Data visualization

Design and storytelling at EY
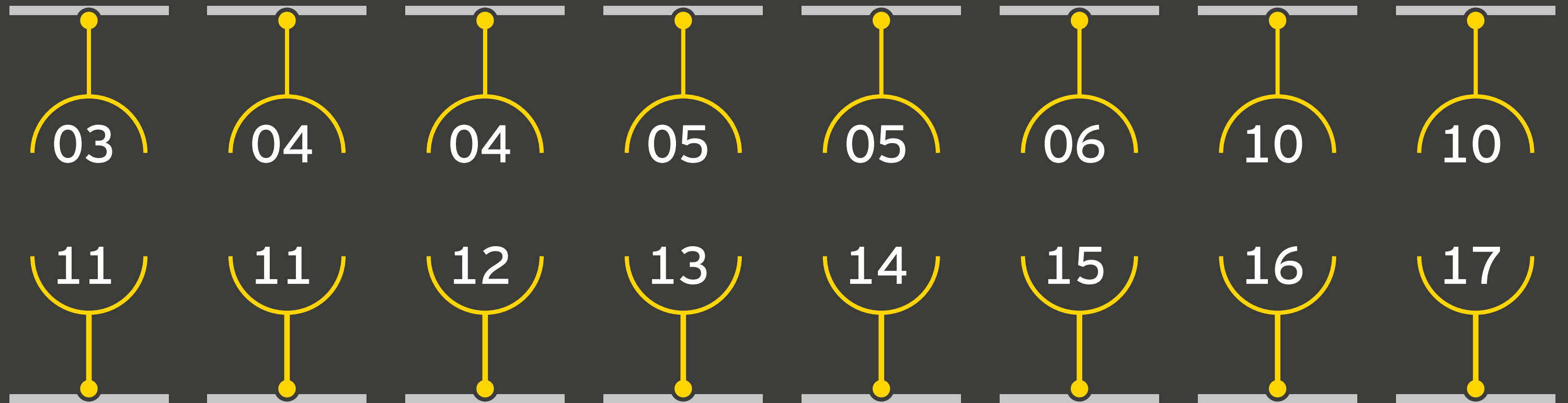
Quick reference guide
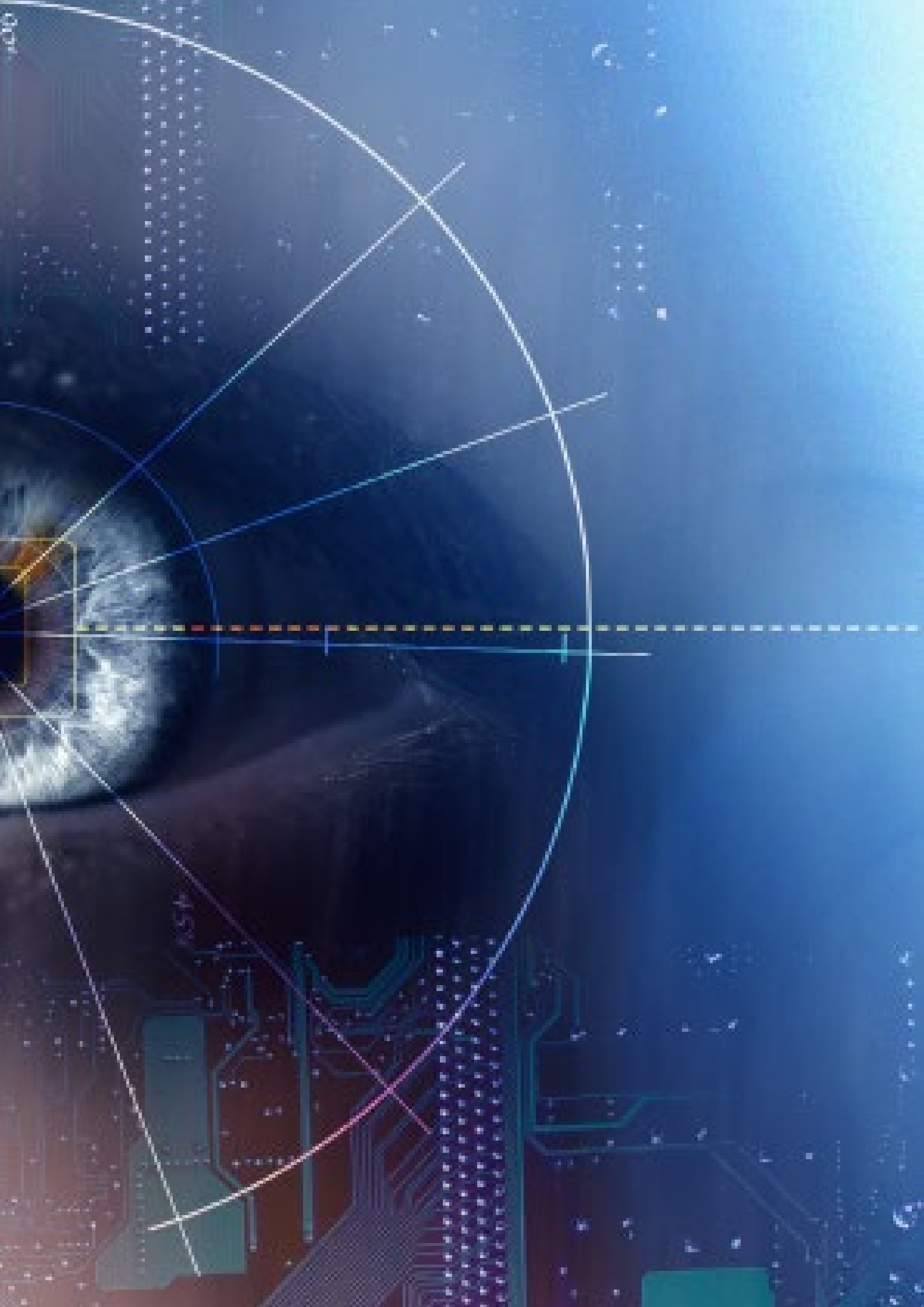
EY
Building a better
working world

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Blending the art of design with the science of data

The key to attaining value from big data and analytics strategies and transformational programs is getting the human element right. Once insights are derived from analytics, it's the people who have to take a business decision and change a business process and their behavior in order to do something differently that creates value. The execution of the insights from analytics often happens at the individual level – and we all know that strategy is only as good as its execution.

