**Hand-out: Effective graph design**

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| **Steps** |  | **Instructions** |
| Choose the right type of display |  | * Break up graphs and tables into two categories: those that gives you insights, those that help you tell your story to others
* Determine if a table, graph or both are needed to communicate your message.
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| Tailor each graph/table |  | * Adapt to the specific purpose and audience at hand, and their level of graphicacy.
* Determine the best means to encode the values by using what you want to communicate: what comparison, what order, what grouping? Let the relationship you want to show guide the type of chart you choose.
* Determine where to display each variable
* Determine best use of color. Color evokes emotions and should match the story you are trying to tell.
* Encode the data in many different ways before to choose the right one for communicating your results. Start on paper and iterate.
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| Determine the best design for the non-data objects |  | * Determine the range for the quantitative scale
* If a legend is required, determine where to place it
* For each axis, determine if tick marks are required and how many
* Determine the best location for the quantitative scale
* Determine if grid lines are required
* Determine what descriptive text is needed
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| Reduce non-data ink. Eliminate the clutter |  | * Always focus on the data, not on fancy or sexy ornamentations. Separate signals from the noise. Don’t let your message get buried. Pursue simplicity by minimizing distracting information and design elements
* Eliminate chart junk (The stuff that doesn’t change when the data changes, 3D, gradient, colors, shadows, etc.). Remove unnecessary non data-ink (background colors, gridlines, etc.). Use contrast strategically.
* Leverage gestalt principles to cut that which has no informative value
* Avoid repetition. Simplify. Use the least visible means to support the function of the non-data ink (white space will work in most of the cases). Less is more
* Remove gridlines, they rarely add value.
* De-emphasize and regularize what remains. Use lines or white space to separate areas that are conceptually different.
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| Emphasize data ink. Draw attention where you want it |  | * Remove unnecessary data ink (thousands, repetitions, etc.). Substract what’s unnecessary. Quiet down less important parts
* Determine if particular data should be featured, and if so, how. Emphasize what’s most important (i.e. point, line or bar of interest in your graph). Use the least effective difference to highlight: contrast, italic, bold, color or a combination of those.
* Maximise data density (avoid low data density or data overload). Display the smallest amount of numbers that you can to support your needs
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| Apply design fundamentals |  | * Help the reader by using sensory memory: Use pre-attentive attributes, especially line length and 2-D position for quantities. Use no more than a handful of categorical visual attributes, avoid distraction.
* Make it easy to compare the quantities
* Make it easy to see the ranked order of values
* Keep your geometry in check
* White space is not your enemy. Use it to delineate data and text.
* Be confident that you can justify the inclusion, exclusion or deployment of every design property.
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| Define required interactive features and functions |  | * Define options for variable adjustment: selection highlighting/brushing, filtering, excluding, sorting
* View adjustment: Pan, zoom, scale, rotate, transpose, arrange, hovering/annotate, drop lines
* Animation: play, pause, reset, chapter navigation, grab the slider, etc.
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| Be precise |  | * Check the data, include your sources
* Indicate the nature of the relationship
* Indicate how the values relate to one another
* Explain encodings with labels, legend and keys
* Represent the quantities accurately
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| Make figures stand alone |  | * Assume readers are showing up to your graphic blindly and will not see the same things that you see if there are no explanations or setup.
* Provide context: label axis, include units and sources
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| Text is your friend |  | * Write a good headline
* Careful use of labels, introductions, explanatory text and captions
* Annotate and highlight most interesting data points
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| Revise and edit before publishing |  | * Seek feedback from your colleagues
* Iterate for success. But know when to stop.
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| Questions you need to ask yourself before, during and after |  | * Should we be doing this?
* What is the point?
* Will any of our readers/user’s care?
* Is this going to be a core component of the story, or merely supplemental?
* What can we do with the data. What should we do?
* Why is it important? How is it related to x, y and z?
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