2025

frank.computer

# Educating Practitioners on Accessibility and Data Visualization

## Tools, Guidelines, and Approaches to Teaching Basics

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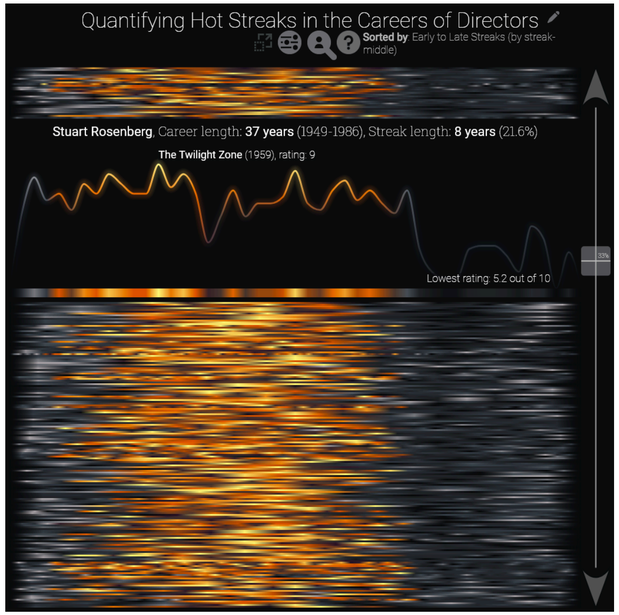
# My pre-phd work: supporting others with tools

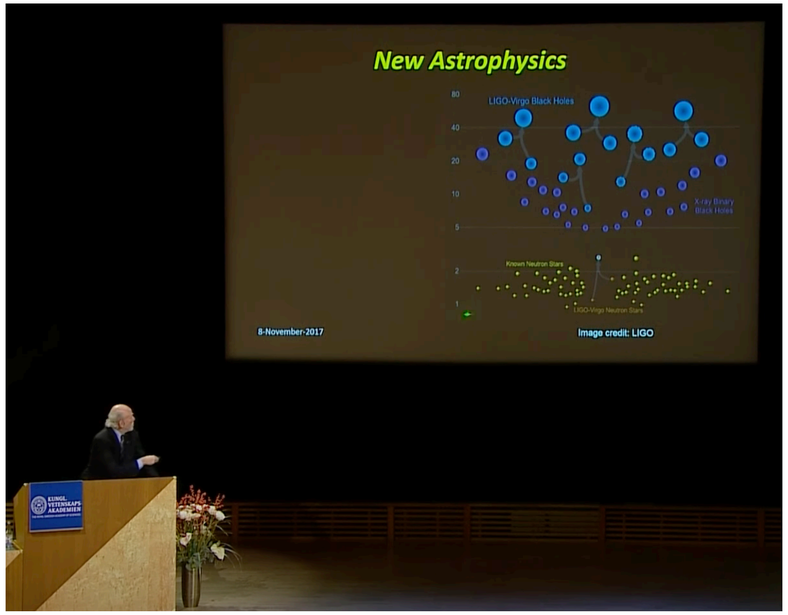
## Industry and research-oriented visualization

### Supporting data scientists



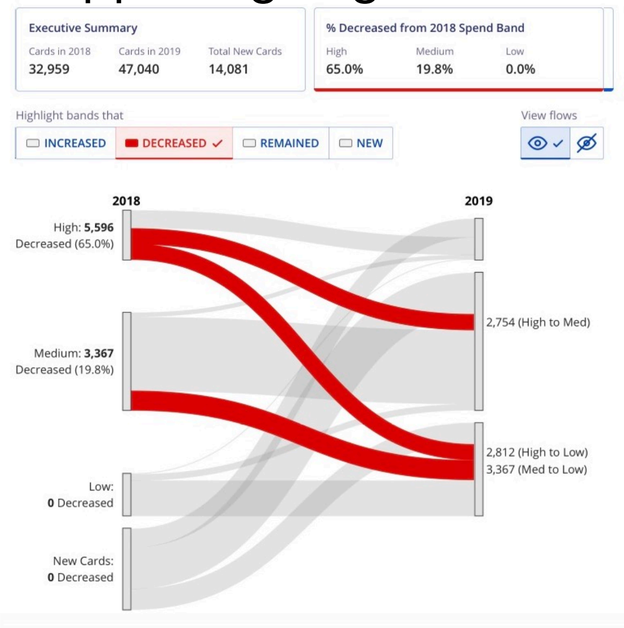

Visualizing a model of over 1m careers

### Supporting scientists

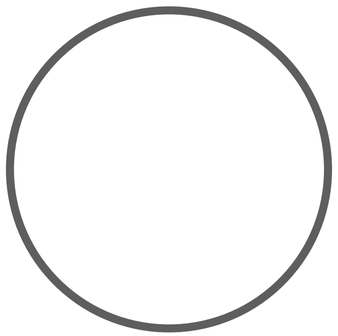



Shown here is Barry Barish giving the Nobel Lecture in Physics in 2017 with my visualization