In order to drive tangible market differentiation for EY in the data and analytics market, we need to bring the 'human element' to life. **Visualization is a key element of this**… many of our teams need to be able to use rich, interactive visuals to transform data into **actionable insights.**

The data visualization webcast series shed insights around the impact of effective data visualization and the power of data storytelling.

We hope this learning series inspire you to further innovate and develop your data visualization skills regardless of the preferred choice of tools. The principles and frameworks shared in the series are applicable to all who need to interact and influence an audience irrespective of our service lines or the tools used.

- The EY Team

The human element of analytics

The power of analytics is transformative.

1   Definition of data visualization

Based on data:
A visualization's purpose is the communication of data.

Produce an image:
The visual must be the primary means of communication.

The result must be readable and recognizable:
The most important criteria is that the visualization must provide a way to learn something about the data.

2   Types of data visualization

Exploratory visualizations
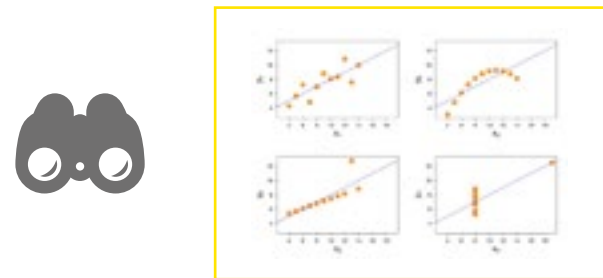
Source: https://en.wikipedia.org/wiki/Anscombe%27s_quartet

Exploratory analyses
‣ Allows audience to explore the data for further analyses

‣ Conducted for a problem that has not been clearly defined

Anscombe's quartet
‣ Allows audience to explore patterns missed by statistics alone

‣ Showed the power of visualization for exploratory data analysis

Explanatory visualizations

Source: xxxx

Explanatory analyses
‣ Explains the audience what they need to know

‣ Shows specific relationships in data such as link between causes and results

Cholera map – John Snow
‣ Explains the root cause of transmission of cholera

‣ Shows the relationship between deaths and the Broad Street Water Pump

Effective visualization

Impactful visualizations do the following:

‣ They support exploratory data analysis process of finding insights

‣ Once insights are found, they communicate the insights using an explanatory focused data visualization
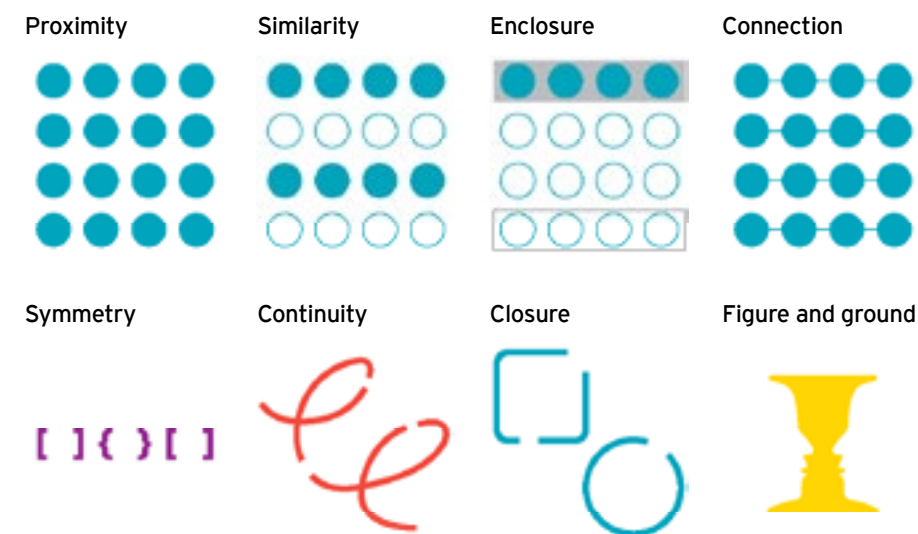
3   Understanding design

By studying design, we create a common understanding, giving us a starting point to **learn**, **collaborate** and make **further improvements** and **innovations**.

4   Design principles

Gestalt principles

Proximity   Similarity   Enclosure   Connection

Symmetry   Continuity   Closure   Figure and ground

Source: FusionBrew: The FusionCharts Blog

Edward Tufte's principles of graphical excellence

"Excellence in statistical graphics consists of complex ideas communicated with clarity, precision and efficiency"

‣ Show the data (data to ink ratio)

‣ Induce the viewer to think about the substance of the findings rather than the methodology, the graphical design or other aspects

‣ Avoid distorting what the data have to say (chart junk)

‣ Present many numbers in a small space efficiently

‣ Make large data sets coherent

‣ Encourage the eye to compare different pieces of data

‣ Reveal the data at several levels of details from a broad overview to the find structure

‣ Serve a clear purpose: description, exploration, tabulation or decoration

‣ Be closely integrated with the statistical and verbal descriptions of the data set

E.R. Tufet. The Visual Display of Quantitative Information, 2nd Edition. Graphics Press, Cheshire, CT 2001.
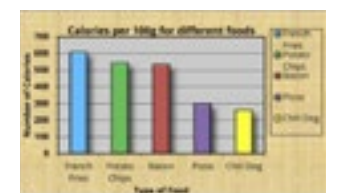
Data to ink ratio

Chart junk

5 Pre-attentive attributes

Good design leverages pre-attentive processing in our brains. Pre-attentive processing is tuned to detect a specific set of visual attributes, which results in certain elements standing out – all without conscious thought.

