

Creating Effective Posters

A Few Ideas

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Creating Effective Posters: A few ideas

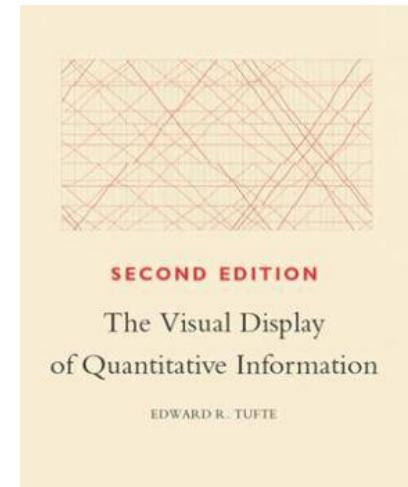
OVERVIEW

- Big-picture thoughts on...
 - Effective data visualizations (taken from Edward Tufte)
 - Design principles
- Examples
 - ISDC Award-winning posters
 - A less-effective poster
- Resources

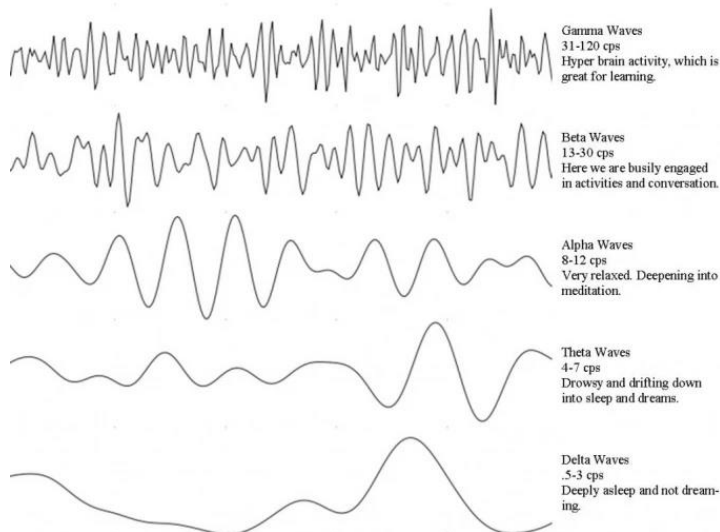
Big picture: Data visualization

EDWARD TUFTE, *THE VISUAL DISPLAY OF QUANTITATIVE INFORMATION*

- Use data to tell the story
- Avoid chartjunk
- Strive for a high data/ink ratio
- Facilitate comparisons (small multiples)
- Take advantage of human eye-brain information processing system

