

06 Data Visualisation *Communication*

DMV

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DMV: Status and coming up next

So far: generic data process, sources & formats, describing data, open data, big data, metadata, data quality & cleaning

Today: Data Visualisation → Communication

Next:

- Data Visualisation: Choosing Charts
- Data Visualisation: Good design

Today: Data Visualisation

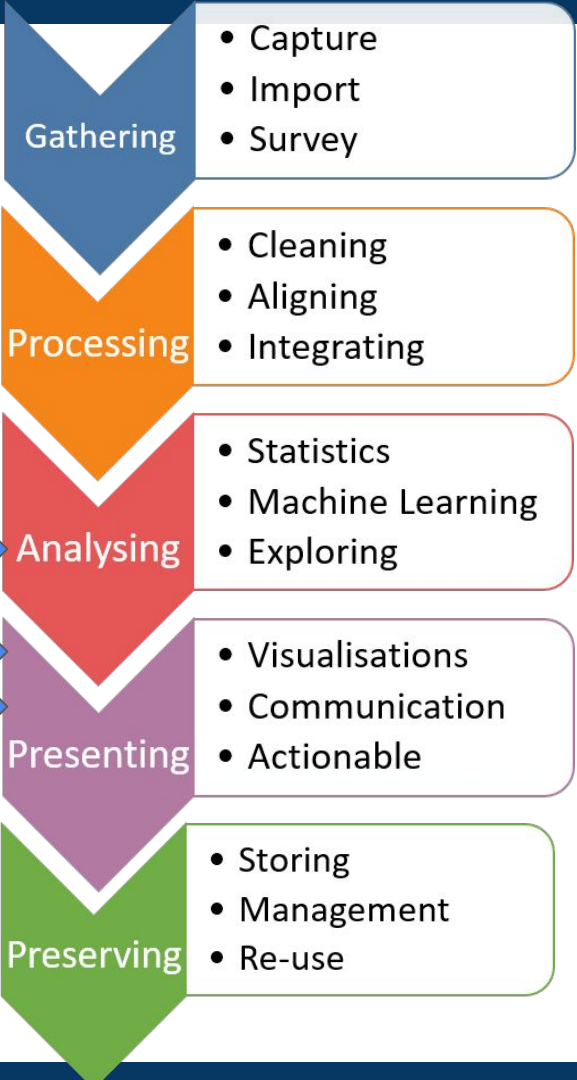
- Communication
- Motivations for visualisations
- Analysing communication
- “Data Visualisation: Good things to know”

Data Visualisation

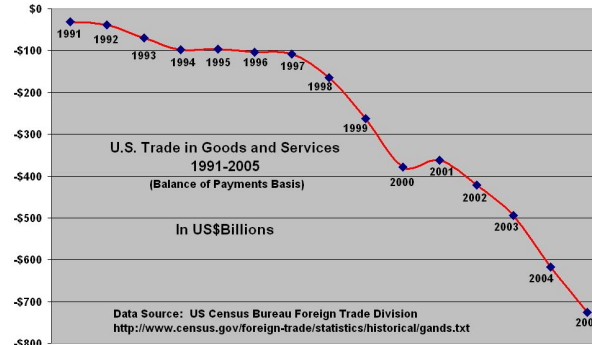
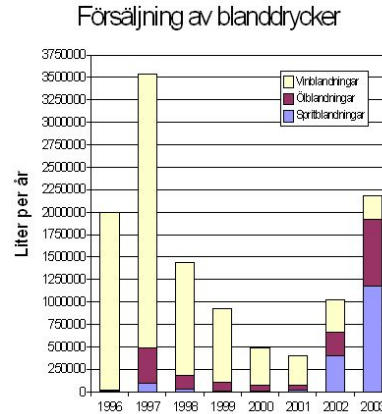
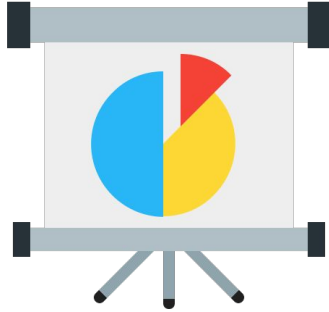
Why visualise?