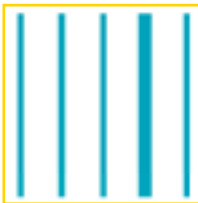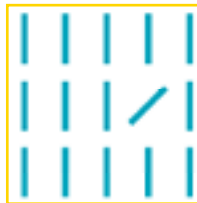Visual tools that aid in pre-attentive processing include:
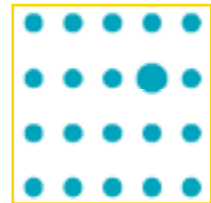
1. Emphasis
2. Quantity
3. Color

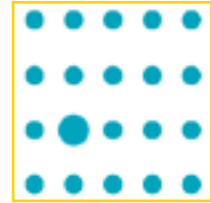## 1. Emphasis

Form

Length

Width

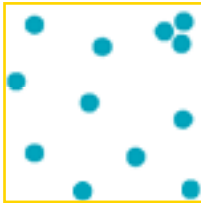Orientation
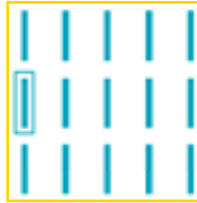
Size

Shape

Curvature

Enclosure
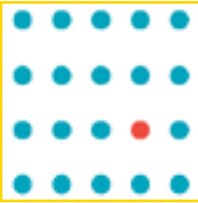
Blur

Position

2-D position
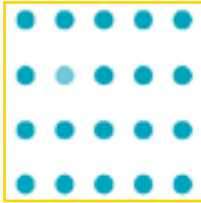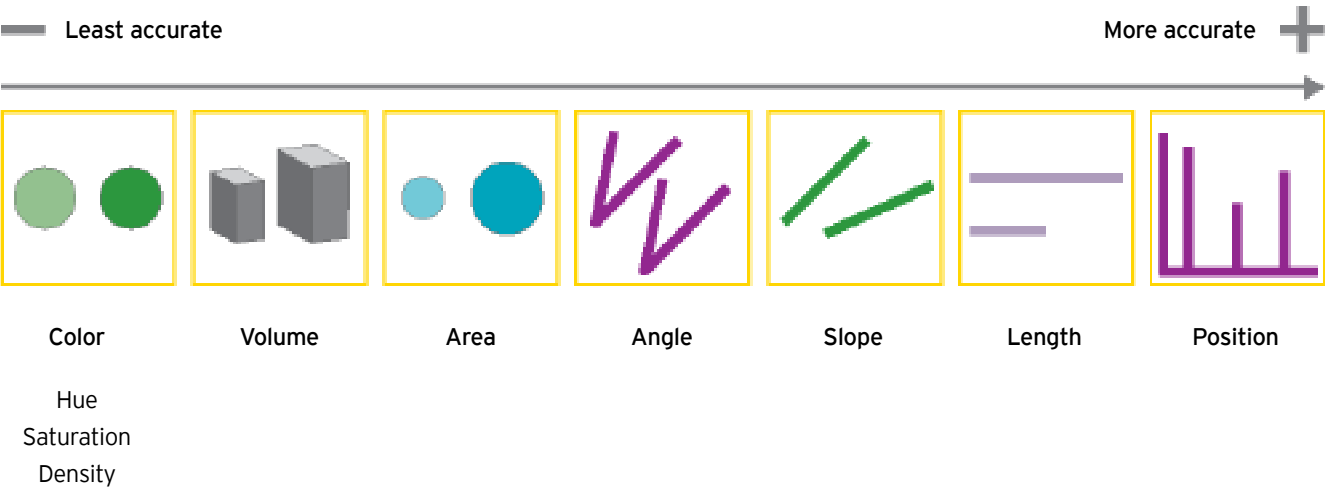
Spatial grouping

Motion

Direction of motion

Color

Hue

Intensity

2. Quantity

Accuracy of Perceiving Quantity
When comparing quantity, note which visual tool is most accurate.

Least accurate   More accurate

Color
Volume
Area
Angle
Slope
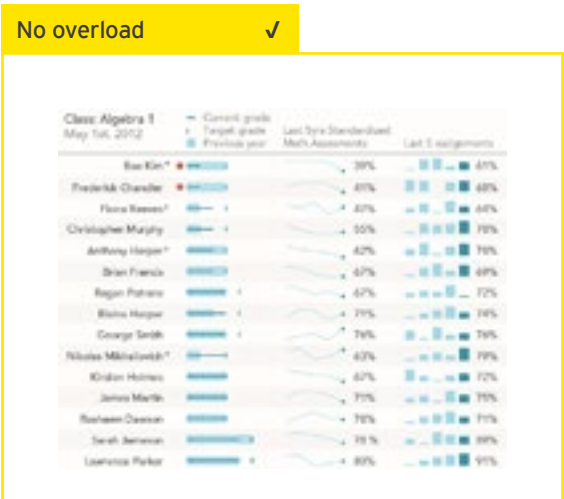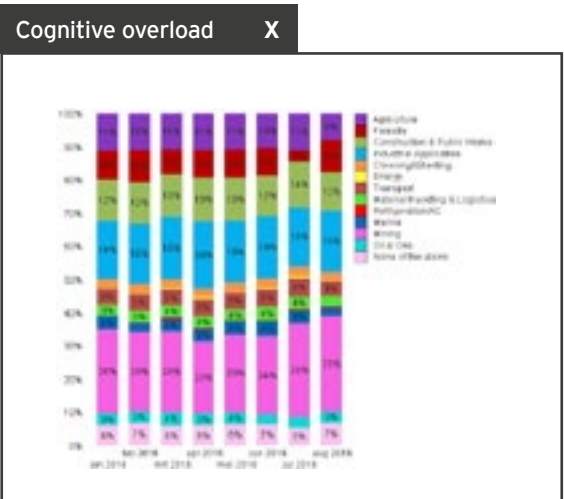Length
Position

