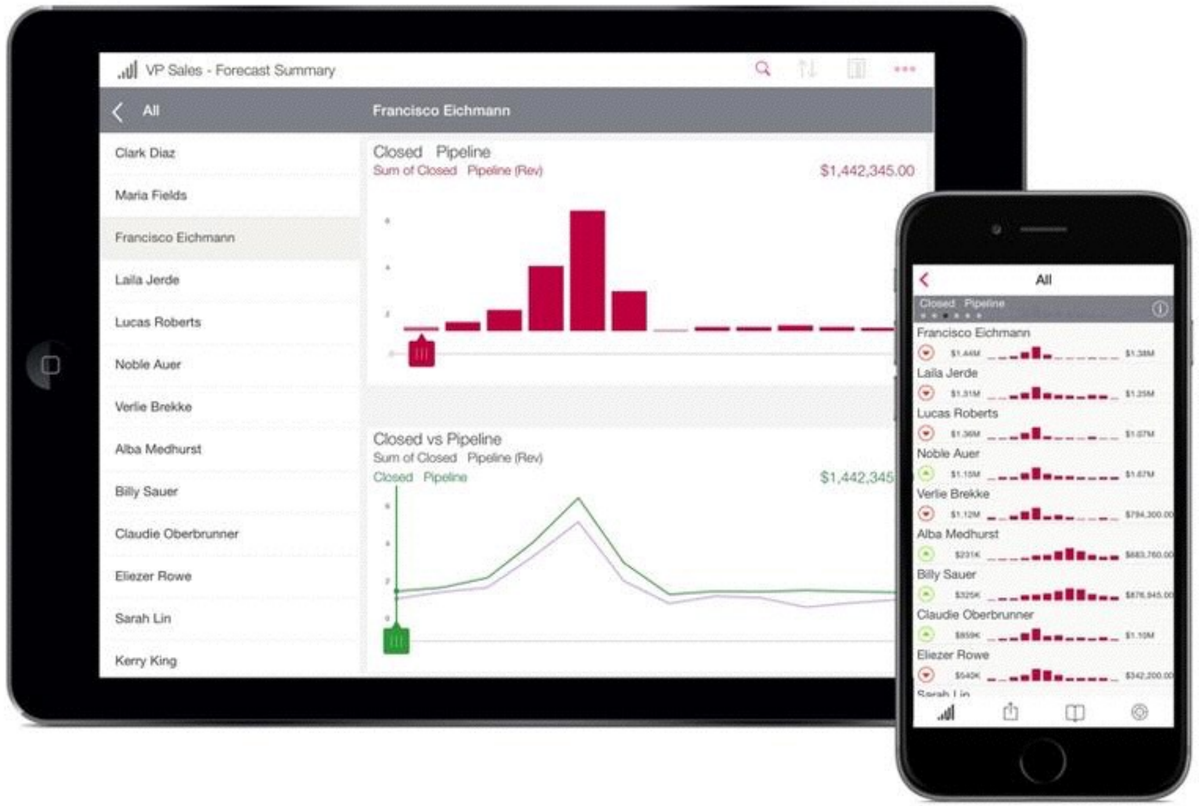


MOBILE SOLUTIONS









ERGOMANIA.EU

- “You are tasked with showing the revenue per available room (RevPAR) for your hotels and in comparison to a peer group.
- You need to organize hotels by regions and compare those to hotels within the same region.
- You need to show data over time, showing a selected number of weeks in the past.
- You want to see the spread for available rooms from the lowest-priced room and the highest-priced room.
- You need to understand how quickly the business is reacting to these prices and how much alignment exists between the different locations.
- You need to provide an on-demand (interactive) breakdown to the daily rate by segment and channel.

SOFTWARE LICENSE SALES REPORT

- (•) Product 1
- ( ) Product 2

License or MR

- (•) (All)
- ( ) Invoice
- ( ) Maintenance Renewal

Region

All

Last 5 orders

Company 1	$	1,300
Company 1	$	1,300
Company 1	$	1,300
Company 2	$	1,299
Company 3	$	1,299