Analysis tool: Exploration

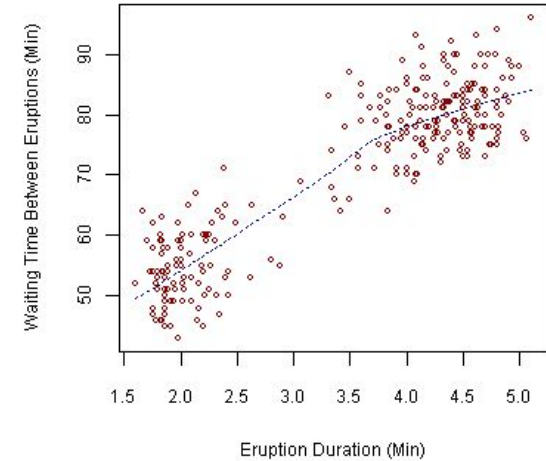
Communication
(Explanation)



What do I mean by “data visualisation”?



Old Faithful Eruptions



But also diagrams, maps, infographics, dashboards, tables etc. that are based on data.

Consider ...

“... data visualization is not an exact science. There is rarely, if ever, a single right answer or single best solution. It is much more about using heuristic methods to determine the most satisfactory solutions.”

p20, Andy Kirk, Data Visualisation - a successful design process (2012)

<http://site.ebrary.com/lib/dublincu/detail.action?docID=10642563>

→ **This doesn't apply to marking your assignment and exam!**

What is “good” visualisation?

<https://vevox.app> → 197-247-164

Provide words for what makes a good visualisation.

I'll show the results later in the session.

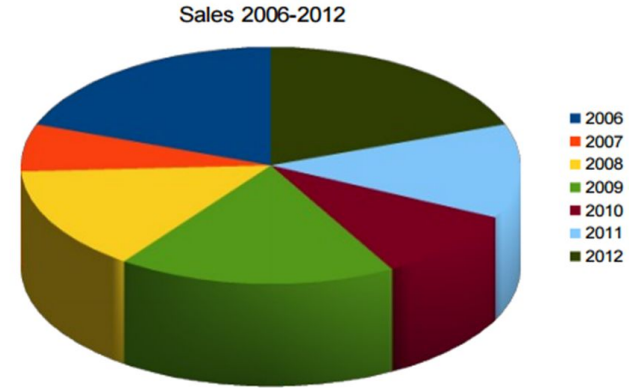
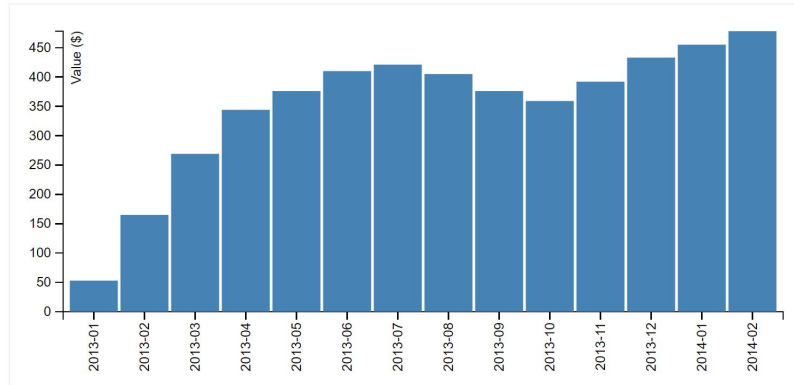
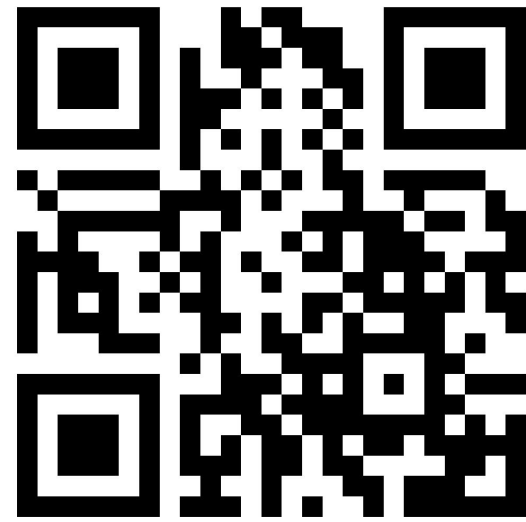


