

 **PMBA** | Virtual

Annual Conference

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VISUALIZING DATA

Understanding & Telling Stories with Data

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pmbaonline.org/AC2020



PURPOSE

Why: Highlight value of using visuals to communicate and interpret data

How: Understand some of the key steps to develop data visualizations

What: Create a real-world example for future publication in Current

WEBINAR PRESENTERS



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WHY VISUALIZE?

Data visualization is the presentation of data in a pictorial or graphical format. It:

- **Helps the brain** – visuals make data much easier for the human brain to understand and interpret
- **Helps detect patterns** - visuals also make it easier to compare numbers and detect patterns, trends, and outliers in groups of data
- **Enables decisions** – when analytics are presented visually, it's often easier for decision makers to grasp difficult concepts and identify a way forward

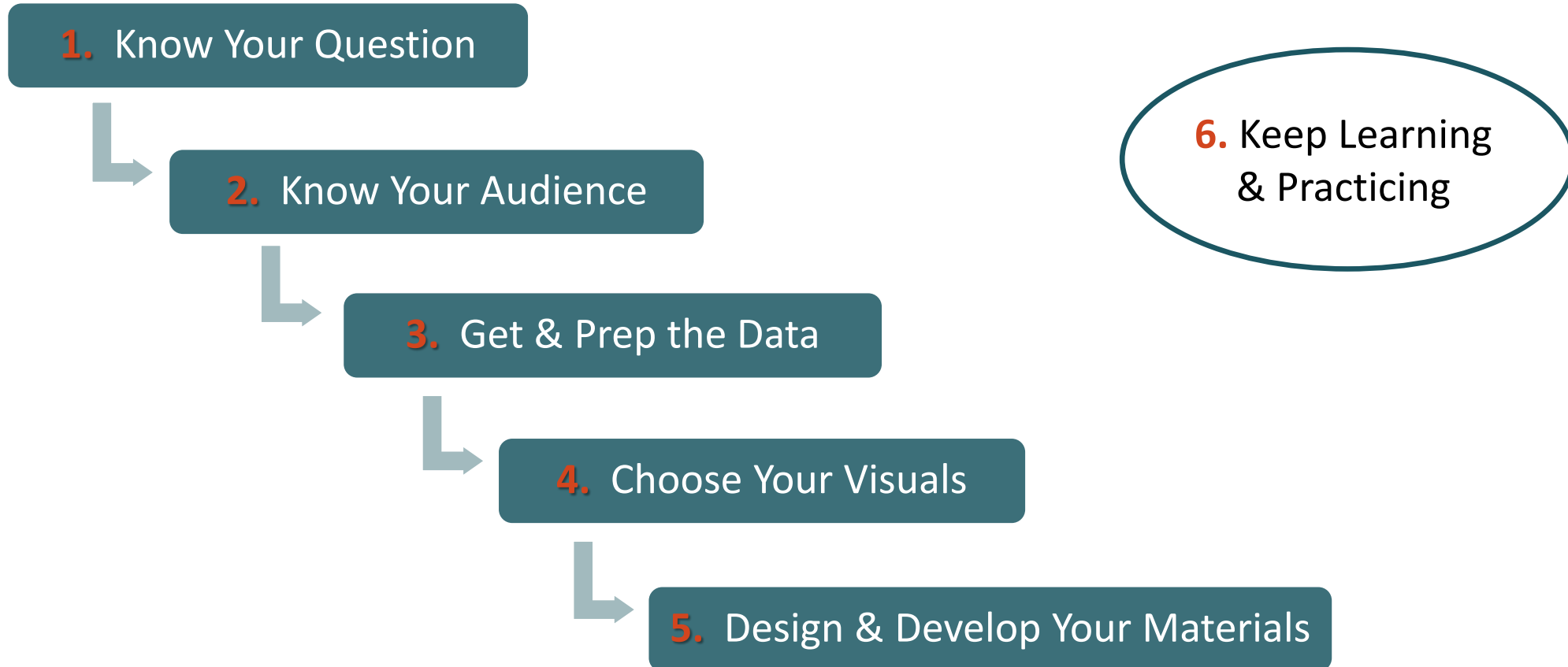
VISUALIZING DATA AT YOUR ORGANIZATION

- Do you currently develop data visuals?
- What software do you use?
- Any lessons learned?



Tell us more in
the chat box

HOW TO VISUALIZE



1. KNOW YOUR QUESTION

- Step one: **determine the question(s) you're trying to answer**
- Knowing the question will help clarify the visual(s) you want to use
- Question for today and future publication in Current:
 - Since the Great Recession, what have been the significant revenue and expense trends in public media? Where has station revenue come from and where have stations invested? Are there differences between station groups?
 - Builds on a previous Current article focused on trends during the recession:
<https://current.org/2020/04/trends-during-great-recession-may-foreshadow-pandemics-impact-on-pubmedia/>