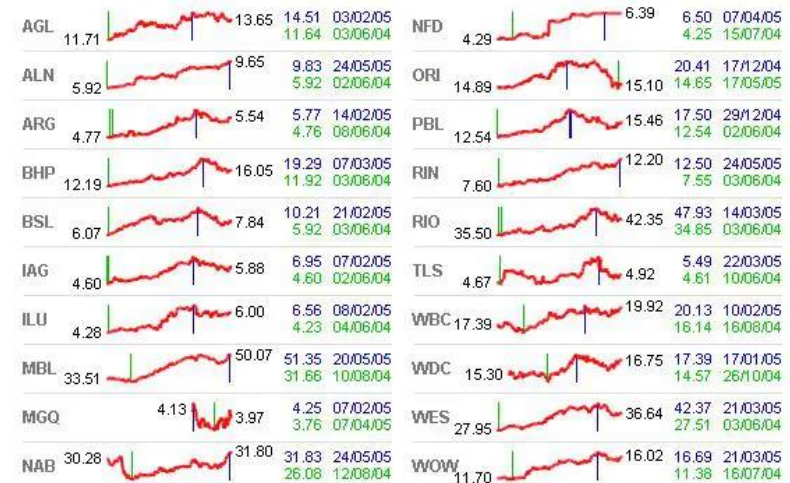


Brain Waves Graph



High Data-Ink Ratio

Small Multiples

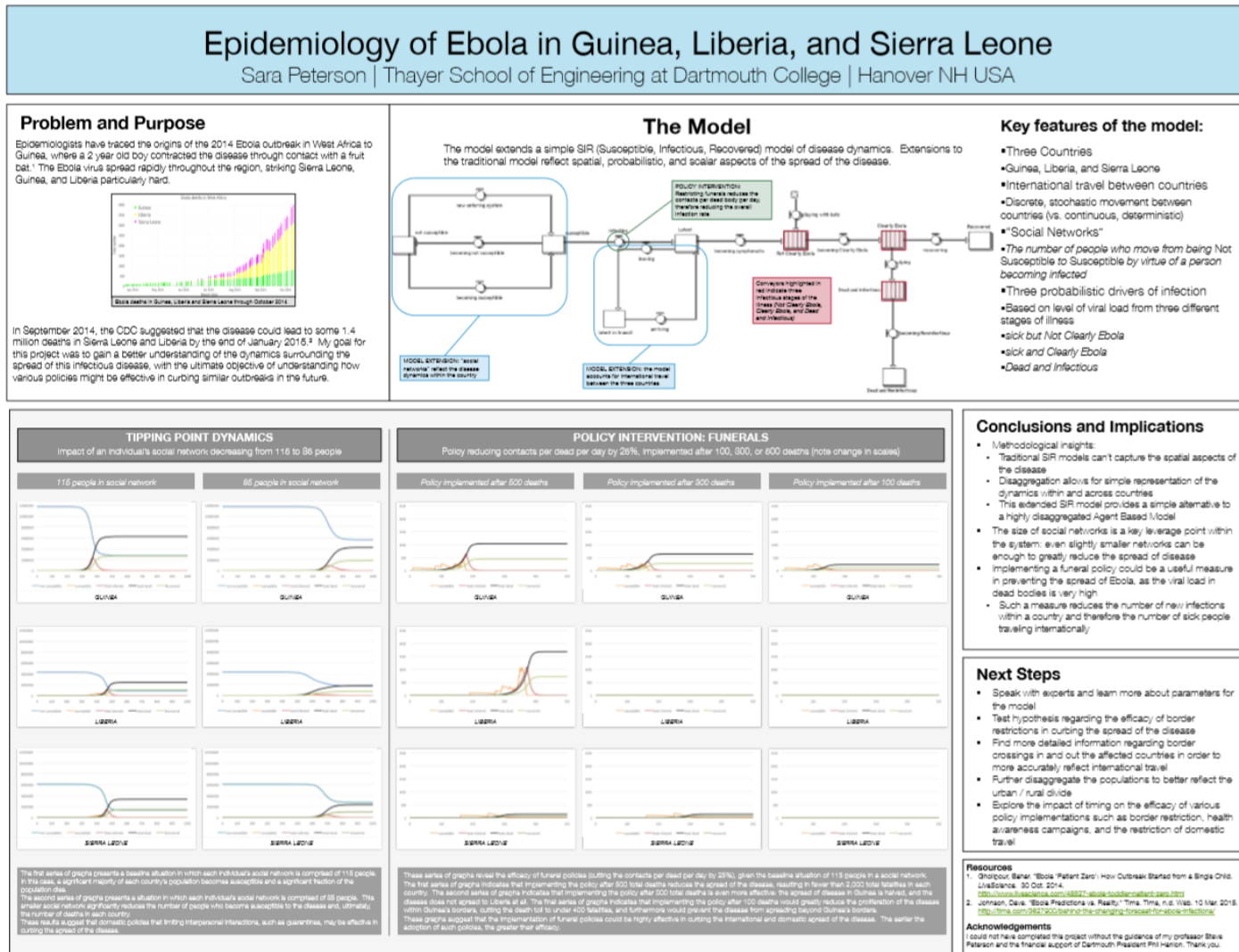


Big-picture: Design principles

1. Frame your poster as high inquiry/low advocacy
 - Remove “I’m trying to prove” from the lexicon
 - Replace with “Here’s my hypothesis...” or “Here’s the question I’m trying to answer...” or “Here’s what I want to understand...”
2. Use your poster to create a narrative that engages participants
 - What is the story you want to tell?
 - What are the key insights from your analysis?
3. Strive for essence in your poster
 - Purpose | methods | results | insights
 - Use data-rich graphics (diagrams, graphs, tables) to convey the story
4. Be graphics-forward!
 - Keep prose to irreducible essence
 - Small-multiple graphs can be very helpful
 - Make judicious use of simplified stock/flow diagrams and CLDs

