Data Management

How to Make Reporting Less Painful

Anna Marbut, MsBA
Growth Strategy Analyst, Submittable

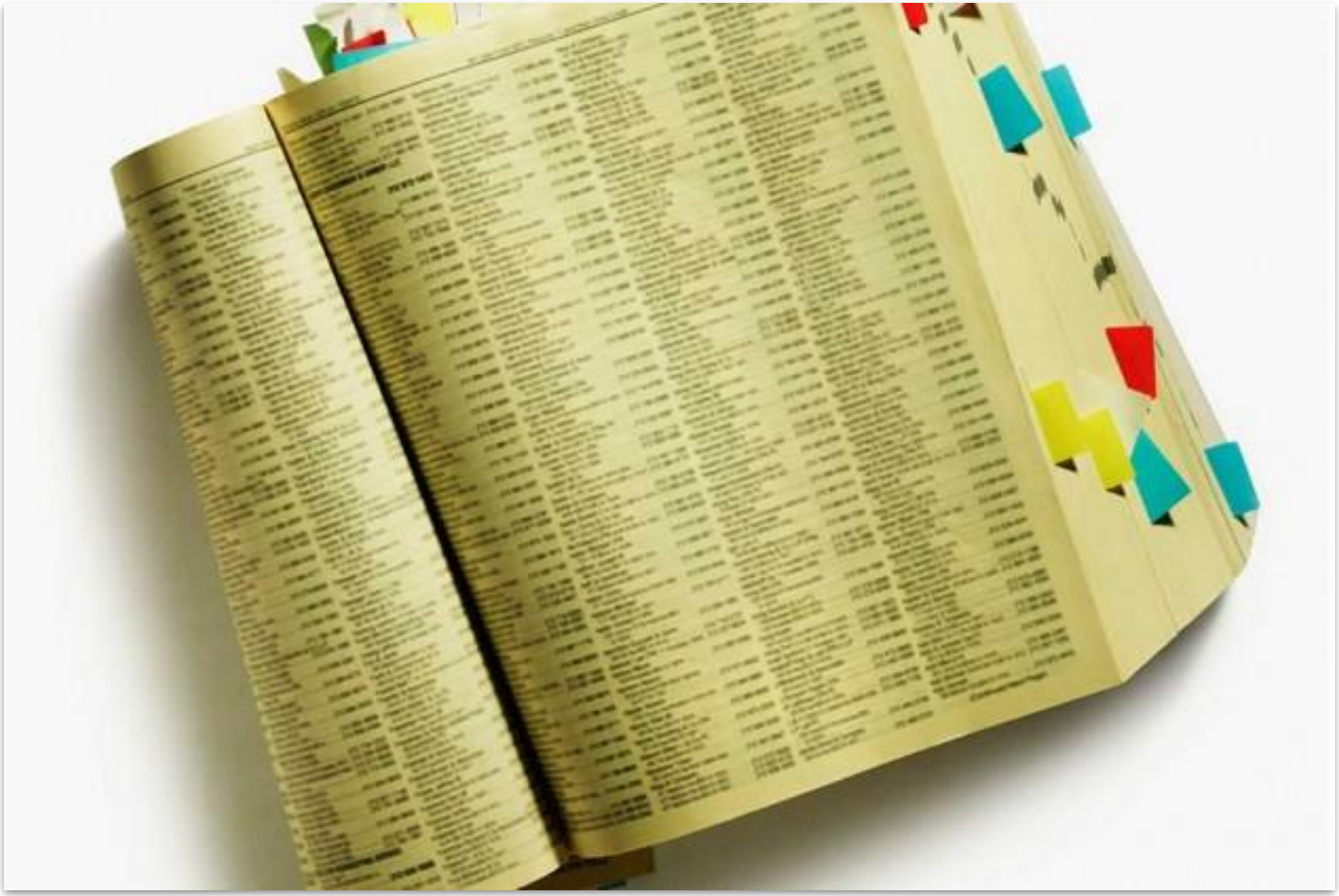
Caitlin Stainken
Grants Manager, Submittable

Data Management

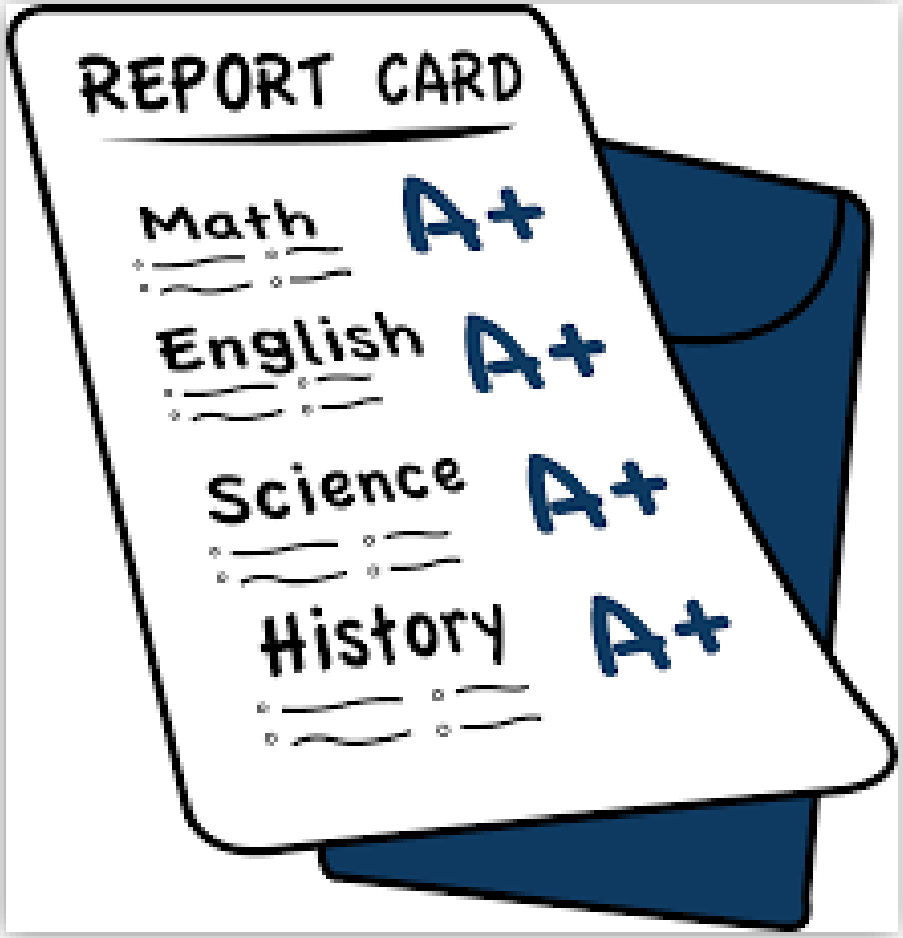
- Data types
- Collection and Management
- Visualization and Presentation
- Submittable walk-through
- *Break*
- **Hands-on workshop**

Data Types

- Categorical/Nominal
  - Gender, race, etc.
- Numerical
  - Age, income, etc.