Hue
Saturation
Density
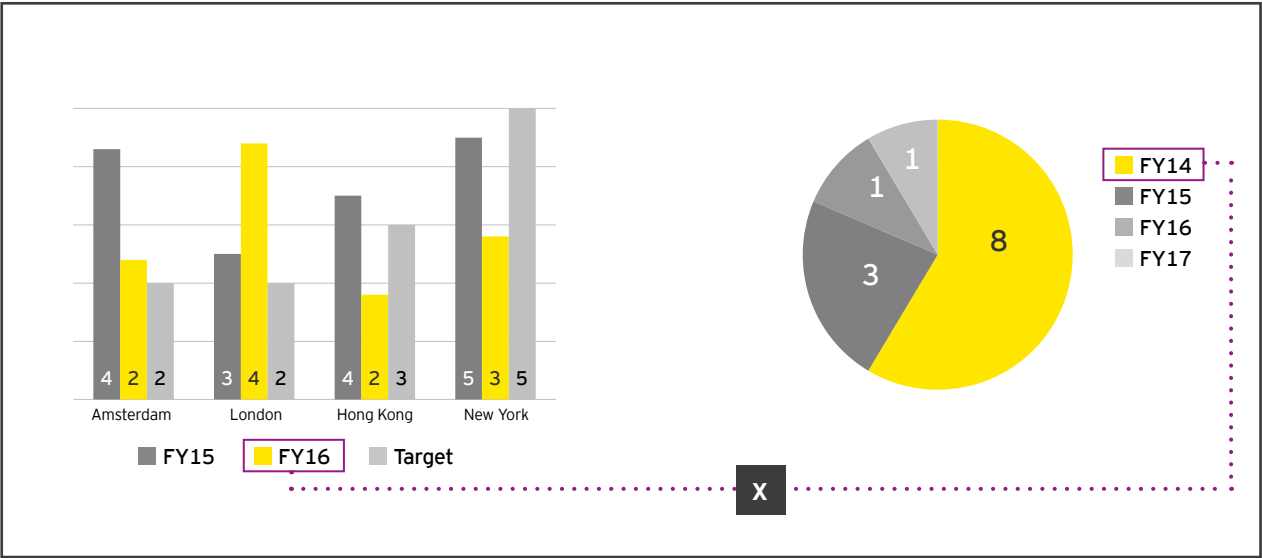
5 Pre-attentive attributes (continued)

3. Color

‣ Use color to emphasize without overload

‣ Be consistent and effective in the use of color

‣ Cater for the audience

‣ Context, Cultural differences, Pastel vs. bright

Mindful of color overload
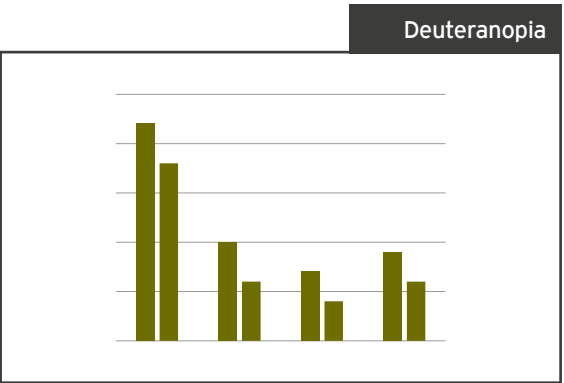

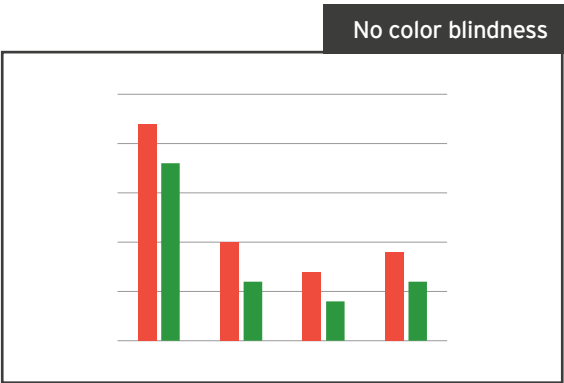Cognitive overload   X

No overload   √

Color can show categories

‣ Be consistent, otherwise audience will be confused

Color conveys meaning
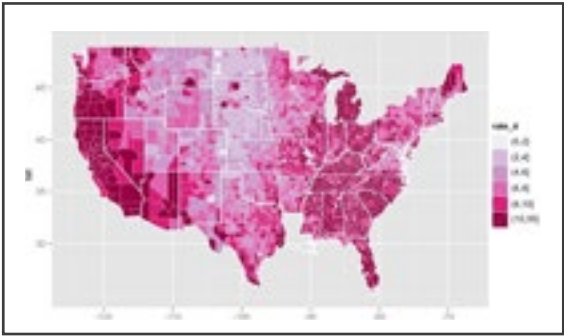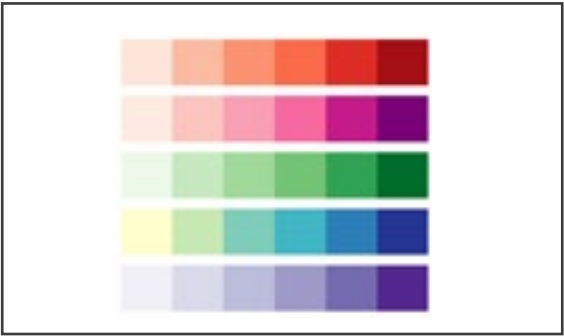
‣ Color blindness such as deuteranopia affects