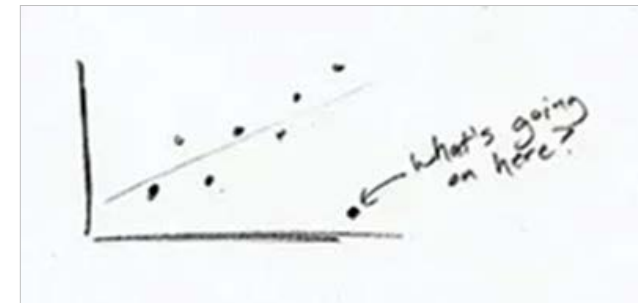
2. KNOW YOUR AUDIENCE

- Who are you developing the visual(s) for?
 - You? Your immediate boss? The GM? The board? Your station's audience?
- What does the audience want? What will your visual(s) be asked to do?
 - Is it for communication, decision making, analysis?
- The form depends on the function – knowing your audience and question helps clarify the tasks your visual is helping with
- Example:
 - Communicating new insight to Current readers (public media leaders)

3. GET & PREP THE DATA

There are no data visuals without data. Identify and obtain the data you need (it may be internal, external, or both) and tidy it up so it's ready for analysis and visualization:

- Delete everything above the header
- Unmerge cells and get rid of double-row headers
- Delete columns and rows you don't need
- Check the data:
 - Look at the data and make sure you understand it – are there weird outliers or spikes?
 - If so, find out what's going on and fix, delete, abandon, etc as needed
- Learn more: <https://blog.datawrapper.de/prepare-and-clean-up-data-for-data-visualization/>
- Current example: CPB Annual Financial Reports (AFR) and lots of work to organize



QUESTIONS?

4. CHOOSE YOUR VISUALS

- Different visuals are good at communicating different things. Helpful to first ask ourselves what are we trying to show:
 - **Comparison** - differences or similarities between values
 - **Trend over time** – how data varies over a particular time period
 - **Relationship** – relationships, connections, or correlations between the data
- Current example (contrasting public media trends using AFR data):
 - Trend over time (2010 onwards) and comparison

4. CHOOSE YOUR VISUALS – OPTIONS

- **Bar charts** to compare numbers
- **Line charts** to depict trends over time
- **Scatter plots** to see relationships
- **Bubble charts** for simple comparison
- **Maps** to depict data geographically
- And don't forget about **tables**

Many more visuals and variations. Learn more:

<https://datavizcatalogue.com/>
<https://datamatic.io/>

BAR CHARTS

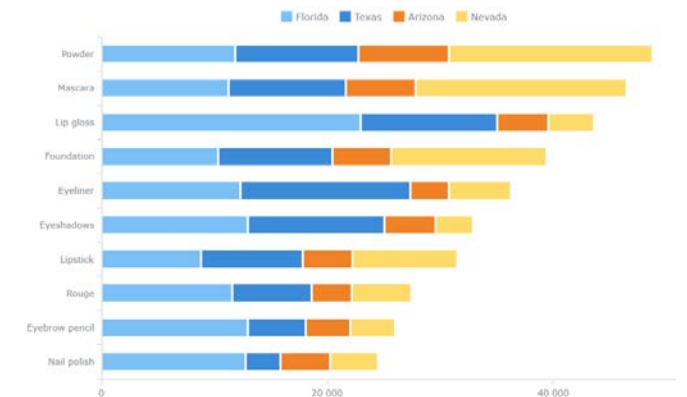
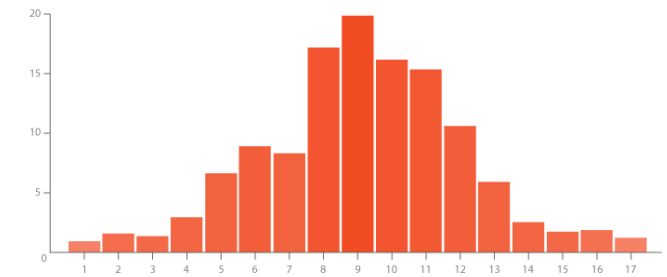
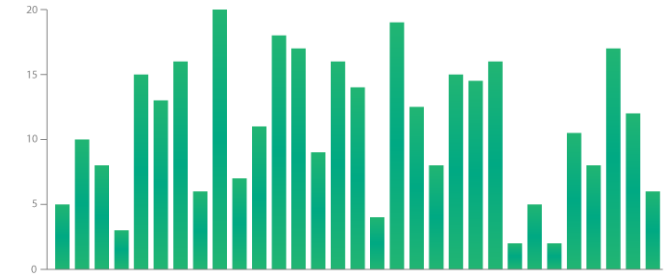
Horizontal or vertical bars to show discrete, numerical comparisons across categories.

