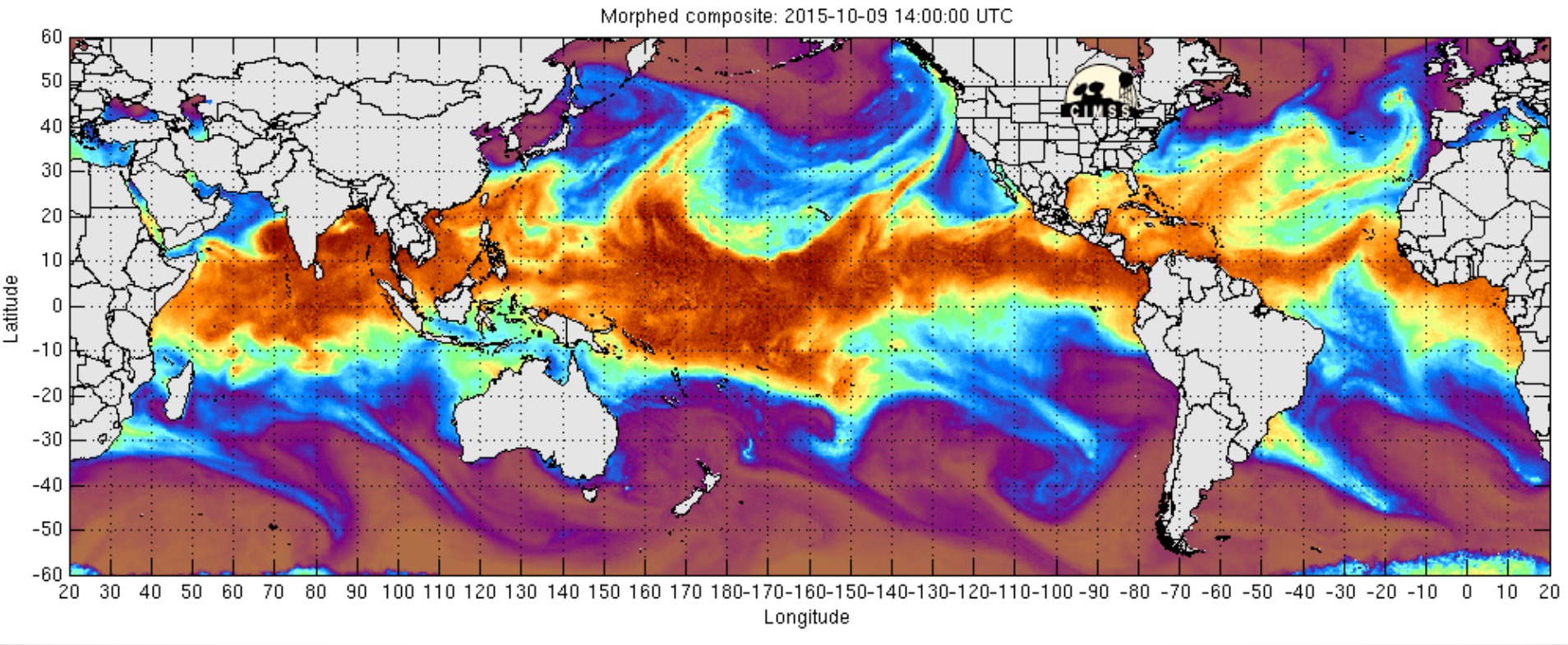
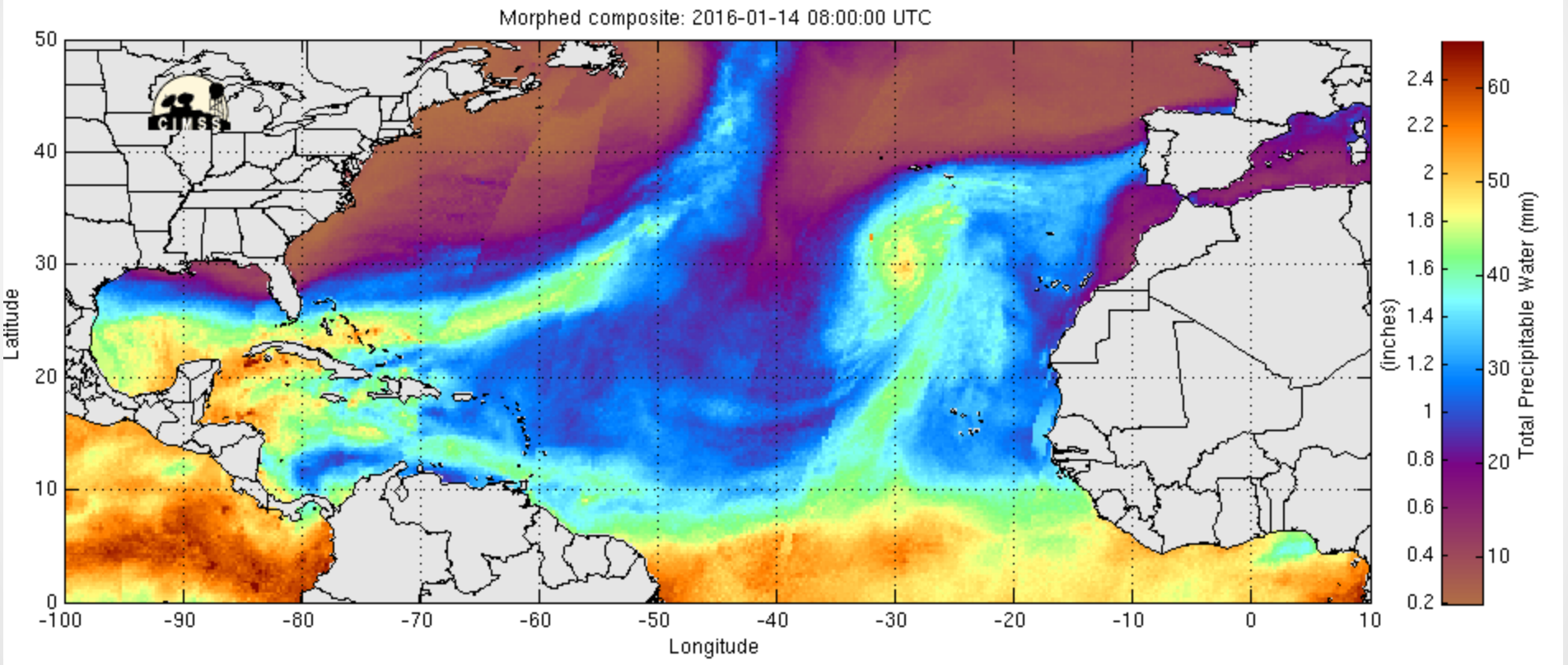
WHY IT RAINS