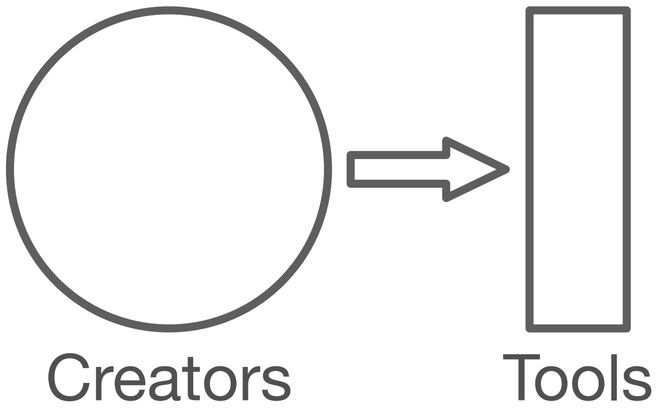
### Supporting engineers

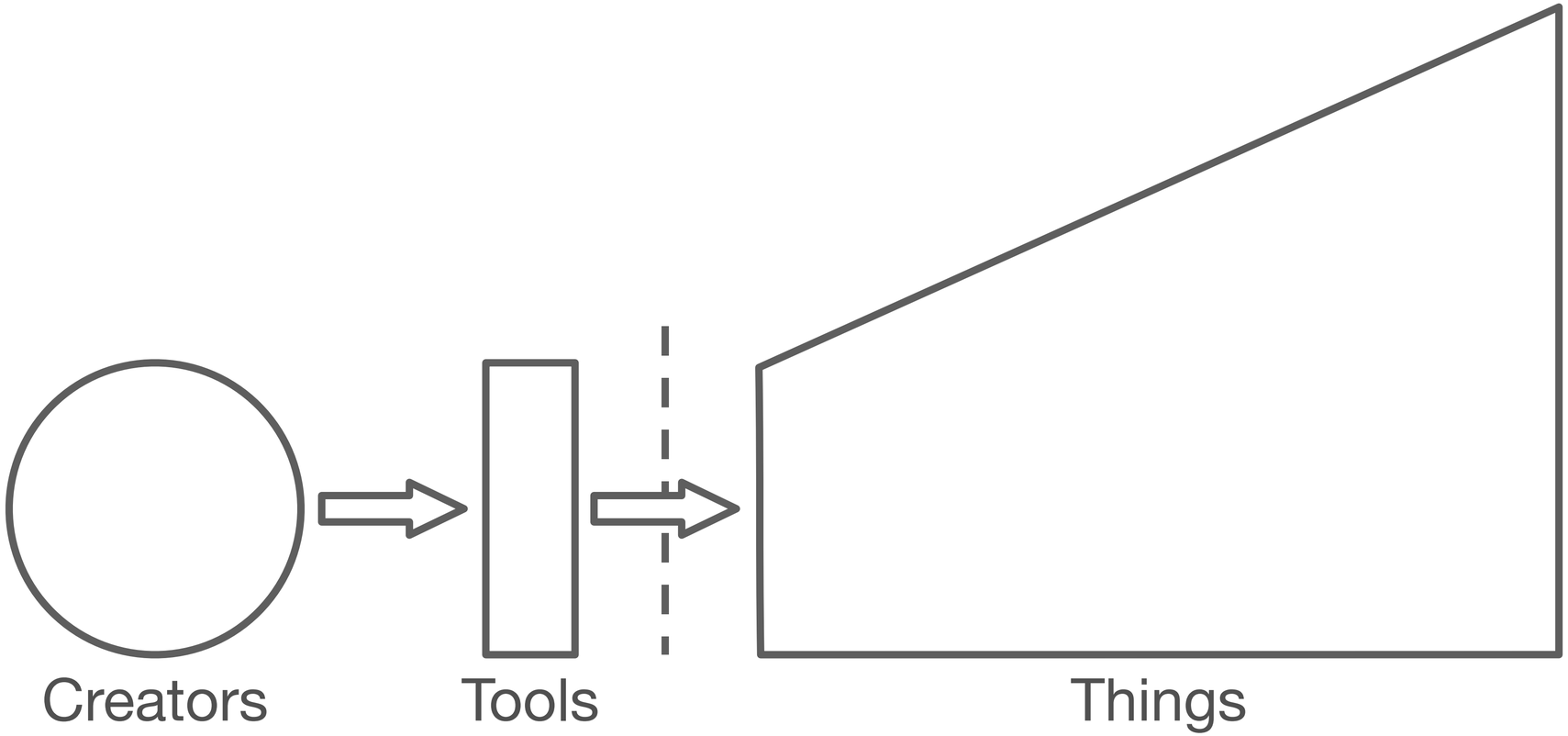


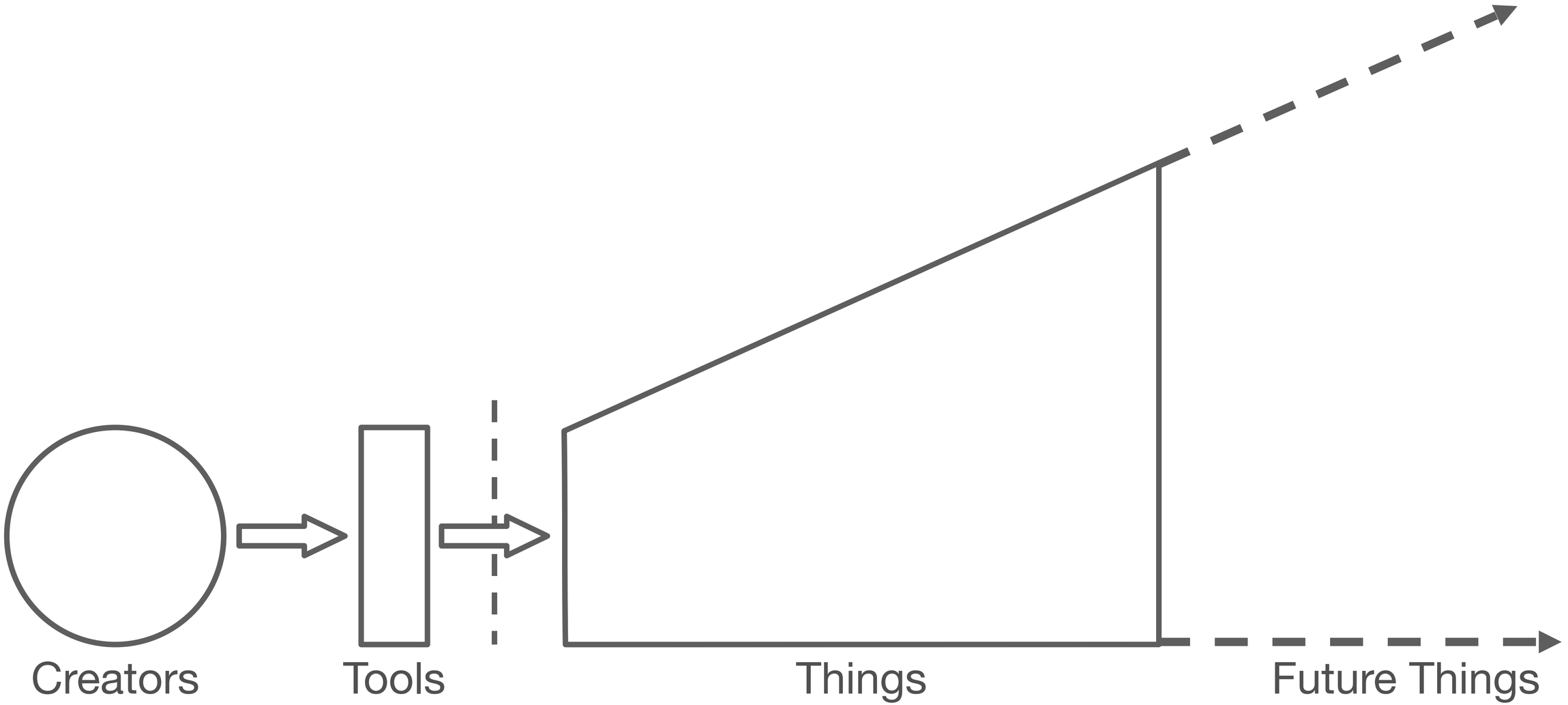

Building a chart component library that supports 2000 devs and 200 products in 200 countries