2
1
3


REPORT CARD
Math A+
English A+
Science A+
History A+

Data Collection

- Plan first
  - 5 W’s
  - No p-hacking!
- Think about your data types
  - Closed-ended questions whenever possible
  - Can you give limited options?

Have you previously applied for a NASA Space Grant?

- (•) Yes
- ( ) No

Which years have you applied?

- [ ] 2018
- [x] 2017
- [x] 2016
- [ ] 2015

What's your zipcode?

59003
59004
59005
59006
59007
59008
59009
59010
59011
59012
59013
59014
59015
59016
59017
59018
59019
59020
59021
59022
59023
59024

What's your highest level of education?

I got a bachelors degree in underwater basket weaving

Data Collection

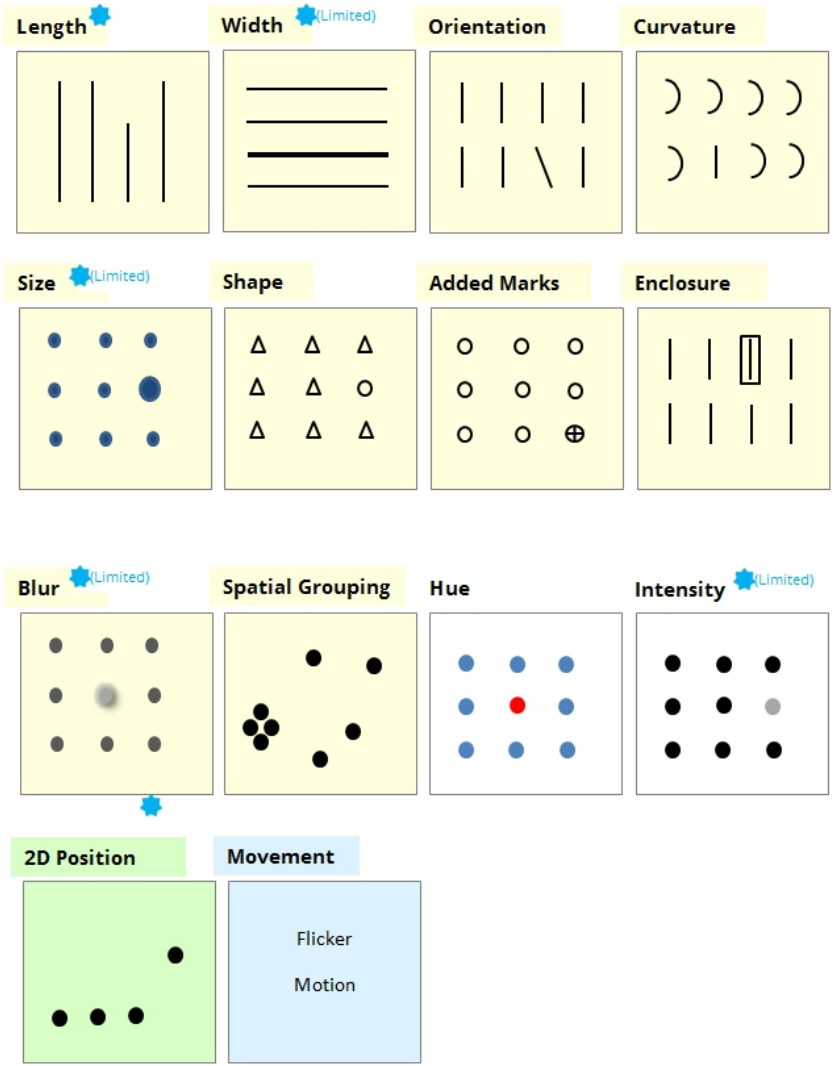
- FERPA compliance
  - PII & Educational Records
  - Directory information
  - Security
- YoY comparisons

Data Management

- Cleaning
  - Missing values
  - Outliers
- Ambiguity & Integrity

Data Visualization

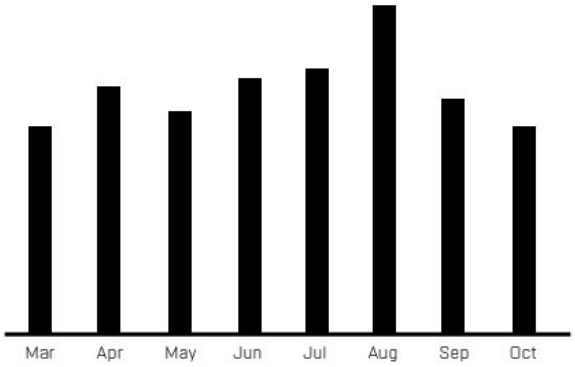
- What’s the point? Who’s your audience?
- Preattentive attributes
  - Position, color, size, shape, texture

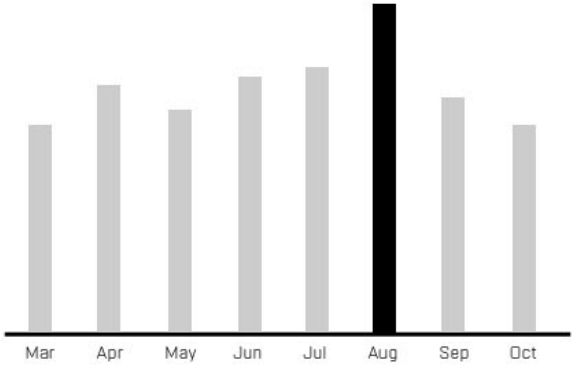

Length
Width
(Limited)
Orientation
Curvature
Size
(Limited)
Shape
Added Marks
Enclosure
Blur
(Limited)
Spatial Grouping
Hue
Intensity
(Limited)
2D Position
Movement
Flicker
Motion