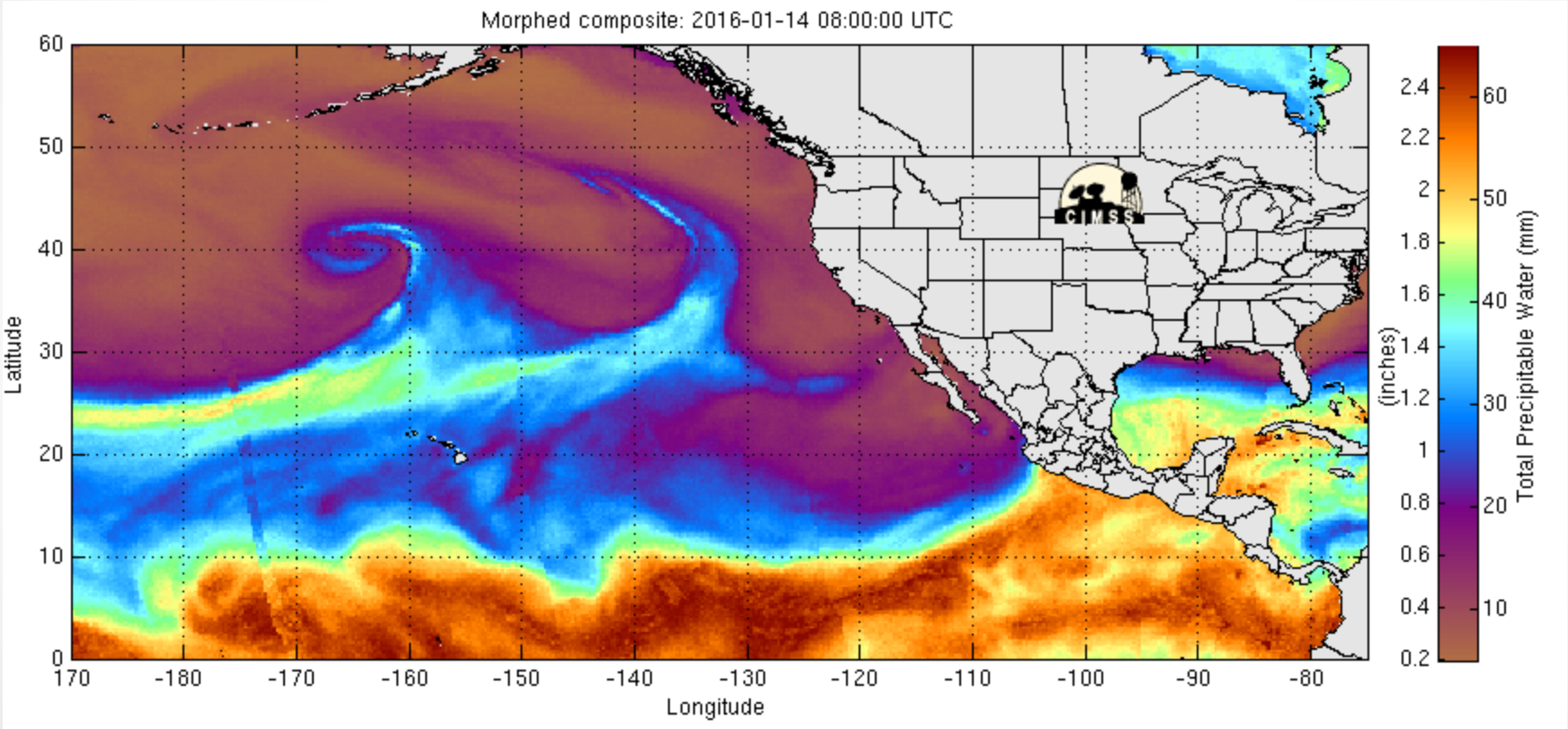
NOAA/ESRL/PSD
CW3E SCRIPPS UCSD

EAST COAST



NOAA/ESRL/PSD
CW3E SCRIPPS UCSD

WEST COAST



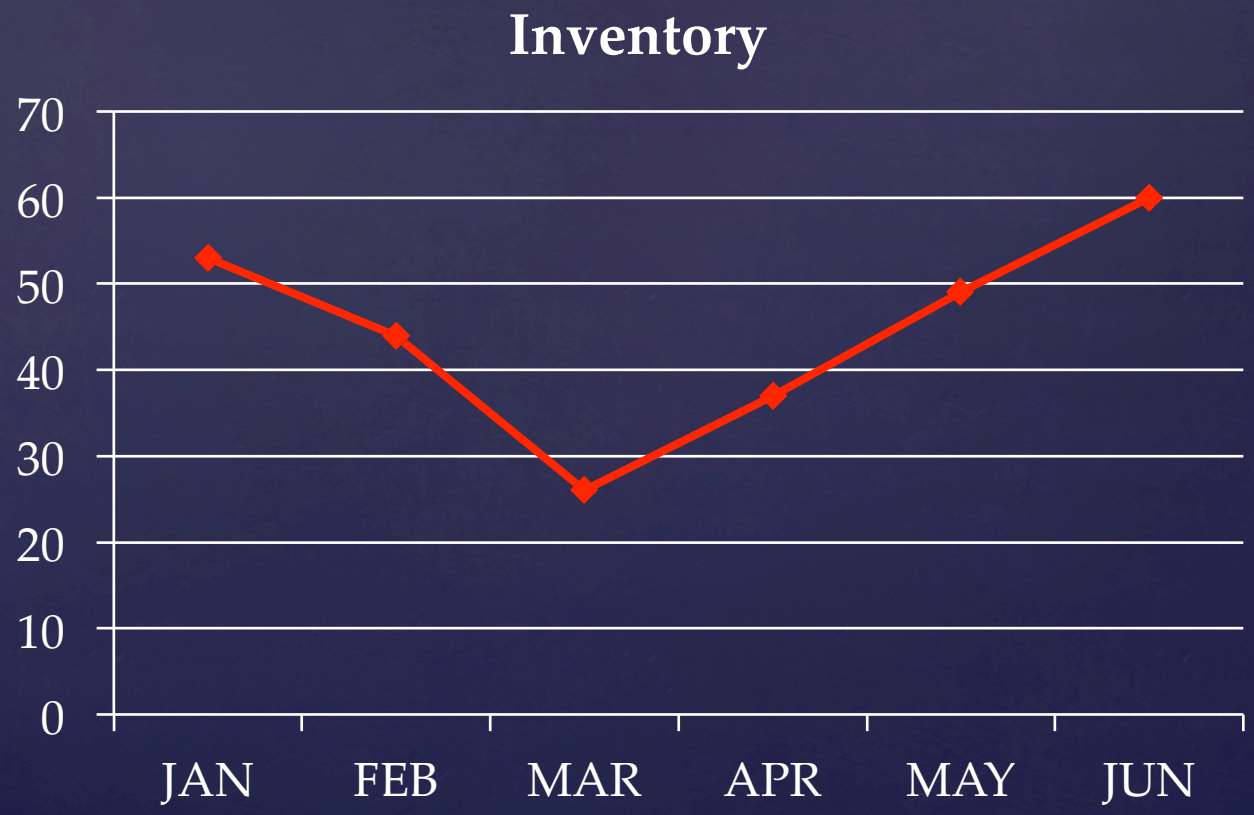
NOAA/ESRL/PSD
CW3E SCRIPPS UCSD

WHY DO WE NEED GRAPHICS?