Variation: histograms for frequency, stacked bars for category comparisons

Advantage: people are most accurate at judging length, making bar charts one of the best choices for comparing data

Disadvantage: labelling becomes problematic when there are a large number of bars

Best for: comparisons



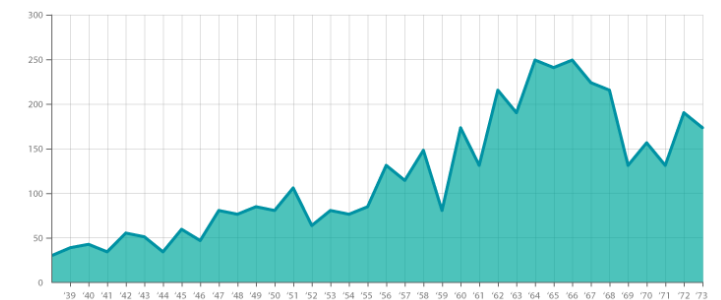
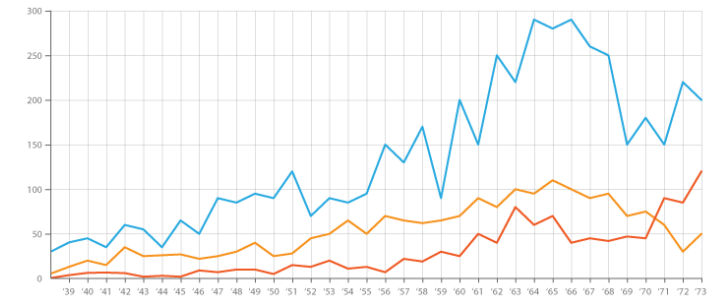
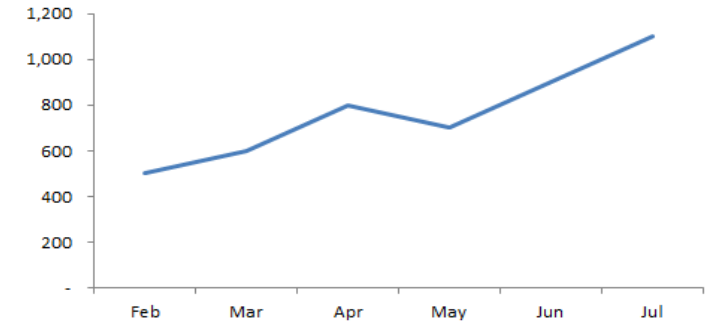
LINE CHARTS

Display values over a continuous interval or time period. Used to show trends and analyze how data has changed over time. When grouped with other lines, individual lines can be compared to one another. *Similar:* area charts

Advantages: shows trends and relationships better than other graphs. Usually simple to understand

Disadvantages: multiple lines on graph can be confusing; difficult to make out exact values

Best for: trends over time, patterns, comparisons (when grouped)

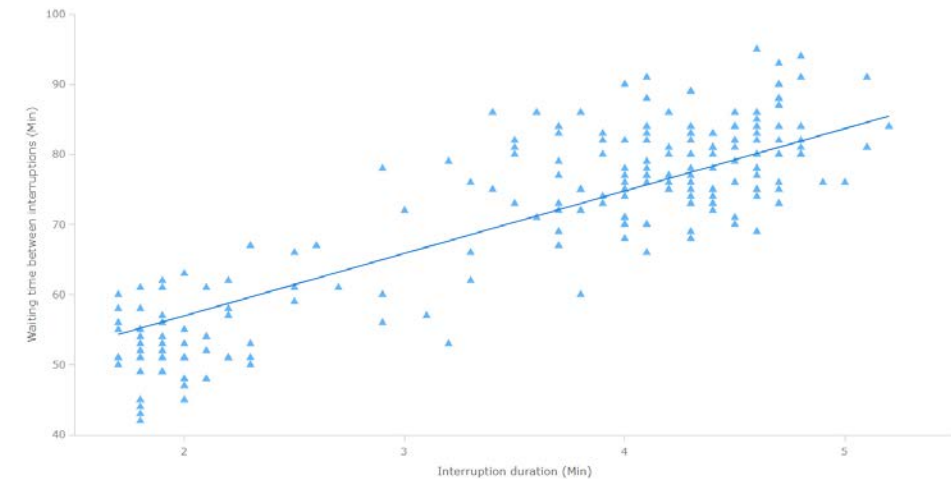
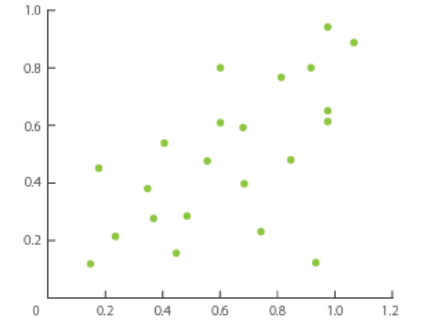
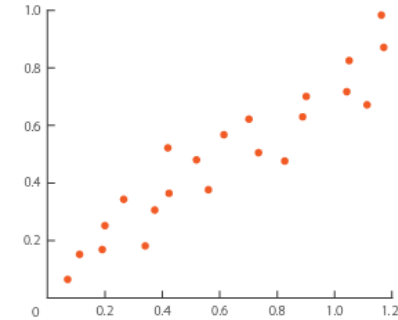


SCATTER PLOTS

Use a collection of points to display values from two variables. By displaying a variable in each axis, you can detect if a relationship or correlation between the two variables exists

Advantages: easy to see if one variable may be impacting the other. However, remember that correlation is not causation

