Effective Data Visualization Do's and Don’ts

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PUBLIC

THE BEST RUN SAP®

Effective Data Visualization Do's and Don’ts

"*...a visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance*“

Stephen Few

"*An effective dashboard is the product not of cute gauges, meters and traffic lights, but rather of informed design: more science than art, more simplicity than dazzle. It is, above all else, about communication*“

Stephen Few

Effective Data Visualization Do's and Don’ts

Visual design is about solving problems and providing elegant solutions

Good design means never having to say “Click Here.”

Effective Data Visualization Do's and Don’ts

Dashboards

… are visual displays

… should be presented on a single screen

… should instantly accessible

… need to support the objectives of the viewers

… should only show relevant information

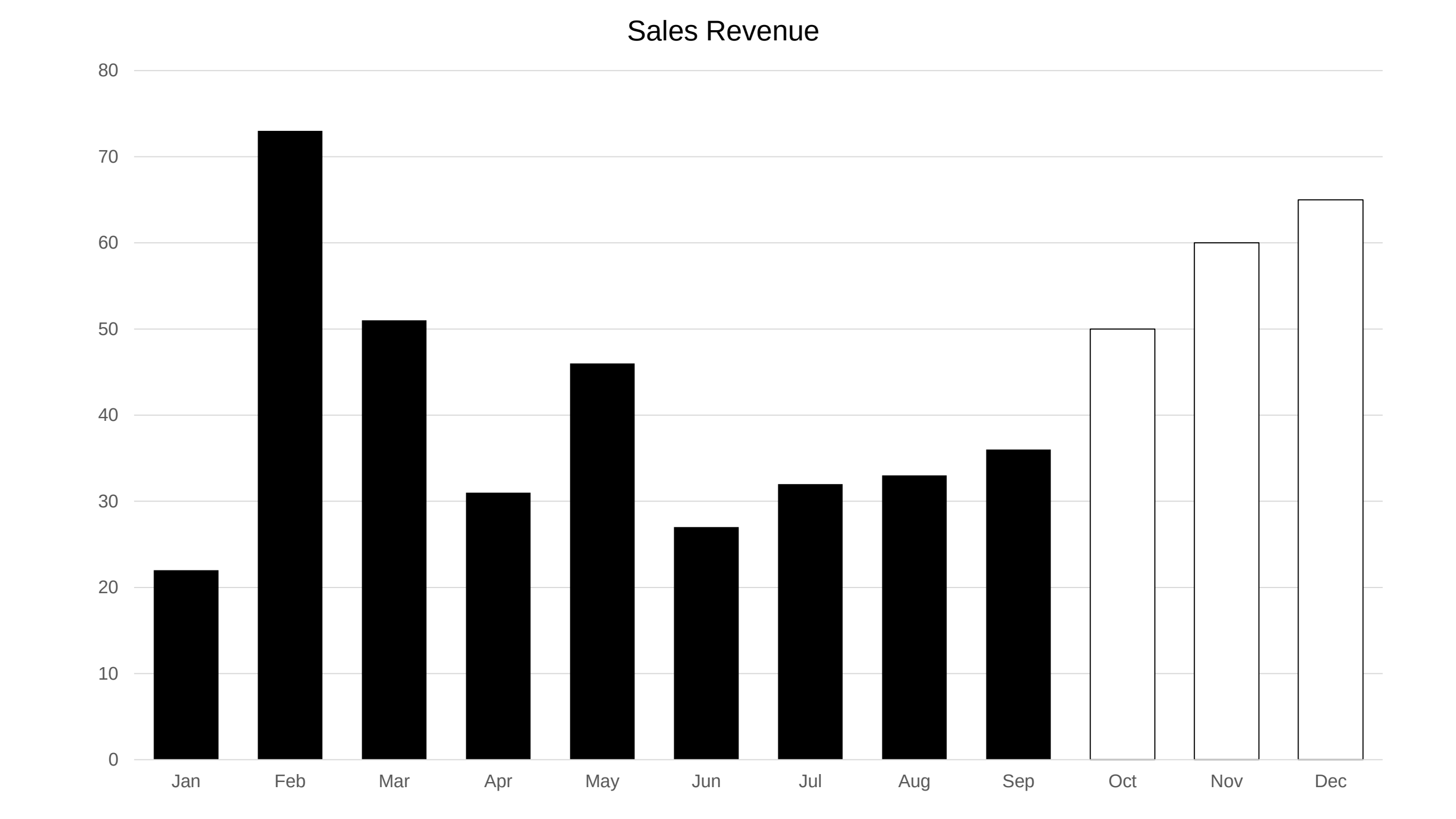
… should help to gain an instant understanding of the data

… should use the space economically

Effective Data Visualization Do's and Don’ts

John Snow’s (circa 1854) deduction that a cholera epidemic was caused by a bad water pump, circa 1854.

Horizontal lines indicate location of deaths.


Sales Revenue
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

Requirements & Prototyping

Step 1: Observe and Understand

Use a “Top – Down” approach

- Start with the Problem
  – Why are we creating this visualization ?
- Learn what the associated business goals are
- Identify how the impact can be measured
- Who is the audience for the visualization?

Learn about existing “solutions” to the problem

- Do reports or dashboards already exist ?
- How are people using them ?
- What do people “like” and “don’t like” about them ?
- What are the KPIs and related corporate goals?

Step 2: Define

- A KPI represents a metric that is linked to a company goal.
- A KPI should indicate how the company is doing compared to the agreed-upon goals.
- A KPI should have concrete goals and timelines associated with it
- You should be able to articulate how important the KPI is for the overall company success

Effective Data Visualization Do's and Don’ts

Requirements & Prototyping

Step 2: Define

- Who in the organization needs this KPI?
- What is the business problem they are trying to solve when using this KPI?
- How is this KPI defined?
- Where is the data that is relevant for this KPI?
- Are there related KPIs that are often used in combination?
- What are some of the common terms and abbreviations for this KPI?
- How often is the data being updated or calculated for this KPI?
- What is the required granularity for this KPI?
- What are the company goals related to this KPI?
- What are the defined thresholds for this KPI?
- Does the KPI have a particular owner?
- On which organizational level is this KPI being used?
- Which decisions are impacted by this KPI?
- What are the related or supporting measures?
- What are the key influencing factors for this KPI?
- What are the most typical timeframes used for this KPI?

Step 3: Ideate

DATA related requirements

- Define and document all your KPIs and measures
- Outline all required data sources
- Identify potential data model changes

USER INTERACTION related requirements

- How are users going to use the dashboard ? (desktop, tablet, phone)
- How is the navigation path of the user ?
- What user interaction are required ? (Print, Export, Sharing, commenting, exploration, interactivity…)

DASHBOARD DESIGN related requirements

- Overall Layout of the dashboard
- Corporate Identity
- “Design” aspects for consuming data

Step 4: Prototype

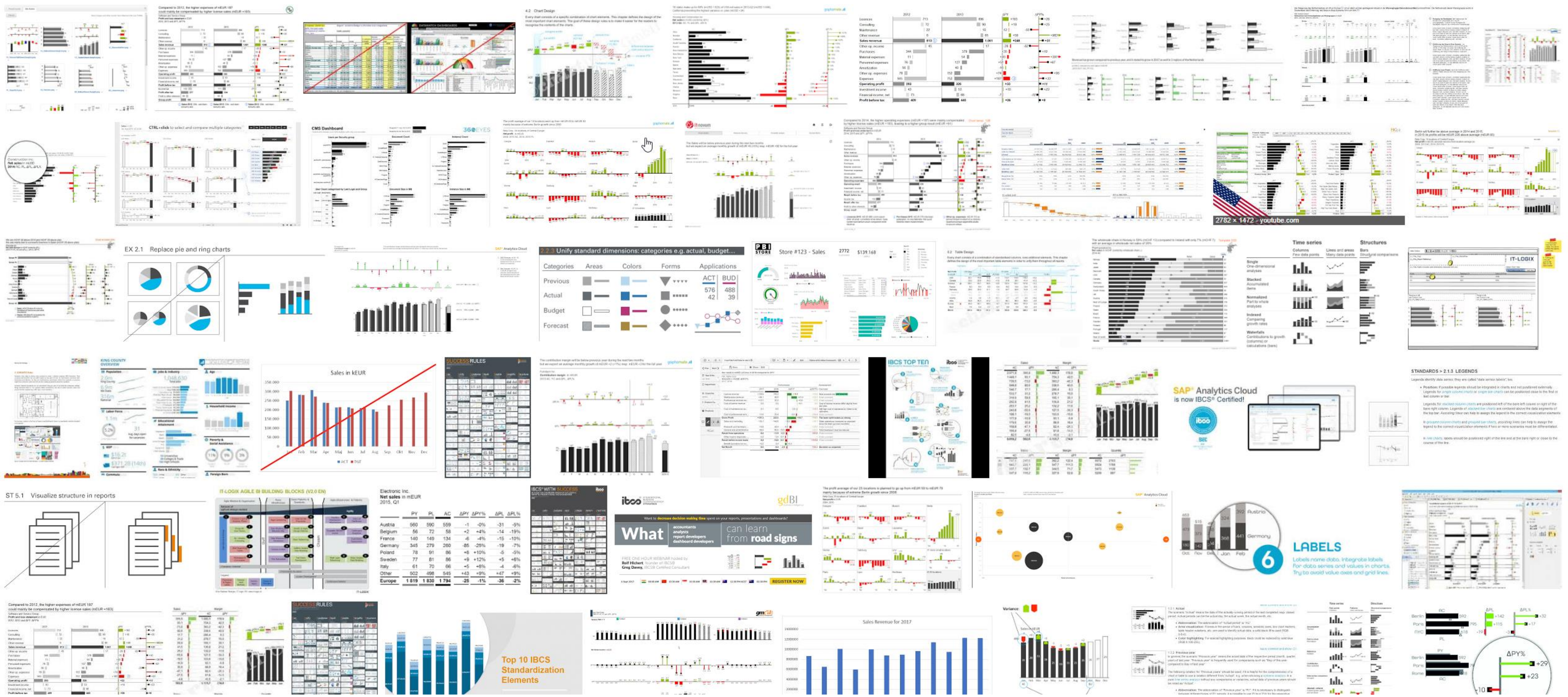
- Start with a User Story (short, simple, from the perspective of the business user)
- Leverage a agile methodology and gather feedback frequent
- Consider the different devices and different user interactions
- Create your own library of templates for mockups
- Try to create interactive mockups
- Do not look for the “perfect” product at this stage

Prototyping Software

- Balsamiq (https://balsamiq.com/products/mockups/)
  - Mockups; large online library of templates
- Axure (http://www.axure.com/)
  - Interactive HTML mockups
- OmniGraffle (https://www.omnigroup.com/omnigraffle/)
  - Mac, iPad

Dashboard Design

Source: Google search “Great dashboards”, July 20, 2016


EX 2.1 Replace pie and ring charts
Unify standard dimensions: categories e.g. actual, budget...
Categories
Areas
Colors
Forms
Applications
Previous
Actual
Budget
Forecast
ACT
BUD
Store #123 - Sales
CMS Dashboard
2782 × 1472 - youtube.com
Sales in kEUR
SUCCESS RULES
IBCS TOP TEN
SAP Analytics Cloud is now IBCS® Certified!
STANDARDS > 2.1.3 LEGENDS
ST 5.1 Visualize structure in reports
IT-LOGIX AGILE BI BUILDING BLOCKS (V2.0 EN)
Electronic Inc.
Net sales in mEUR
2015, Q1
What
can learn
from road signs
LABELS
Top 10 IBCS Standardization Elements
Sales Revenue for 2017
Time series
Structures