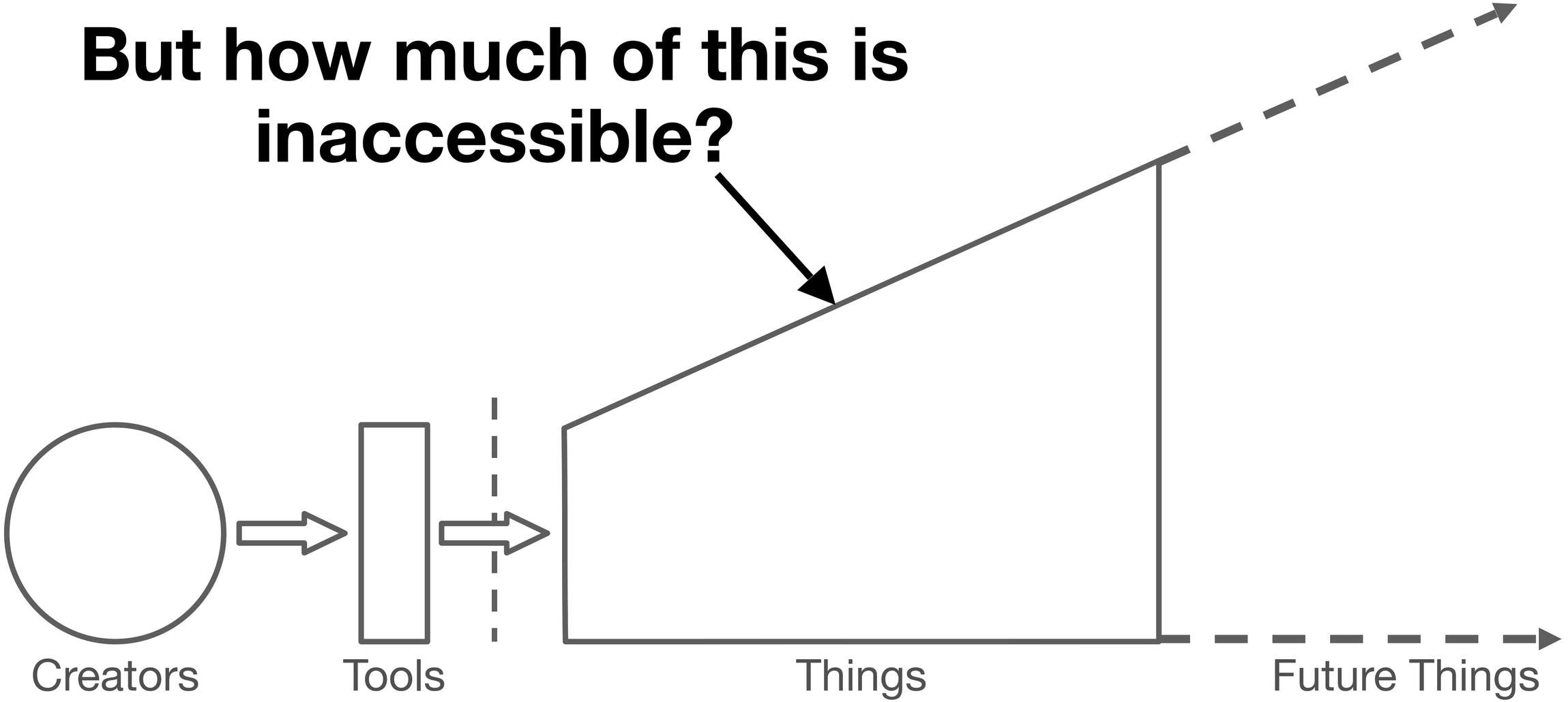
Creators


Creators
Tools


Creators
Tools
Things

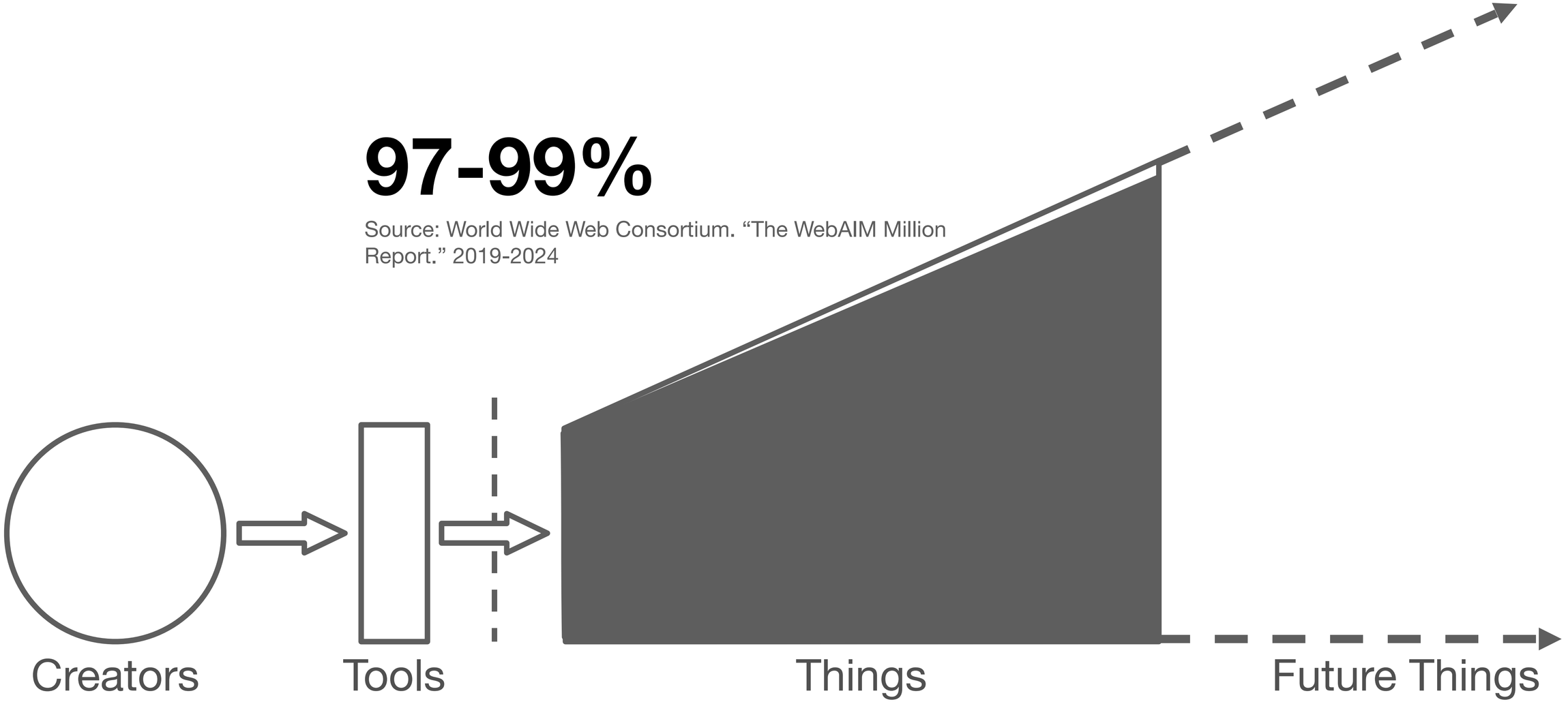

Creators
Tools
Things
Future Things

# But how much of this is inaccessible?



# 97-99%

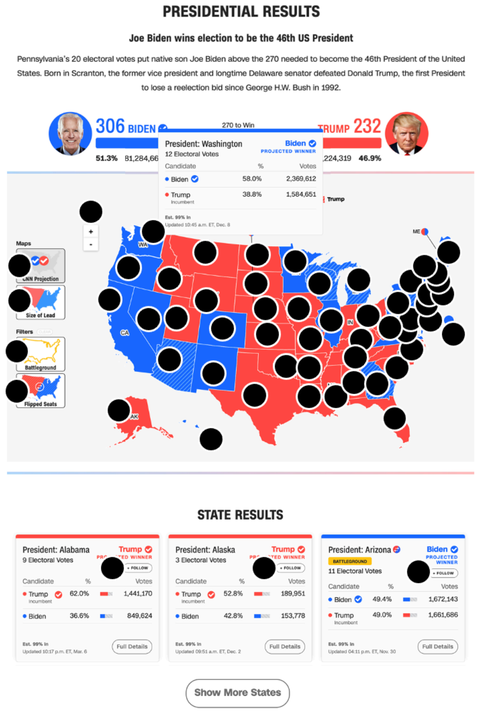
Source: World Wide Web Consortium. “The WebAIM Million Report.” 2019-2024



# What and how of visualization accessibility

## (My recent research)

### *Chartability*:
### **What** are accessibility barriers?

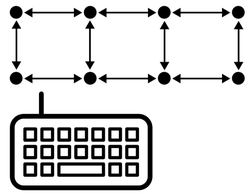


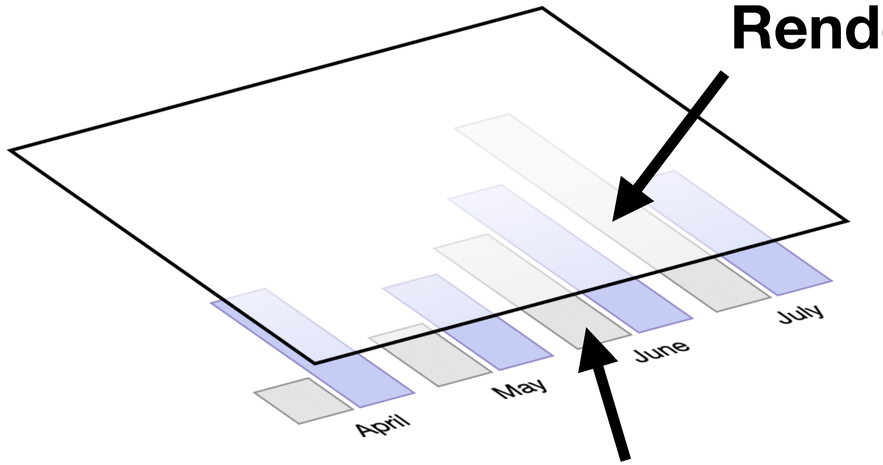