Examples

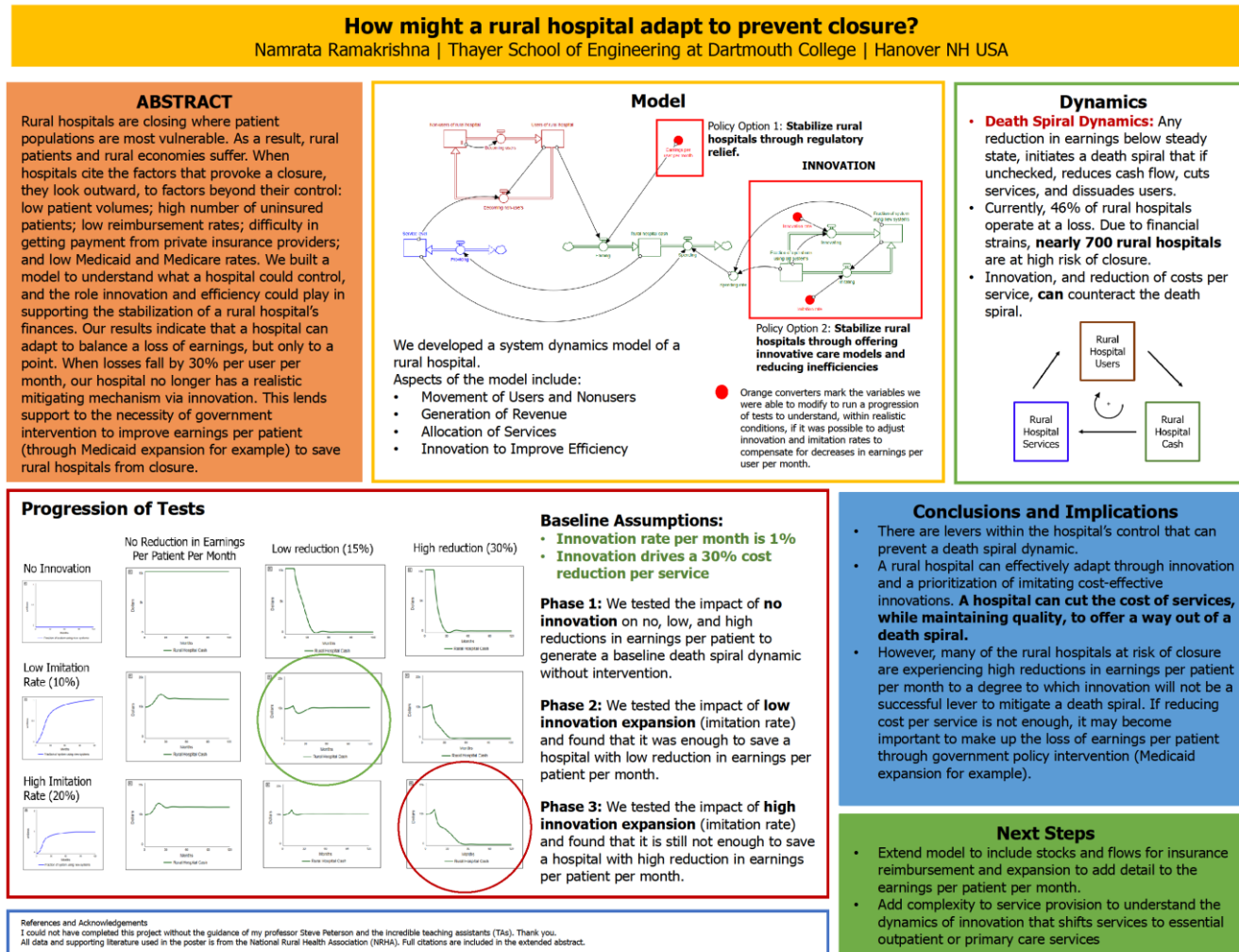
DESIGN IDEAS FROM AWARD-WINNING POSTERS AT ISDC



1. Narrative "fall line"
2. Simplified, annotated model diagram
3. Tells story with data (Tufte, small multiples)
4. Clear ID of take-aways and next steps