{ Really necessary?

Which is better?

Month	JAN	FEB	MAR	APR	MAY	JUN
Inventory	53	44	26	37	49	60



WHY GRAPHS

"A picture is worth 1000 words"

- Discover or answer questions
- Make massive accessible & See data in context
- Pattern recognition, signal detection
- Support calculation, analysis and modeling
- Provide evidence or present argument
- Reasoning & Decision – making

and more…

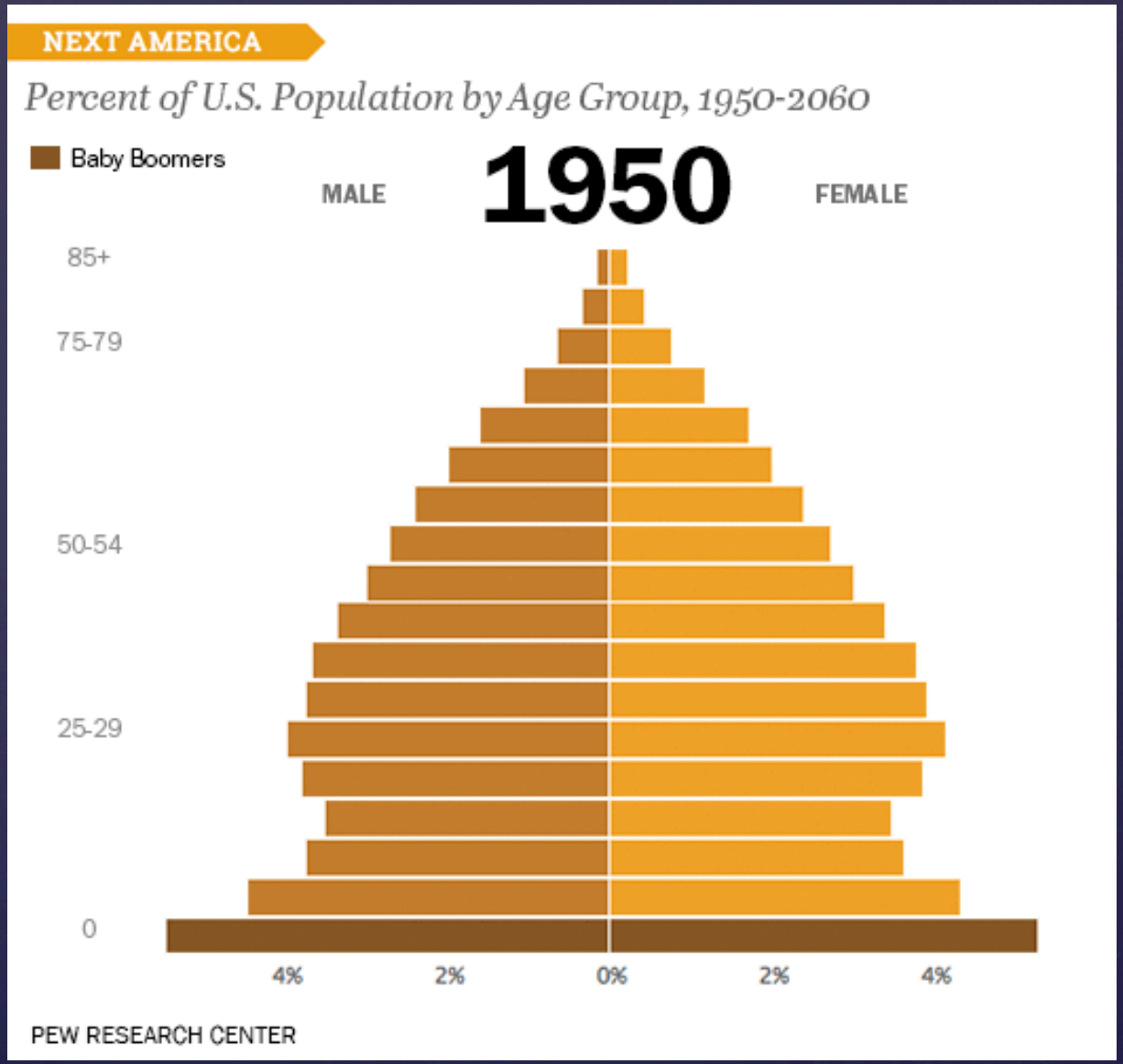
THE ROLES OF GRAPHS

THINK LIKE A DATA SCIENTIST

What it takes? {

GRAPHS ARE COMPARISON…

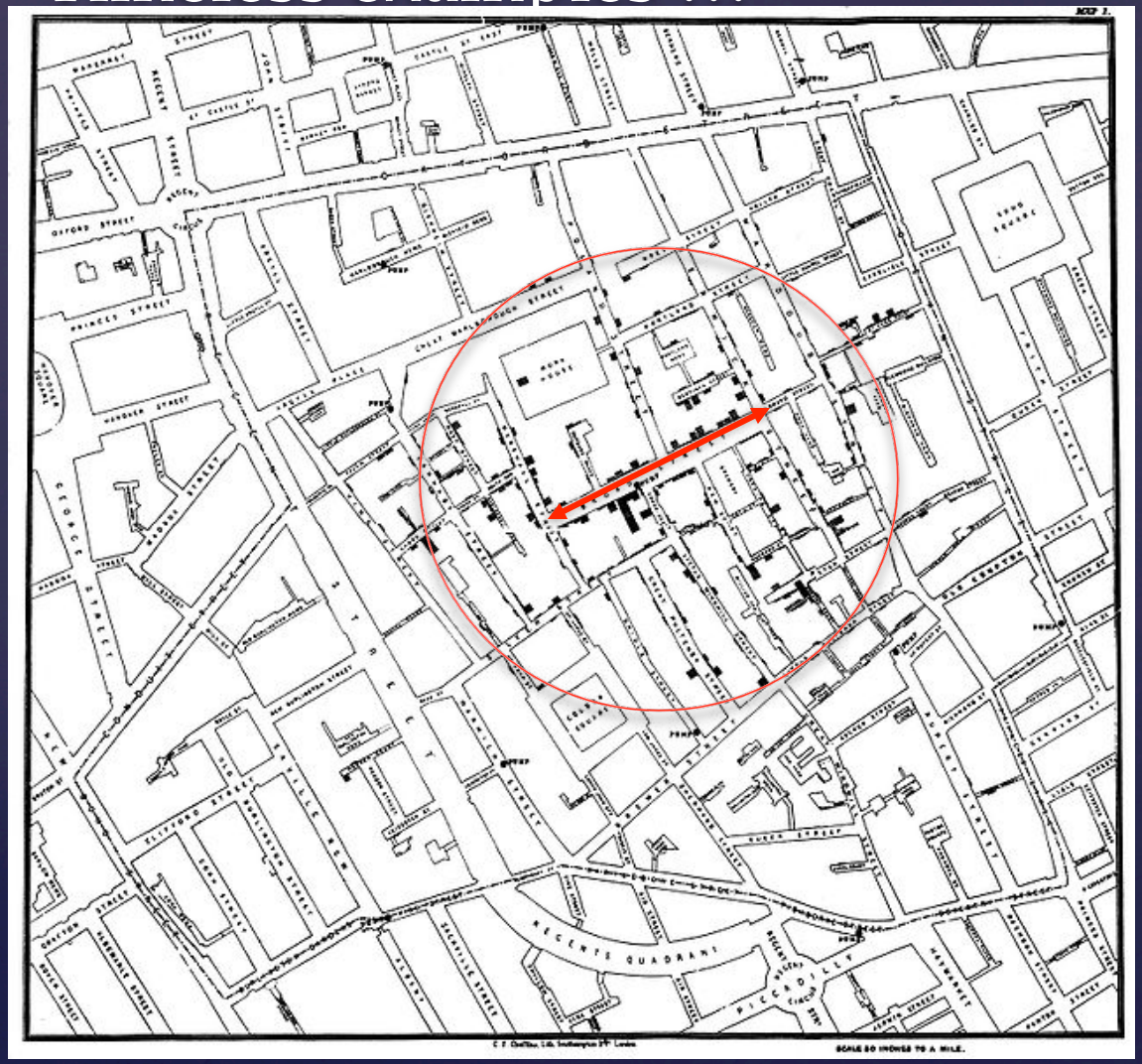
{ To find things unexpected


NEXT AMERICA
Percent of U.S. Population by Age Group, 1950-2060
Baby Boomers
MALE
1950
FEMALE
85+
75-79
50-54
25-29
0
4%
2%
0%
2%
4%
PEW RESEARCH CENTER