Dashboard Design

- Basic Rules
- Structure & Alignment
- Color and Contrast
- Proximity and Similarity
- Consistency, Consistency, Consistency
- Display Media (= Chart type)
- Removing Clutter
- Examples & Checklists

Effective Data Visualization Do's and Don’ts

Dashboard Design – Basic Rules

Number Scaling

- Try to eliminate large number of digits / decimals
- Always include the Scaling factor
- Charts should follow an identical scaling

Units

- Always include Unit information
- Either show once per dashboard or per KPI (based on values)

Always provide Context

- Showing a simple number “does not help” (context is King!)
- Share information, such as the value from last year, Target value, Forecast, …

Include an Online Help

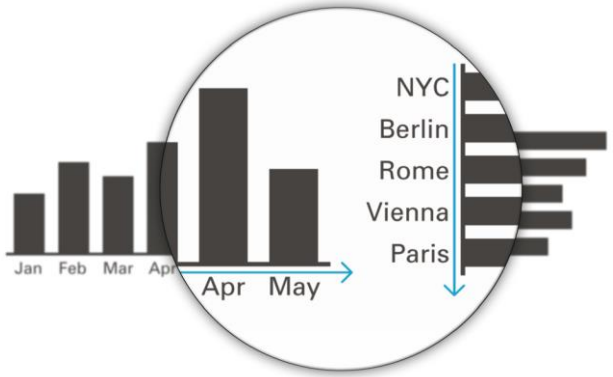
- Not everyone might know your typical abbreviation

Effective Data Visualization Do's and Don’ts

Dashboard Design – Basic Rules

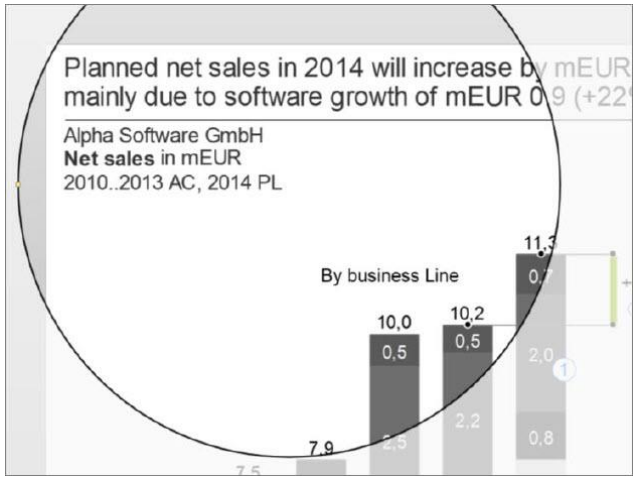
Charts

- Should follow an identical scaling
- Horizontal Structure = Time
- Vertical Structure = Categories / not time based



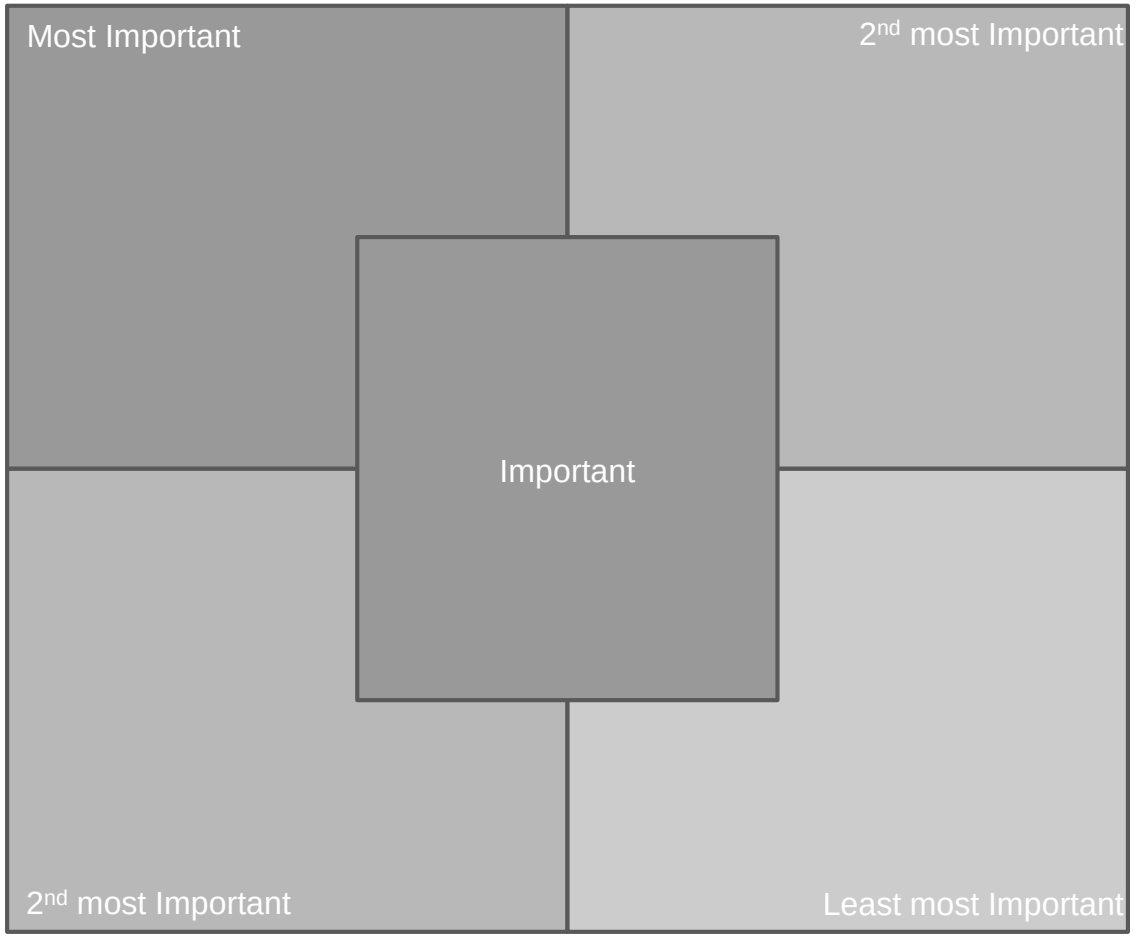
Title / Subtitle

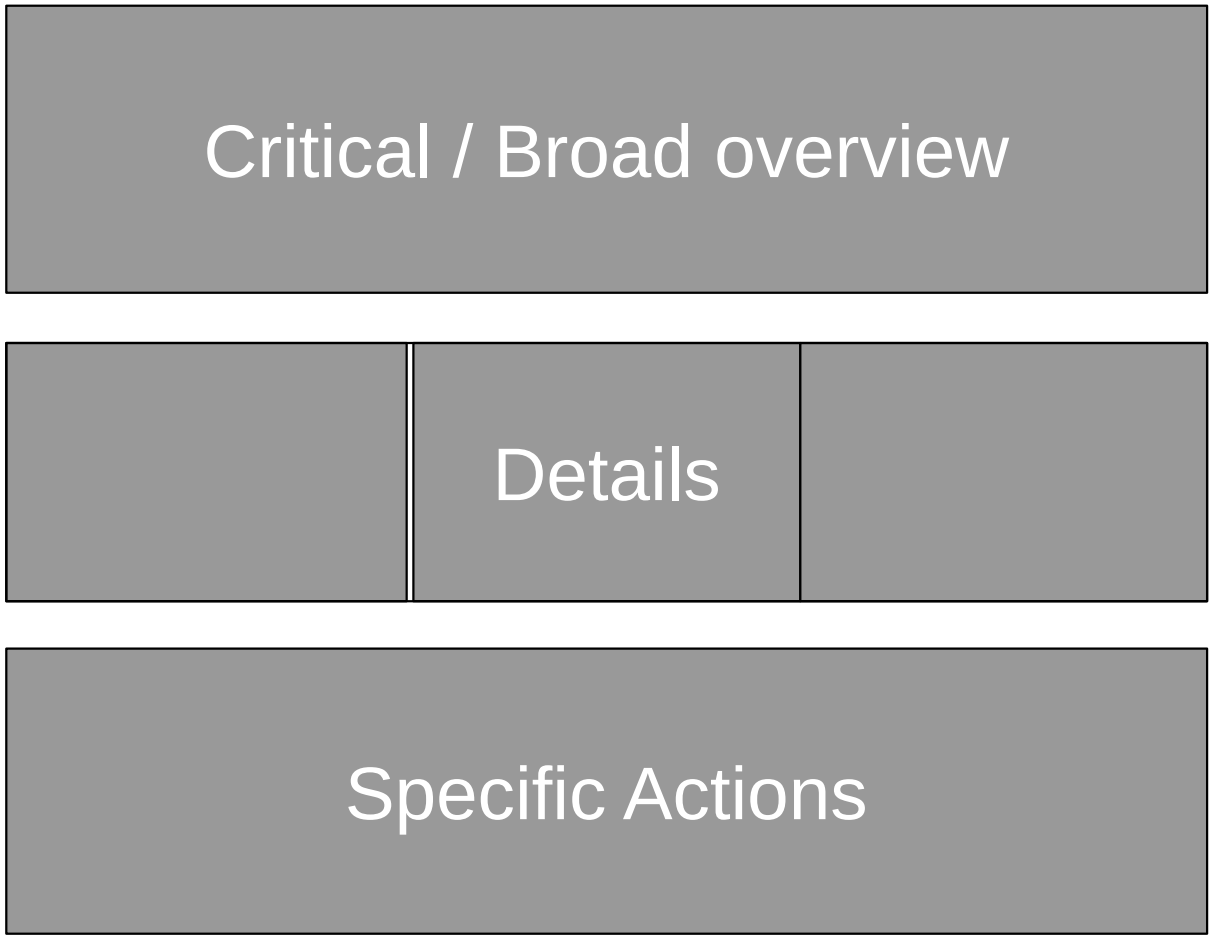
- Should include: measure, time periods



Effective Data Visualization Do's and Don’ts

Dashboard Design – Structure & Alignment





Effective Data Visualization Do's and Don’ts

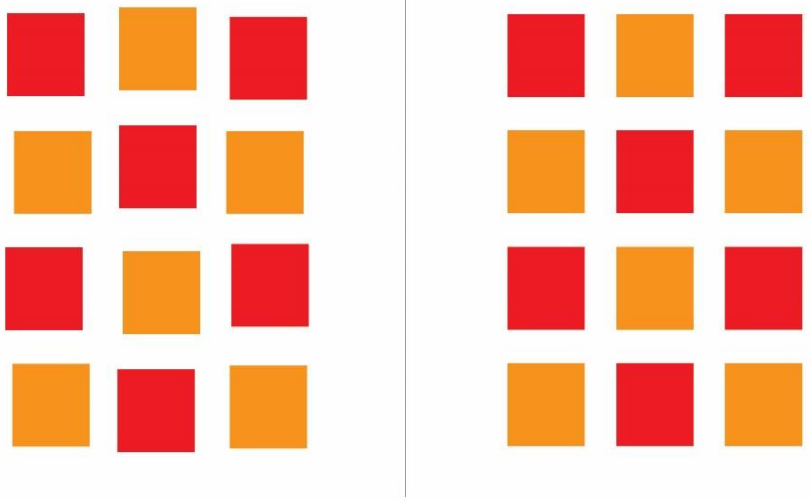
Dashboard Design – Structure & Alignment