Best for: patterns, relationships



BUBBLE CHARTS

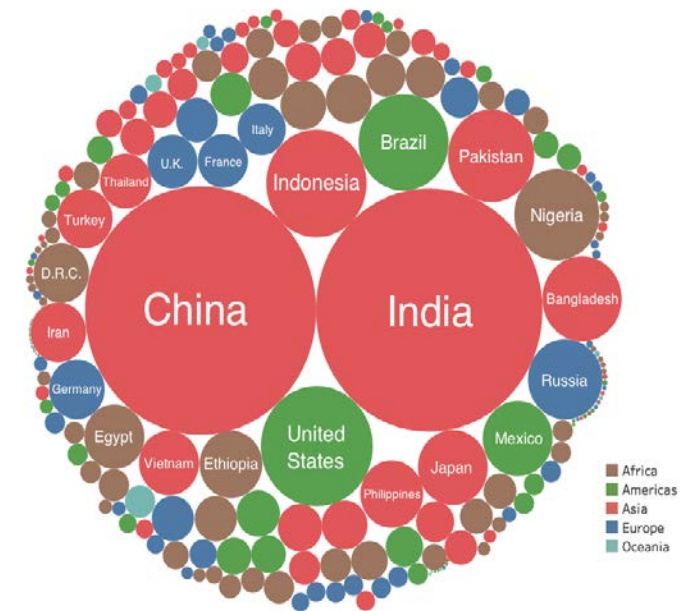
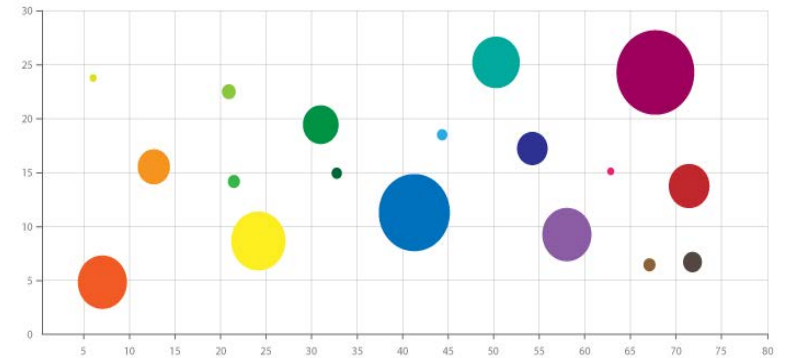
Show the relationships between categorized circles by use of positioning and proportions.

Can be used with and without axes

Advantages: give a sense of difference (show the big picture)

Disadvantages: minimize the differences between numbers and makes it hard to compare accurately

Best for: approximate proportional comparisons



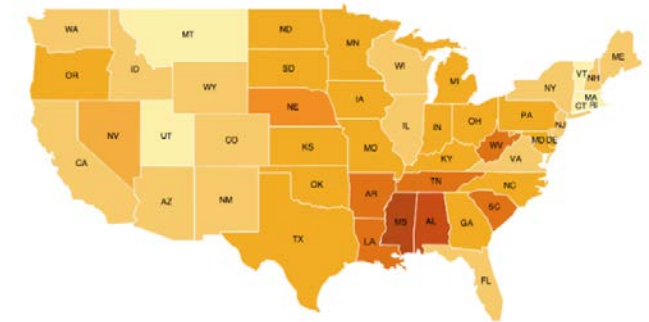
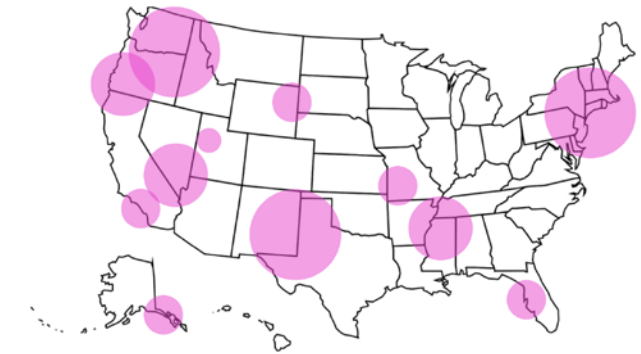
MAPS

Depict data geographically. Lots of variations:

Dot maps: show spatial patterns or the distribution of data over a geographical region. Good for seeing how things are distributed over a geographical region

Bubble maps: circles displayed over a geographical region with the area of the circle proportional to its value. Good for comparing proportions over geographic regions

Area maps: display geographical areas using color or shade in relation to a data variable. Good for showing variation or patterns across the displayed location



TABLES

Great for data we're used to reading and when precise numbers are important. That's often the case when our audience doesn't just want to get informed but wants to act on the data. Most people won't read a whole table and instead only look at the data they're interested in. Tables are also great for showing ranks

Tables can be made more visual using heatmaps and other designs. Heatmaps visualize data through variations in color and make it easier to see certain datapoints or potentially revealing patterns

Learn more: <https://blog.datawrapper.de/guide-what-to-consider-when-creating-tables/>

TEAM †	DIVISION †	TEAM RATING †	1-WEEK CHANGE †	RECORD †	RUN DIFF
Astros 31-16	AL West	1589	+7	104-58	+23
Dodgers 31-17	NL West	1573	+4	100-62	+17
Twins 30-16	AL Central	1536	+7	95-67	+14
Yankees 28-17	AL East	1570	+4	97-65	+14
Phillies 27-16	NL East	1525	-3	88-74	+5