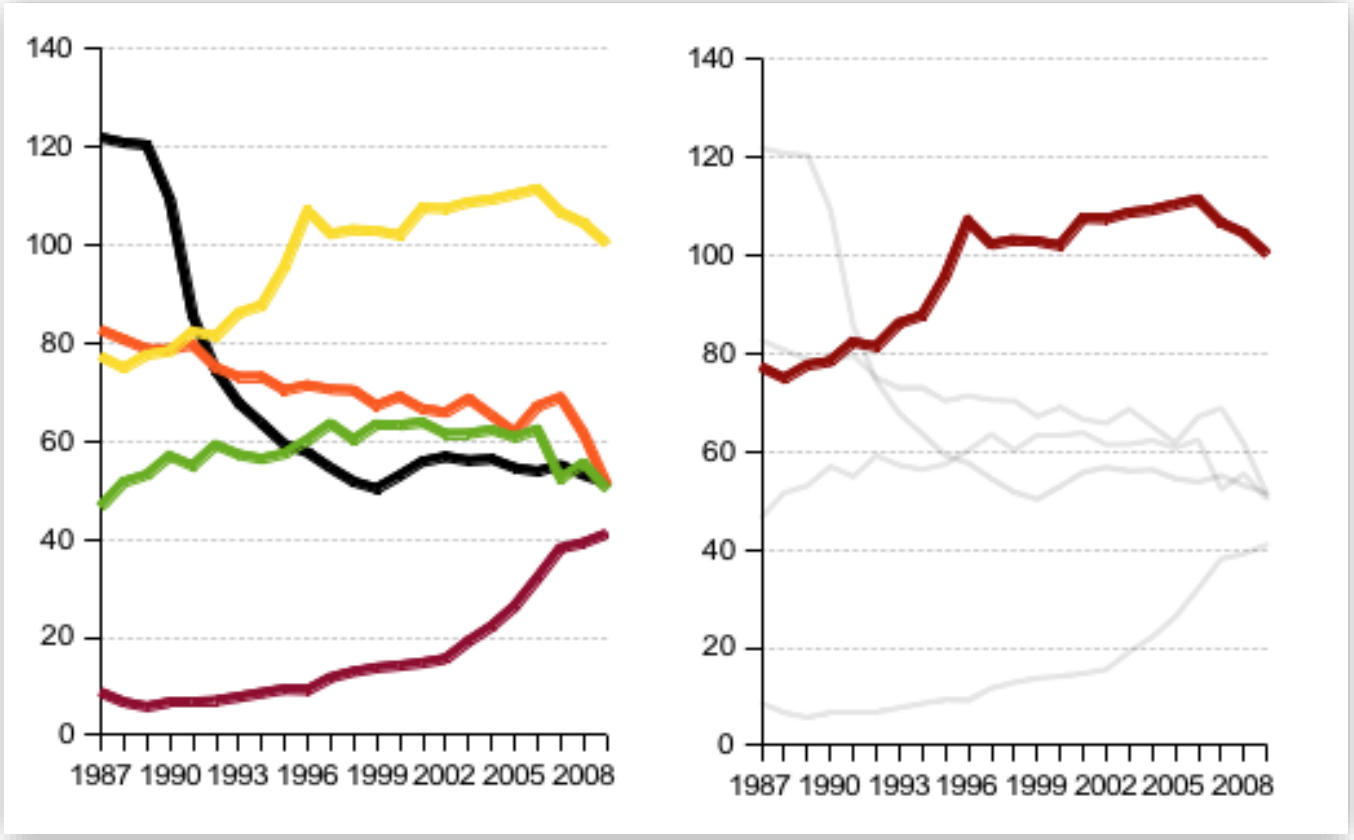
Data Visualization

- What’s the point? Who’s your audience?
- Preattentive attributes
  - Position, color, size, shape, texture
- Labels
- Keep it simple
  - Squint test