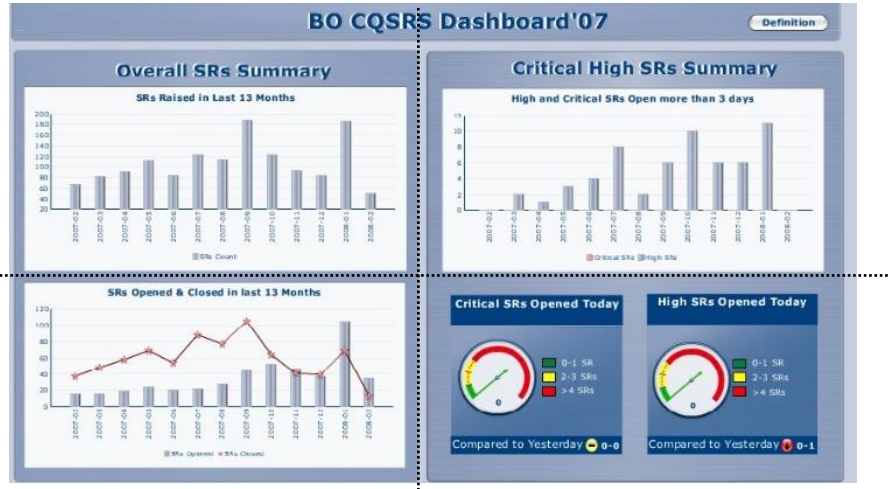
Strong alignment helps to shape the first impression

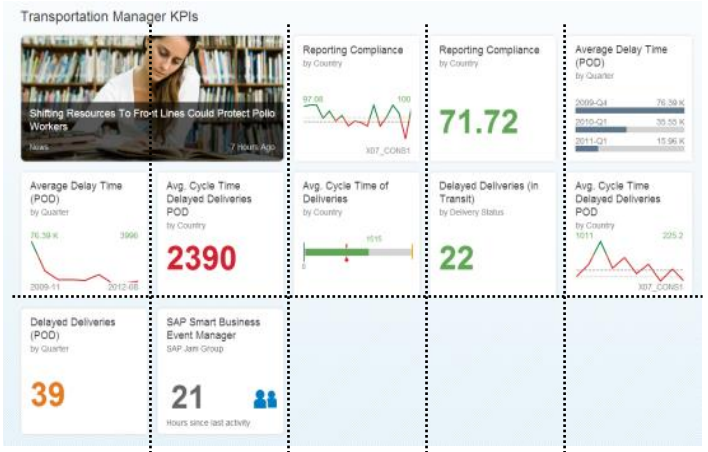
Effective Data Visualization Do's and Don’ts

Dashboard Design – Structure & Alignment

- Alignment is the backbone of the overall design, giving a the first impression of balance, stability
- Strong alignment helps organize visual elements, reduce eye movement friction
- Imagine containers for all visual elements.
- Make sure all the edges of these containers align with each other.







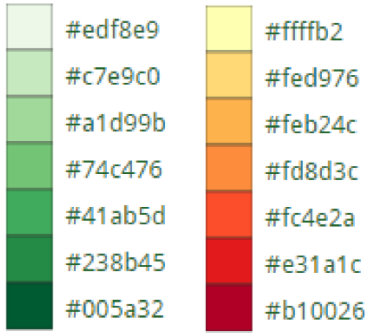
Effective Data Visualization Do's and Don’ts

Color & Contrast

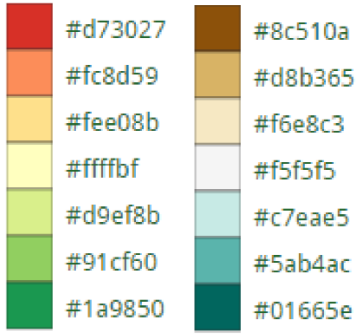
- Humans can only differentiate effectively around 7 color steps
- Adding more qualitative colors usually just adds noise.…

- **Sequential** scheme: when you are ordering values from low to high.
- **Divergent** scheme: when the values are ordered and there is a critical mid-point (e.g. an average or zero).
- **Categorical** scheme: when data falls into distinct groups (e.g. Products) and therefore requires contrast between adjacent colors.

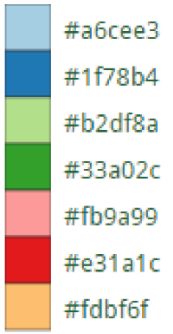
Sequential



Diverging



Qualitative

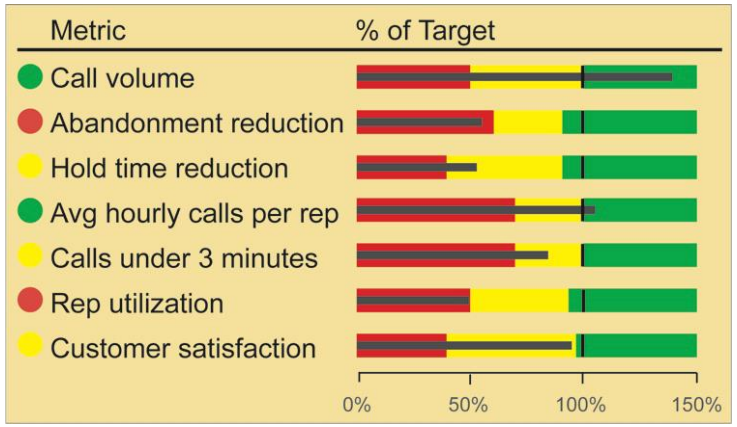


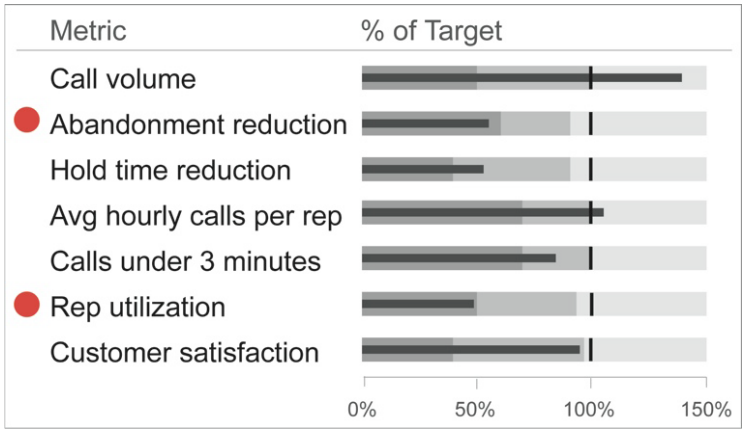
Effective Data Visualization Do's and Don’ts

Color & Contrast

Before using color ask yourself

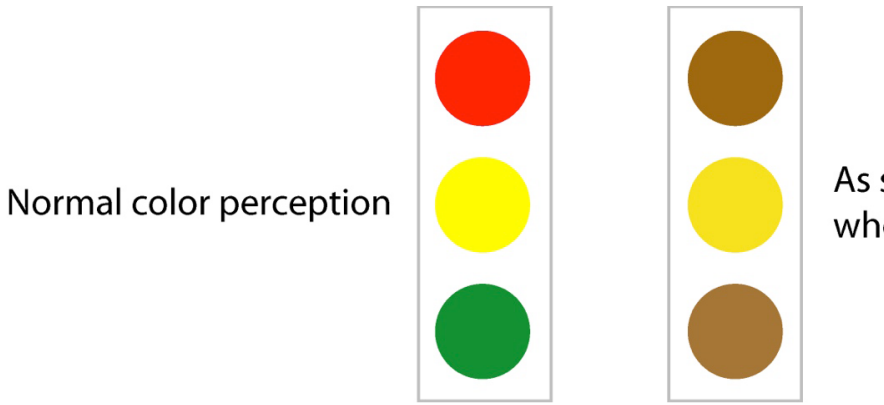
- Do we need the color ?
- Does the color have any meaning ?





Effective Data Visualization Do's and Don’ts

Color & Contrast

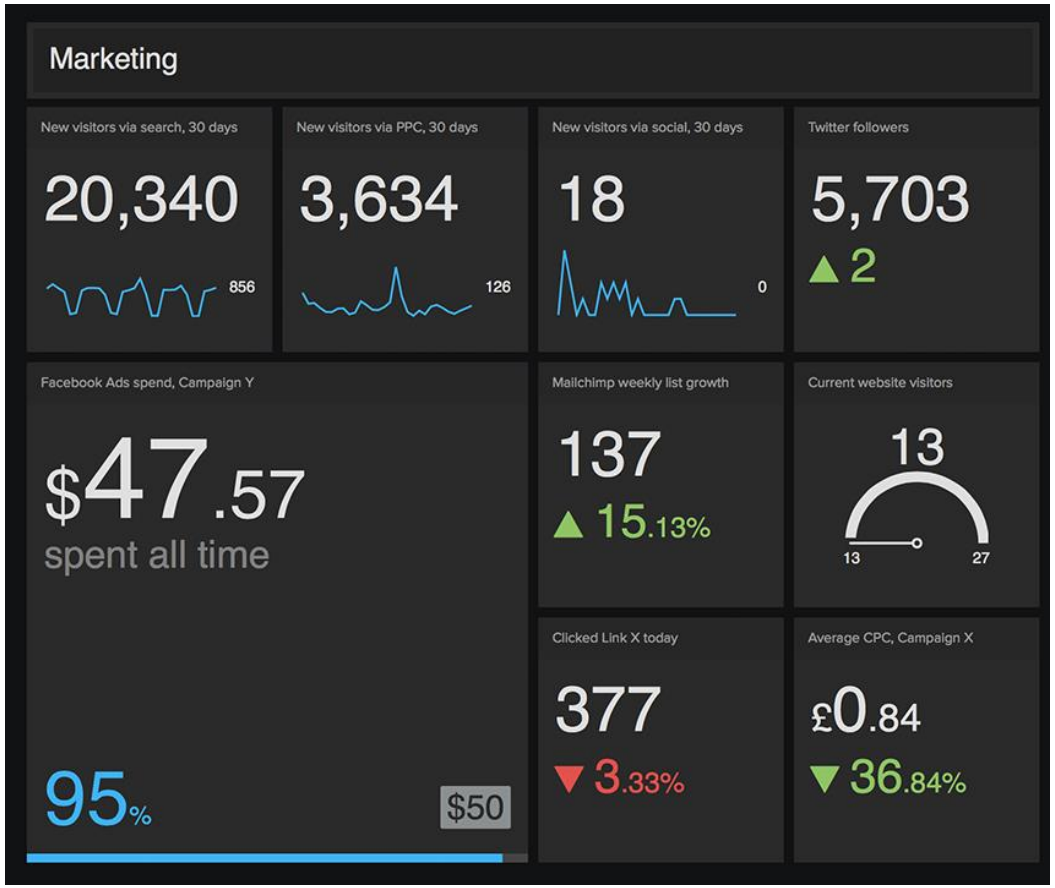


Effective Data Visualization Do's and Don’ts

Color & Contrast

Contrast is what gives your design character

Contrast implies relationship or degree of significance among visual elements



Effective Data Visualization Do's and Don’ts

Color & Contrast

Negative Space

- Background colors (colors that are background to make other colors stand out: dark grey, light grey, white)

Dominant Colors

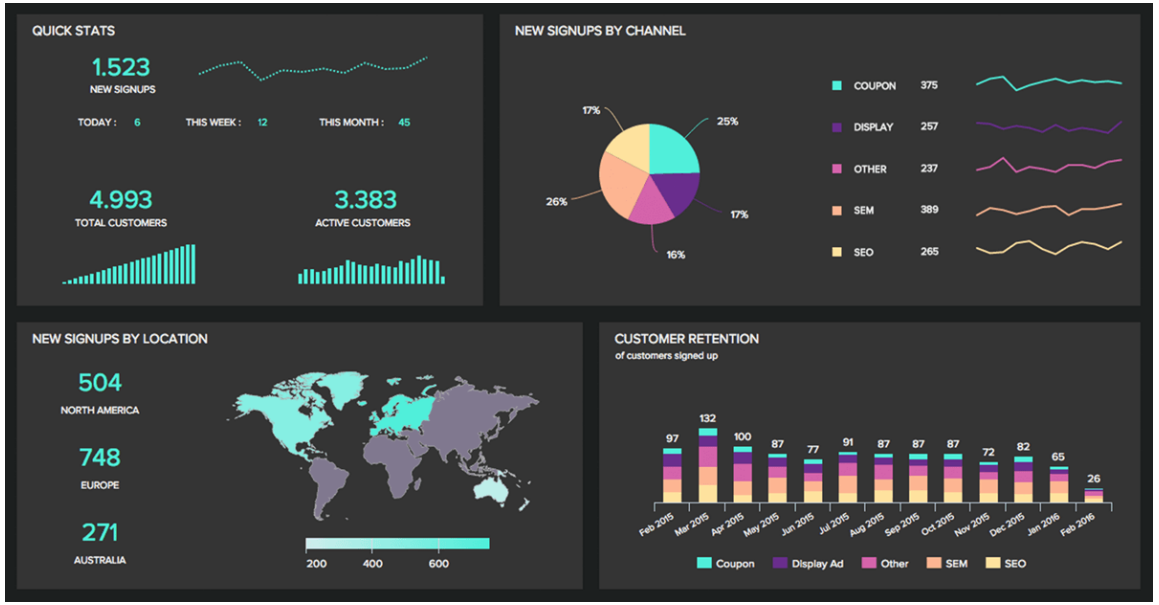
- Can play the role of create negative space or accent color
- A theme color to create an overall impression. This color is usually muted or have low brightness.