### *Data Navigator*:
### **How** do we build accessible visualizations?

**Structure**

**Input**

**Rendering**




To any visualization toolkit

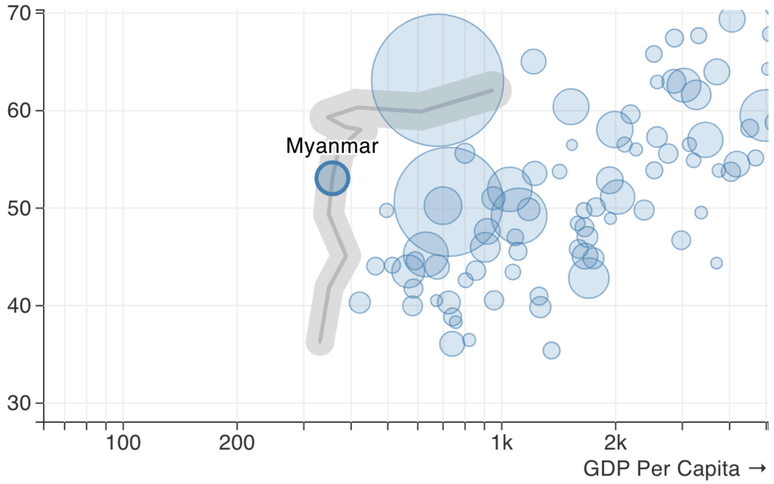
# Data Navigator opened up collaborations with already-experts

## Example: Accessible Gapminder Chart

Below is a responsive, screen-reader-navigable version of the chart shown on the homepage. Press Navigate to enter keyboard navigation. Or, change your “prefers reduced motion” system setting to see fade animations instead of motion.

Navigate

↑ Life Expectancy (yr)