Category	Sub-Category	Ship Mode / Customer Segment											
		First Class		Same Day		Second Class		Standard Class					
		Consumer Corpora...	Home Office	Consumer Corpora...	Home Office	Consumer Corpora...	Home Office	Consumer Corpora...	Home Office				
Furniture	Bookcases	\$166	\$394	\$339	\$67	\$271	\$156	(\$781)	(\$47)	\$230	\$375	(\$528)	(\$107)
	Chairs	\$2,653	\$1,714	\$1,403	\$1,791	\$231	\$873	\$3,178	\$3,114	\$2,211	\$14,317	\$8,076	\$4,575
	Furnishings	\$692	\$319	\$128	\$143	\$9	\$114	\$808	\$339	\$145	\$3,961	\$1,953	\$209
	Tables	(\$583)	\$88	(\$754)	(\$523)	\$100	(\$370)	(\$370)	(\$2,262)	(\$424)	(\$6,104)	(\$5,706)	(\$1,832)
Office Supplies	Appliances	\$1,303	\$1,142	\$123	\$696	\$75	(\$102)	\$1,654	\$1,909	\$1,049	\$4,088	\$2,925	\$1,145
	Art	\$331	\$110	\$196	\$137	\$157	\$18	\$643	\$275	\$165	\$1,586	\$1,233	\$492
	Binders	\$4,537	\$3,115	\$3,405	\$1,408	\$571	\$122	\$7,897	\$1,714	\$2,806	\$32,035	\$15,115	\$7,688
	Envelopes	\$419	\$117	\$79	\$121	\$46	\$100	\$280	\$500	\$94	\$1,258	\$1,172	\$417
	Fasteners	\$46	\$39	\$8	\$22	\$8	\$0	\$91	\$28	\$14	\$304	\$139	\$75
	Labels	\$332	\$138	\$69	\$141	\$14	\$53	\$411	\$823	\$20	\$1,412	\$562	\$317
	Paper	\$1,315	\$1,365	\$552	\$667	\$151	\$788	\$2,351	\$1,245	\$1,735	\$6,899	\$4,546	\$2,812
	Storage	(\$350)	(\$391)	(\$7)	(\$279)	\$163	\$153	\$308	(\$254)	\$121	(\$2,574)	(\$1,073)	\$528
	Supplies	\$76	(\$57)	(\$2)	\$14	\$2	\$16	(\$1,266)	(\$402)	\$11	(\$1,339)	\$11	\$96
	Technology	Accessories	\$1,688	\$783	\$409	\$1,238	\$76	\$591	\$897	\$1,933	\$1,463	\$6,324	\$3,978
	Copiers	\$6,069	\$1,447	\$7,048	\$1,245	\$912	\$446	\$3,325	\$2,602	\$450	\$9,446	\$9,784	\$1,866
	Machines	(\$394)	\$4,330	\$1,127	\$1,275	\$6,410	\$518	\$3,455	\$128	\$261	\$15,825	\$4,313	\$7,333
	Phones	\$2,030	\$1,560	\$2,049	\$1,211	\$241	\$866	\$1,273	\$777	\$189	\$7,707	\$4,996	\$3,659

QUESTIONS?

5. DESIGN & DEVELOP YOUR MATERIALS

- Making the right chart choice is critical but it's also important to use good design – on individual charts and throughout your materials
- Sketch out ideas first before spending too much time developing visuals
- Utilize basic design principles as part of your visuals/materials: alignment, hierarchy, contrast, repetition, proximity, balance, color, space
 - Learn more: <https://blog.adobespark.com/2016/07/27/8-basic-design-principles-to-help-you-create-better-graphics/>

6. KEEP LEARNING & PRACTICING

- Practice makes (more) perfect
- Get better through:
 - Work projects (direct (your day job) and indirect (helping others))
 - Personal projects (e.g. Netflix, Spotify, sports)
- Be inspired by others:
 - <https://www.tableau.com/about/blog/2017/10/7-tips-and-tricks-dashboard-experts-76821>
- Get access to more data:
 - <https://www.searchenginejournal.com/free-data-sources/302601/>

QUICK NOTE ON SOFTWARE

I'll be creating the example visuals in Tableau (data visualization software) but **Excel or any other software you use is good**