Accent Colors

- Call to Actions, Buttons, Highlighted

Semantic Colors

- Red, Green, Orange – indicators of some values. If there are semantic colors consider using less or no accent colors on the same space.



Effective Data Visualization Do's and Don’ts

Proximity and Similarity

Proximity

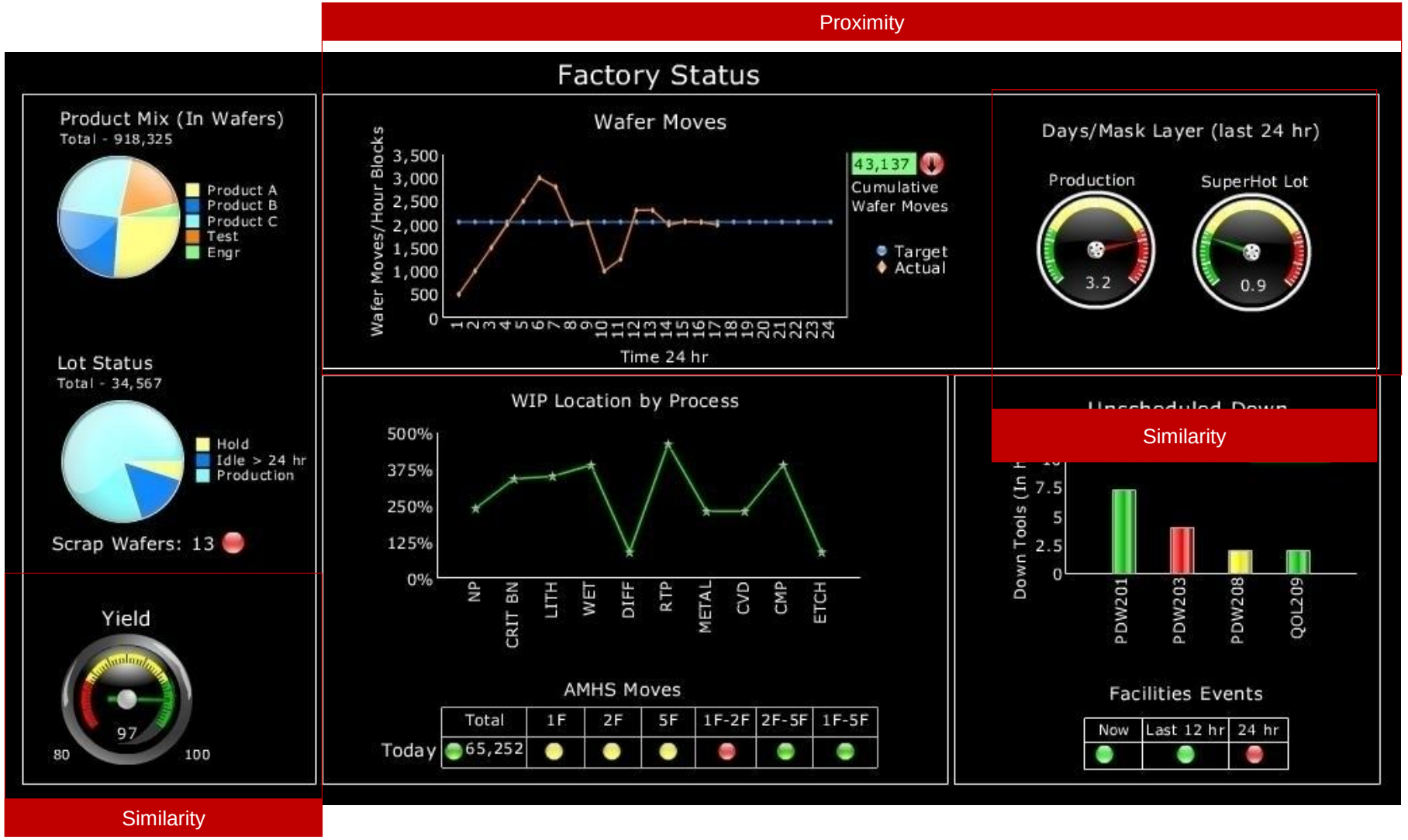
- Elements that are placed close together are belonging together
- Addition of “white space” can help to separate items

Similarity

- Elements with similar color, shape, size are perceived as being part of one group
- For example: Same size implies equal importance

Effective Data Visualization Do's and Don’ts

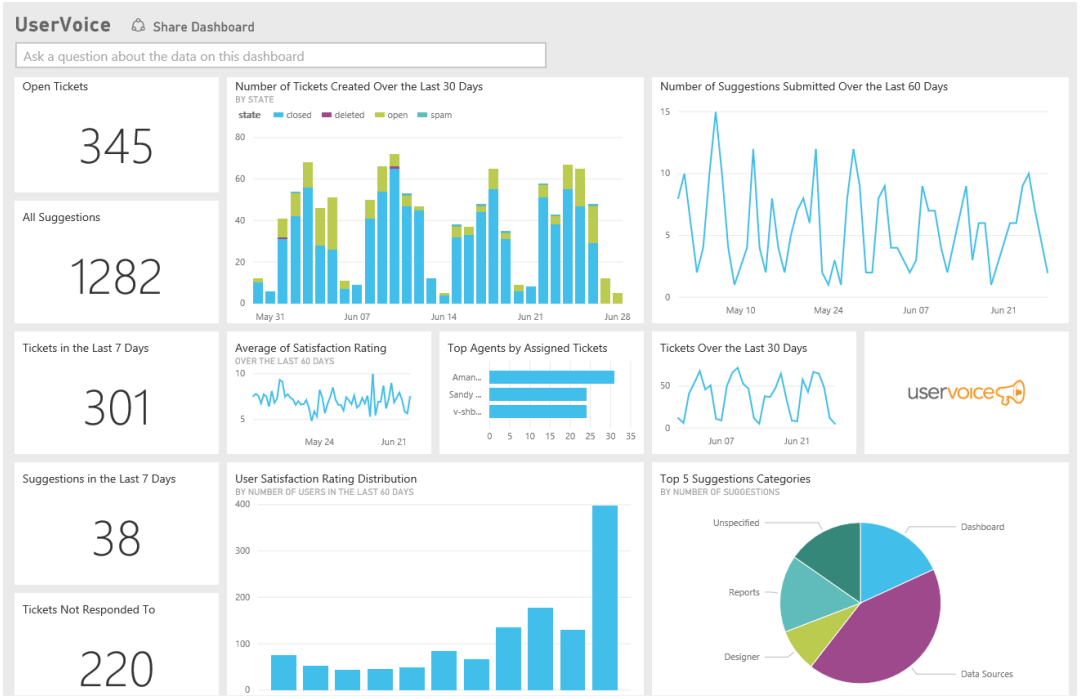
Proximity and Similarity



Effective Data Visualization Do's and Don’ts

Proximity and Similarity

- Using white space is the best for grouping visual elements. Avoid lines and shapes.
- White space needs to be used in consistent amount to create a strong alignment
  - Ex.: gray space between white area makes them easier to read and to focus on.
- Note that the use of negative space and contrast is better than just drawing borders around each chart or text.



Effective Data Visualization Do's and Don’ts

Consistency

Inconsistent Design is the “enemy” of your dashboard users.

Consistent Design allows users to
“**perceive**” and “**consume**” information instead or “**reading**” the dashboard

Consistency

- Using common and consistent terms and Icons / Symbols
- Using consistent navigation paths and options
- Provide “feedback” on actions / clicks
  - Example: Bread Crumb Filter
  - Example: A clicked button with a different color shade
- Allow your users to go “back” > “Undo Button”
- Don’t “overwhelm” your users with complex navigation
  - Example: iPhone

Effective Data Visualization Do's and Don’ts

Consistency

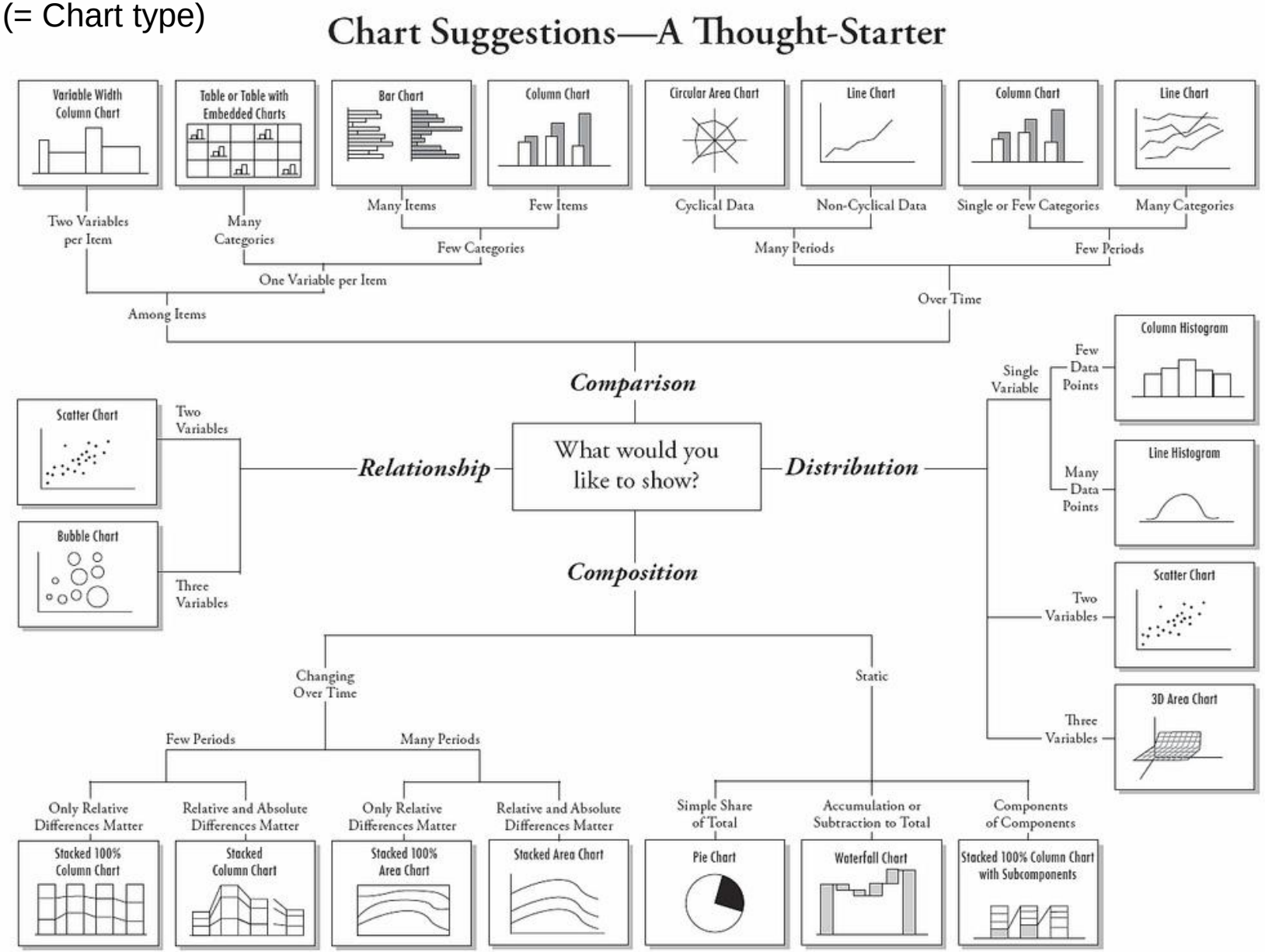
Ask Yourself (before moving the production)

- Is the style of the element in the dashboard maintained across your dashboards ?
- Is the navigation option consistent with your existing dashboards ?
- Are the icons and colors being used correct ?
- Does your user always know where in the overall dashboard he / she is ?
- Does the user have to do “guess” on any of your dialogs?
- Does the user get any confirmation when dialogues are closed?
- How easy can the user “undo” his actions?
- Does the user have to “remember” of can he “recall” things?