Data Visualization



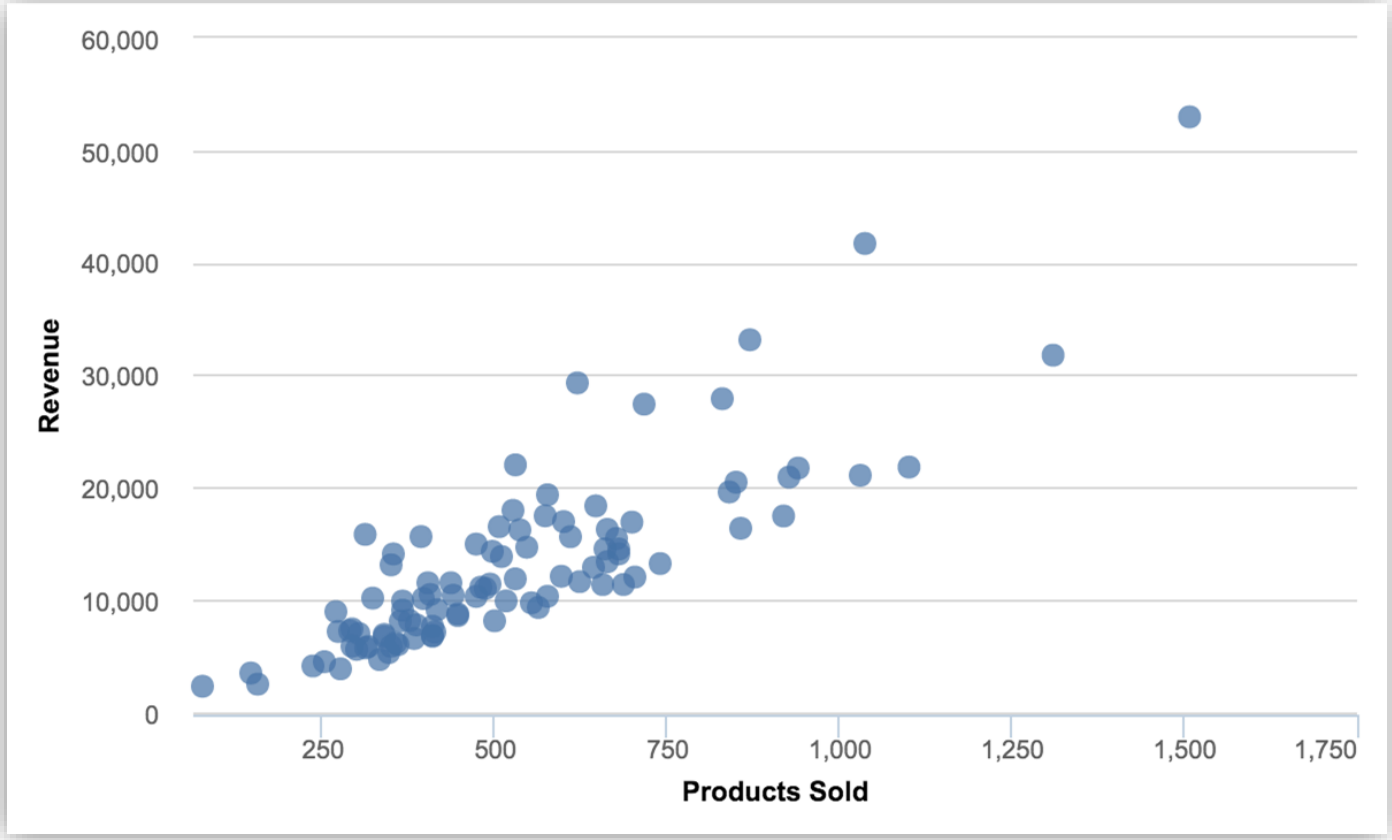


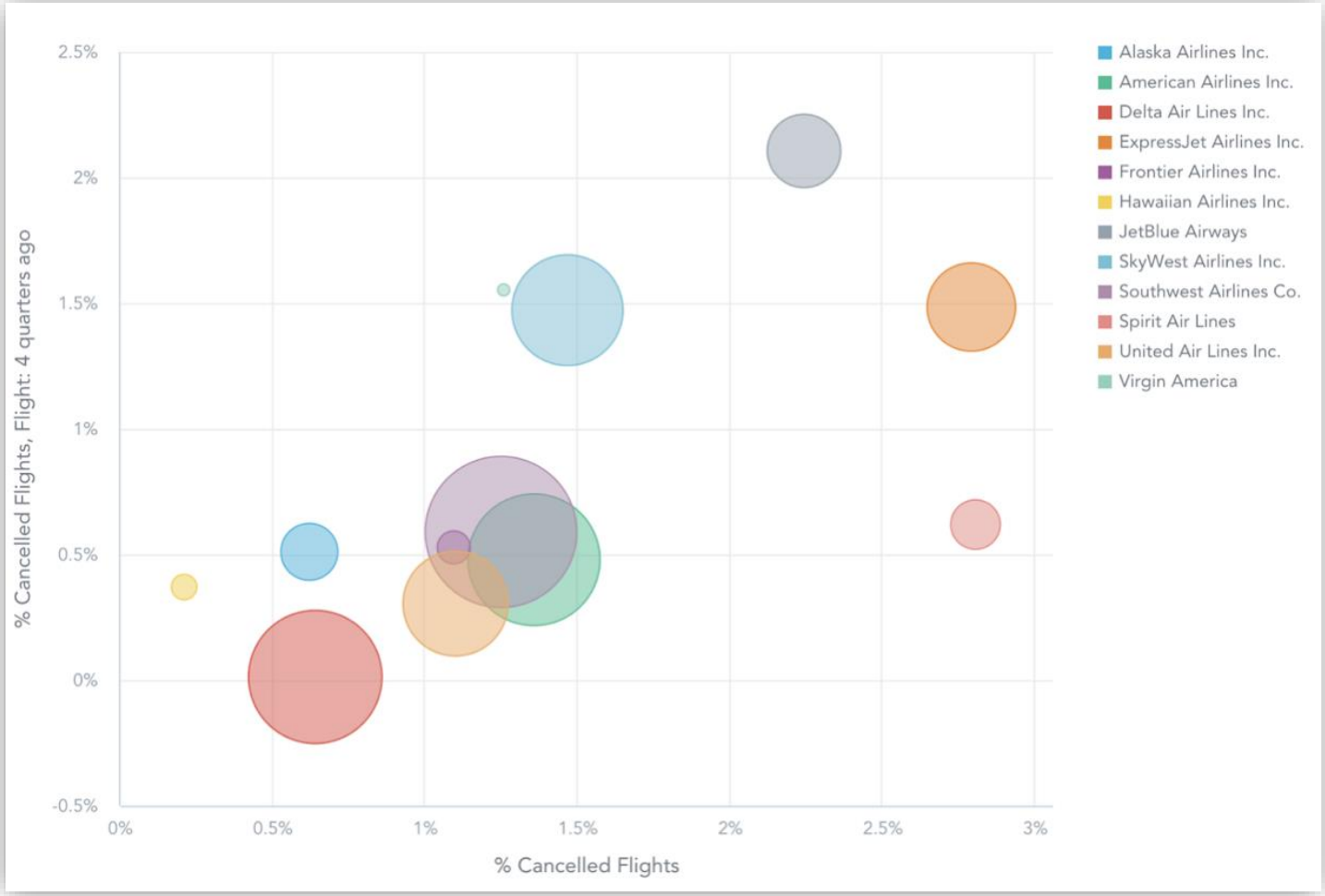

140
120
100
80
60
40
20
0
1987 1990 1993 1996 1999 2002 2005 2008
140
120
100
80
60
40
20
0
1987 1990 1993 1996 1999 2002 2005 2008