‣ 8% of males

‣ 1% of females

‣ Be mindful of your audience

No color blindness

Deuteranopia

Color can show quantities

‣ Range of colors

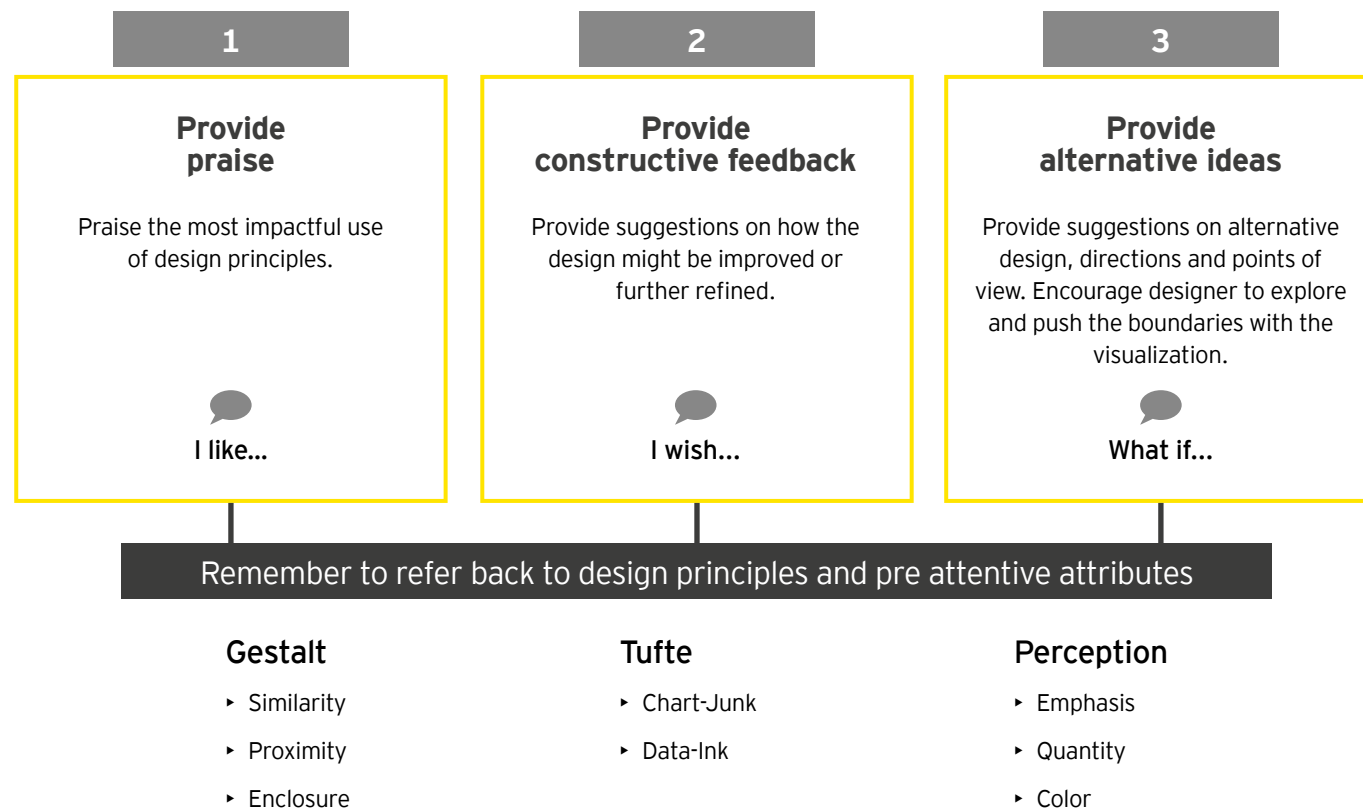‣ Darker hues denotes higher quantities

Color can vary by culture
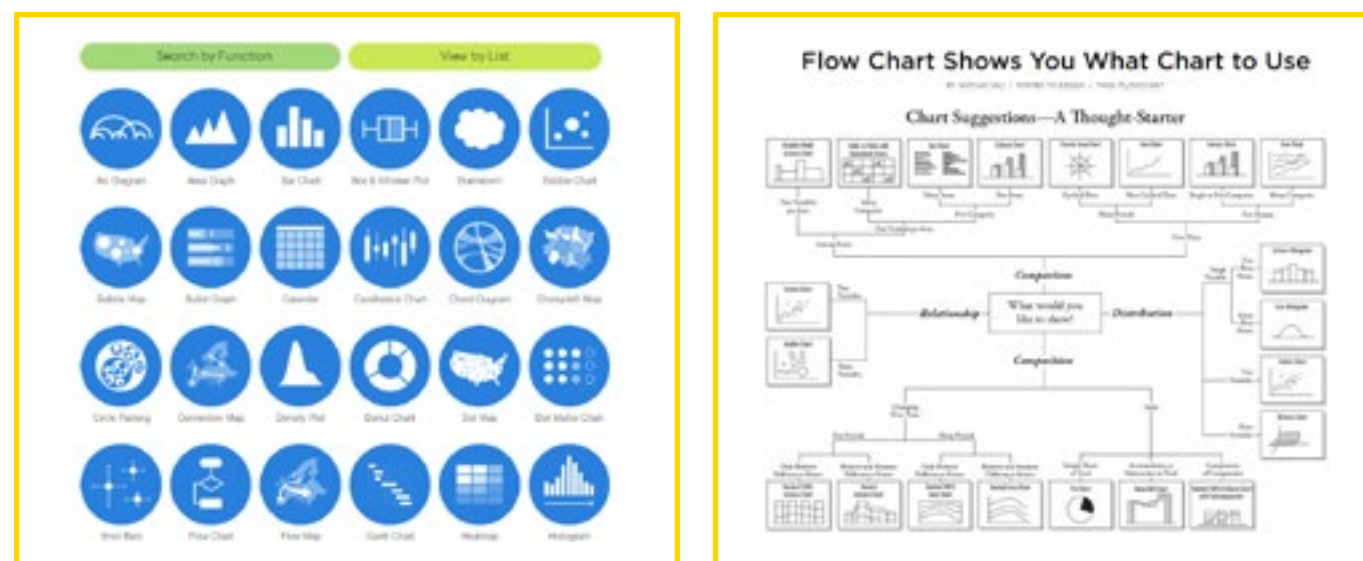
‣ Colors can have different meanings

Bad | Good luck | Strength | Success

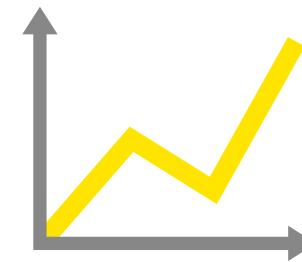**Good (luck) | Death | Jealousy**

6 | Design critique framework

1	**2**	**3**
Provide praise	**Provide constructive feedback**	**Provide alternative ideas**
Praise the most impactful use of design principles.	Provide suggestions on how the design might be improved or further refined.	Provide suggestions on alternative design, directions and points of view. Encourage designer to explore and push the boundaries with the visualization.
💬	💬	💬
I like…	I wish…	What if…

Remember to refer back to design principles and pre attentive attributes

Gestalt
- Similarity
- Proximity
- Enclosure

Tufte
- Chart-Junk
- Data-Ink

Perception
- Emphasis
- Quantity
- Color

7 | Choosing the right chart

Source: http://datavizcatalogue.com/index.html

Source: http://flowingdata.com/2009/01/15/flow-chart-shows-you-what-chart-to-use/