Figure 1 – a 3d pie-chart

Graphic Communication

AKA Visual Communication

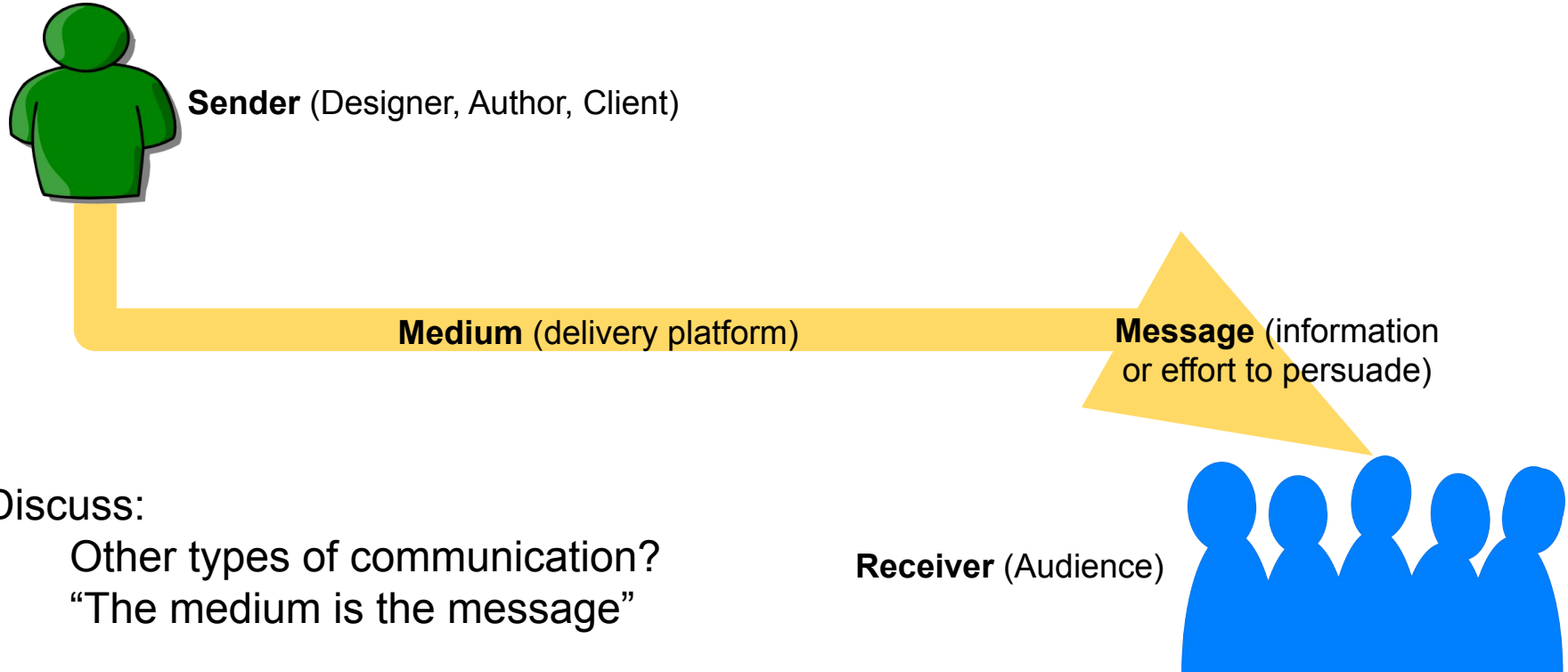


Cave Paintings → Written Word → Illuminated Manuscripts → Printed Word →
Digital Age → Modern Media

Media: “*all forms of printed paper or material (books, magazines, newspapers, brochures, flyers, signage, and billboards), the Internet, mobile phones and handheld devices, television, radio, CDs and DVDs, videos, video games, films, ...*”[Ref: 1]

A key part of “postindustrial” information economies

Graphic Communication



Discuss:

Other types of communication?
“The medium is the message”