Year: 1972

Play/Pause

X axis: Life Expectancy

Y axis: GDP Per Capita

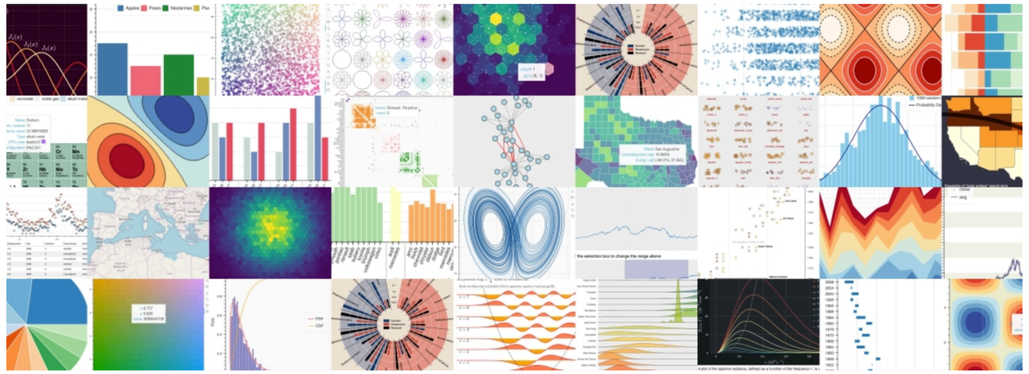
Radius: Population

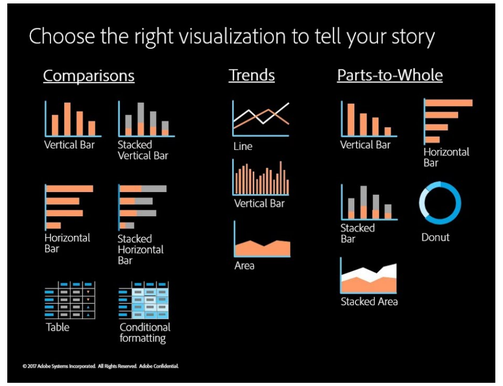
Reset Zoom

Source: Free Data from World Bank via gapminder.org, CC-BY license

Myanmar 1972: GDP Per Capita is 357, Life Expectancy (yr) is 53.1, Population is 28,500,000. In 5 years, GDP Per Capita increases by 3.9% and Life Expectancy (yr) increases by 5.6%. left/right arrow to change country, up/down arrow to change year, space to summarize trend, backspace to return.

Interactive demo link





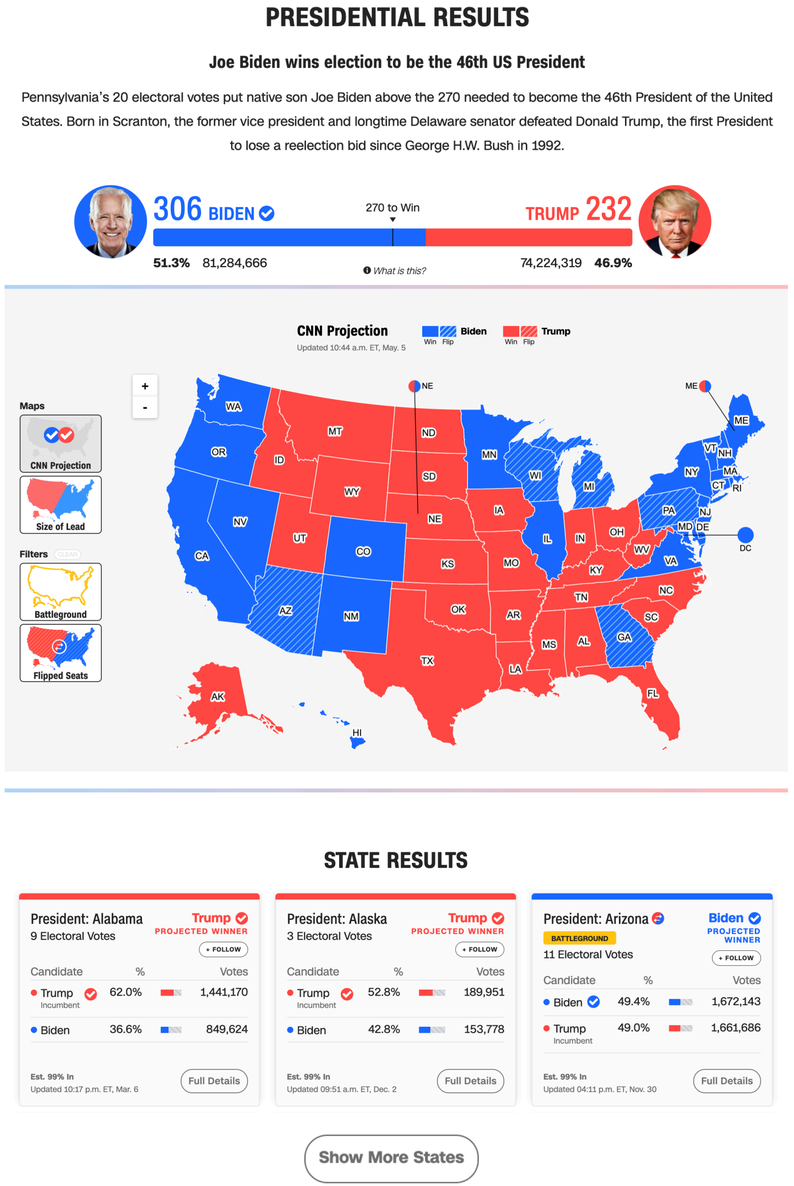

# Chartability has helped me audit and train others

**978 access failures found in ~60 minutes.**

**Perceivable**:
**6** – Low contrast
**57** - Content is only visual
**50** - Color alone is used
**3** - Meaningful elements can be distinguished

**Operable**:
**54** - Interaction modality only has one input type
**58** - No interaction cues or instructions
**5** - Low contrast on interactive elements
**4** - Keyboard focus indicator missing
**4** - Complex actions have no alternative
**18** - Target pointer interaction is too small