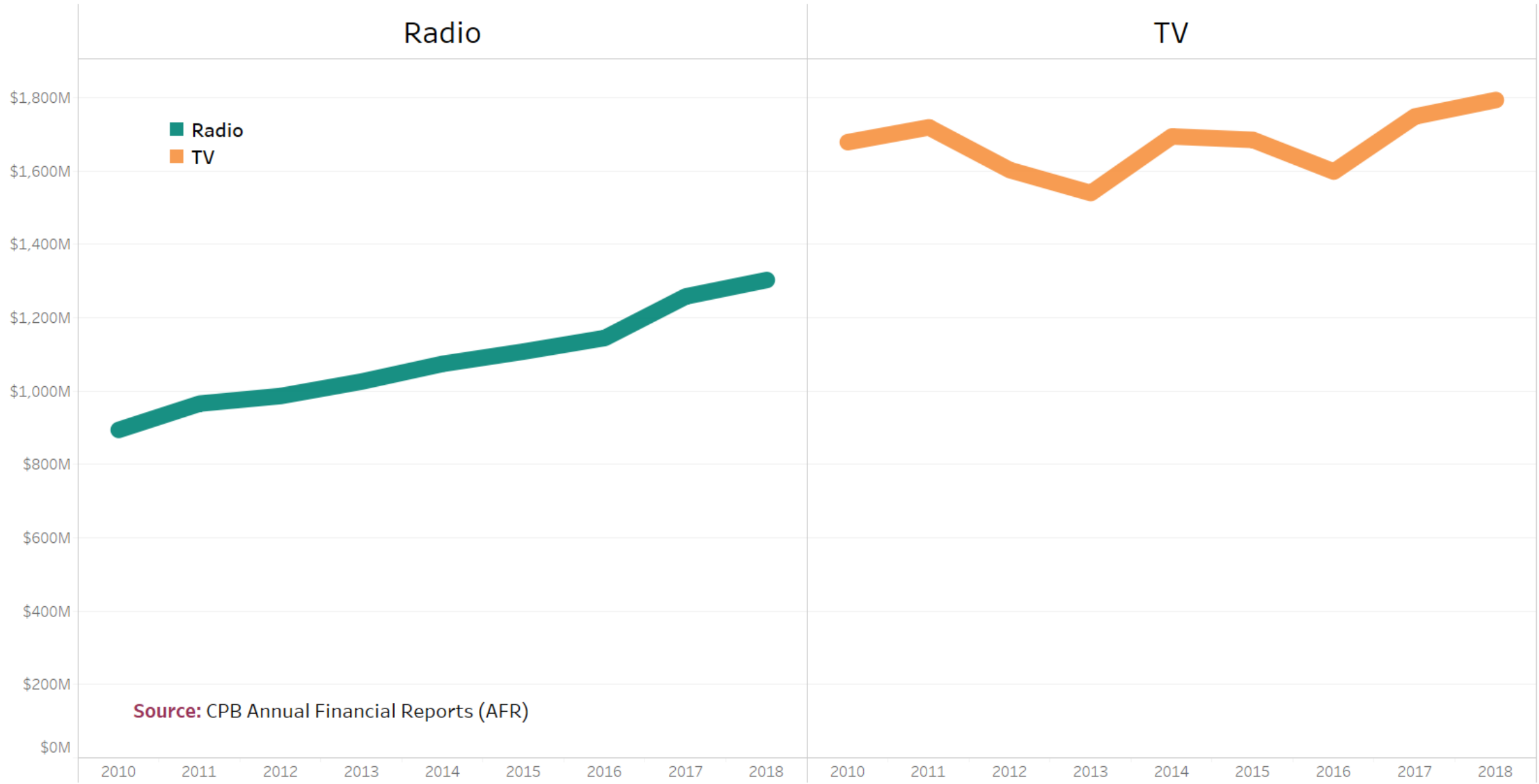
The steps and principles are more important than the software

I'm a Tableau fan and it's relatively affordable for smaller community licensees (revenue less than \$5M):
<https://www.tableau.com/foundation/license-donations>