Graphic Communication: Stages of Understanding

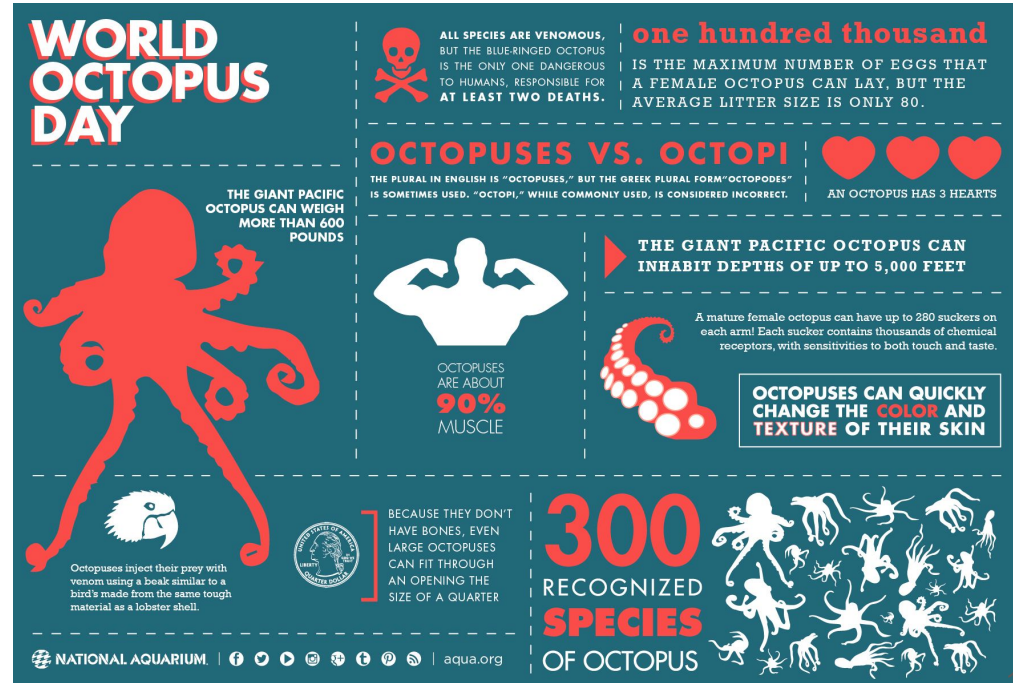
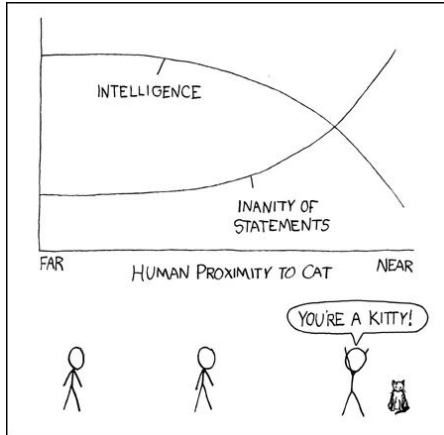
- Sensing → your brain seeing colours and shapes
- Perceiving → what does it show? big, small, bright, red,
- Interpreting → what does it mean? increasing, smaller, good, bad
- Comprehending → what does it mean **to me**? relevance, consequences



Graphic Communication Goals

- Information
- Persuasion
- Education
- Entertainment

<http://www.informationisbeautiful.net/visualizations/snake-oil-supplements/>



Goals: Information

Structured data

Design principles:

Structure is key

Level of detail - macro v micro

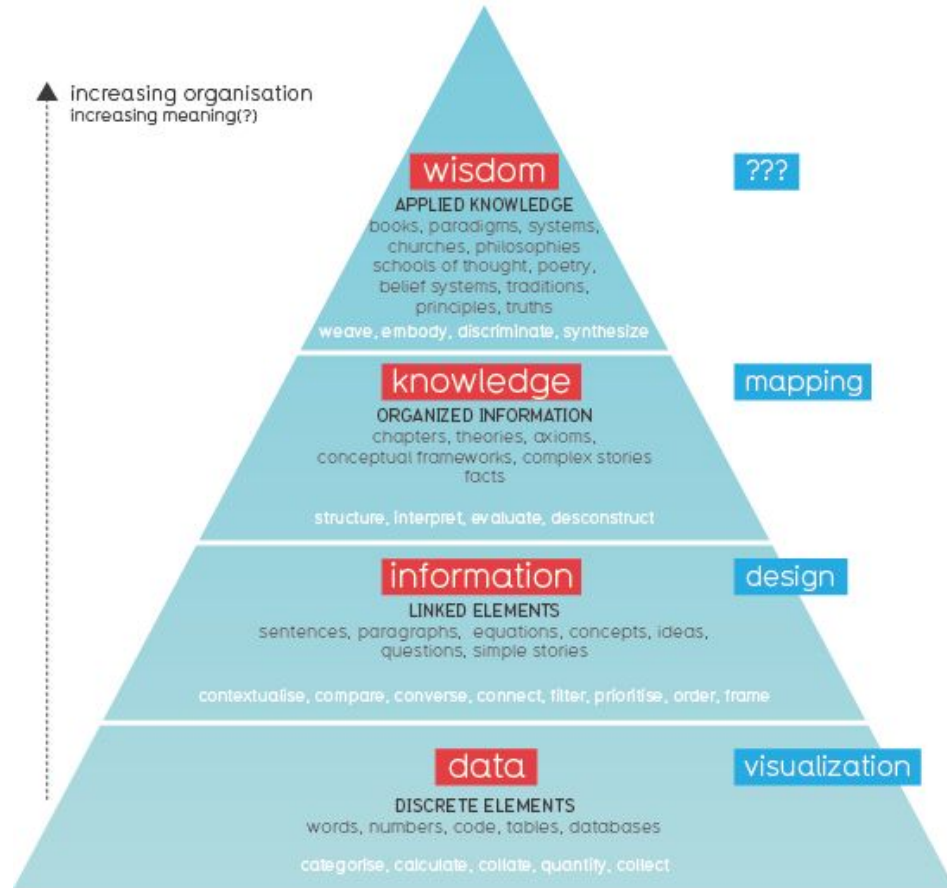
Layout, Colour - **credibility**

Important to have good source data - high quality



Hierarchy Of Visual Understanding?

Just playing. Something in this?



informationisbeautiful.net

Goals: Persuasion

Communication to elicit a particular response

E.g., Advertising → using information to present a message

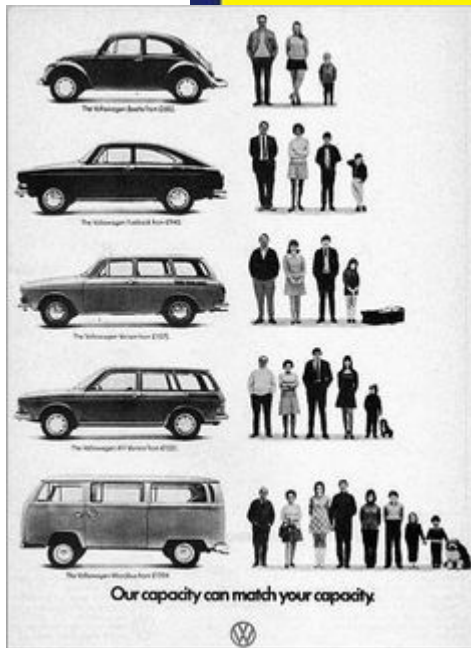
Appeal: Factual (rational) vs Emotional (values, opinions, attitudes)

Design principles:

- Research audience

- Illustrations, themes, colours, grouping → attract viewer's eye





According to a recent Nationwide survey:

MORE DOCTORS SMOKE CAMELS

THAN ANY OTHER CIGARETTE

DOCTORS in every branch of medicine... 11,197 in all—were quoted in this nationwide study of cigarette preference. These leading research organizations made the survey. The gist of the query was: "What cigarette do you smoke, Doctor?"

The brand named most was Camel!

The rich, full flavor and cool moisture of Camel's superb blend of choice tobacco seem to have the same appeal to the smoking tastes of doctors as to millions of other smokers. If you are a Camel smoker, this preference among doctors will hardly surprise you. If you're not—well, try Camels now.



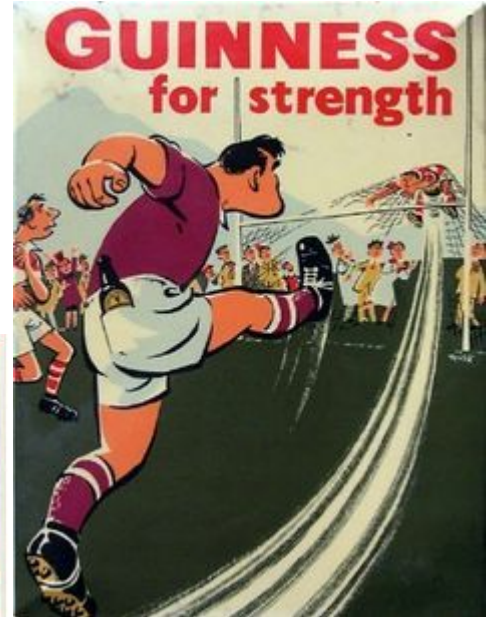
Your "I-Zone" Will Tell You...