**Understandable**:
**4** - Interactive context is not clear
**6** - Metrics or variables are undefined




**Robust**:
**275** - Does not conform to standards
**82** - Semantically invalid
**12** - Fragile technology support

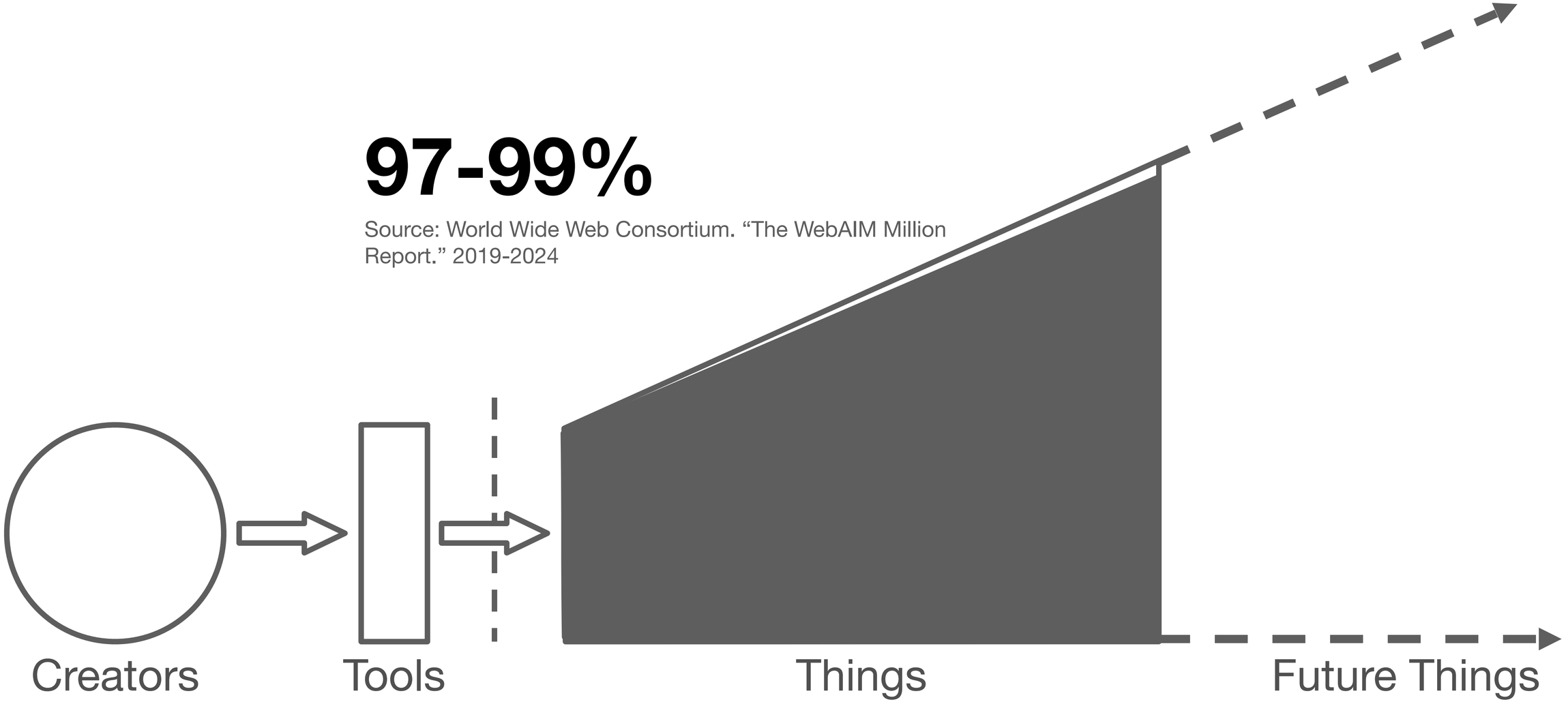
**Compromising**:
**54** - Information can only be reached through single process
**61** - Information cannot be navigated according to narrative or structure

**Assistive**:
**101** - Navigation and interaction is tedious

**Flexible**:
**2** - User style change not respected
**121** - User text adjustments are not respected
**1** - Scrolling experiences cannot be adjusted or opted out of Contrast and textures cannot be adjusted

# 97-99%

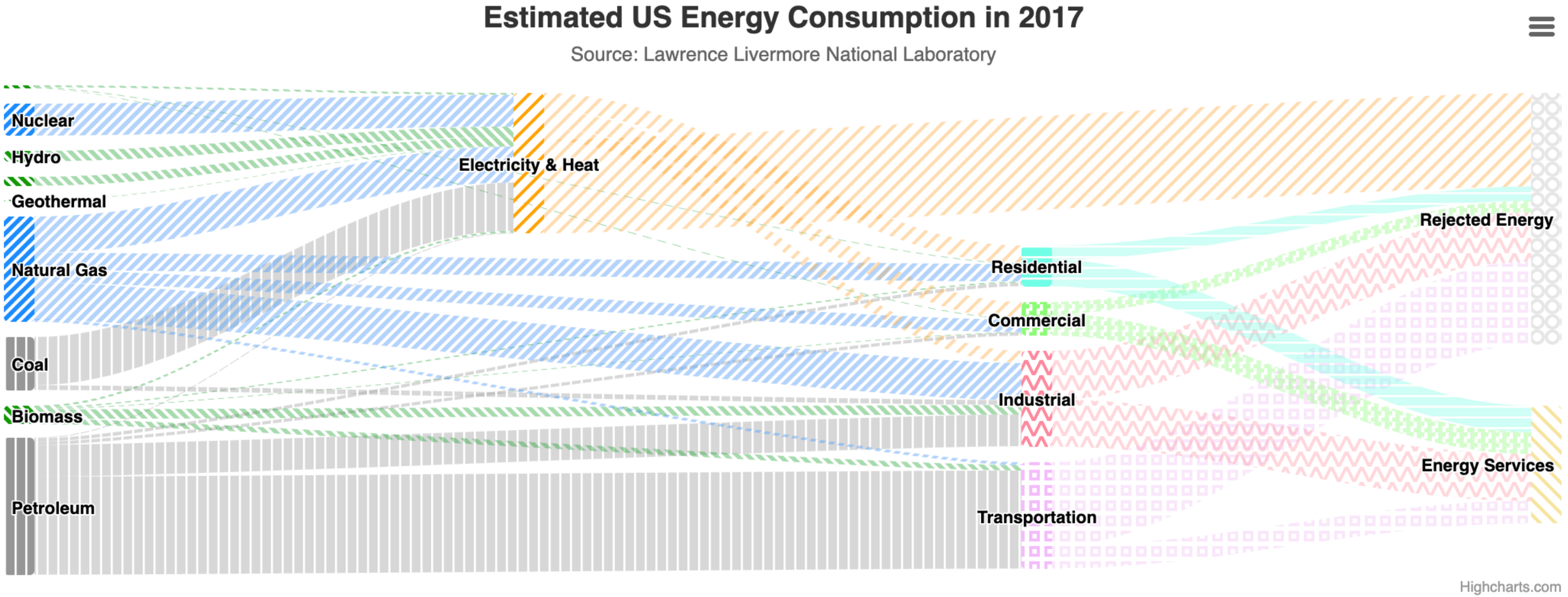
Source: World Wide Web Consortium. “The WebAIM Million Report.” 2019-2024