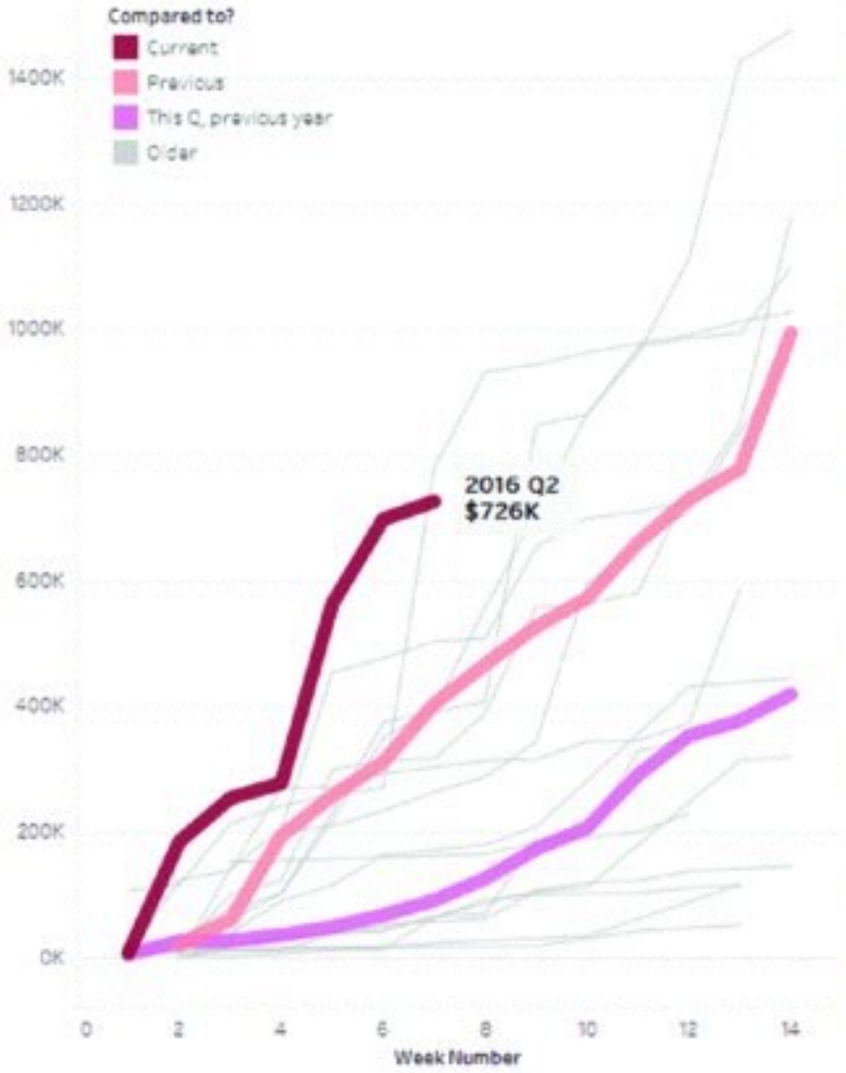
Country performance

Amounts are shown as monies passed to the vendors. For Product 1, this is shown in USD; for Product 2 it is GBP. EUR amounts for European countries are converted at a rate of 1.35.