THE JOY OF STATS

GRAPHS ARE COMPARISONS

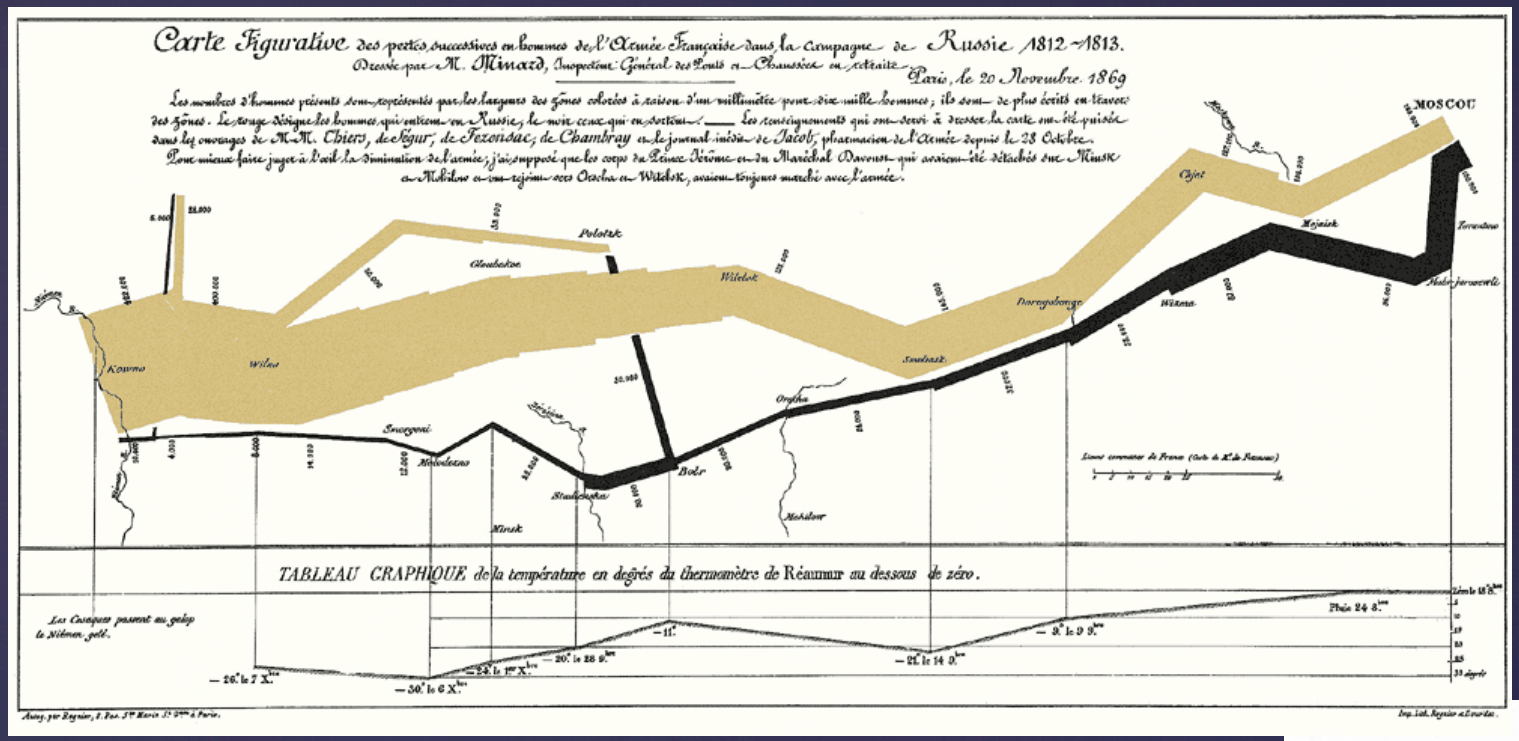
Timeless examples …



John Snow's Dot Distribution Map of Broad Street Cholera Cases

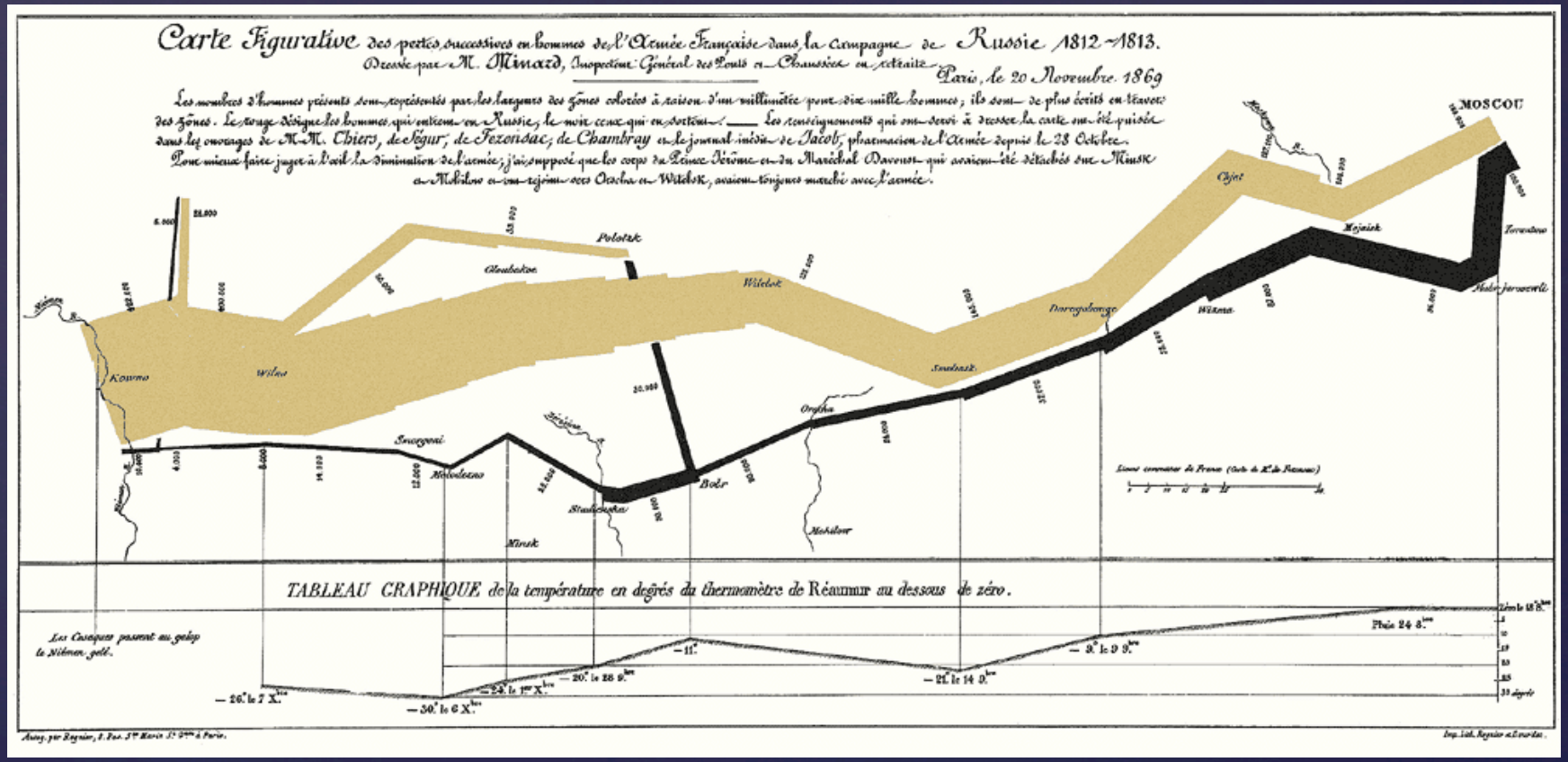
source: Wikimedia Commons

The Night Bivouac of Napoleon's Army during retreat from Russia in 1812. Oil on canvas. *Historical Museum, Moscow, Russia.*