# Will I always be teaching primarily just the basics?

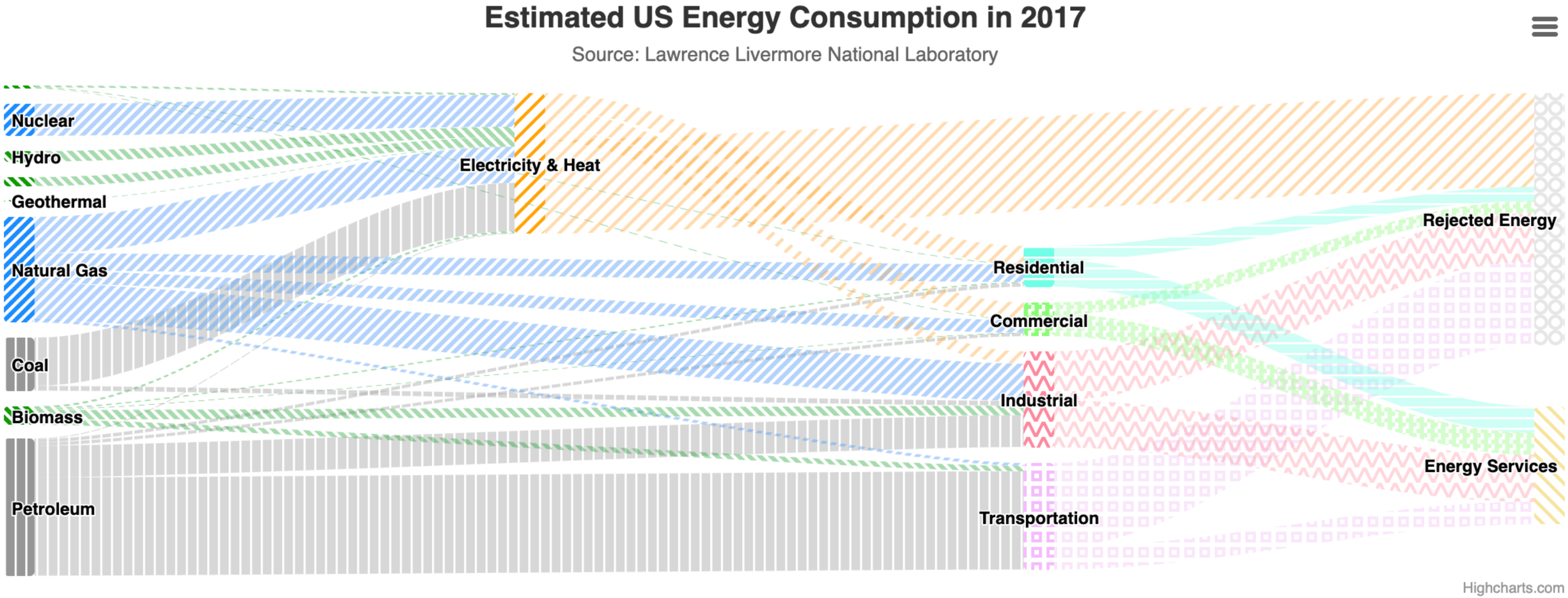
**A hard problem**: **Access Friction** is when accessibility for someone produces a barrier for others

# What about this is accessible? Why?



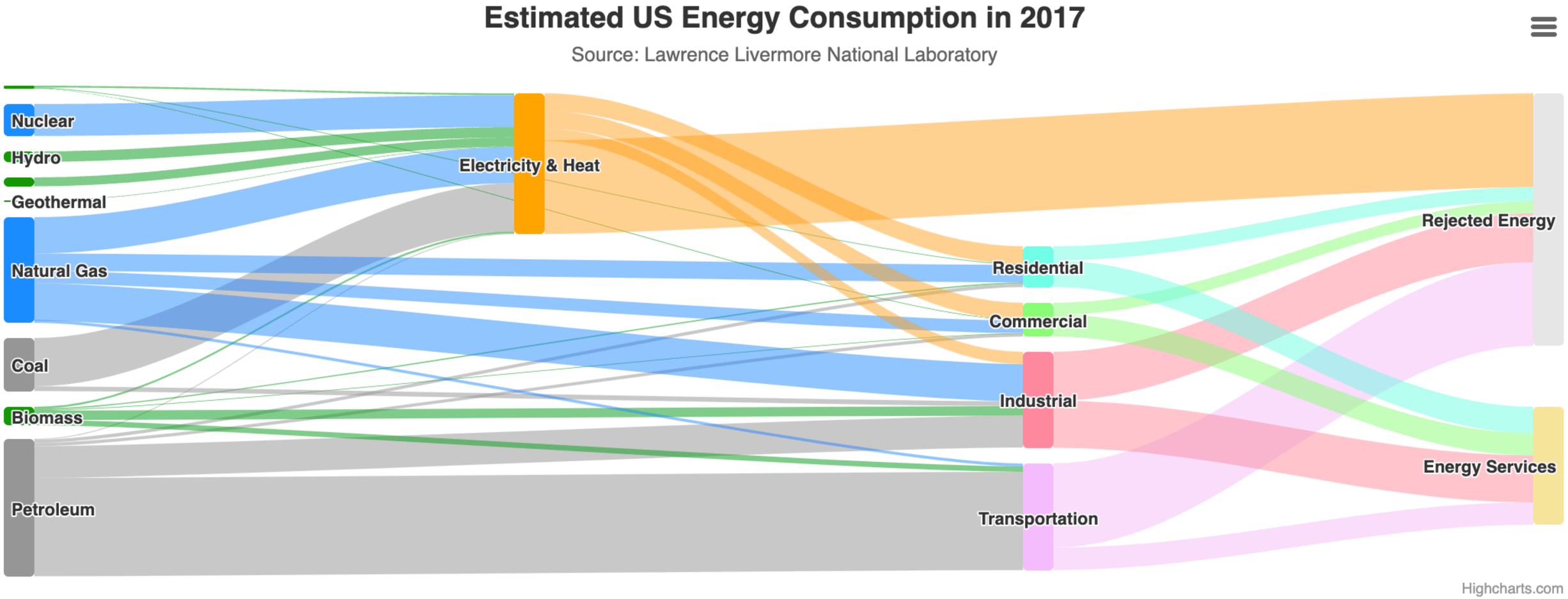

Sankey charts are used to visualize data flow and volume between nodes. The wider lines indicate larger volumes.

