Data Visualization Best Practices

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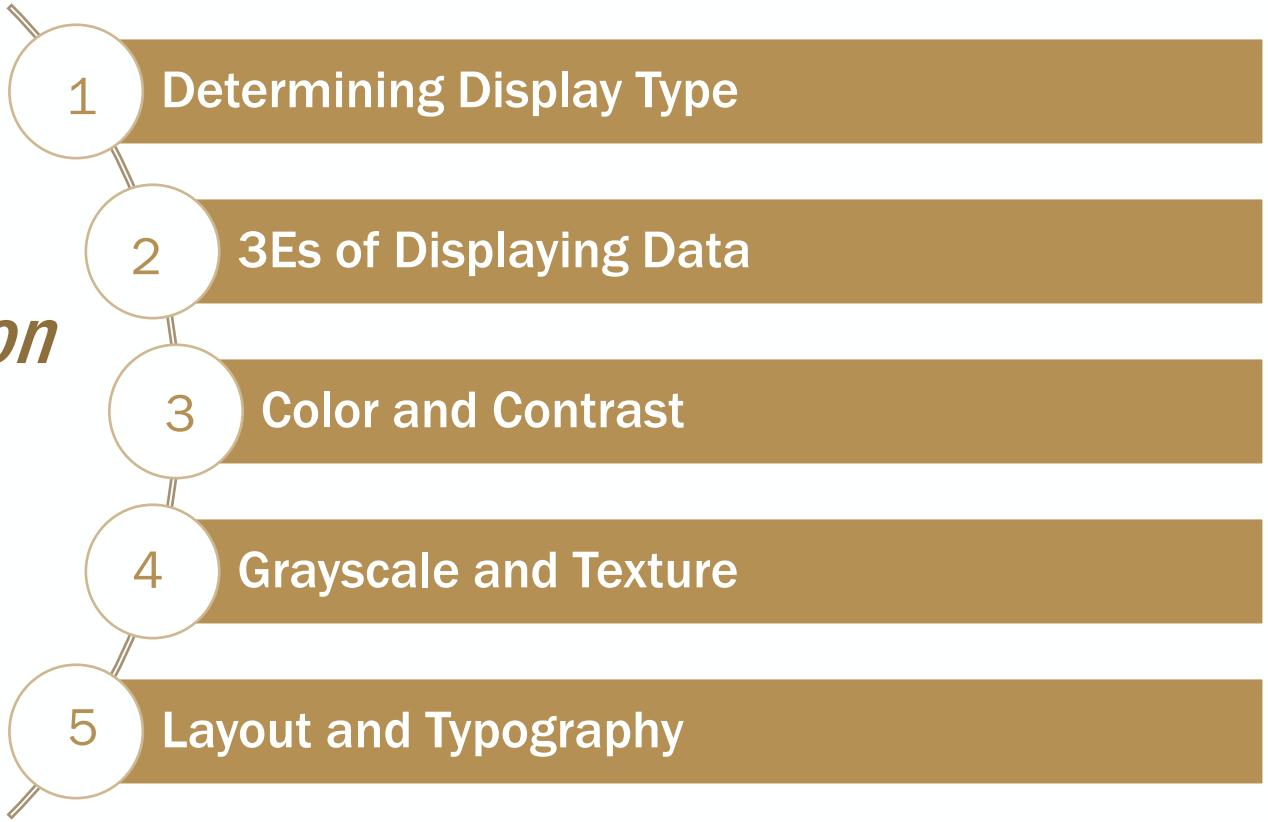
This presentation will cover :