Examples

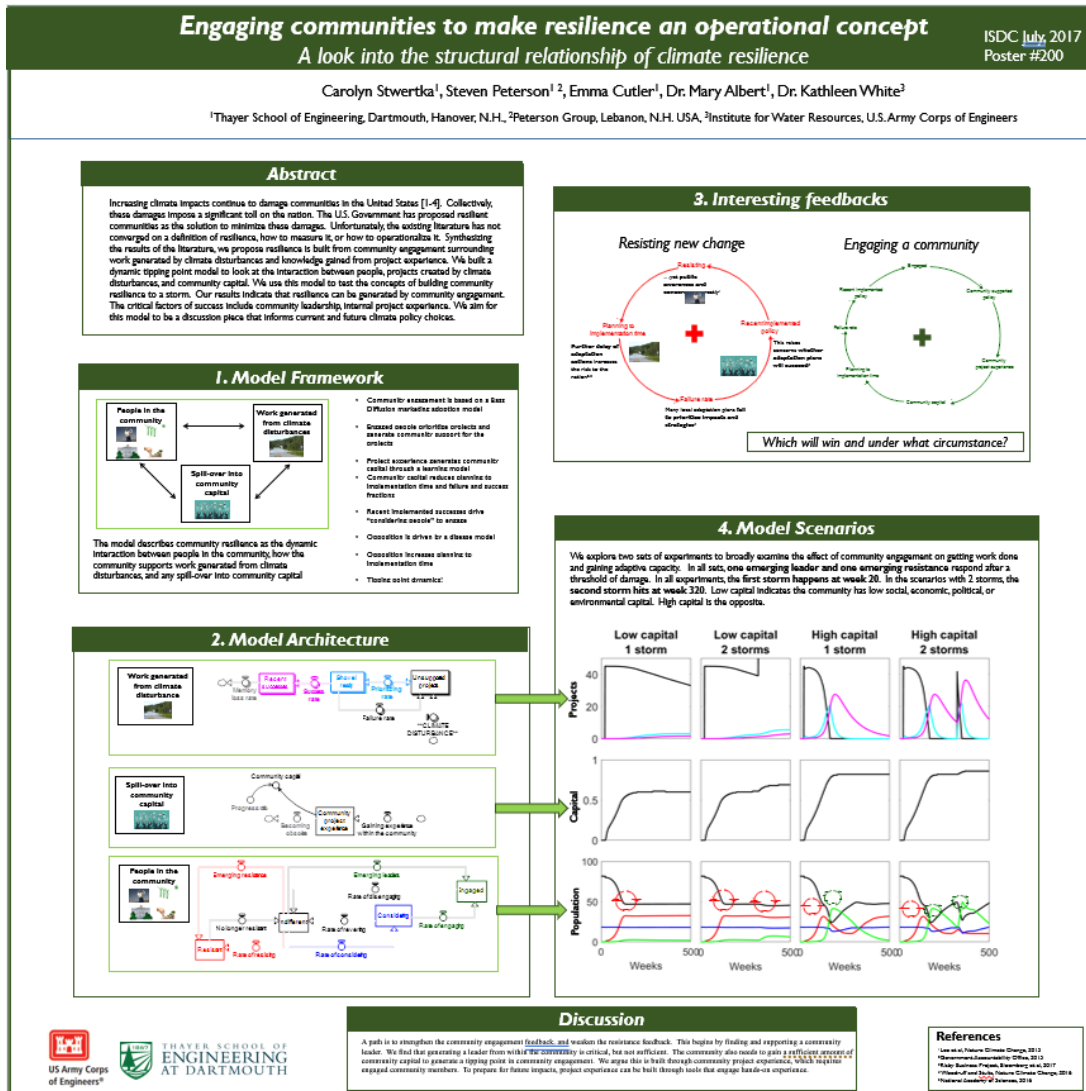
DESIGN IDEAS FROM AWARD-WINNING POSTERS AT ISDC



1. Title captures essence of research question.
2. Abstract
3. Color used to create narrative fall line
4. Modified CLD used to describe death spiral structure
5. Tells story with data (Tufte, small multiples)
6. Clear ID of take-aways and next steps