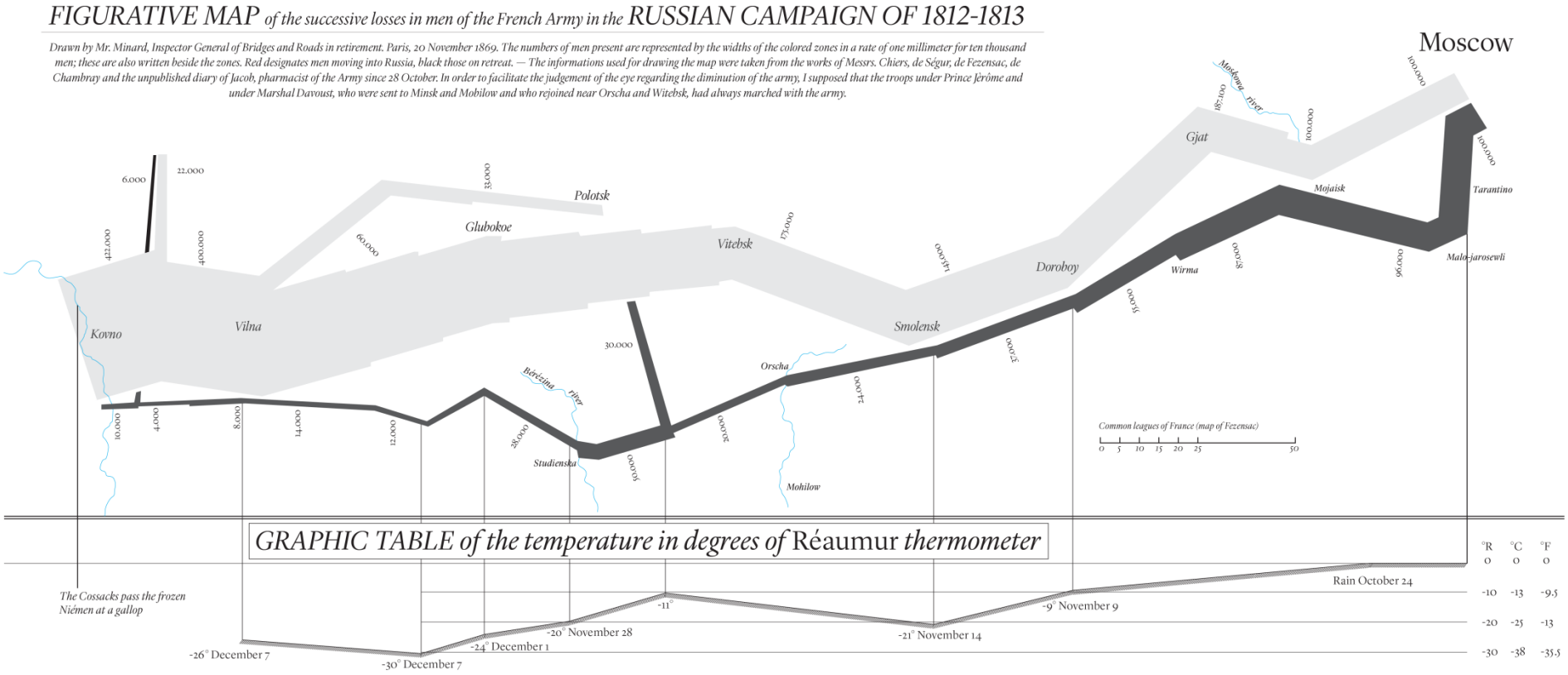
Charles Joseph Minard

Charles Minard's Visualization of Napoleon's 1812 March



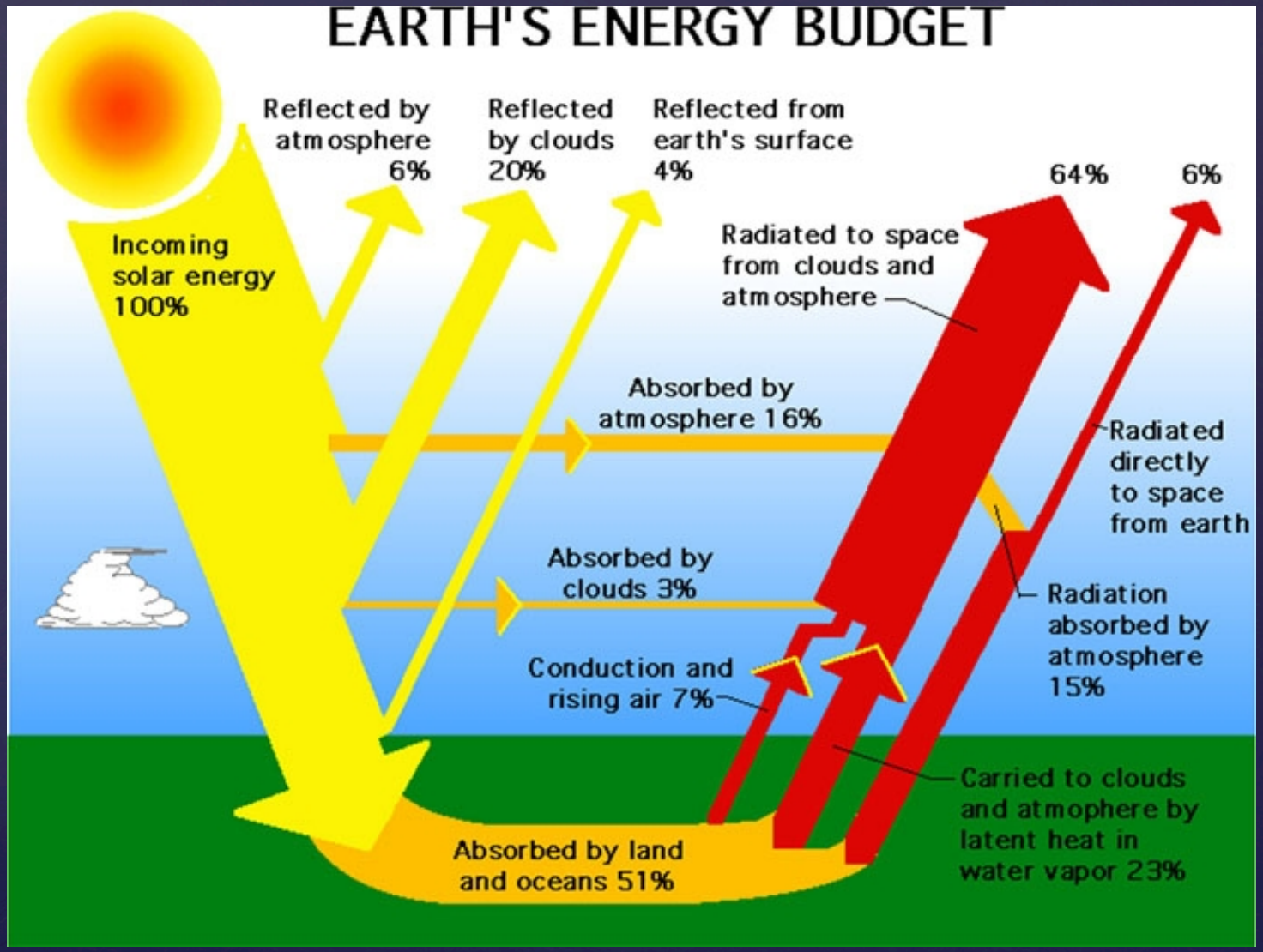
More can be found at: http://www.edwardtufte.com/tufte/minard