Shneiderman’s 8 Golden Rules to Your Interface Designs

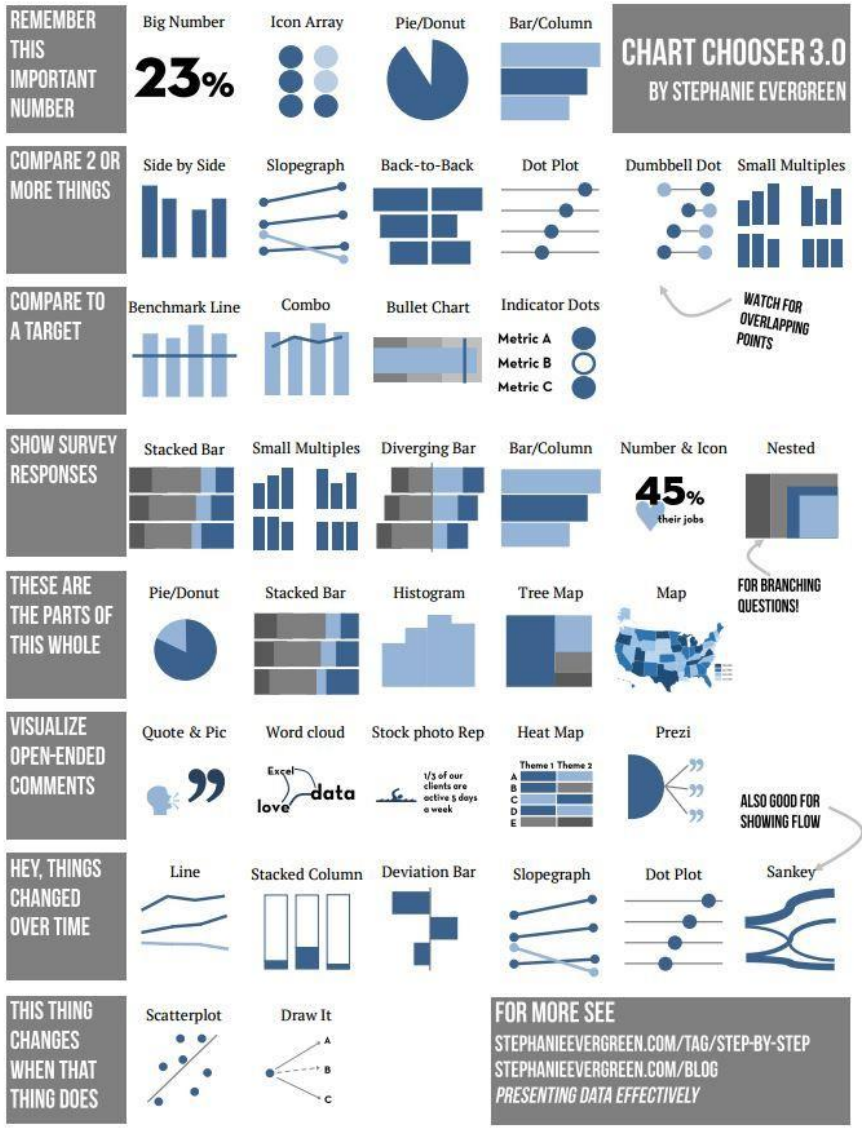
Effective Data Visualization Do's and Don’ts

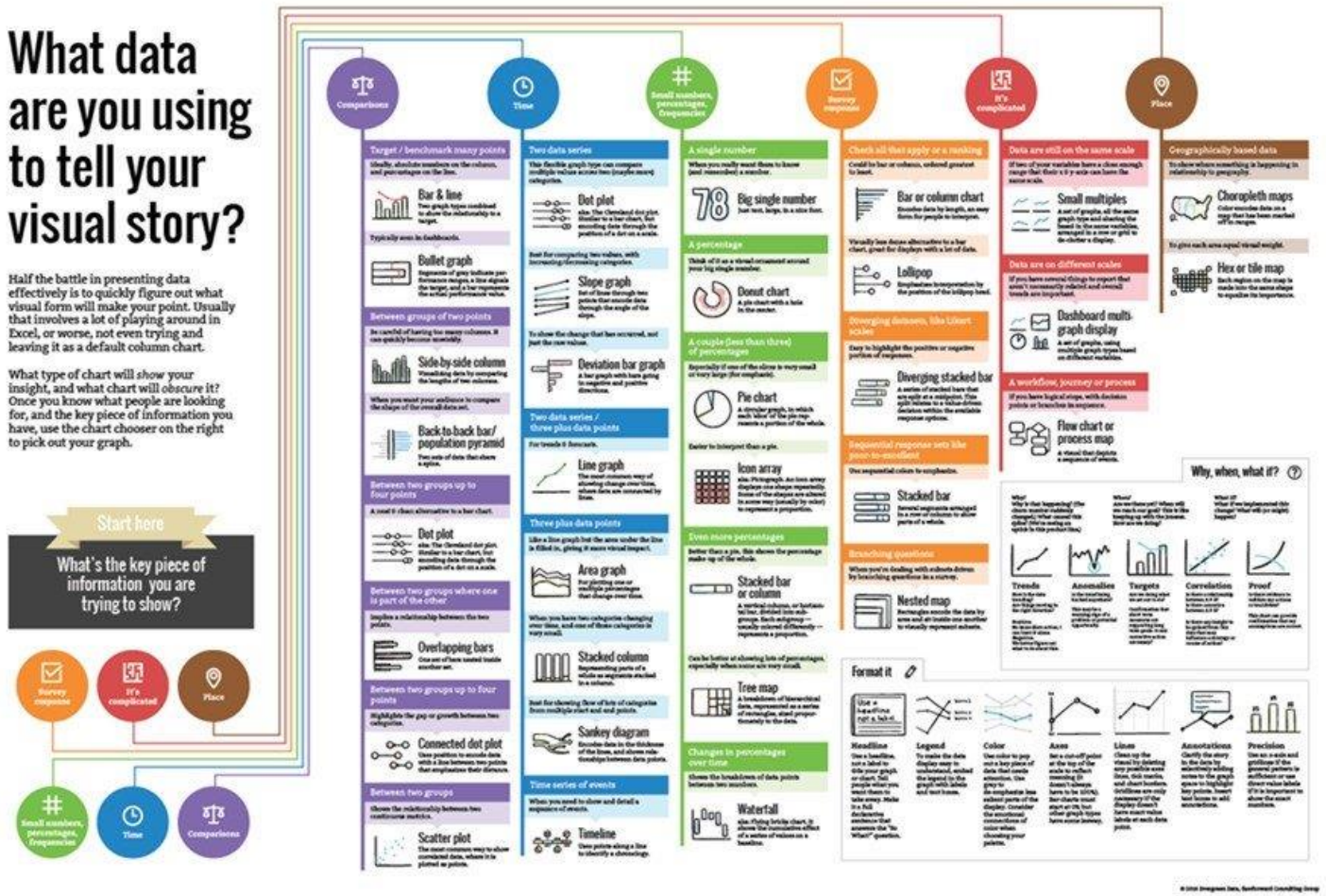
Display Media (= Chart type)



Effective Data Visualization Do's and Don’ts

Display Media (= Chart type)