Examples

DESIGN IDEAS FROM AWARD-WINNING POSTERS AT ISDC



1. Title captures essence of research question
2. Use of numbers to support narrative
3. Simplified CLDs used to create puzzle: "which will win?" puzzle
4. Connection of model architecture and feedbacks (structure) to model scenarios (behavior)



US Army Corps of Engineers

THAYER SCHOOL OF ENGINEERING AT DARTMOUTH

Examples

A LESS-EFFECTIVE EXAMPLE

Arctic National Wildlife Refuge Oil Development vs. Environmental Conservation Trade -Off

Problem & Purpose

The main issue at stake here is what will become of a portion of the Arctic National Wildlife Refuge in Alaska. Specifically, using projections for oil prices, amount of retrievable reserves, and non-economic benefits to wilderness preservation (and various corresponding sub-categories), we aim to determine whether or not drilling should occur in the currently protected area.

The environmental protection versus economic gain debate occurs frequently and all across the world. The debate is inherently difficult because of issues associated with putting a price on nature. First, given that the benefits of these protected places are largely unrelated to monetary gains, their value is somewhat abstract. When they are attempted to be given an economic value, a second problem arises, related to what model should be used in said assessment. Different standards place differing monetary values on wilderness, making disputes between policy-makers almost inevitable. Legislators who use the sustainability standard, for example, will place a much higher value on wilderness preservation than those who employ the efficiency standard. No one evaluation method is "right," so it is virtually impossible to reach a consensus. Through this simulator, we can test a myriad of scenarios that place different values on preservation versus economic gains from oil. We hope to be able to identify what we believe to be the ideal pathway forward for the ANWR reserve and/or gain insight into different outcomes that would arise from plausible future scenarios.

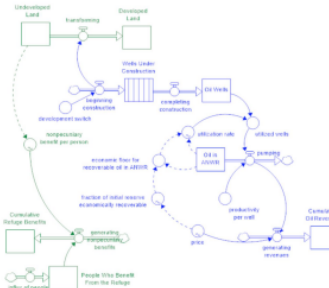
Approach

In our analysis we used a system dynamics model of the oil development in the Arctic National Wildlife Refuge. The key aspects of the model were:

- Wells in construction.
- Cumulative benefits of refuge.
- The amount of developed land.
- Oil in ANWR.
- Price of oil.

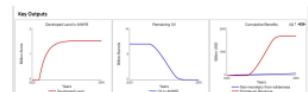
The model gives us scenarios of developed land in ANWR, remaining oil and the cumulative revenue of wilderness and petroleum. This was given by different inputs in oil price, the amount of oil reserves remaining and peoples benefits from wilderness.

The amount of oil reserves left in ANWR drives the amount of pumping being done, which in turn is what drives cumulative revenues for oil extraction. This is also affected by the price of oil, which in turn drives both the generating revenues for oil and the economic floor for recoverable oil. The amount of undeveloped land drives the generated nonpecuniary benefits per person, which in turn drives the cumulative benefits from wilderness/refuge.

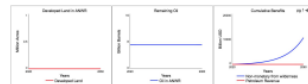


Progression of Tests

Current Scenario



Shift to Renewables



Current Projections:
We ran our baseline model to mirror the current US oil scenario, increasing domestic oil extraction and production (meaning the start of oil drilling in the ANWR in 2024) in light of geopolitical tensions disrupting oil imports, causing a massive increase in oil prices. Furthermore, we decided to set the number of people who benefit from ANWR annually to 15 million at a 4% growth rate per annum - based on the groundwork of conservation beliefs in the US population and the growing concern for mitigating climate change.

Shift to Renewables:
This scenario focused on the impending shift to renewable sources of energy, and thus the decreasing demand for oil. Based on this, we modeled a situation where oil prices sat at a low value with no oil development set to begin in the ANWR even though the estimated oil reserves sat at 7 billion barrels (the mean estimate). Additionally, we assumed that in this scenario a higher proportion of the population would derive benefits from keeping the land undeveloped - so we set it to 20 million people at a 10% growth rate per year.