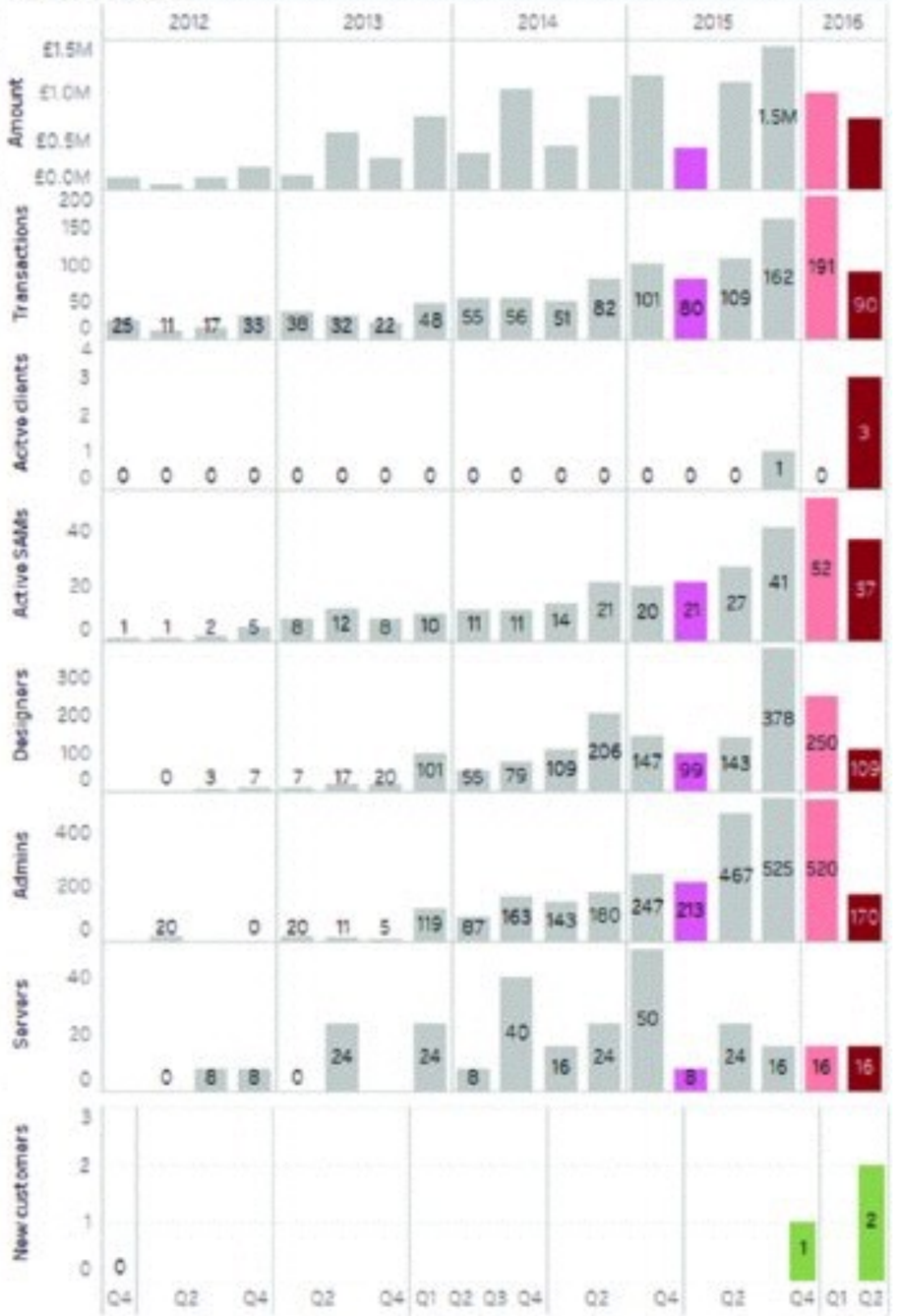
Days Left EOQ	QTD Transactions	QTD Active Clients	QTD SAMs
46	90	3	37

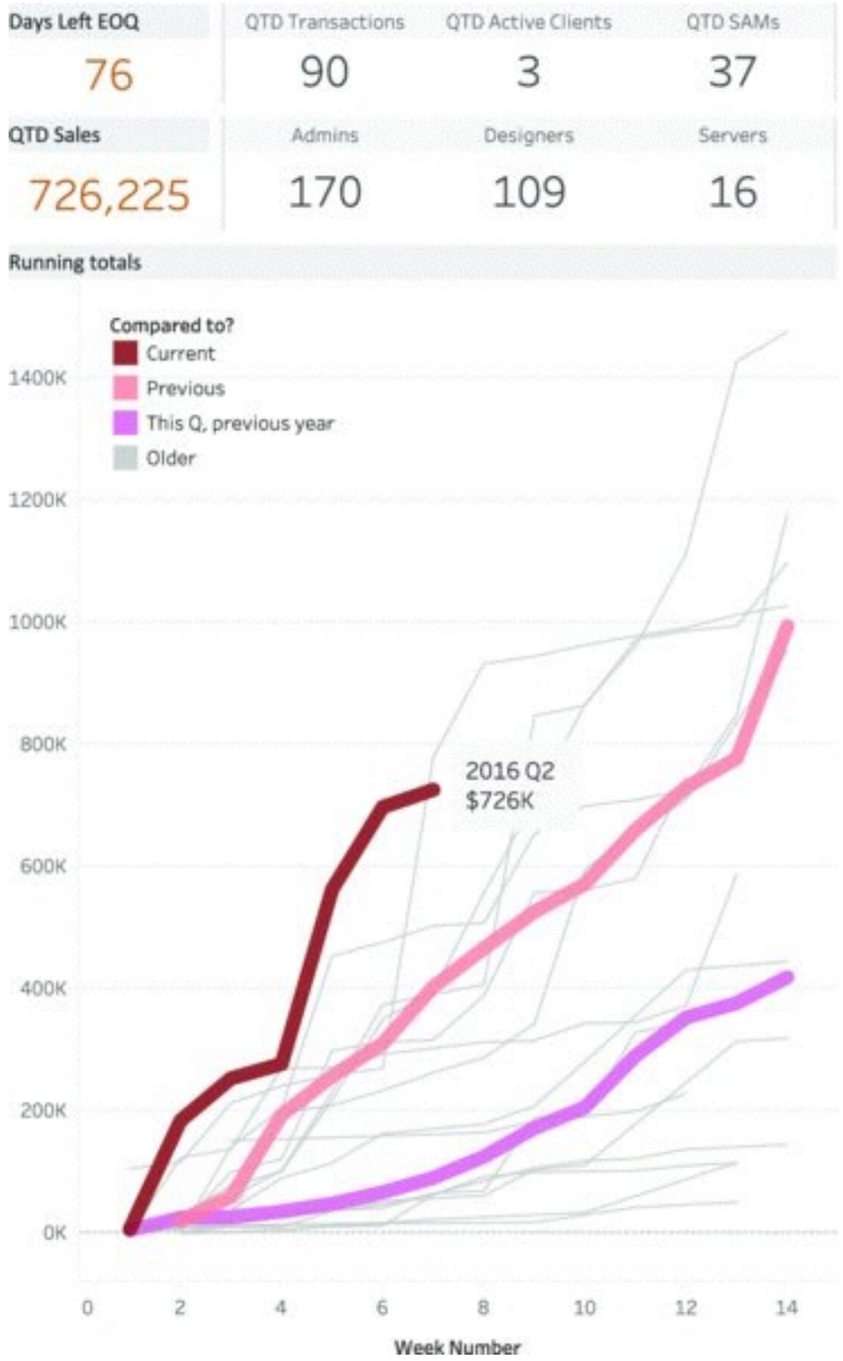
QTD Sales	Admins	Designers	Servers
726,225	170	109	16