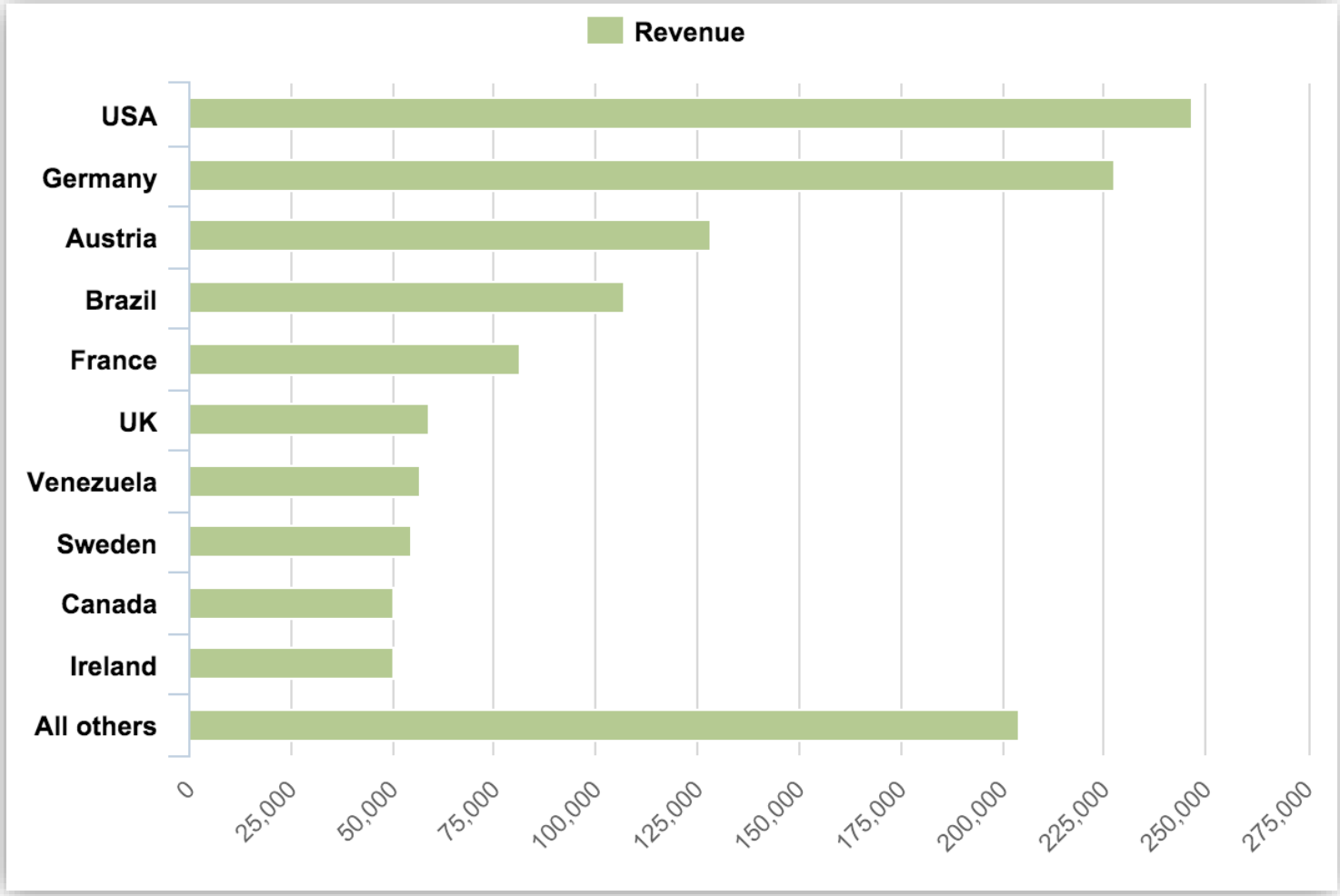
Data Visualization

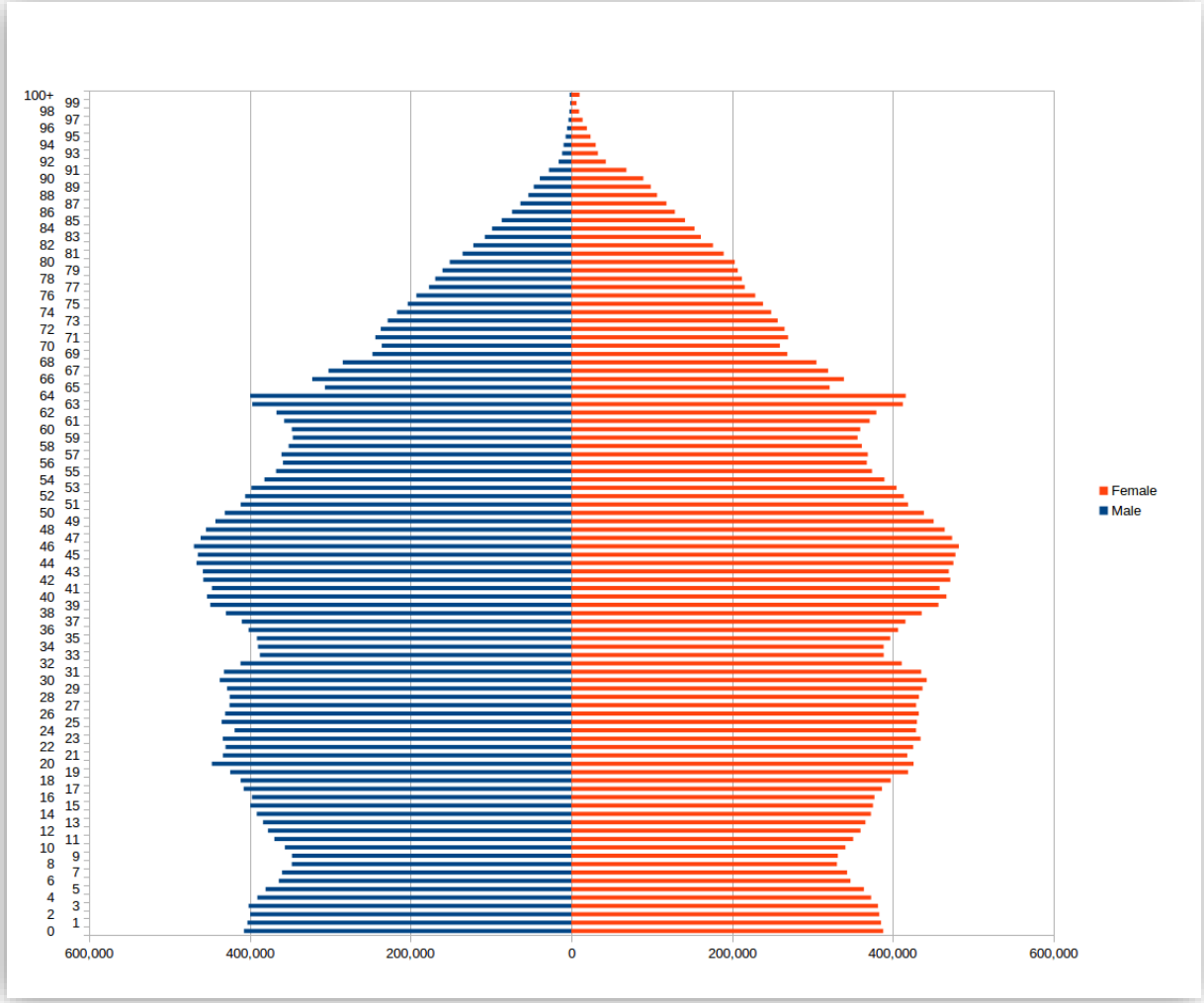
- Consider your data type
  - Different visual encodings
  - Different chart types