Data Visualization Best Practices

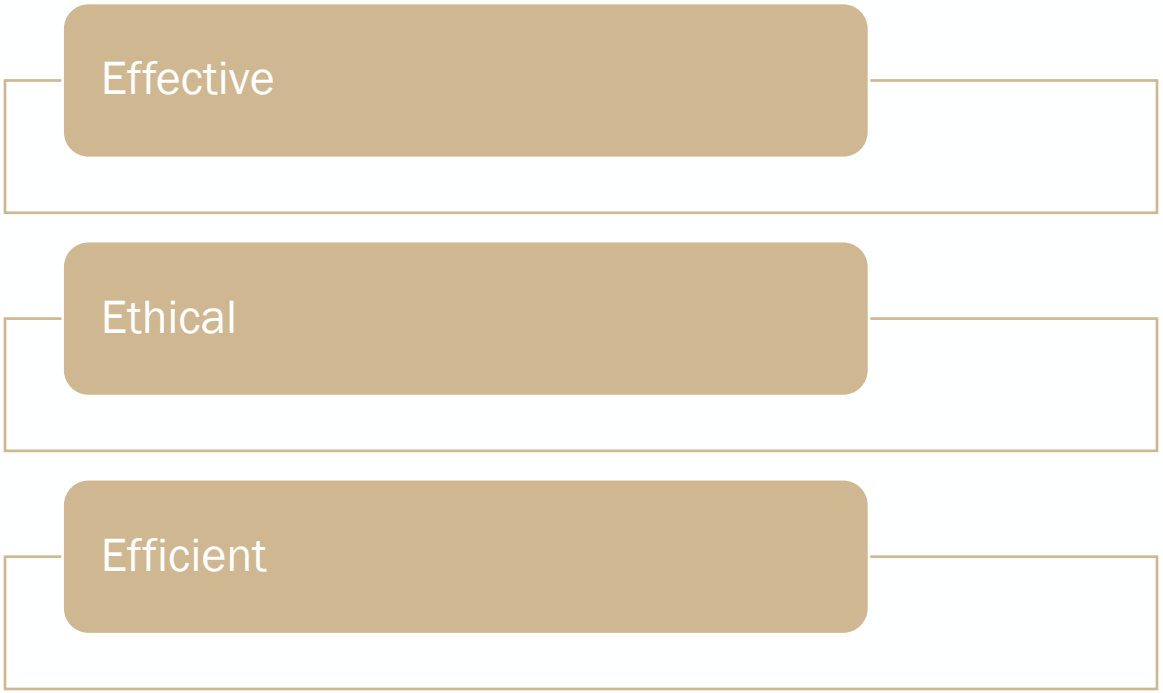


Determining Display Type

Though it can be tempting to use flashy or novel visual presentation tools, consider the best display method for your information:

Information Type	Effective Presentation
Numeric	Tables, charts
People, objects	Pictures, line drawings
Processes	Flow charts
Geographic data	Maps
Nonchronological lists	Bulleted lists
Chronological or prioritized lists	Numbered lists