8 | Storytelling with data visualization

Facts get recorded

Stories get remembered
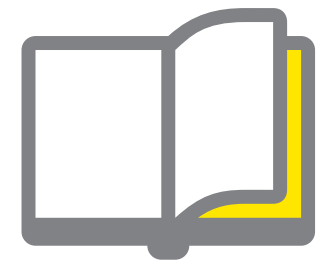
9 | Reasons why we tell stories

1	**2**	**3**
🧠	❤️	✋
Memorable	**Relatable**	**Lead to action**
Stories make it easier to connect and remember information.	Stories lead to emotional coupling – both storyteller and audience go through and relate to the same experience.	Research shows that storytelling can engage brain parts that lead to action.
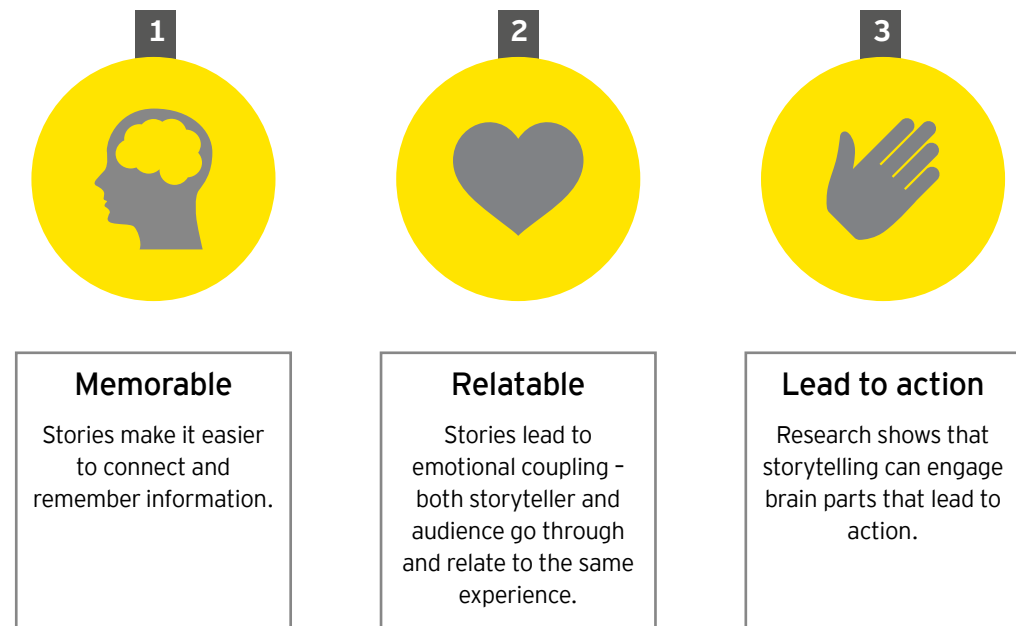
10 Narrative framework for data stories

Visual design

How you **show** your story

Messaging

How you **tell** your story

Interactivity

How you **engage** your audience
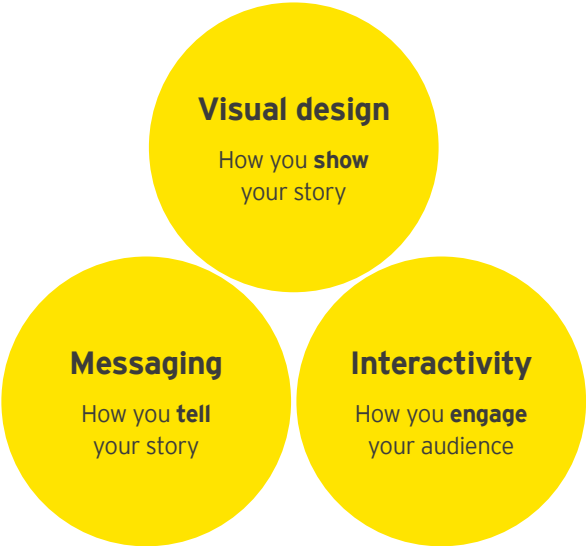
Author driven vs. reader driven

Author driven	Reader driven
Goals	**Goals**
‣ Storytelling	‣ Ask questions
‣ Clarity	‣ Explore
‣ Speed	‣ Find

	Sequencing	
Strong		Weak

	Messaging	
Heavy		Light

	Interactivity	
Limited		Free
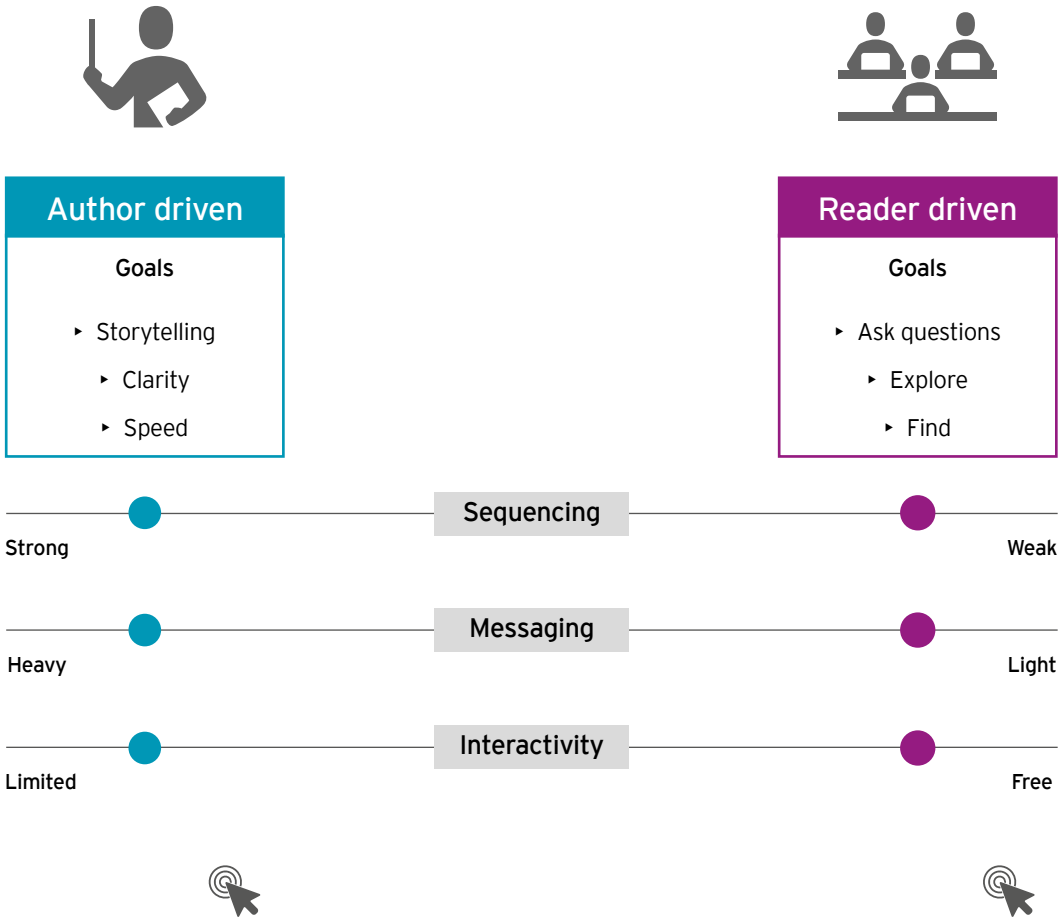
11 Understanding your audience