*I for Taste...
I for Thrill...*

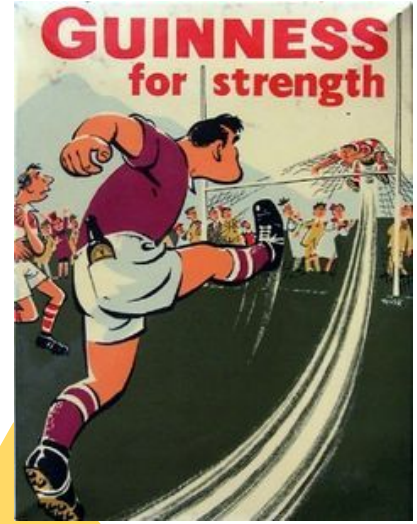
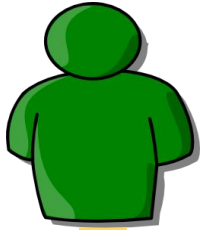
That's your proving ground for any cigarette. See if Camels don't win your "I-Zone" in a "I."



CAMELS *Coastal Tobaccos*



Graphic (Visual) Communication



Goals: Education

transferring knowledge and skills

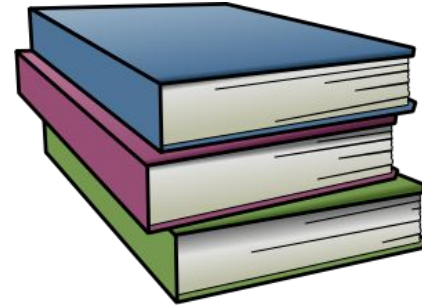
Textbooks, online learning resources, brochures, movies

Design principles:

- Divide information into chunks (hierarchy - trees, chapters, etc.)

- Legibility is key

- Progressive disclosure



Goals: Entertainment

pleasure, diversion, amusement

art, video games, film, television, ebooks

Design principles:

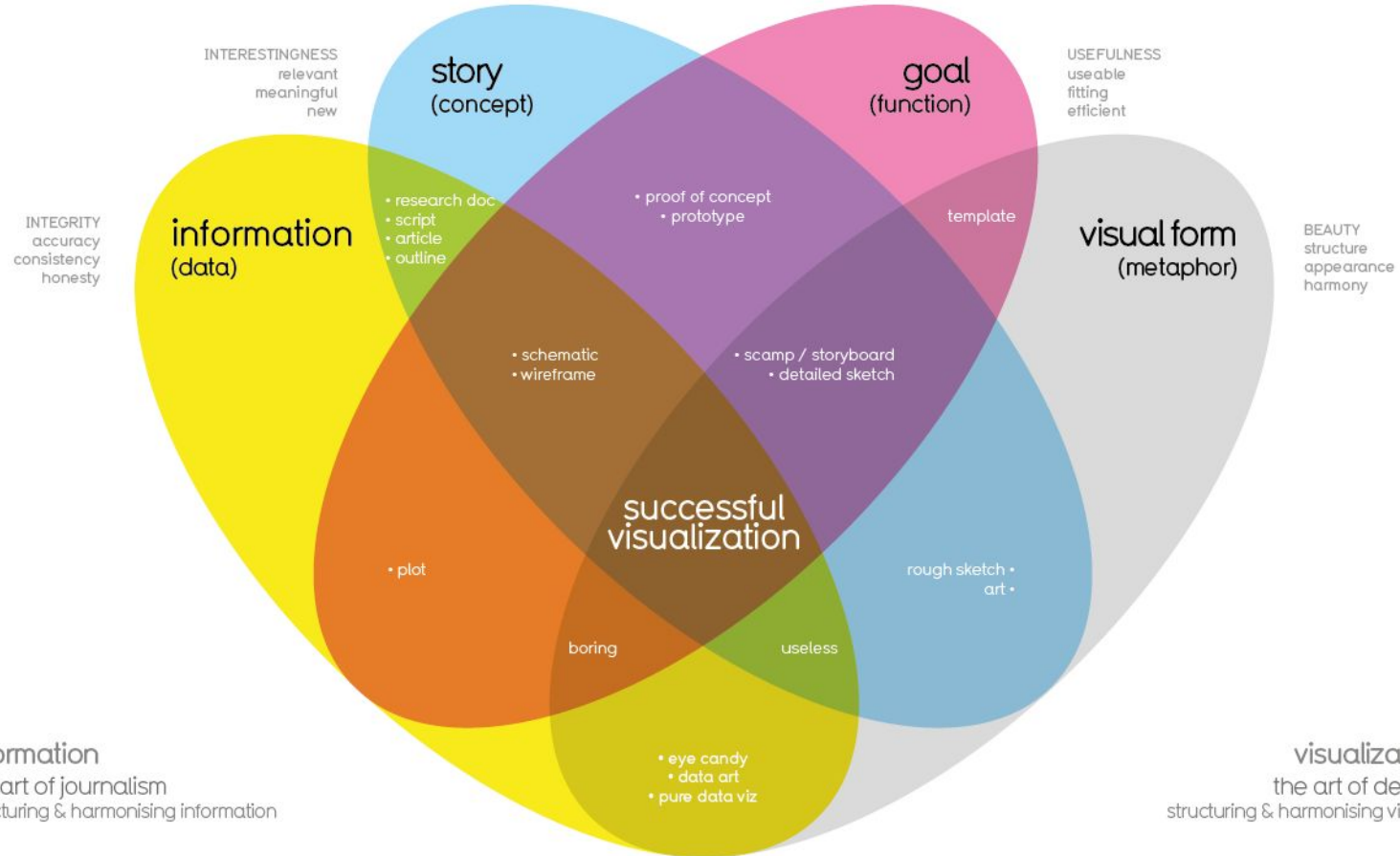
- focus on narrative

- how constructed (lighting, layout, multimodality) → the medium

- Style ...

What Makes a Good Visualization?

explicit (implicit)



What makes a good visualisation?

Edward Tufte

“Graphical excellence ... gives the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space”

Stephen Few - “Show Me the Numbers” (2012)

Well told stories - simple, seamless, informative, true, contextual, familiar, concrete, personal, emotional, actionable, sequential

Gregor Aitsch - drivenbydata.net (NY Times, Graphics Editor)

“Know the rules, before you break them ...”

Cole Nussbaumer Knaflitz - “Storytelling With Data” (2015)

“Data visualization is the process of turning information into pictures for a specific purpose.”

Kirk's principles of Good Data Visualisation

Good data visualisations are:

1. Trustworthy

- a. Don't use inappropriate colour **palettes** or **fonts**
- b. Don't include unnecessary chart junk

2. Accessible

- a. Useful and understandable
- b. Reward vs Effort (complexity is sometimes okay!)

3. Elegant

- a. Thorough (get the little details right!)
- b. Stylish

Andy Kirk, "Data Visualisation" (2016)

Questions?

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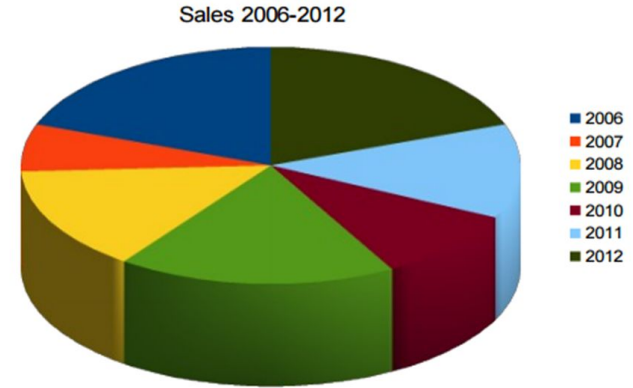
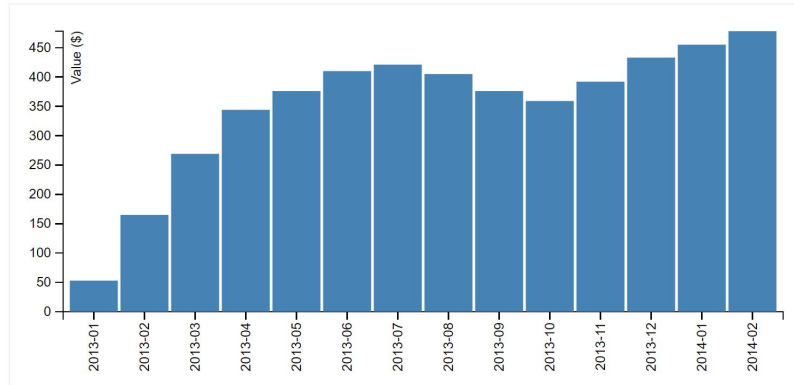
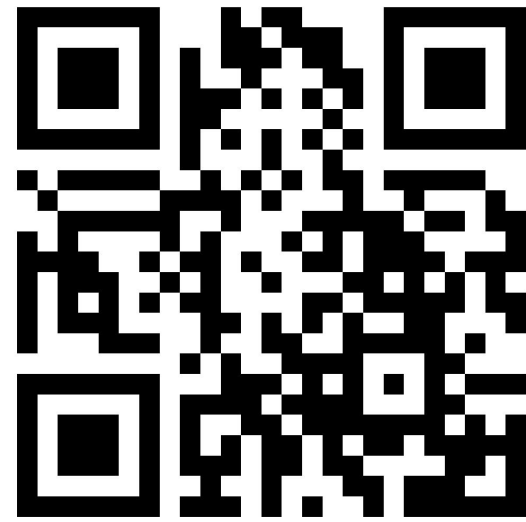