Nature is Beautiful:
In this rather unrealistic (some may say utopian) scenario, we made the wild assumption that 30 million people derive benefit from the ANWR (growing at a massive 20% per annum) being undeveloped despite there being an estimated 7 billion barrels of 'technically recoverable oil'.
Oil is King:
Just as unrealistic as the previous scenario (hopefully), we chose to model a situation where the US reverts to reliance on black gold as a primary energy source, resulting in increased demand and increased price (AEO High) with oil development beginning in 2024. This meant that we set oil reserves to the high end of estimates - 12 billion barrels. Furthermore, in keeping with the tone of this scenario, we assumed that people would derive fairly low benefits from keeping the ANWR undeveloped - set at 5 million people at a 2% rate of growth.

Conclusions & Implications

In both Oil is King and the Current Projection scenarios, petroleum revenue peaks around 2050 and remains constant for the next decade at 1655.84 and 1806.40 billion USD respectively. While this is a massive amount, we do not believe it warrants development in the area. As stated, our models indicate that production will not reach its peak until 2050, at which point (ideally and such is the target set by President Biden) the majority of cars coming on to the market will be electric. Additionally, as the effects of climate change become increasingly salient, protection of remaining wilderness becomes all the more important, especially northern territories most at risk of warming. ANWR development would also have other secondary effects. One of such is the disruption of the annual caribou migration which would have a profound impact on soil.

Caveats

In modeling our scenarios it was difficult to find any distinct evidence or previous studies regarding the number of people who benefited from undeveloped ANWR. As such, we based our numbers on the general sentiment of the current US population when it comes to topics such as wildlife conservation and climate change, rather like an informal approach towards hedonic pricing. Likewise, there were no numbers we could find regarding the annual growth-rate of people who benefited for the wilderness and the monetary value they put on undeveloped land.

We also only have one option when oil development actually occurs, we based this on the fact that oil development in the ANWR is highly unlikely to get underway by 2024. However, the results would probably look very different if the oil development began say 2030, or 2034. Having only one option limited our outcomes in the scenarios.

Next Steps

While this simulator is relevant today, it will only become more and more important to consider these hypotheses as global warming increases and as development (hypothetically) begins. The arctic is warming at 3 times the global average, and thus, decisions made now will become increasingly impactful in the coming years. As ice continues melting and the rate of extinction of native Arctic species continues, we predict that nationally, the average per-person value of wilderness will increase which will make support for oil development, and drilling into these reserves, more difficult. With that being said, legislation that aligns with our climate goals will need to be put in place in order for this to be ensured. If a conservative president with an oil-thirsty agenda succeeds Biden (a return to Trumpism), a scenario similar to that of our 'Current' projection could unfold. In order for a no-drilling scenario to occur, it is also crucial that we continue to increase the rate of renewable energy and EV development to ensure that we don't need to rely on fossil fuels for transportation.

References & Acknowledgements

- [How much oil is really in ANWR? - Alaska Public Media](#)
- [Oil in ANWR: The debate over drilling in Alaska's Arctic National Wildlife Refuge - 60 Minutes - CBS News](#)
- [Oil Porting Arctic National Wildlife Refuge - The Wilderness Society](#)
- [Arctic National Wildlife Refuge \(ANWR\) - An Overview - EEO](#)
- [Theory and Evidence - Drilling for Oil in the Arctic National](#)
- [ANWR: How much oil is really in ANWR? - Alaska Public Media](#)
- [ANWR: How much oil is really in ANWR? - Alaska Public Media](#)

1. Poster created as part of a class assignment
2. Extensive use of tex--more suitable for an extended abstract than a poster
3. Minimal use of color
4. Difficult quickly to identify research question/purpose

Resources

- A nice summary of Edward Tufte's ideas, by Alyssa Goodman of Harvard (~13 min)
https://www.youtube.com/watch?v=r7YdcZkS_1k
- Edward Tufte on “Beautiful Evidence” (~5 minutes)
https://www.youtube.com/watch?v=Th_1azZA2OY&t=3s
- Brief *Science* article about creating a scientific poster
<https://www.science.org/content/article/how-prepare-scientific-poster>
- How-to video on creating an effective humanities research poster—some of the principles are applicable <https://www.youtube.com/watch?v=i0sXMEc-Aas&t=4s>