

Storytelling Through Data: Engaging Stakeholders and Improving Data Literacy

Resource Handout

Session Objectives

- Learn how to tell a story using data that easily translates to constituents
- Discover how to transform data into your story
- Strategize ways to enhance your understanding of communicating data
- Identify potential barriers to using data and ways to overcome those challenges
- Learn about visualization tools that can help you create a dynamic visual representation of your story to encourage stakeholder engagement

The Seven Hats of Data Visualization Design

Kirk, A. (2016). *Data visualisation: A handbook for data driven design*. Sage Publications.

Project Manager: oversees the project

- Initiates and leads on formulating the brief
- Identifies and establishes definitions of key circumstances
- Pays strong attention to detail

Communicator: manages the people relationships

- Manages expectations and presents possibilities
- Helps to define the perspective of the audience
- Launches and promotes the final solution

Scientist: provides scientific rigour

- Understands the science of visual perception
- Understands visualization, statistical, and data ethics
- Verifies and validates the integrity of all data and design decisions

Data Analyst: handles all data work

- Examines the physical properties of the data
- Transforms and prepares the data for its purpose
- Undertakes exploratory data analysis
- Has database and data modelling experience

Journalist: pursues the scent of an enquiry

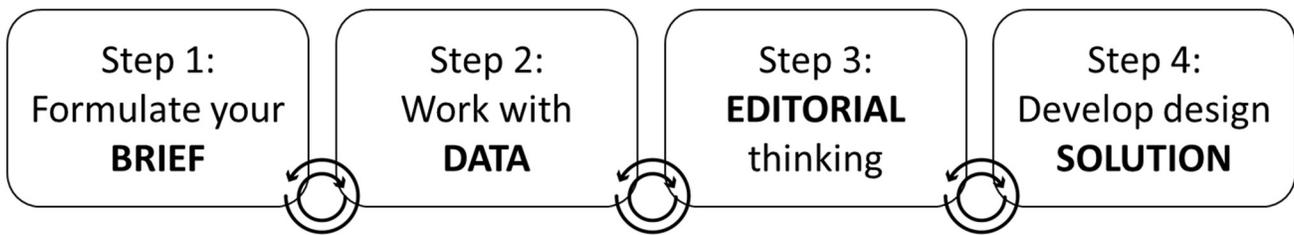
- Has an instinct to research, learn and discover
- Driven by a desire to help others understand
- Possesses or is able to acquire salient domain knowledge
- Has empathy for the interests and needs of an audience
- Defines the editorial angle, framing and focus

Designer: provides creative direction

- Establishes the initial creative pathway through the purpose map
- Has strong creative, graphic and illustration skills
- Understands the principles of user interface design
- Is fluent with the full array of possible design options
- Unifies the decision-making across the design anatomy

Technologist: constructs the solution

- Possesses a repertoire of software and programming capabilities
- Possesses strong mathematical knowledge
- Can automate otherwise manually intensive processes
- Works on the prototyping and development of the solution
- Undertakes pre- and post-launch testing, evaluation and support



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Step 1: Formulating your brief

- Establishing your project's context
 - Personal intrigue: 'I wonder what ...'
 - Stakeholder intrigue: 'He/she needs to know ...'
 - Audience intrigue: 'They need to know ...'
 - Anticipated intrigue: 'They might be interested in knowing ...'
 - Potential intrigue: 'There should be something interesting ...'
- Defining your purpose
 - What are we trying to accomplish with this visualisation?
 - What is a successful 'outcome'?
- Establishing your project's vision
 - What kind of experience?
 - Explanatory, exhibitory or exploratory?
 - What tone of voice will it offer?
 - The efficiency and perceptibility of reading data
 - The high-level, affective nature of feeling data
- Harnessing Ideas
 - What mental images, ideas and keywords when thinking about the subject matter of this challenge?
 - What influence and inspiration can you source to shape your thinking?

Step 2: Working with data

- Acquisition
 - Different sources and methods for getting your data
- Examination
 - Developing an intimate appreciation of the characteristics of this critical raw material
 - Physical properties: type, size, and condition.
 - Meaning: phenomenon, completeness
- Transformation
 - Getting your data into shape, ready for its role in your exploratory analysis and visualisation design:
 - Clean: resolve any data quality issues.
 - Create: consider new calculations and conversions.
 - Consolidate: what other data (to expand or append) or other assets could be sought to enhance your project?
- Exploration
 - Using visual and statistical techniques to see the data's qualities:
 - What insights does it reveal to you as you deepen your familiarity with it?

Step 3: Establishing your editorial thinking

- Angle: you cannot show everything at once, so what perspective will you show in one chart?
 - Must be relevant in its potential interest for your audience.
 - Must have sufficient quantities to cover all relevant views – but no more than required
- Framing: effectively a filtering decision concerned with which data to include and exclude
 - Applying filters to your data to determine the inclusion and exclusion criteria
 - Framing decisions must provide access to the most salient content but also avoid any distorting of the view of the data
- Focus: emphasising what is more important in contrast to what is less important
 - Which features of the display to draw particular attention to?
 - How to organize the visibility and hierarchy of the content?