3Es of Displaying Data



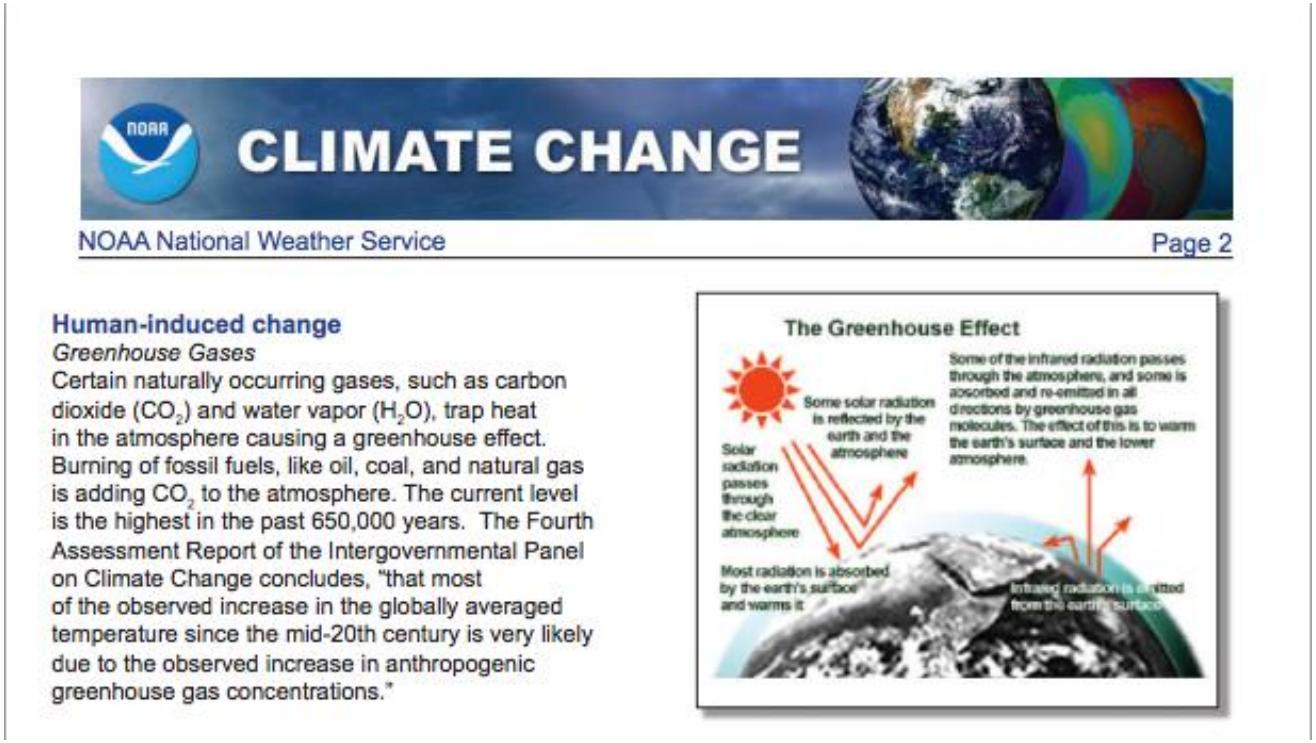
Effective Display

1. • Assure that the visual is placed within proximity to the text and vice versa.
2. • Visuals give readers opportunities to pause and consider the ideas in the text.
3. • Graphics visually reinforce your argument; readers tend to trust what they can see.
4. • Tell a *simple* story with your data.

Example

Evaluate the following graphic

- What is effective about the placement of this graphic?
- What could be made more effective in the layout and composition of this page?
- How might these suggestions change from print to screen audiences?



CLIMATE CHANGE

NOAA National Weather Service Page 2

Human-induced change

Greenhouse Gases

Certain naturally occurring gases, such as carbon dioxide (CO_2) and water vapor (H_2O), trap heat in the atmosphere causing a greenhouse effect. Burning of fossil fuels, like oil, coal, and natural gas is adding CO_2 to the atmosphere. The current level is the highest in the past 650,000 years. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change concludes, "that most of the observed increase in the globally averaged temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Ethical Display

1. Be absolutely honest with your readers.
2. Do not be tempted to exaggerate trends or inflate results.
3. If you did not create the graphic or generate the data, cite your source.
4. If you want to publish a graphic that you did not create, obtain permission.
5. Include all relevant data. For instance, if you have a data point that you cannot explain, do not change the scale to eliminate it.
6. Represent quantities honestly. Do not use a table to hide a data point that would be obvious in a graph.
7. Do not use color to misrepresent an item's importance. Shade can trick the eye to make elements larger than darker shaded items of the same size.

Example

Evaluate the following graphic:

- What ethical issues do you notice about this graph?
- How might the manner in which the information is displayed misinform readers?
- What suggestions would you offer to improve the way this data is displayed?
- How might you revise this graph to be more ethical?
- How does color change the data and reader reception?