Example	Encoding	Ordered	Useful values	Quantitative	Ordinal	Categorical
	position, placement	yes	infinite	Good	Good	Good
1, 2, 3; A, B, C	text labels	optional alpha or num	infinite	Good	Good	Good
	length	yes	many	Good	Good	
	size, area	yes	many	Good	Good	
	angle	yes	medium	Good	Good	
	pattern density	yes	few	Good	Good	
	weight, boldness	yes	few		Good	
	saturation, brightness	yes	few		Good	
	color	no	few (<20)			Good
	shape, icon	no	medium			Good
	pattern texture	no	medium			Good
	enclosure, connection	no	infinite			Good


60,000
50,000
40,000
30,000
20,000
10,000
0
Revenue
250
500
750
1,000
1,250
1,500
1,750
Products Sold


2.5%
2%
1.5%
1%
0.5%
0%
-0.5%
% Cancelled Flights, Flight: 4 quarters ago
0%
0.5%
1%
1.5%
2%
2.5%
3%
% Cancelled Flights
Alaska Airlines Inc.
American Airlines Inc.
Delta Air Lines Inc.
ExpressJet Airlines Inc.
Frontier Airlines Inc.
Hawaiian Airlines Inc.
JetBlue Airways
SkyWest Airlines Inc.
Southwest Airlines Co.
Spirit Air Lines
United Air Lines Inc.
Virgin America


Revenue
USA
Germany
Austria
Brazil
France
UK
Venezuela
Sweden
Canada
Ireland
All others
0
25,000
50,000
75,000
100,000
125,000
150,000
175,000
200,000
225,000
250,000
275,000