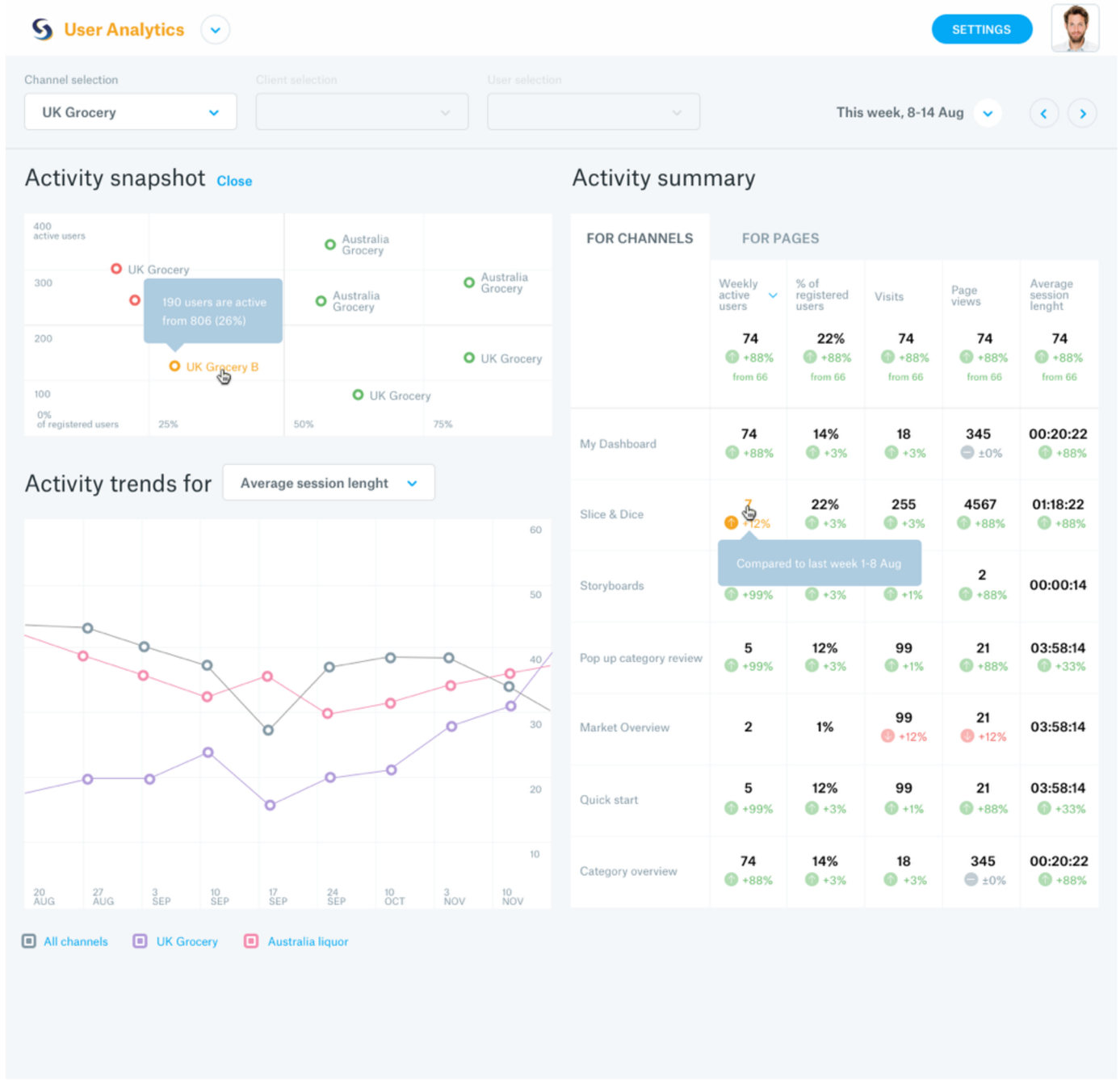
Running totals

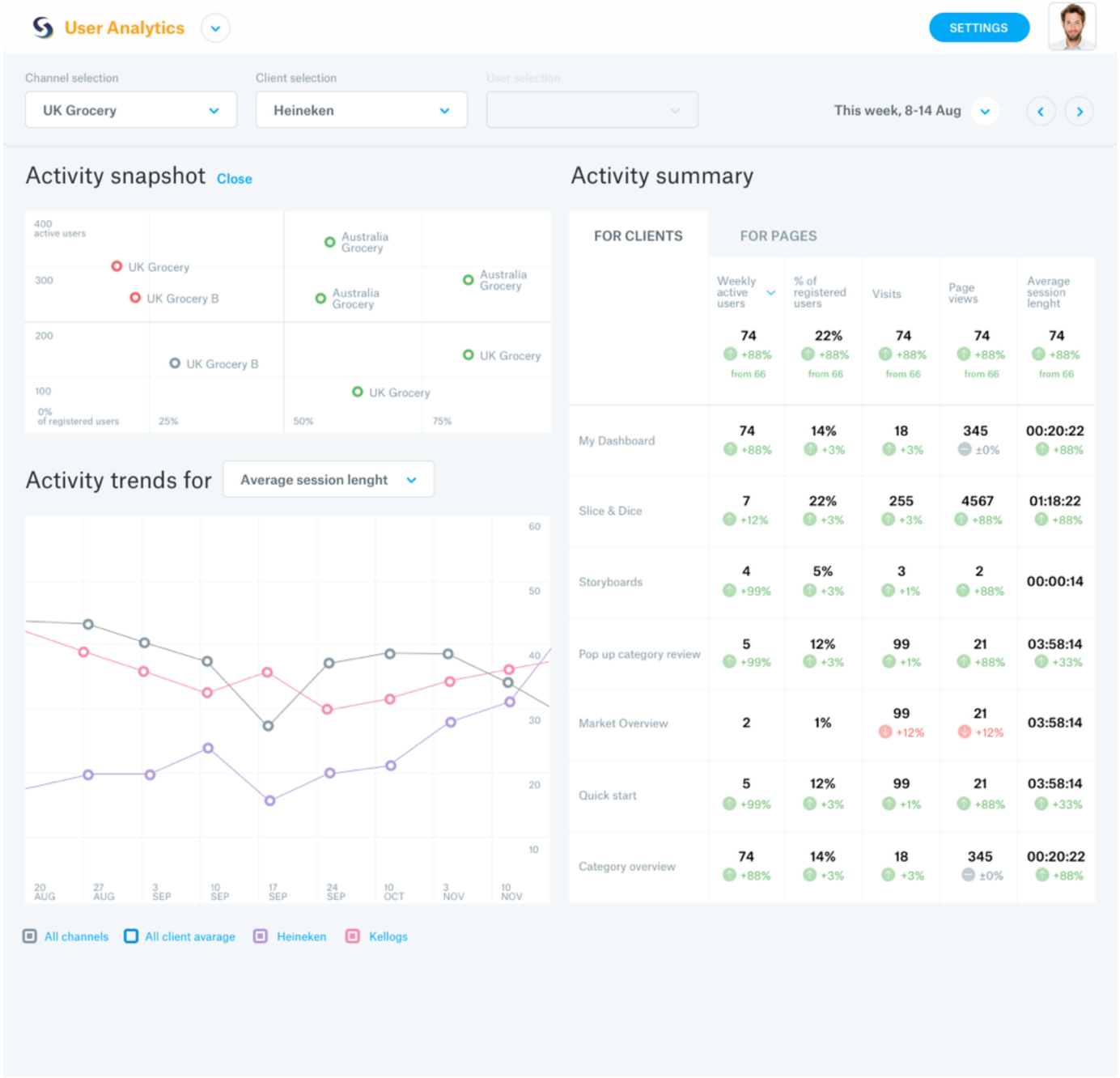


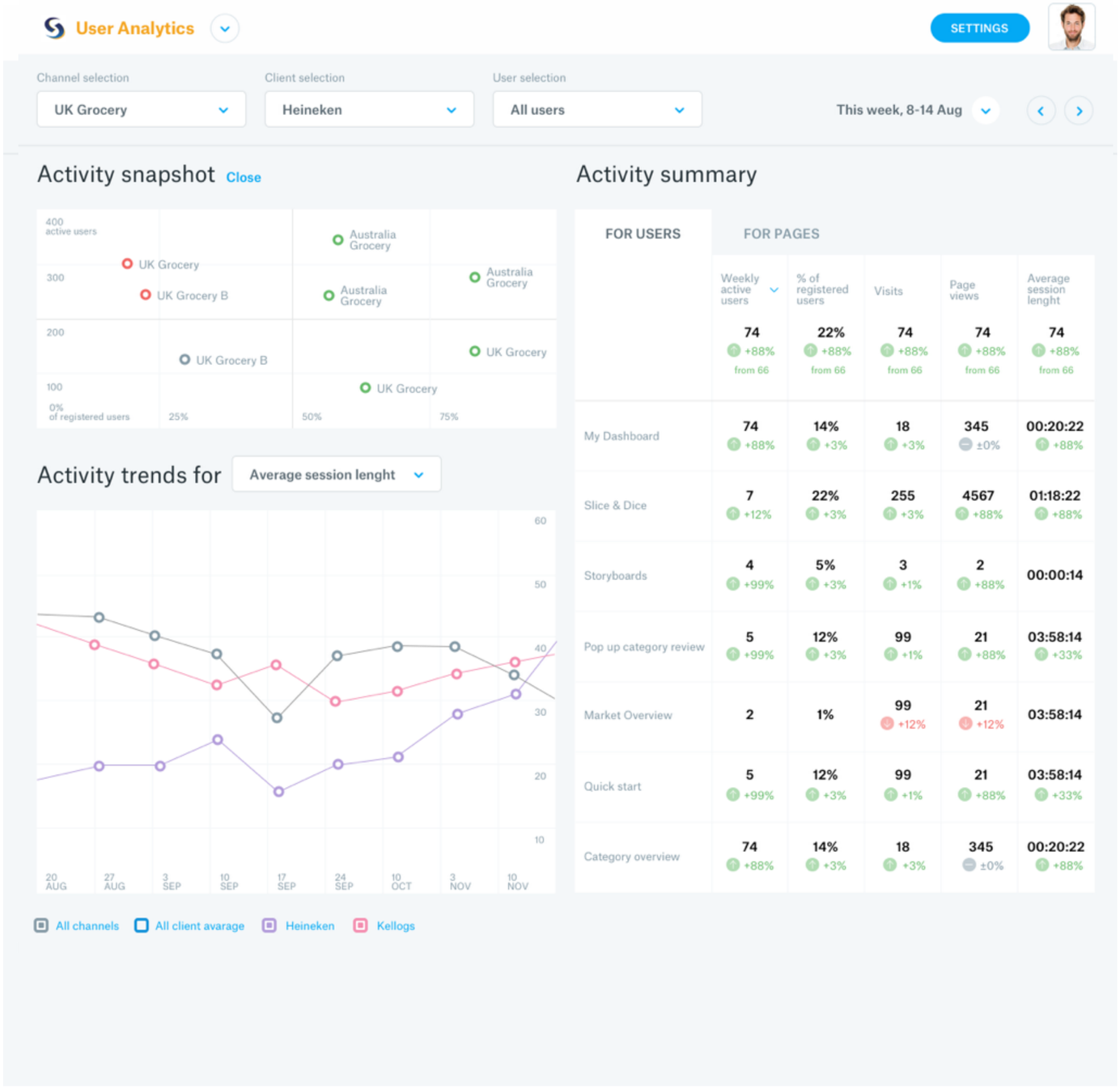
Quarterly Metrics

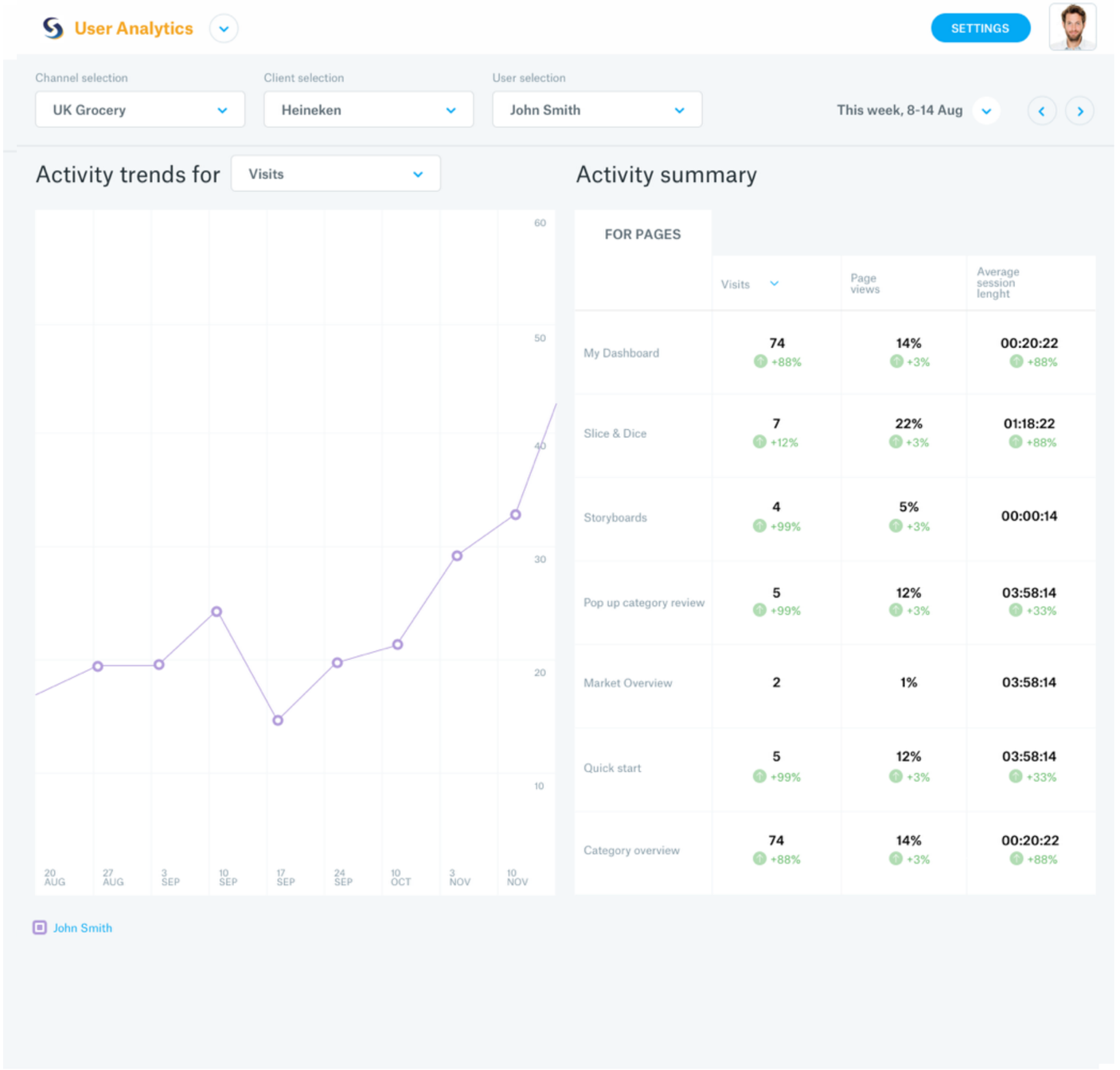



Days Left EOQ
76
QTD Transactions
90
QTD Active Clients
3
QTD SAMs
37
QTD Sales
726,225
Admins
170
Designers
109
Servers
16
Running totals
Compared to?
Current
Previous
This Q, previous year
Older