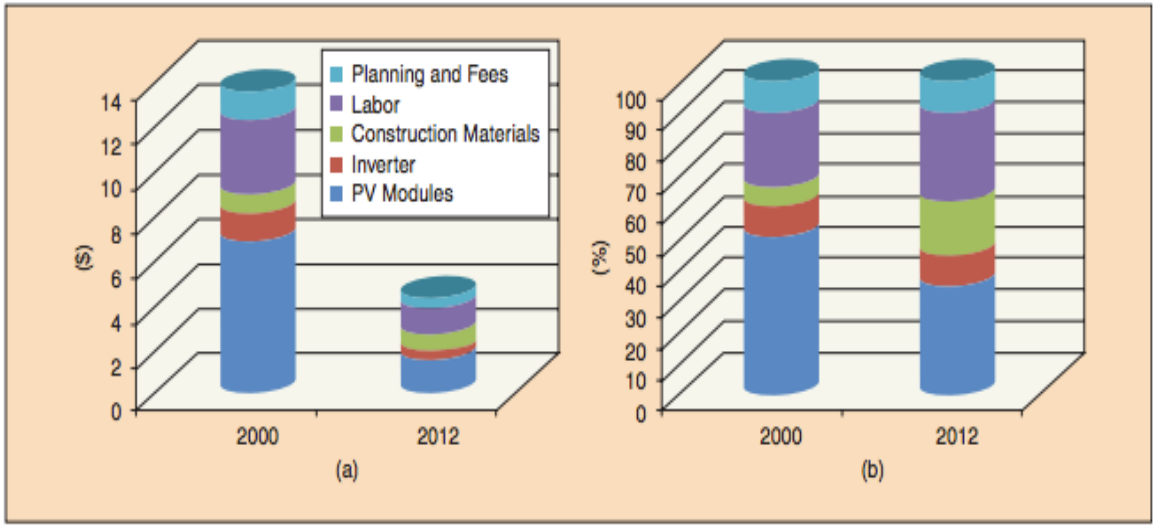


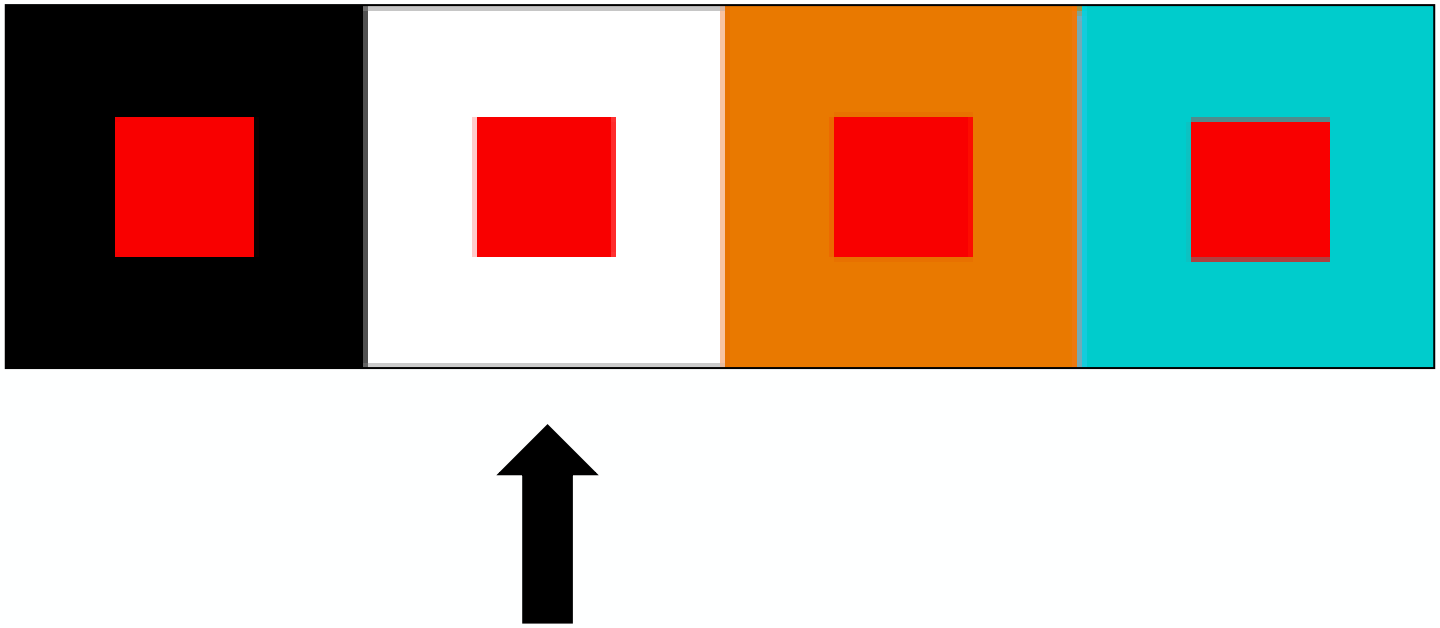
FIGURE 2 – The evolution of the cost distribution of PV systems (in the range of 2–50 kWp) [8]: (a) the costs in U.S. dollars and (b) the distribution of each component cost.