100+
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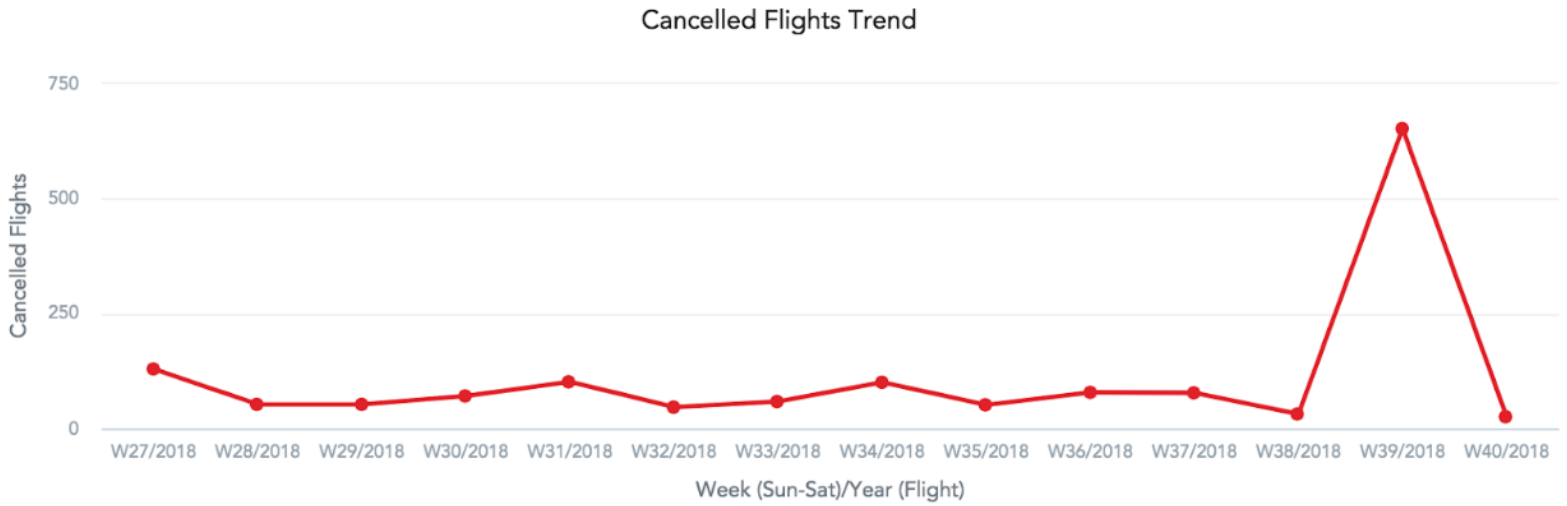
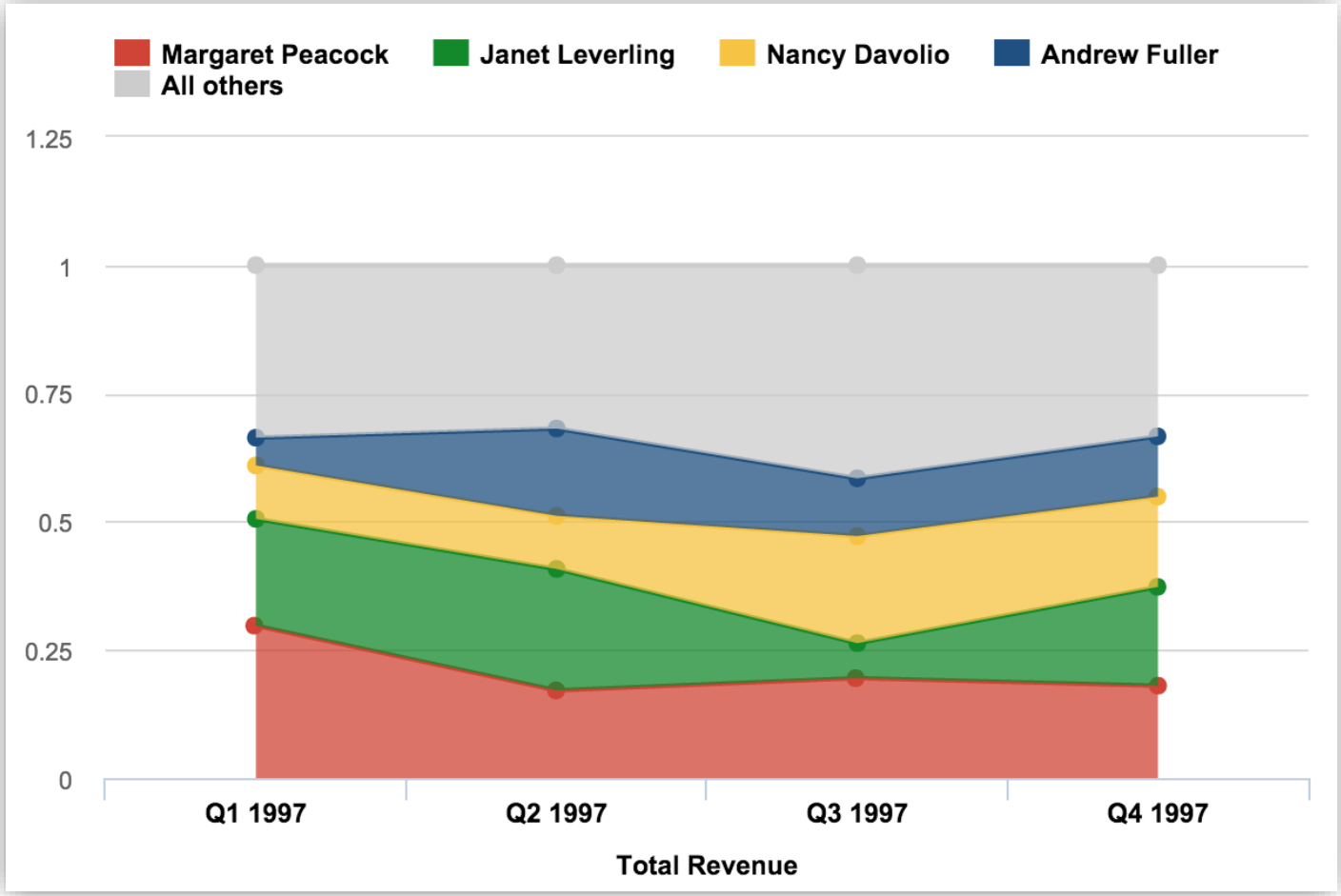
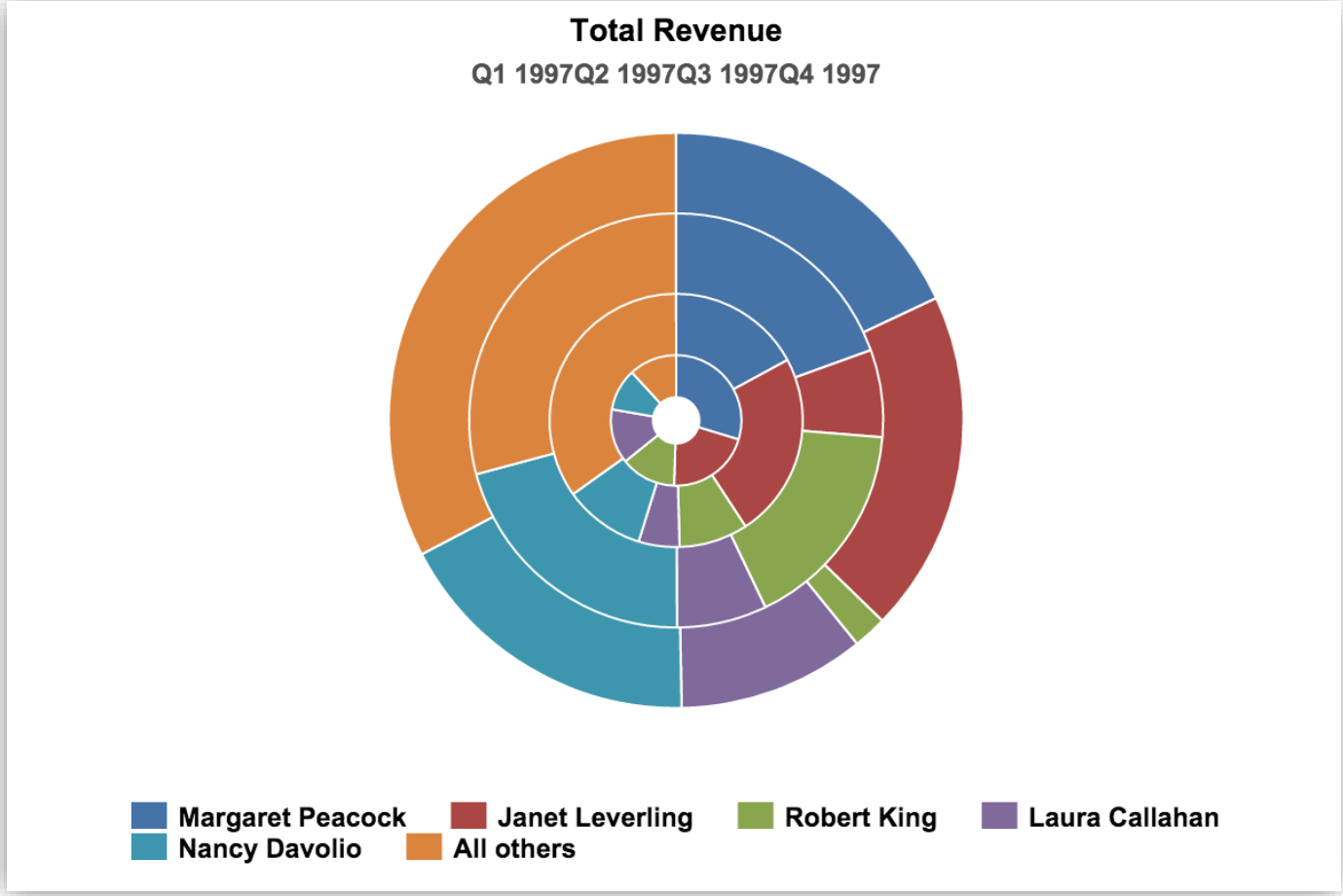
12
11
10
9
8
7
6
5
4
3
2
1
0
600,000
400,000
200,000
0
200,000
400,000
600,000
Female
Male