1400K
1200K
1000K
800K
600K
400K
200K
0K
2016 Q2
$726K
0
2
4
6
8
10
12
14
Week Number


User Analytics
SETTINGS
Channel selection
UK Grocery
Client selection
User selection
This week, 8-14 Aug
Activity snapshot
Close
400
active users
300
200
100
0%
of registered users
25%
50%
75%
UK Grocery
190 users are active
from 806 (26%)
UK Grocery B
Australia
Grocery
Australia
Grocery
Australia
Grocery
UK Grocery
UK Grocery
Activity trends for
Average session lenght
60
50
40
30
20
10
20
AUG
27
AUG
3
SEP
10
SEP
17
SEP
24
SEP
10
OCT
3
NOV
10
NOV
All channels
UK Grocery
Australia liquor
Activity summary
FOR CHANNELS
FOR PAGES
Weekly active users
% of registered users
Visits
Page views
Average session lenght
74 +88% from 66
22% +88% from 66
74 +88% from 66
74 +88% from 66
74 +88% from 66
My Dashboard
74 +88%
14% +3%
18 +3%
345 ±0%
00:20:22 +88%
Slice & Dice
7 -12%
22% +3%
255 +3%
4567 +88%
01:18:22 +88%
Compared to last week 1-8 Aug
Storyboards
+99%
+3%
+1%
2 +88%
00:00:14
Pop up category review
5 +99%
12% +3%
99 +1%
21 +88%
03:58:14 +33%
Market Overview
2
1%
99 -12%
21 -12%
03:58:14
Quick start
5 +99%
12% +3%
99 +1%
21 +88%
03:58:14 +33%
Category overview
74 +88%
14% +3%
18 +3%
345 ±0%
00:20:22 +88%