Modern redraw

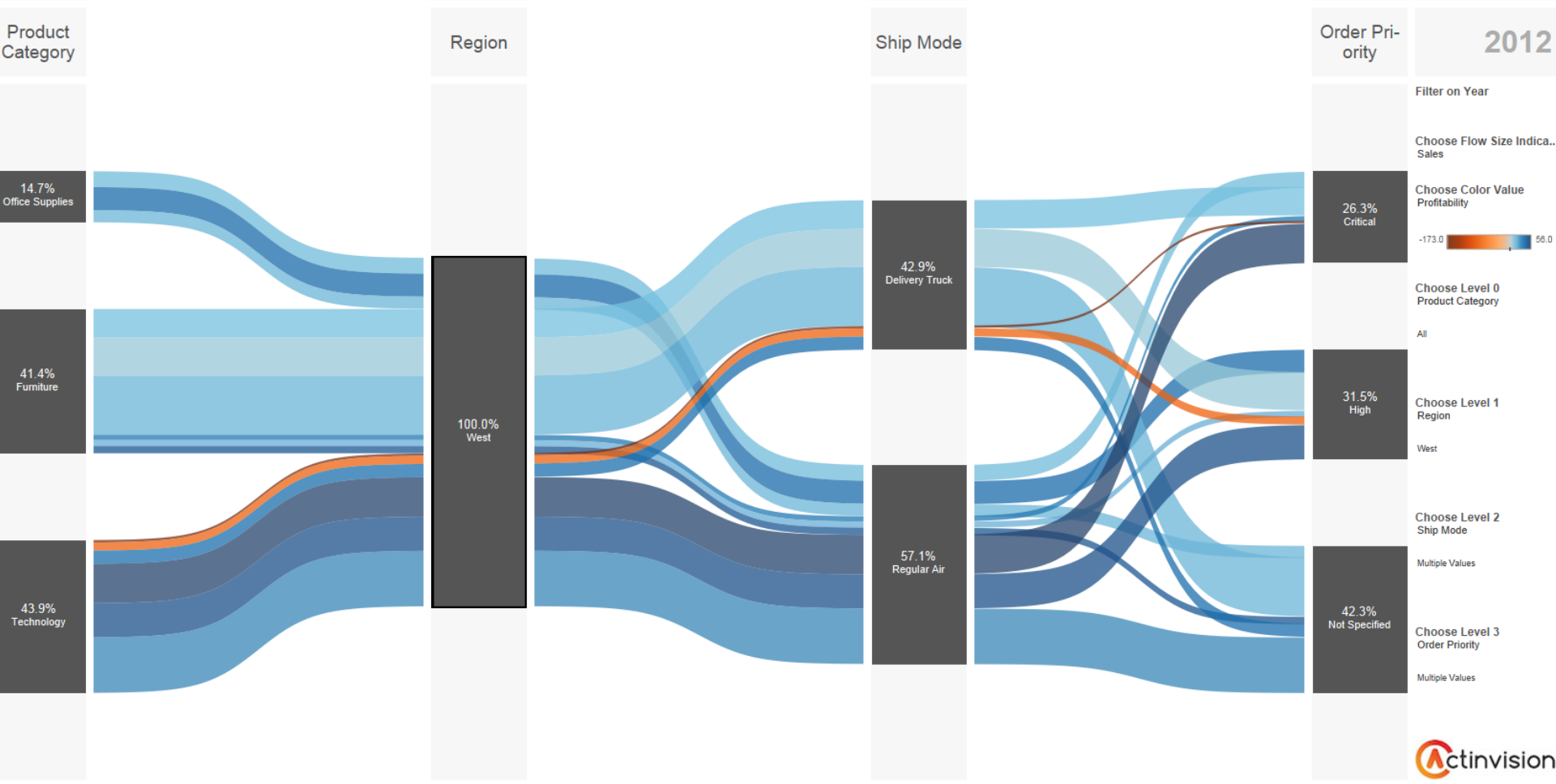


"it may well be the best statistical graphic ever drawn", *Edward Tufte*
"Minard's map is a "gem" of information graphics, it is the World's Champion Graph", *Howard Wainer*
"His famous map was only one of 51 thematic