Step 4: Developing your design solution

- Considering all the design options and beginning the production cycle
 - Wireframing and storyboarding designs
 - Developing prototypes or mock-up versions
 - Testing
 - Refining and completing
 - Launching the solution
- Five layers of the visualisation design anatomy
 - Data representation
 - Interactivity
 - Annotation
 - Color
 - Composition

5 layers of the visualisation design anatomy

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1) Data Representation

- Visual Encoding
 - Marks: represent records (or aggregation of records) and can be points, lines, areas or forms.
 - Attributes: represent variable values held for each record and can include visual properties like position, size, colour, connection.
- Chart Types
 - Categorical: Comparing categories and distributions of quantitative values
 - Hierarchical: Charting part-to-whole relationships and hierarchies
 - Relational: Graphing relationships to explore and correlations and connections
 - Temporal: Showing trends and activities over time
 - Spatial: Mapping spatial patterns through overlays and distortions

2) Interactivity

- Data adjustments affect what data is displayed
 - Framing: isolate, include or exclude data.
 - Navigating: expand or explore greater levels of detail in the displayed data.
 - Animating: portray temporal data via animated sequences.
 - Sequencing: navigate through discrete sequences of different angles of analysis.
 - Contributing: customising experiences through user-inputted data.
- Presentation adjustments affect how the data is displayed
 - Focusing: control what data is visually emphasised.
 - Annotating: interact with marks to bring up more detail.
 - Orientating: make better sense of your location within a display.

3) Annotation

- Project annotations help viewers understand what the project is about and how to use it
 - Headings: titles, sub-titles and section headings.
 - Introductions: providing background and aims of the project.
 - User guides: advice or instruction for how to use any interactive features.
 - Multimedia: the potential to enhance your project using appropriate imagery, videos or illustrations.
 - Footnotes: potentially includes data sources, credits, usage information, and time/date stamps.
- Chart annotations help viewers perceive the charts and optimise their potential interpretations
 - Chart apparatus: axis lines, gridlines, tick marks.
 - Labels: axis titles, axis labels, value labels.
 - Legend: providing detailed keys for colour or size associations.
 - Reading guides: detailed instructions advising readers how to perceive and interpret the chart.
 - Captions: drawing out key findings and commentaries.
- Typography
 - Most of the annotation features you include are based on text and so you will need to consider carefully the legibility of the typeface you choose and the logic behind the font-size hierarchy you display.

4) Color

- Data legibility involves using colours to represent different types of data.
 - The most appropriate colour association or scale decisions will depend on the data type: nominal (qualitative), ordinal (qualitative), interval and ratio (quantitative).
- Editorial salience is about using colour to direct the eye.
 - For which features and to what degree of emphasis do you want to create contrast?
- Functional harmony concerns deciding about every other colour property as applied to all interactive features, annotations and aspects of your composition thinking.

5) Composition

- Project composition defines the layout and hierarchy of the entire visualisation project
 - Visual hierarchy – layout: how to arrange the position of elements?
 - Visual hierarchy – size: how to manage the hierarchy of element sizes?
 - Absolute positioning: where specifically should certain elements be placed?
- Chart composition defines the shape, size and layout choices for all components within charts
 - Chart size: don't be afraid to shrink charts, so long as any labels are still readable, and especially embrace the power of small multiple.
 - Chart scales: what are the most meaningful range of values given the nature of the data?
 - Chart orientation: which way is best?
 - Chart value sorting: consider the most meaningful sorting arrangement for your data and editorial focus.

Useful Resources and Links

Data Presentation Books

- Kirk, A. (2016). *Data visualisation: A handbook for data driven design*. Sage Publications.
 - <http://www.visualisingdata.com/>
- Evergreen, S. D. (2017). *Presenting data effectively: Communicating your findings for maximum impact*. Sage Publications.
 - <https://study.sagepub.com/evergreen2e>

General Presentation Information

- American Evaluation Association
 - <https://www.eval.org/page/p2i-tools>
- Presentation Magazine
 - <https://www.presentationmagazine.com/>

Stock Photos and Graphics

- <http://search.creativecommons.org>
- <https://unsplash.com/>
- <https://www.freeimages.com/>
- <https://www.pexels.com/>
- <https://www.istockphoto.com/>
- <https://www.shutterstock.com/>
- <http://www.presentationpro.com/>

Reference Icons

- <http://thelearningcoach.com/resources/icon-collection/>
- <https://thenounproject.com/>
- <https://www.flaticon.com/>

Fonts and text

- <https://www.fontsquirrel.com/>
- <https://fonts.google.com/>
- <http://fontpark.net/en>

Color

- <https://color.adobe.com>
- <https://www.design-seeds.com/>
- <https://www.colourlovers.com/>
- <http://labs.tineye.com/multicolr>

Color-blind check

- <http://colorbrewer2.com>
- <http://www.color-blindness.com/coblis-color-blindness-simulator/>

Data Visualization Tools

(just a partial list, there are a lot out there...)

Information on Data Visualization Tools

- Data Science Central (online resource for Big Data Practitioners)
 - <https://www.datasciencecentral.com/profiles/blogs/17-data-visualization-tools-resources-you-should-bookmark>
 - <https://www.datasciencecentral.com/profiles/blogs/10-data-visualization-tools-to-bring-analytics-into-focus>

Specific Data Visualization Tools

- Excel
 - <https://products.office.com/>
- Google Charts
 - <https://developers.google.com/chart/>
- Infogram
 - <https://infogram.com/>
- Adobe Photoshop & Illustrator
 - <https://www.adobe.com/products/illustrator.html>
- Timeline
 - <https://timeline.knightlab.com/>
- Tableau
 - <https://www.tableau.com/>
- Power BI
 - <https://powerbi.microsoft.com/en-us/>
- Google Data Studio
 - <https://datastudio.google.com/>