User Analytics
SETTINGS
Channel selection
UK Grocery
Client selection
Heineken
User selection
This week, 8-14 Aug
Activity snapshot
Close
400 active users
300
200
100
0% of registered users
25%
50%
75%
UK Grocery
UK Grocery B
Australia Grocery
Activity summary
FOR CLIENTS
FOR PAGES
Weekly active users
% of registered users
Visits
Page views
Average session lenght
74 +88% from 66
22% +88% from 66
74 +88% from 66
74 +88% from 66
74 +88% from 66
My Dashboard 74 +88% 14% +3% 18 +3% 345 ±0% 00:20:22 +88%
Slice & Dice 7 +12% 22% +3% 255 +3% 4567 +88% 01:18:22 +88%
Storyboards 4 +99% 5% +3% 3 +1% 2 +88% 00:00:14
Pop up category review 5 +99% 12% +3% 99 +1% 21 +88% 03:58:14 +33%
Market Overview 2 1% 99 +12% 21 +12% 03:58:14
Quick start 5 +99% 12% +3% 99 +1% 21 +88% 03:58:14 +33%
Category overview 74 +88% 14% +3% 18 +3% 345 ±0% 00:20:22 +88%
Activity trends for
Average session lenght
60
50
40
30
20
10
20 AUG
27 AUG
3 SEP
10 SEP
17 SEP
24 SEP
10 OCT
3 NOV
10 NOV
All channels
All client avarage
Heineken
Kellogs


User Analytics
SETTINGS
Channel selection
UK Grocery
Client selection
Heineken
User selection
All users
This week, 8-14 Aug
Activity snapshot
Close
400 active users
300
200
100
0% of registered users
25%
50%
75%
UK Grocery
UK Grocery B
Australia Grocery
Activity trends for
Average session lenght
60
50
40
30
20
10
20 AUG
27 AUG
3 SEP
10 SEP
17 SEP
24 SEP
10 OCT
3 NOV
10 NOV
All channels
All client avarage
Heineken
Kellogs
Activity summary
FOR USERS
FOR PAGES
Weekly active users
% of registered users
Visits
Page views
Average session lenght
74 +88% from 66
22% +88% from 66
74 +88% from 66
74 +88% from 66
74 +88% from 66
My Dashboard 74 +88% 14% +3% 18 +3% 345 ±0% 00:20:22 +88%
Slice & Dice 7 +12% 22% +3% 255 +3% 4567 +88% 01:18:22 +88%
Storyboards 4 +99% 5% +3% 3 +1% 2 +88% 00:00:14
Pop up category review 5 +99% 12% +3% 99 +1% 21 +88% 03:58:14 +33%
Market Overview 2 1% 99 +12% 21 +12% 03:58:14
Quick start 5 +99% 12% +3% 99 +1% 21 +88% 03:58:14 +33%
Category overview 74 +88% 14% +3% 18 +3% 345 ±0% 00:20:22 +88%


User Analytics
SETTINGS
Channel selection
UK Grocery
Client selection
Heineken
User selection
John Smith
This week, 8-14 Aug
Activity trends for
Visits
60
50
40
30
20
10
20 AUG
27 AUG
3 SEP
10 SEP
17 SEP
24 SEP
10 OCT
3 NOV
10 NOV
John Smith
Activity summary
FOR PAGES
Visits
Page views
Average session lenght
My Dashboard 74 +88% 14% +3% 00:20:22 +88%
Slice & Dice 7 +12% 22% +3% 01:18:22 +88%
Storyboards 4 +99% 5% +3% 00:00:14
Pop up category review 5 +99% 12% +3% 03:58:14 +33%
Market Overview 2 1% 03:58:14
Quick start 5 +99% 12% +3% 03:58:14 +33%
Category overview 74 +88% 14% +3% 00:20:22 +88%

THANK YOU FOR YOUR ATTENTION!

DR. ANDRÁS RUNG

andras.rung@ergomania.eu
+36 30 397 5008
www.ergomania.eu

ERGOMANIA

Hungary’s first UX agency
15 years of experience