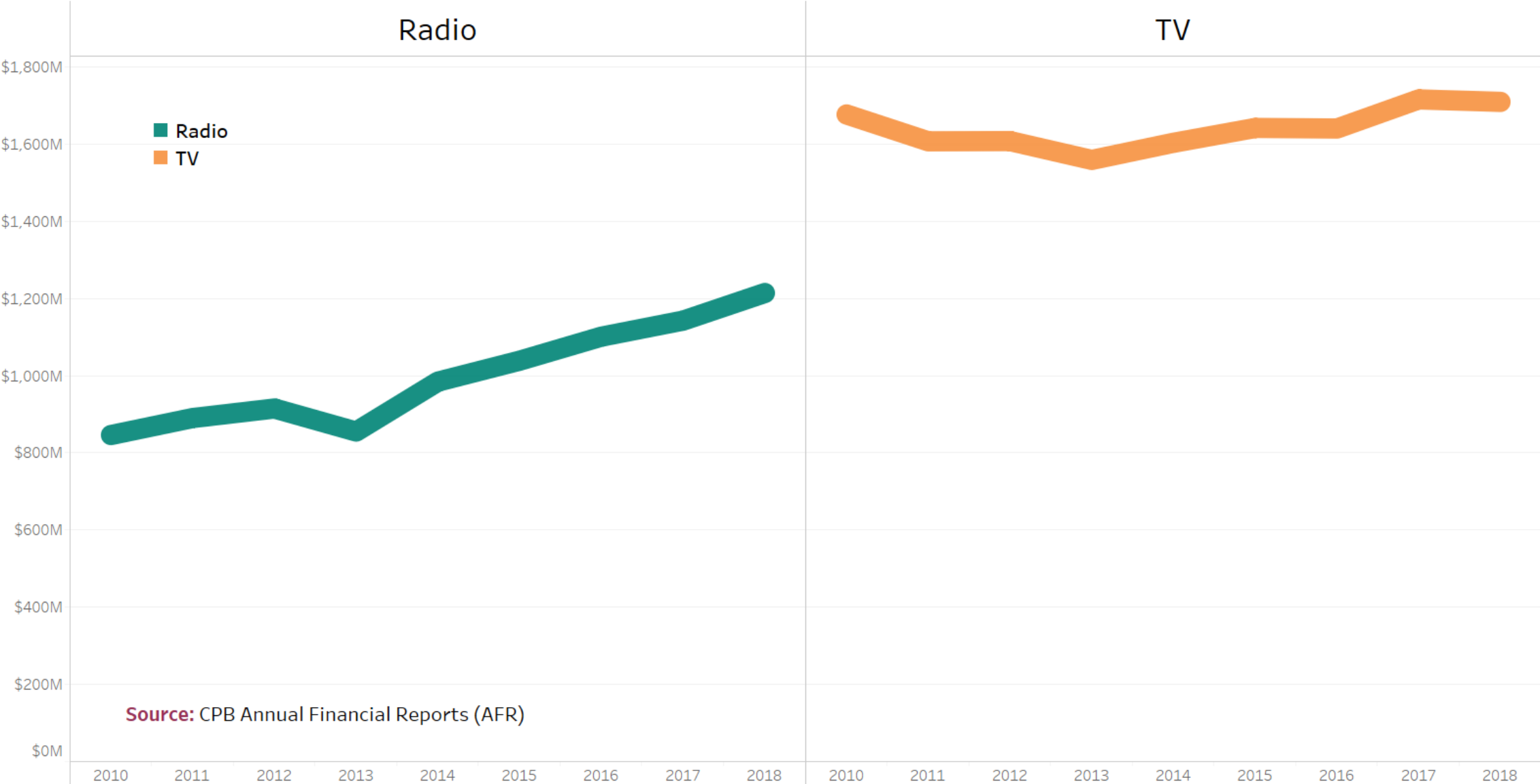


- Question:** Since the Great Recession, what have been the significant revenue and expense trends in public media? Where has station revenue come from and where have stations invested? Are there differences between station groups?
- Audience:** Current readers (public media leaders)
- Data:** CPB Annual Financial Reports (AFR) 2010-18
- Visuals:** Line charts for trends, bar charts for comparison. Let's go!