Figure 1 – a 3d pie-chart

[illegible]



CHOCOLATE

The first box of **Valentine's Day** chocolates was created by famed British chocolatier, **Richard Cadbury**, in **1868**

Chocolate sales for Valentine's Day total over **ONE BILLION DOLLARS (US)** every year



Americans eat **12 POUNDS** of chocolate **ANNUALLY**

A survey conducted by the **Chocolate Manufacturers Association** revealed that **50 PERCENT OF WOMEN** will likely give a gift of chocolate for **Valentine's Day**.

As an **elixir for love**, chocolate has been believed throughout history to bring smiles to the broken-hearted and to prompt amorous feelings in both men and women.



Motivation? Information, Education, Persuasion and/or Entertainment

- Data?
- Illustrations?
- Structure?
- Design?



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With all of the chocolate eaten on Valentine's Day there is bound to be a few stains.

Find out how to remove chocolate and more at **Clorox.com**



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Tools for Visualisation?



Excel/Google sheets

Photoshop/GIMP

Powerpoint

Tableau

PowerBI

Qlikview

R - ggplot

Pandas .plot()

Python - matplotlib, seaborn,
bokeh

Plot.ly

D3.js & other javascript libraries

[Overview of Python Visualisation Libraries \(with example notebooks\)](#)

Becoming an expert in any tool requires practice and experience. From this course the most important skill is that you understand the visualisation design process, that is, how to:

1. choose the most appropriate chart types,
2. tell compelling stories,
3. make effective visualisation design choices, and
4. avoid cognitive load on your audience.

Once you understand this process you can use whichever tool, application or library you need. It's useful to be fairly proficient in one visualisation tool but excellent visualisations can be created using relatively simple tools.

Resources

[Ref 1] John Dimarco, Digital Design for Print and Web An Introduction to Theory, Principles, and Techniques, (Part 1 only), <https://www.dawsonera-com.dcu.idm.oclc.org/abstract/9780470639184>

- David McCandless, The Beauty of Data Visualization (TED talk)
http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization?language=en
- ProPublica Guides, Data Style Guide,
<https://github.com/propublica/guides/blob/master/news-apps.md> - very good source of general design rules, sections on Accuracy, Axes, Charts, Colors, Legends, Maps, Money, Numbers, Sources and Time are relevant to CA682.
- History of Visual Communication, http://www.citrinitas.com/history_of_viscom/
- Does Comic Sans Benefit People with Dyslexia?
<https://www.boia.org/blog/does-comic-sans-benefit-people-with-dyslexia>

Books on Visualisation

Andy Kirk, “Data Visualisation” (2016)

Cole Nussbaumer Knaflitz, “Storytelling with Data” (2015)

Stephanie D. H. Evergreen, “Effective Data Visualisation” (2017) ← Business view

Alberto Cairo, “The Truthful Art” (2016) ← Journalistic view

Stephen Few, “Show Me the Numbers” (2012)

Edward Tufte, many ...