Data Visualization



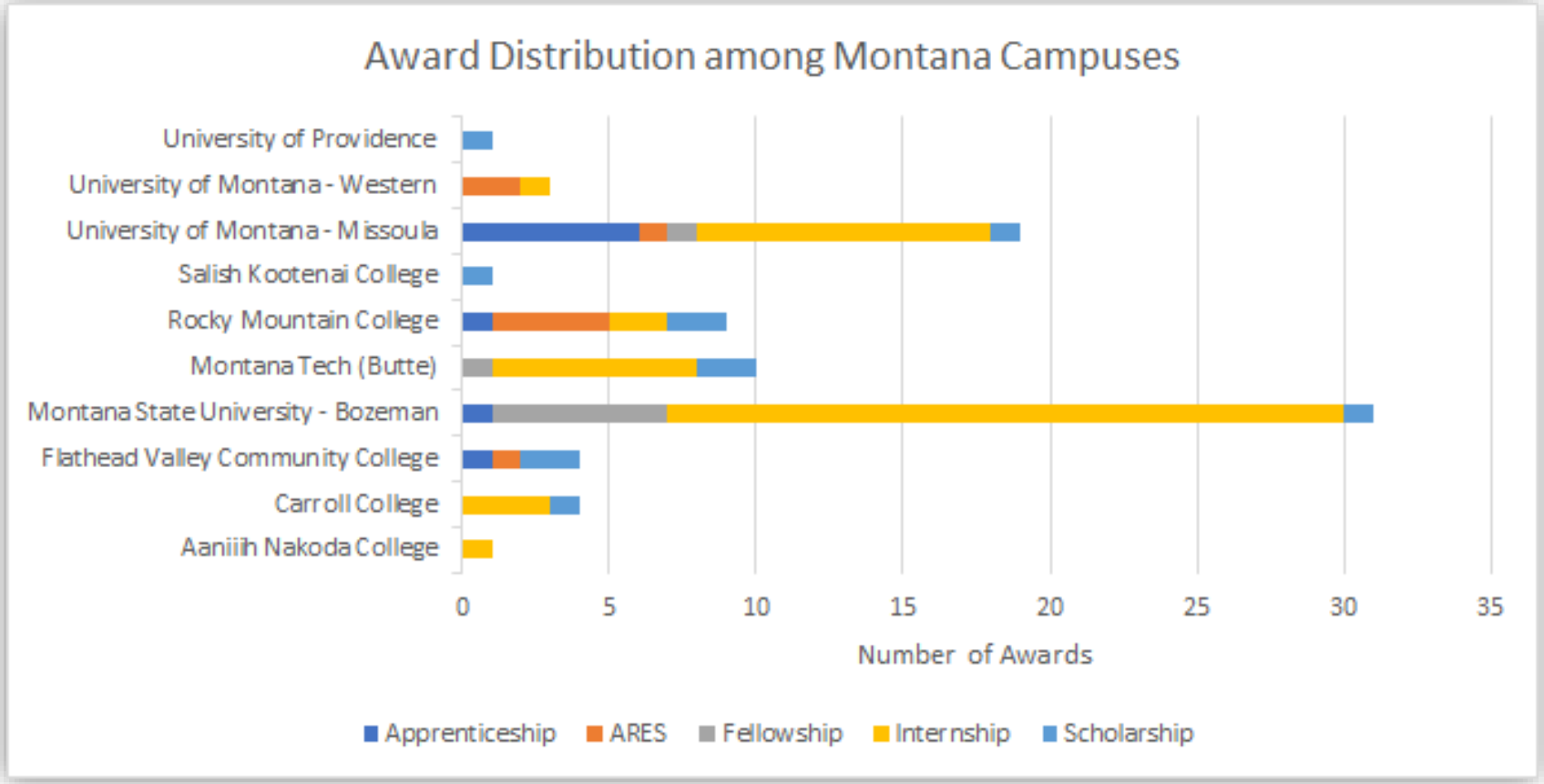

Margaret Peacock
Janet Leverling
Nancy Davolio
Andrew Fuller
All others
1.25
1
0.75
0.5
0.25
0
Q1 1997
Q2 1997
Q3 1997
Q4 1997
Total Revenue


Total Revenue
Q1 1997Q2 1997Q3 1997Q4 1997
Margaret Peacock
Janet Leverling
Robert King
Laura Callahan
Nancy Davolio
All others

Remove to improve the **pie chart** edition

Data Presentation

- Reading a chart
  - Axes, then legend, then takeaways
  - Don’t get lost!
- Consider your audience
- What’s the point?


Award Distribution among Montana Campuses
University of Providence
University of Montana - Western
University of Montana - Missoula
Salish Kootenai College
Rocky Mountain College
Montana Tech (Butte)
Montana State University - Bozeman
Flathead Valley Community College
Carroll College
Aaniiih Nakoda College
0
5
10
15
20
25
30
35
Number of Awards
Apprenticeship
ARES
Fellowship
Internship
Scholarship

Submittable Data Flow

10 min Break

- Get into groups
- Login to Submittable
- Open Excel or Google Sheets

Areas of Analysis

- Gender
- Education
- Geography
- Enrollment
- Department of Study

Data Download

- Choose fields relevant to Question
- Download report

Advanced Excel Basics

- Change file type
- Data cleaning
- Pivot tables and charts

Contact Information

Anna Marbut

Growth Strategy Analyst

anna.marbut@submittable.com

Caitlin Stainken

Grants Manager

caitlin@submittable.com