maps he created during his lifetime, he was a true pioner in many respects", *Arthur Robinson*

SANKEY DIAGRAM



SANKEY DIAGRAM



SANKEY DIAGRAM

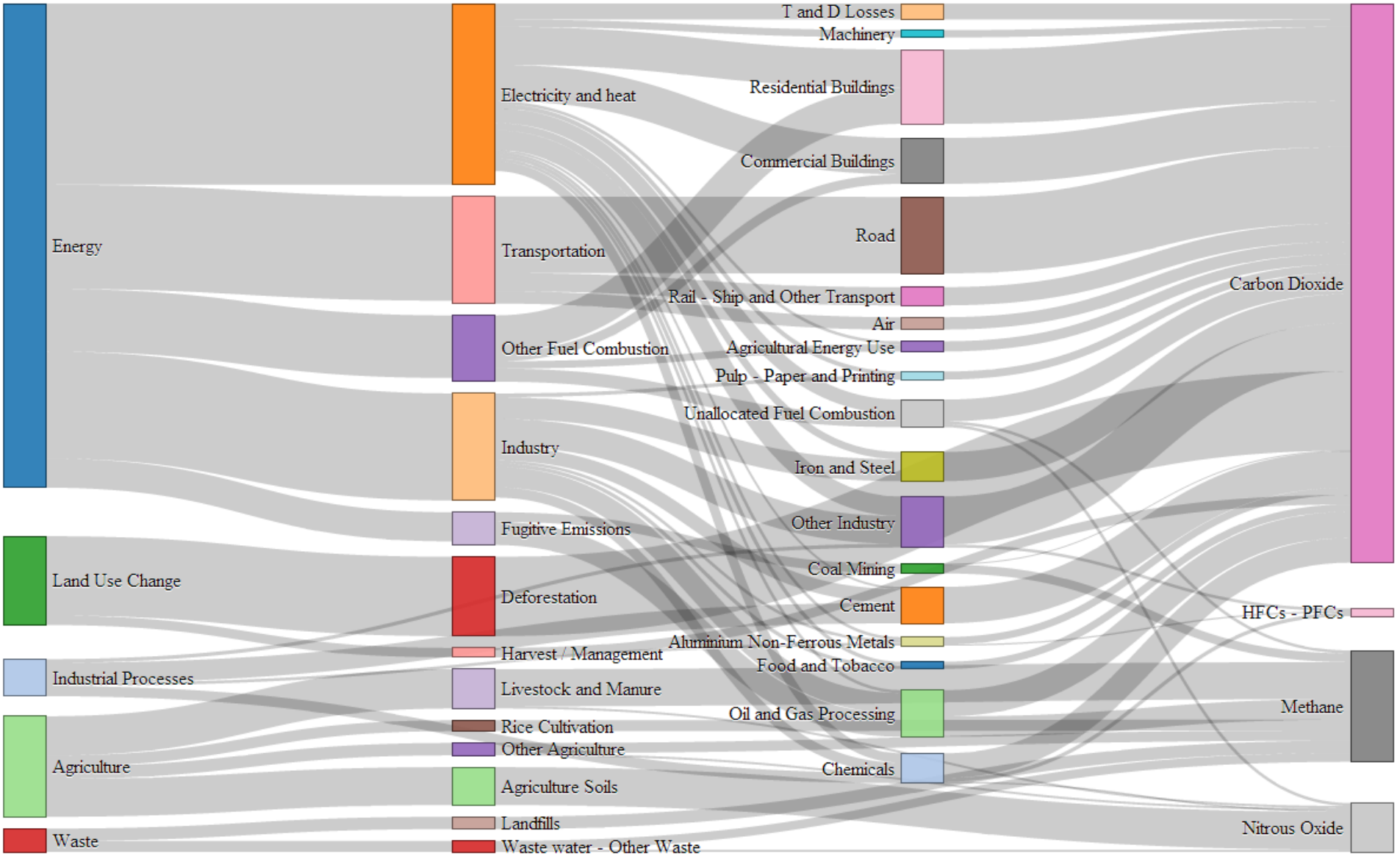
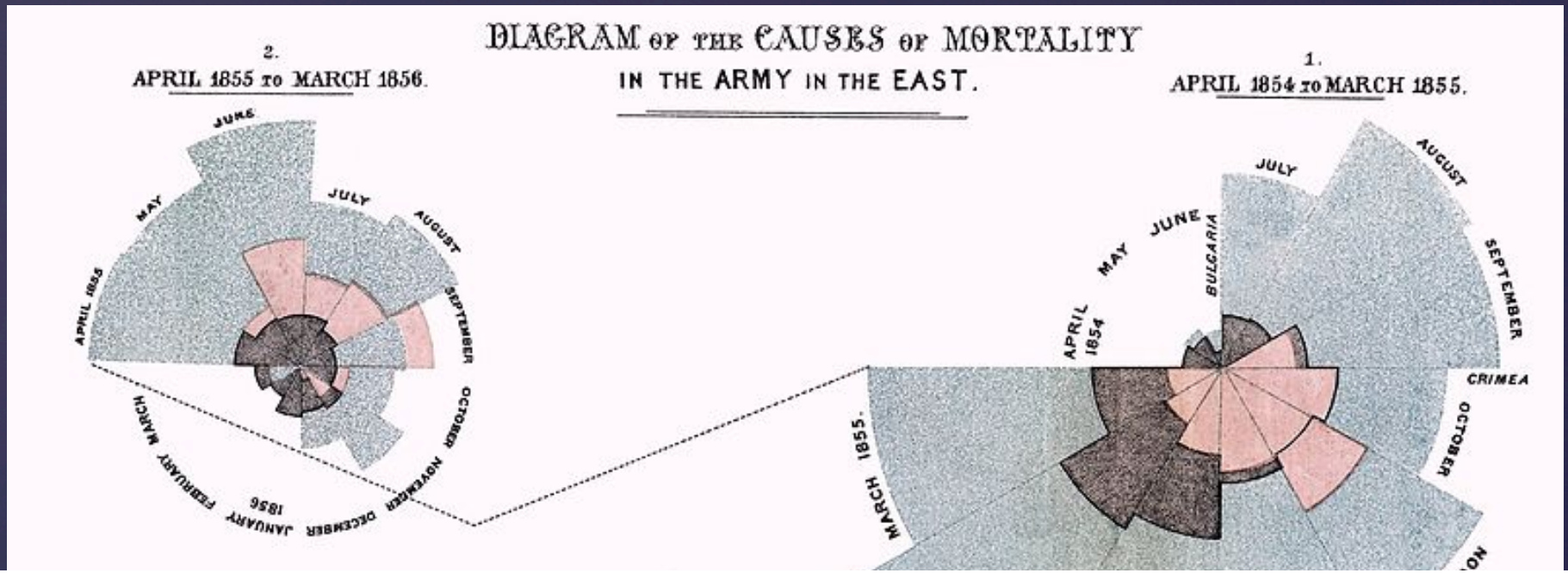
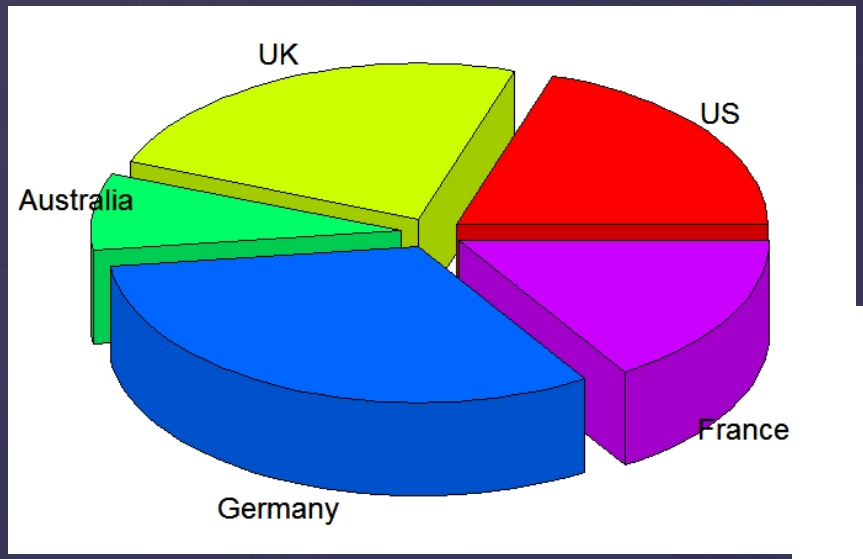