Total Revenue 2010-18

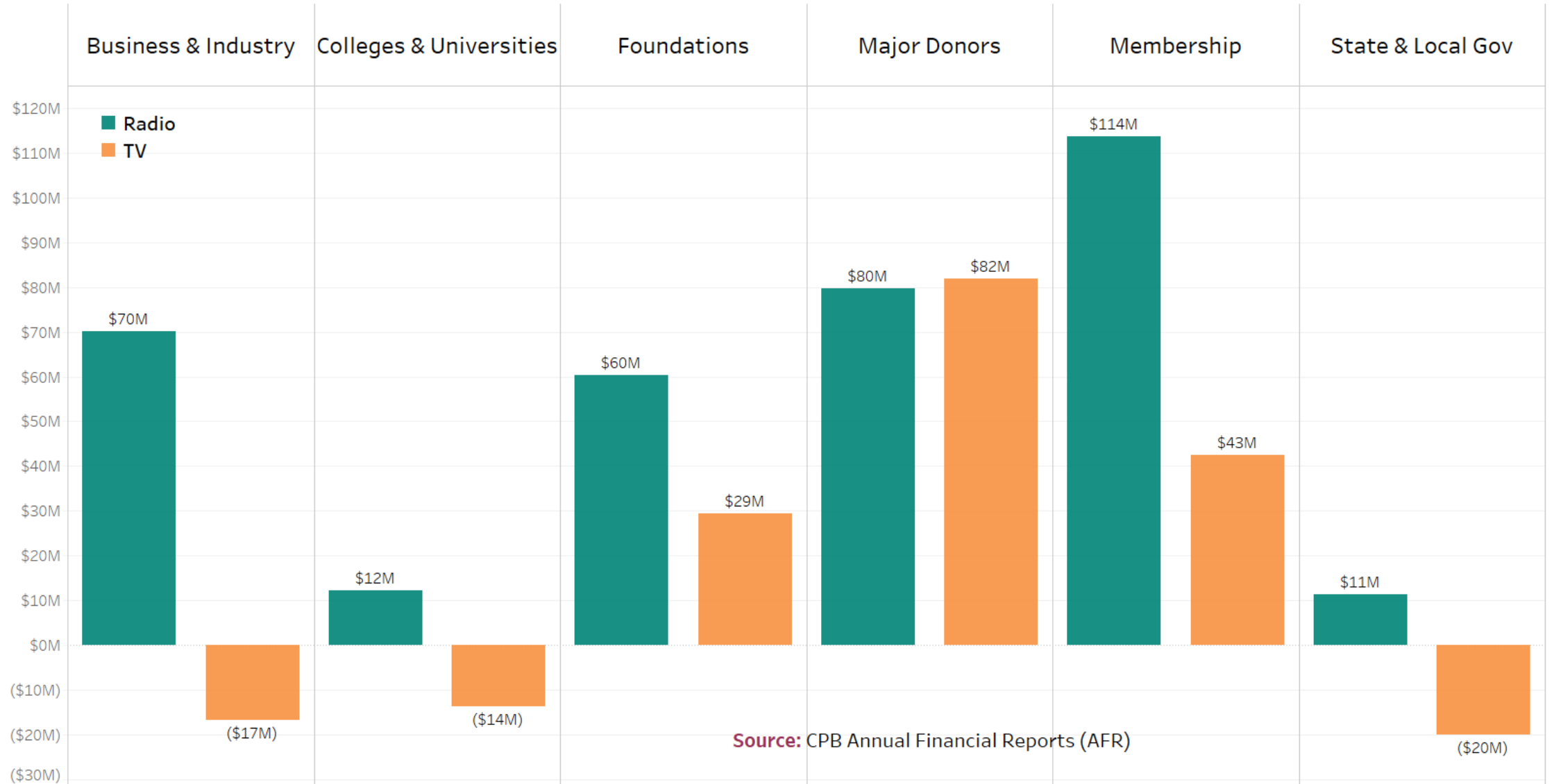


Total Expenses 2010-18

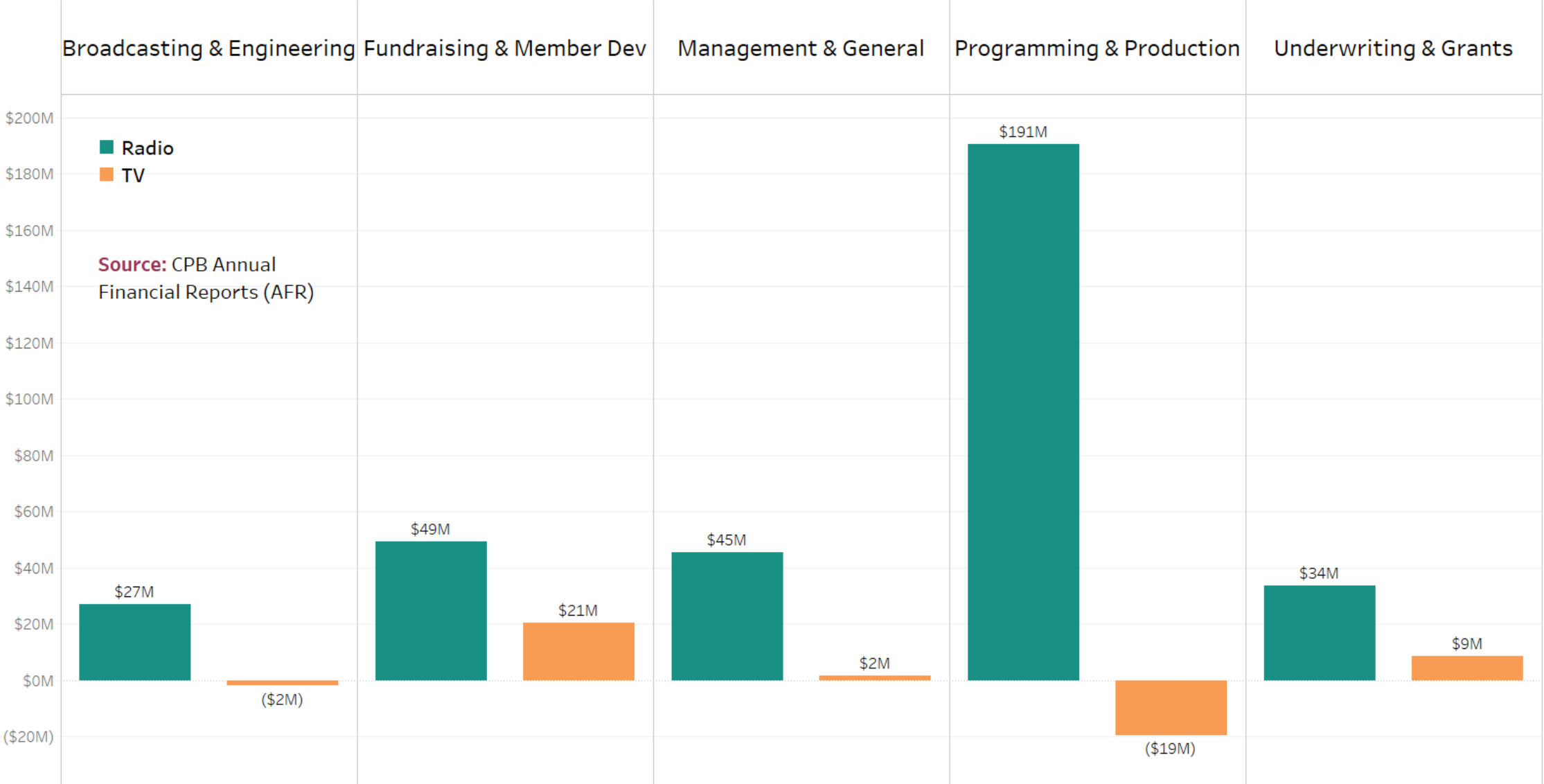


Source: CPB Annual Financial Reports (AFR)

2010-18 Revenue Growth by Source



2010-18 Expenses Growth by Area



QUESTIONS?

LOOK OUT FOR THE FULL ANALYSIS IN CURRENT

THANK YOU!



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