Efficient Display

1. Use color carefully and sparingly.
2. Avoid color when black and white are more effective.
3. Use color to establish visual patterns, but limit it to two or three colors for clarity.

Color & Contrast

Color sets with strong contrast (on screen and in print)



White or neutral backgrounds with bold, warm text or annotation colors provide the strongest contrast.

Best Contrasting Colors

Strong Contrast. Best for visual annotations or charts **on screen.**

Strong Contrast. Stick with the basics- black & white.

Grayscale and Texture

Grayscale: take advantage of texture options in graphics, such as lines, dots, or hash marks.

Tip: it's handy to view your color graphics in grayscale as you work to assure that your graphics represent the data well, taking care to make sure no two colors are similar or muddied.

Example

Evaluate the following visual:

- Does the following graphic create an effective or ineffective contrast?
- Does the use of color make the visual easier to interpret? Why or why not?

SOH definition is that it does not take the application of the battery into application's viewpoint, aging can be related to two major causes: the

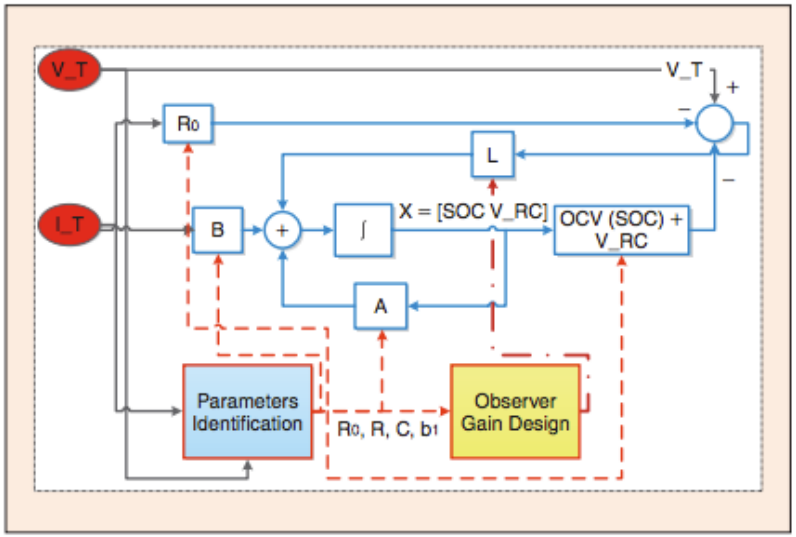


FIGURE 6 – Battery parameters and SOC coestimation block diagram.

indicators, namely the RUL and end of life (EOL) to predict the lifetime of the battery [30], [31]. Although these studies employ statistical analysis to estimate the RUL and EOL of the batteries, they do so mostly in military and aerospace applications and do not consider the requirements and characteristics of the smart grid or EV applications.

An application-dependent definition of SOH in EV and smart grid applications is aimed by ADAC at predicting the RUL and EOL. These applications have different operating power and energy requirements for given time periods, as well as different charging and discharging trends to the battery. It is necessary to take all of the following characteristics into consideration when predicting the EOL and RUL of a battery for a specific application.

Layout and Typography

Your data visualizations will likely be presented alongside text, or work in concert with text such as titles, subtitles or labels.

When working with these elements, the following tips provide general approaches for assuring readers can easily access, read, and interpret the information you provide in your data visualizations.

Layout

HATS Principles & Effective Integration of Visuals

Headings	• Promote easy navigation.
Access	• Promote the finding and understanding of information.
Typography	• Promote the ease of reading and clear levels of information hierarchy.
Space	• Promote effective document design.

Thank You

Purdue OWL

Krach Leadership Center

Web: https://owl.purdue.edu/

Phone: (765) 494-3723

Email: writing.lab@purdue.edu

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