# What about this might be a barrier? Why?



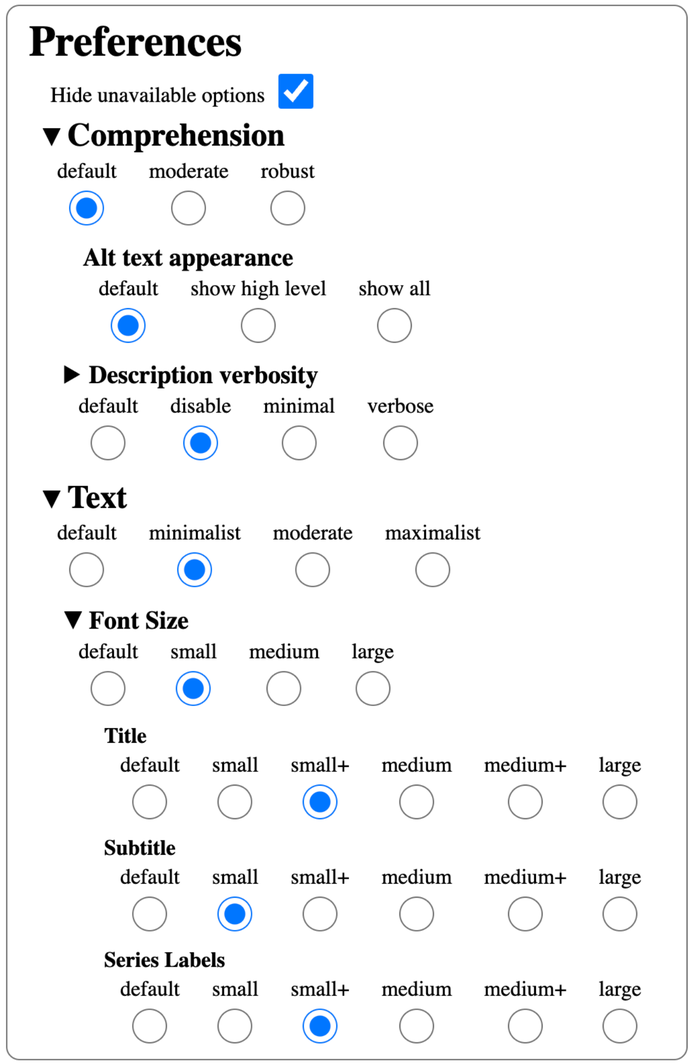

Sankey charts are used to visualize data flow and volume between nodes. The wider lines indicate larger volumes.

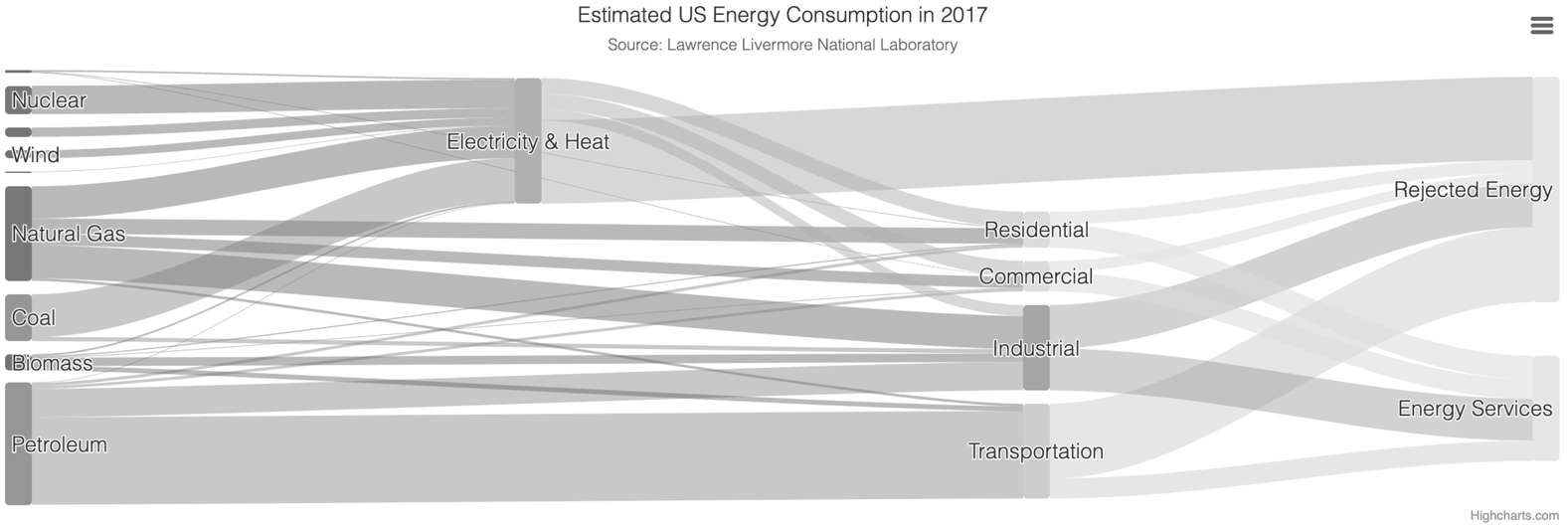
# What about this now might be a barrier?

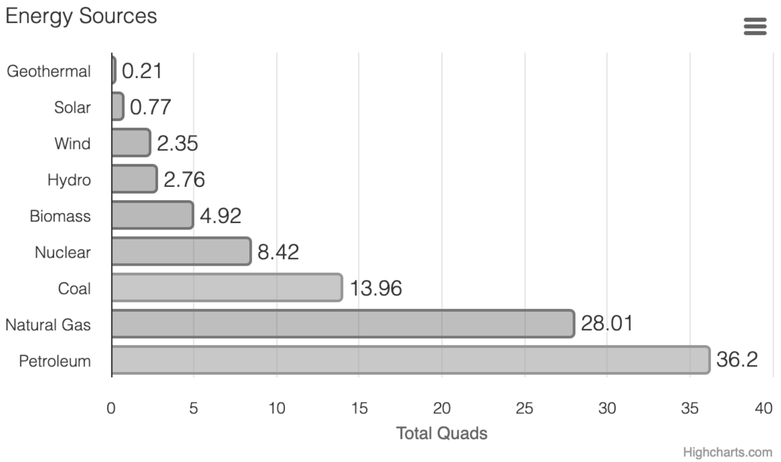


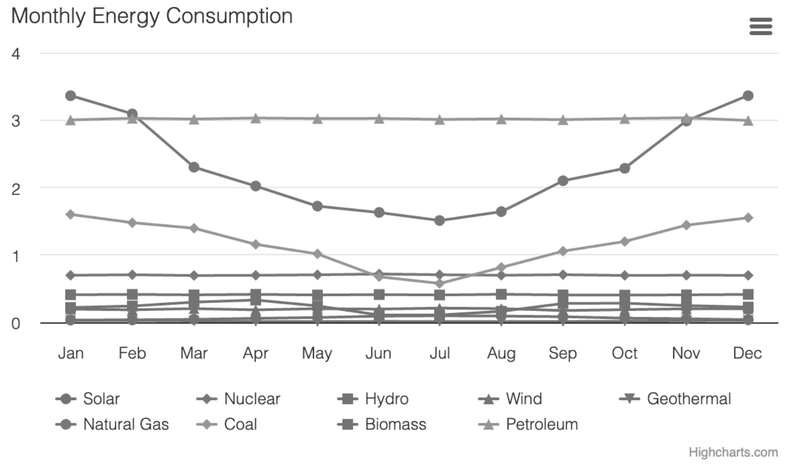

Sankey charts are used to visualize data flow and volume between nodes. The wider lines indicate larger volumes.

# Software: malleable systems with guardrails




Interactive demo link

# How do I teach basics, responsibility, and advanced concepts to practitioners in a limited time (typically 20-45 minute sessions)?

2025

★Slides here → frank.computer

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