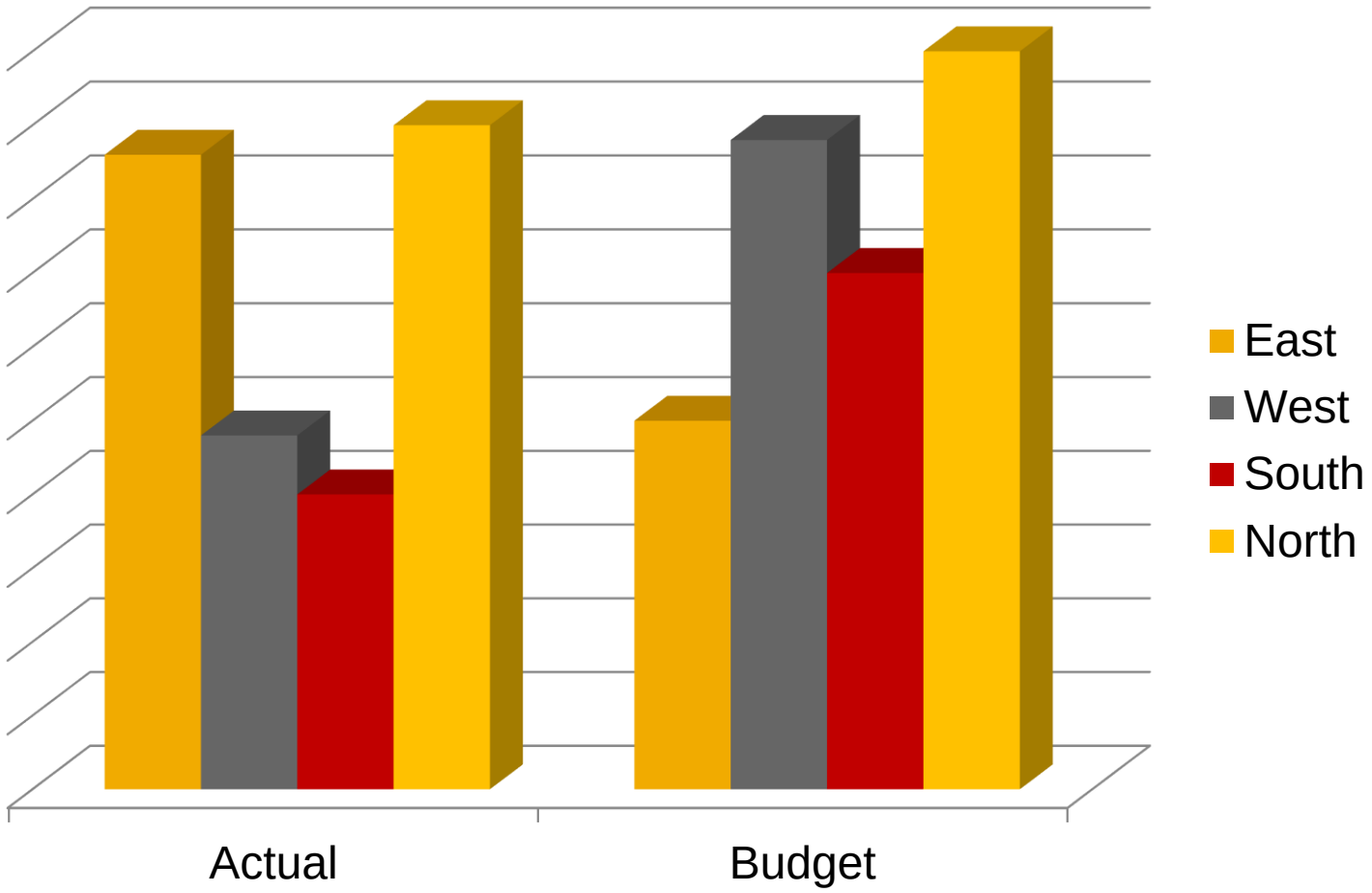




http://chartchoosercards.com/

Effective Data Visualization Do's and Don’ts

Examples



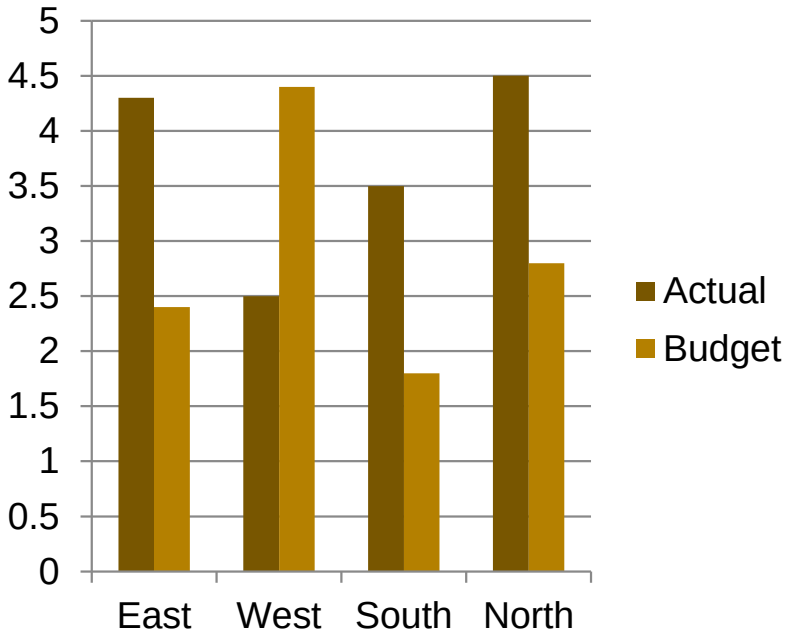
Bad Design Choices

- Too much color
- Colors are too bright (distracting)
- 3D View does not add any values
- Actual and Budget can’t be compared

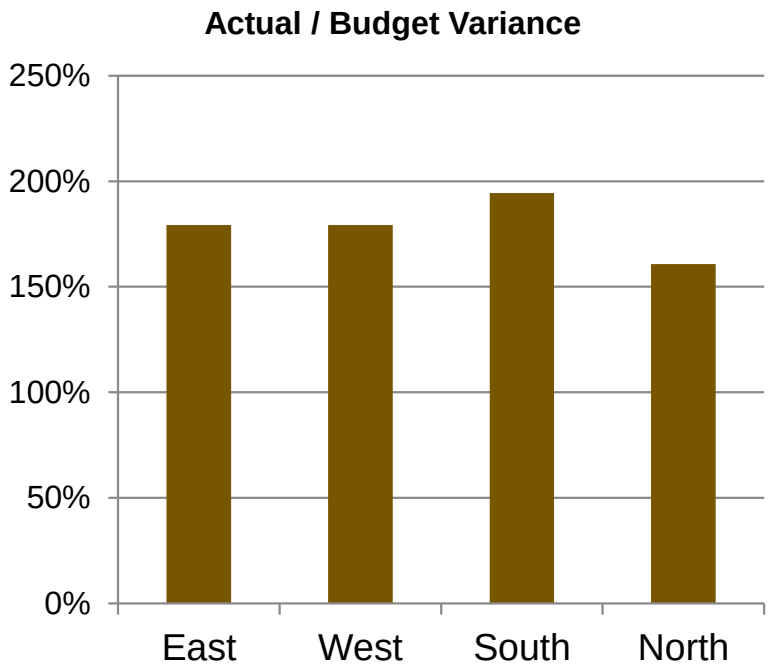
Effective Data Visualization Do's and Don’ts

Examples

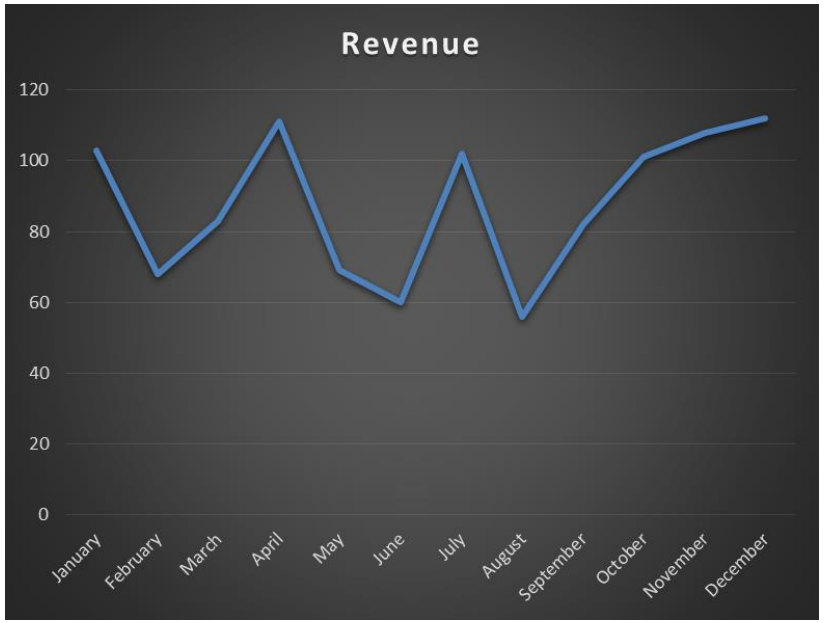
Actual and Budget can be compared now

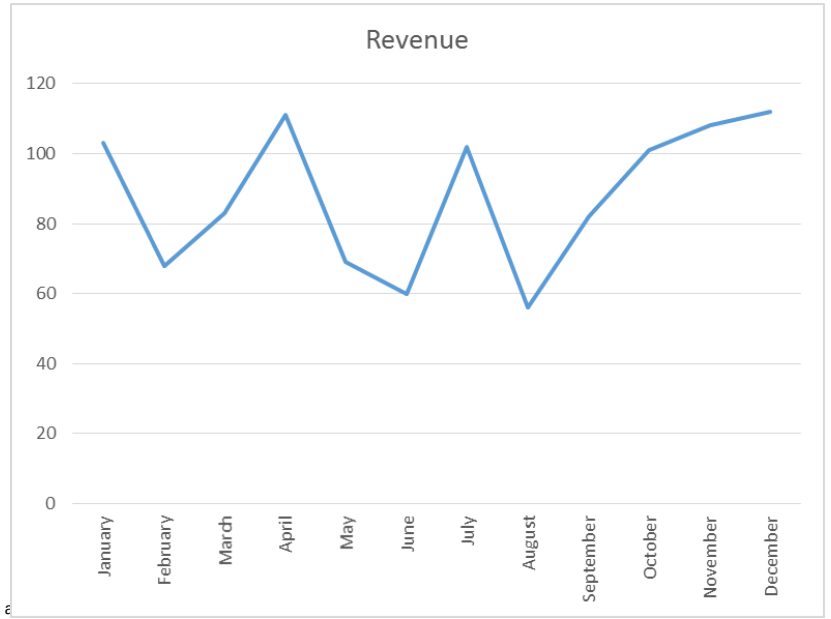


Do we need to show Actual vs Budget or just the variance ?

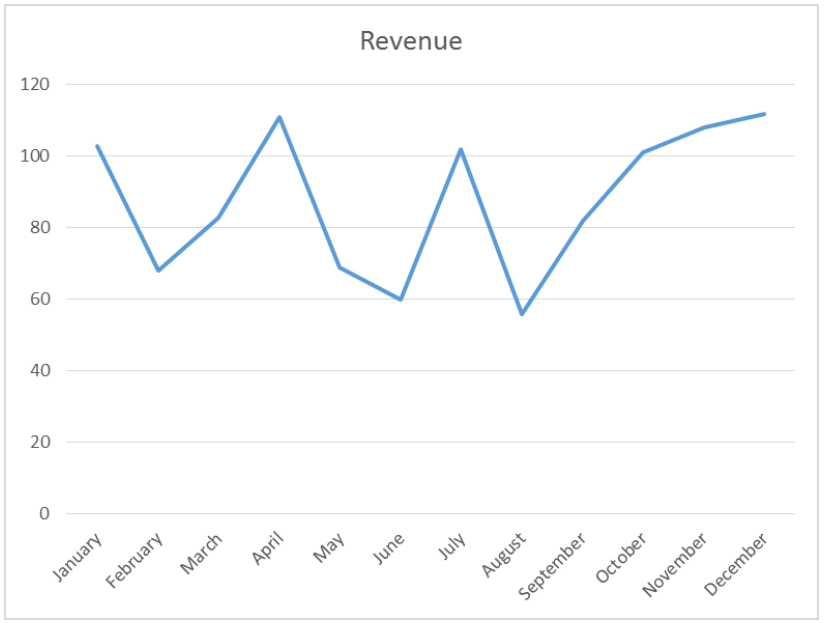


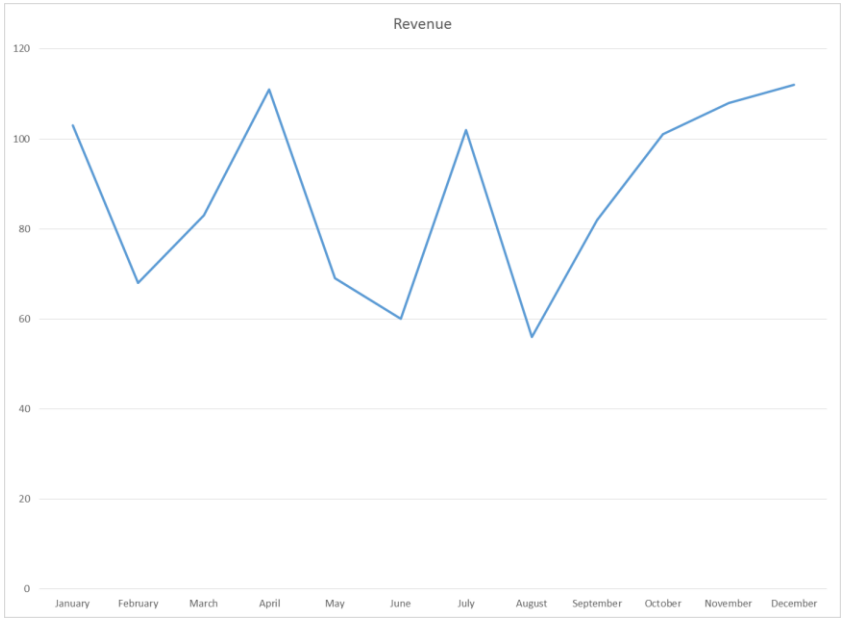
Bad





Good





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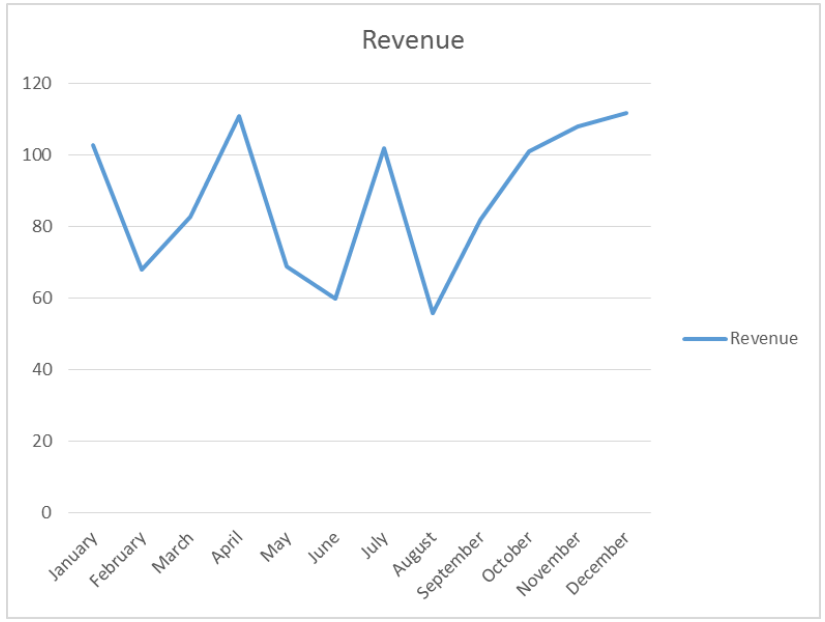