Executive	Departmental	Analyst
‣ C-level experts	‣ Department managers	‣ Business analysts
‣ Business line heads	‣ Legal	‣ Financial analysts
‣ Senior leadership	‣ Compliance	‣ Data analysts

|	Executive	Departmental	Analyst
Communication style	Author driven	Balance	Reader driven
Messaging	Linear narrative	Guided	Light
Interaction	Limited	Intuitive	Extensive
Outcome	Speed, clarity, decision	Understanding, decision	Understanding

12 Visual designing your story

1 Determine the insight(s) you wish to share with client

2 Chose the visualization
  ‣ That best conveys your insights
  ‣ Enforces the message you are trying to communicate

3 Establish your content

4 Develop your storyboard
  ‣ Introduction/executive summary
  ‣ Key messages/section titles
  ‣ Supporting information, bullets, diagrams, charts, etc.
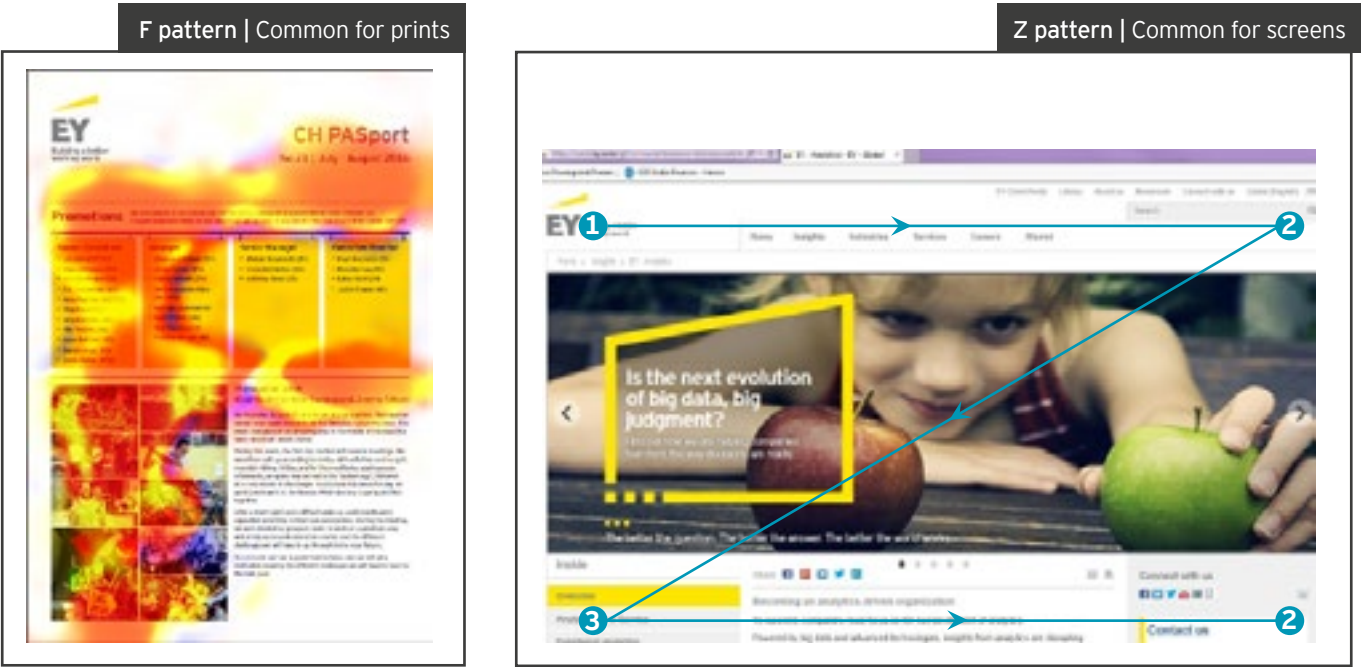
5 Tell your story

6 Iterate to perfect each part

Story(boarding)