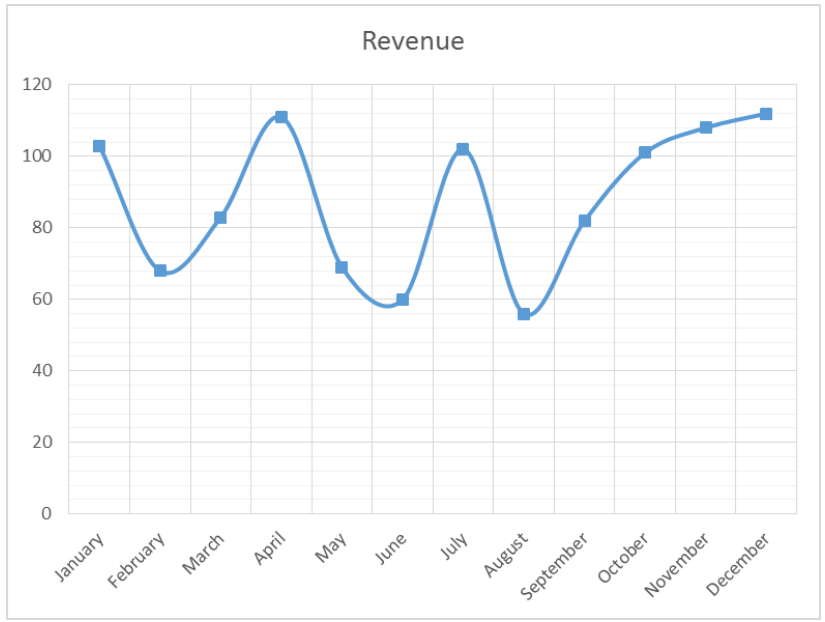

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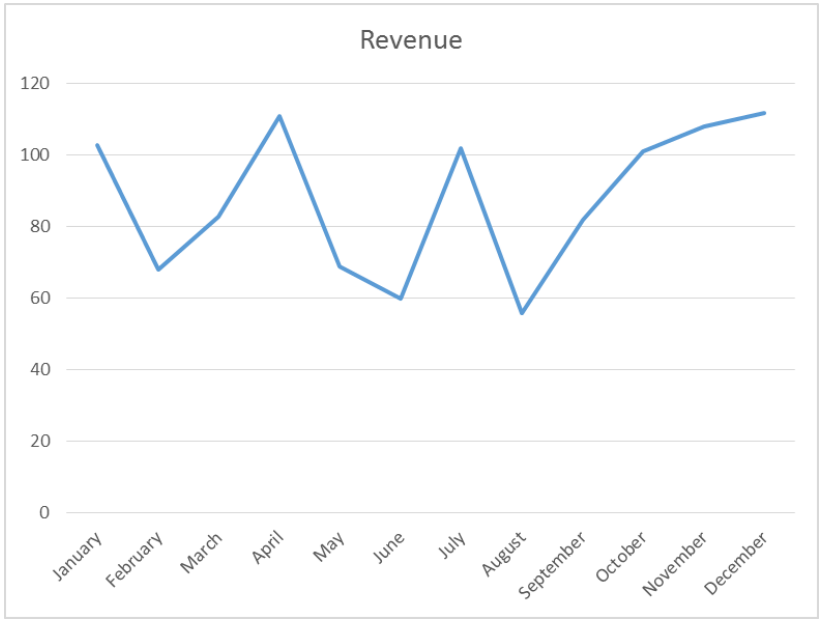
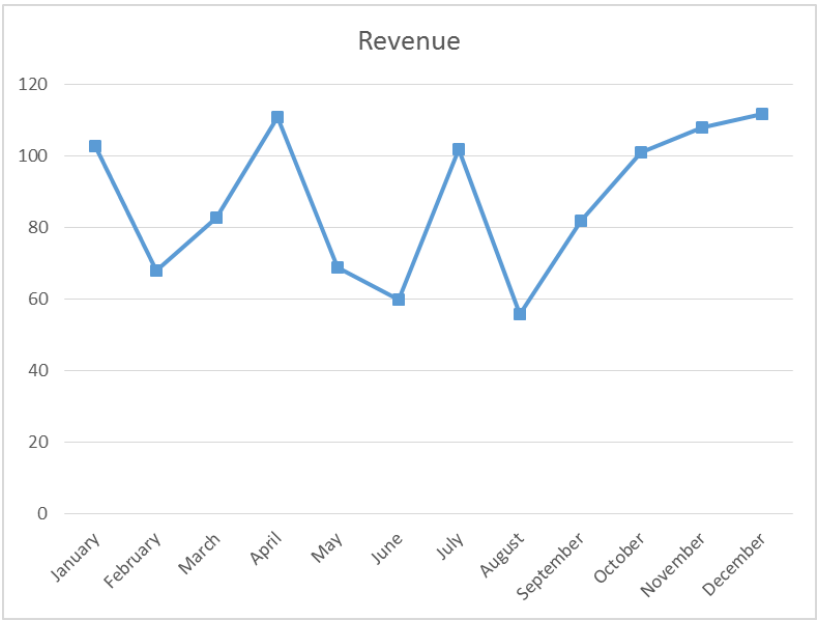
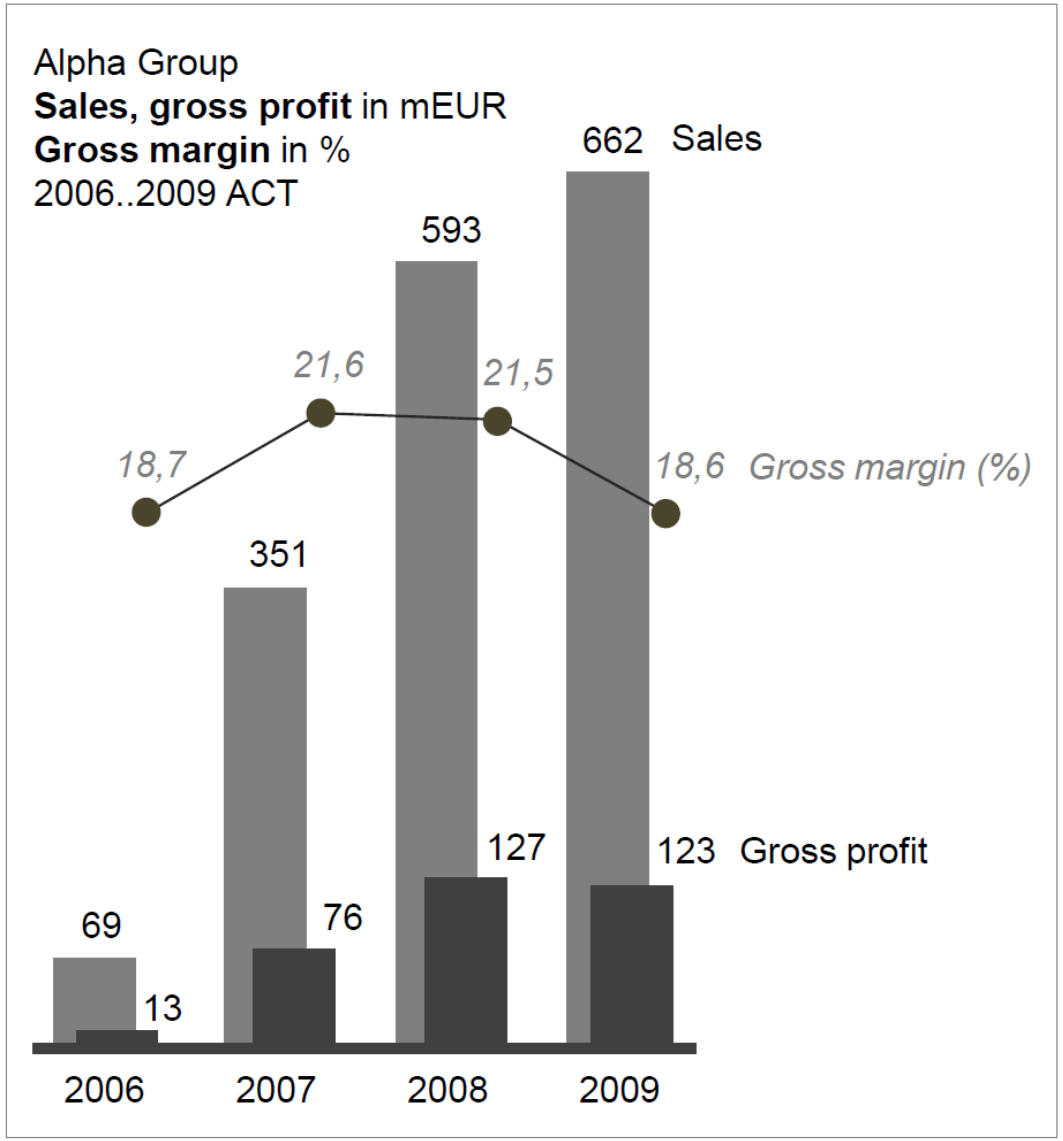
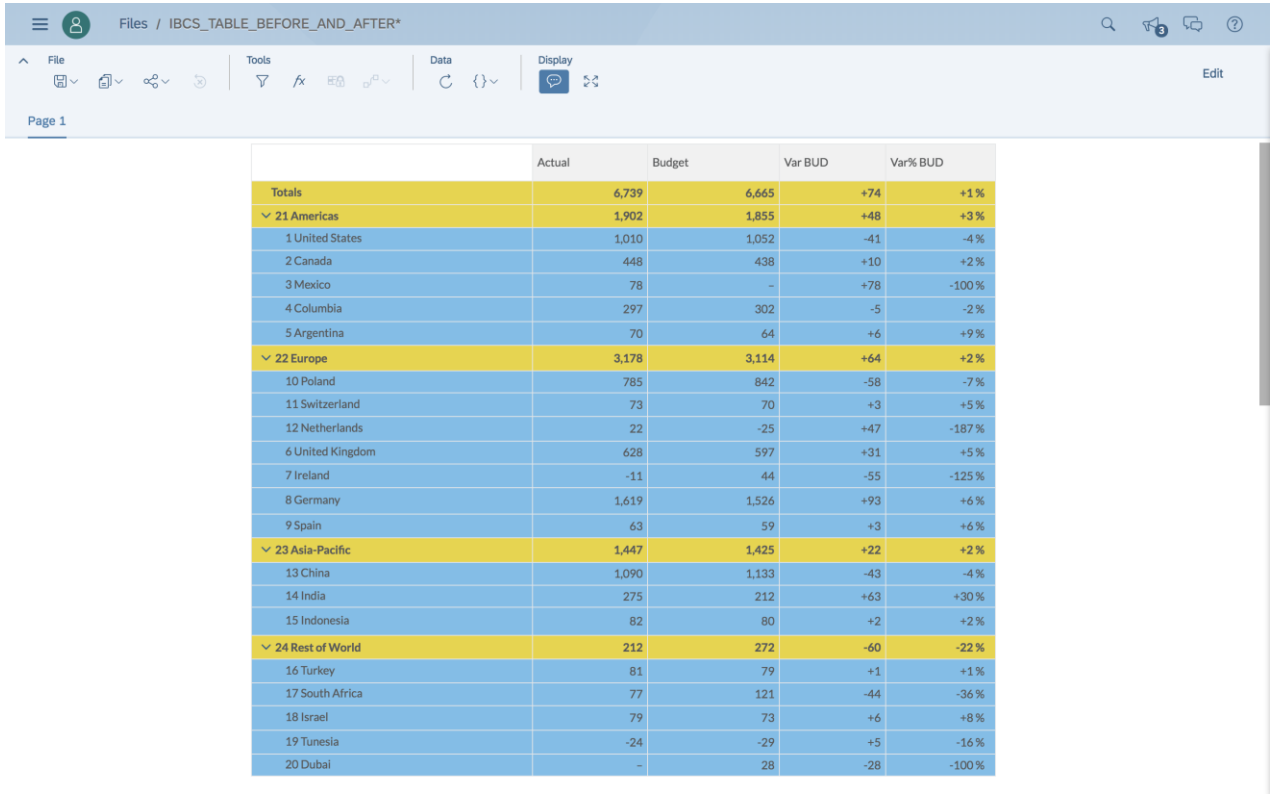