Story arc
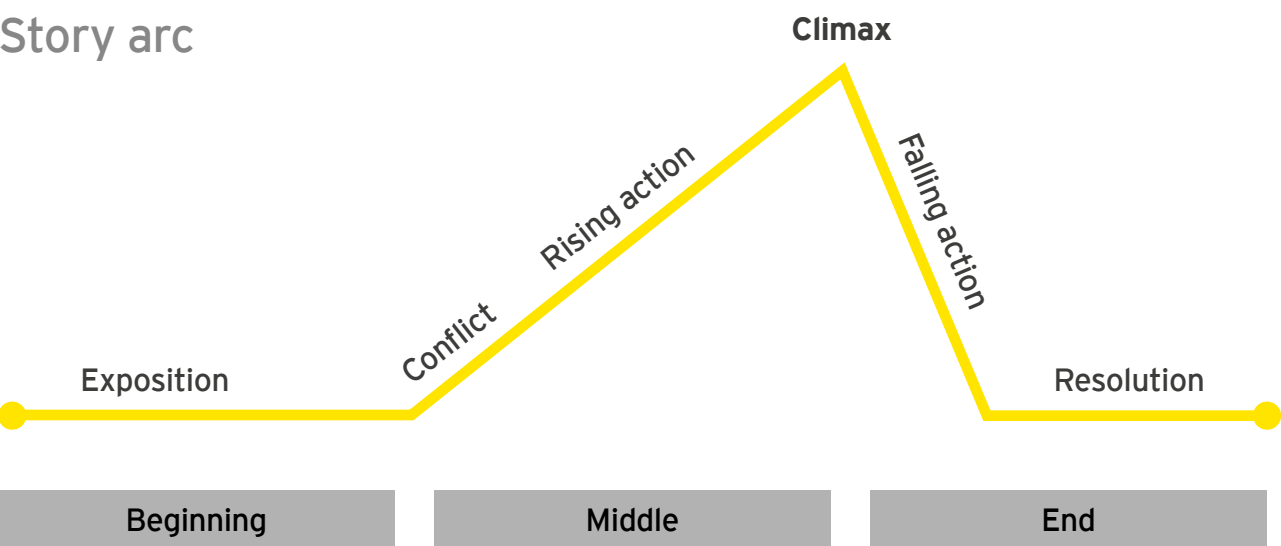
13 Guidance in viewing visualization

Page scanning pattern

F pattern | Common for prints

Z pattern | Common for screens

14 Audience interactivity

Audience engagement is critical

‣ Don't forget to engage your audience

‣ Build in interactions where appropriate
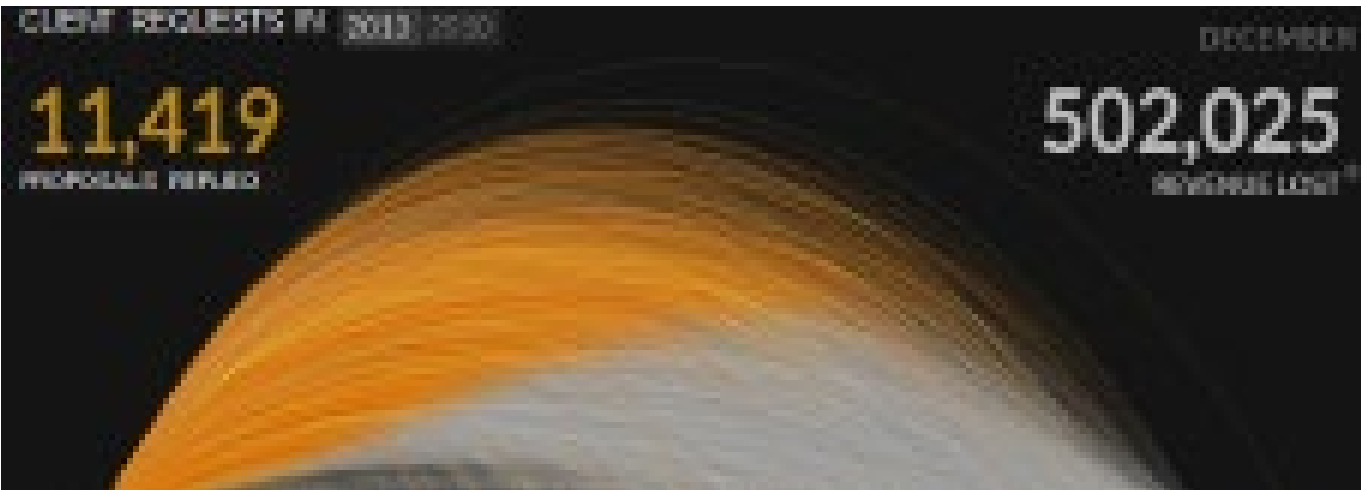
Source: Periscopic.com

15 Tips from EY data viz community

16 Examples from service lines
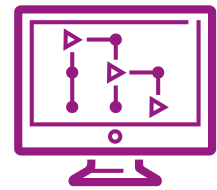
Identify key metrics and insights to build your story

Focus, refine, color and narrate
1010110
1001001
1101010

A visualization is only as good as the story it tells

Understand the audience and end users of the dashboard

KISS
Keep it simple (silly)

Customize overall layout for the target audience

Customize specific visualizations for best impact

Consider the most appropriate visualization for your data story

Define and understand the data elements

Adopt client feedback through iterations

When you have a good story, invest the time to tell it properly

Advisory
User driven design – line graphs

Audit
Exploratory to explanatory audit to insight

FIDS
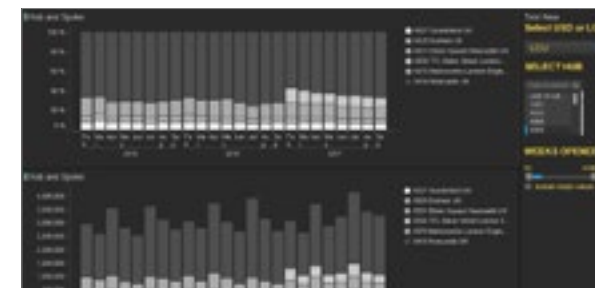Deep exploratory – other chart types

FSO
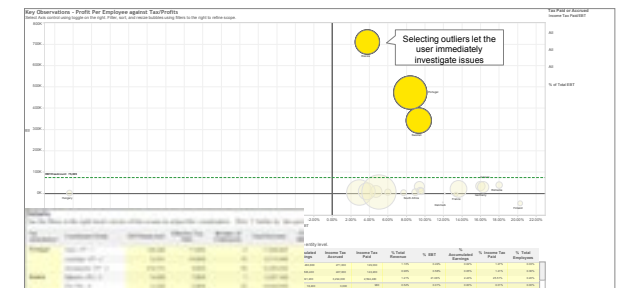Exec dashboard – exploratory to explanatory

TAS
Design with audience in mind

Tax
Deep exploratory – scatter plots

Our Advanced Technology Pursuit Platform can give you insight into our analytics offerings by service line and by sector.

EY | Assurance | Tax | Transactions | Advisory

ey.com