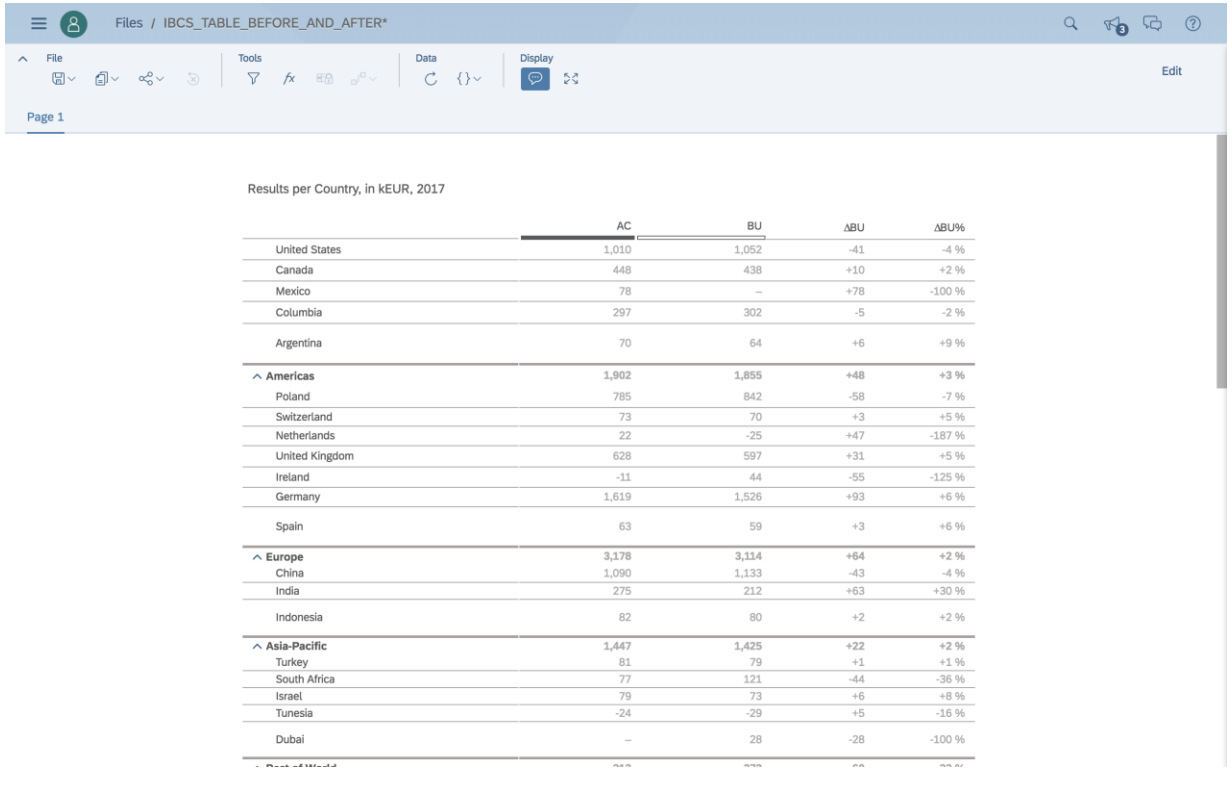


1. Units / Currency missing
2. Which Measures?
3. Do we need a Year Label?
4. Gradient
5. Scaling
6. Repeating yourself
7. Years (right to left) & Months (left to right)





	Actual	Budget	Var BUD	Var% BUD
Totals	**6,739**	**6,665**	**+74**	**+1 %**
21 Americas	**1,902**	**1,855**	**+48**	**+3 %**
1 United States	1,010	1,052	-41	-4 %
2 Canada	448	438	+10	+2 %
3 Mexico	78	–	+78	-100 %
4 Columbia	297	302	-5	-2 %
5 Argentina	70	64	+6	+9 %
22 Europe	**3,178**	**3,114**	**+64**	**+2 %**
10 Poland	785	842	-58	-7 %
11 Switzerland	73	70	+3	+5 %
12 Netherlands	22	-25	+47	-187 %
6 United Kingdom	628	597	+31	+5 %
7 Ireland	-11	44	-55	-125 %
8 Germany	1,619	1,526	+93	+6 %
9 Spain	63	59	+3	+6 %
23 Asia-Pacific	**1,447**	**1,425**	**+22**	**+2 %**
13 China	1,090	1,133	-43	-4 %
14 India	275	212	+63	+30 %
15 Indonesia	82	80	+2	+2 %
24 Rest of World	**212**	**272**	**-60**	**-22 %**
16 Turkey	81	79	+1	+1 %
17 South Africa	77	121	-44	-36 %
18 Israel	79	73	+6	+8 %
19 Tunesia	-24	-29	+5	-16 %
20 Dubai	–	28	-28	-100 %



Results per Country, in kEUR, 2017

	AC	BU	ΔBU	ΔBU%
United States	1,010	1,052	-41	-4 %
Canada	448	438	+10	+2 %
Mexico	78	–	+78	-100 %
Columbia	297	302	-5	-2 %
Argentina	70	64	+6	+9 %
Americas	**1,902**	**1,855**	**+48**	**+3 %**
Poland	785	842	-58	-7 %
Switzerland	73	70	+3	+5 %
Netherlands	22	-25	+47	-187 %
United Kingdom	628	597	+31	+5 %
Ireland	-11	44	-55	-125 %
Germany	1,619	1,526	+93	+6 %
Spain	63	59	+3	+6 %
Europe	**3,178**	**3,114**	**+64**	**+2 %**
China	1,090	1,133	-43	-4 %
India	275	212	+63	+30 %
Indonesia	82	80	+2	+2 %
Asia-Pacific	**1,447**	**1,425**	**+22**	**+2 %**
Turkey	81	79	+1	+1 %
South Africa	77	121	-44	-36 %
Israel	79	73	+6	+8 %
Tunesia	-24	-29	+5	-16 %
Dubai	–	28	-28	-100 %

https://www.sapanalytics.cloud/guided_playlists/ibcs-sample-exercise/

Effective Data Visualization Do's and Don’ts

Checkpoints

Dashboard Composition

- All elements need to have a purpose or a meaning. If one doesn’t, take it out. Nothing should be merely decorative
- Use light shades of grey with white space to build a clean layout
- Consider the medium of consumption: desktop, tablet, phone, etc. Design for mobile first.

Color & Alignment

- Use a consistent set of colors
- Use space as separator instead of lines and borders to achieve a clean look
- Consistently align all text and elements (left align is recommended)

Consistency

- Text sizes should be hierarchical (Title is larger than subtitle, …)
- Clearly label all your charts, report headers.
- Make sure texts are simple and easy to understand.
- Provide guidance if the report includes acronyms or technical terms.
- Remove Redundancy (do not repeat yourself)
- Ensure identical scaling

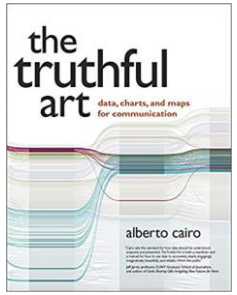
http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf

Effective Data Visualization Do's and Don’ts

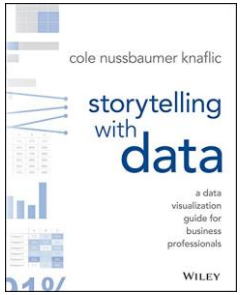
- Allocate time to learn more about Data Visualization and visual perception (independent of technology)
- Start “small” and show the different approach
- Create your own visualization and notation guidelines
- Prepare to “challenge” as well as “be challenged”
- Keep learning from “others” (e.g. NY times)

Effective Data Visualization Do's and Don’ts

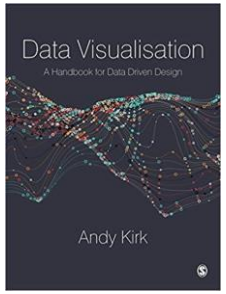
Resources



The Truthful Art: Data, Charts, and Maps for Communication
Alberto Cairo

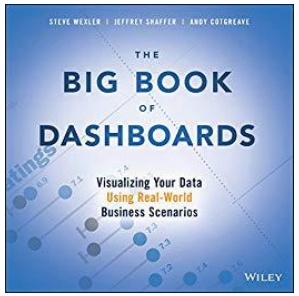


Storytelling with Data: A Data Visualization Guide for Business Professionals
Cole Nussbaumer Knaflic

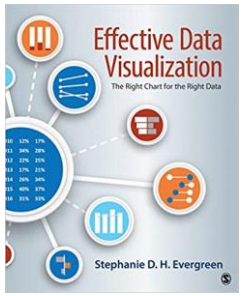


Data Visualisation: A Handbook for Data Driven Design
Andy Kirk

#MakeoverMonday: Improving How We Visualize and Analyze Data, One Chart at a Time
Andy Kriebel, Eva Murray



The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios
Steve Wexler, Jeffrey Shaffer, Andy Cotgreave



Effective Data Visualization: The Right Chart for the Right Data
Stephanie Evergreen

Effective Data Visualization Do's and Don’ts

Resources

Mastering SAP Analytics Cloud
Ingo Hilgefort
https://sapanalyticscloudbook.com/

Mastering SAP Analytics Cloud Application Design
Ingo Hilgefort
https://sapappdesignbook.com/

Effective Data Visualization Do's and Don’ts
Resources

Stephen Few on Amazon

Stephen Few – Perceptual Edge

SUCCESS Rules (Hichert)

Hichert – Before and After Examples

The Functional Art: An introduction to information graphics and visualization (Voices That Matter)

The Functional Art

Microsoft Training on Data Journalism

Stephanie Evergreen – Effective Data Visualizations

Stephanie Evergreen - Blog

Chart Chooser Cards

Visualize This: The FlowingData Guide to Design, Visualization, and Statistics

Don't Make Me Think

Lean UX

Interaction Design Foundation

Designing Data Visualizations: Representing Informational Relationships

Agile Data Warehousing Project Management: Business Intelligence Systems Using Scrum

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Thank you.

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