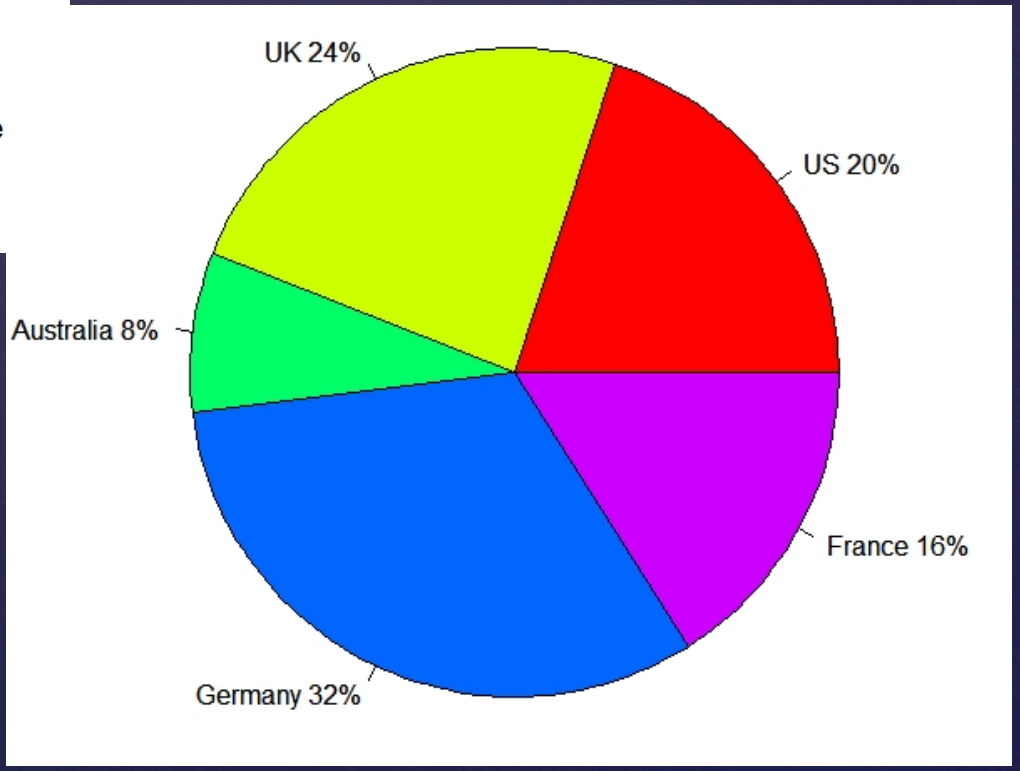
Diagram of the causes of mortality in the army in the East



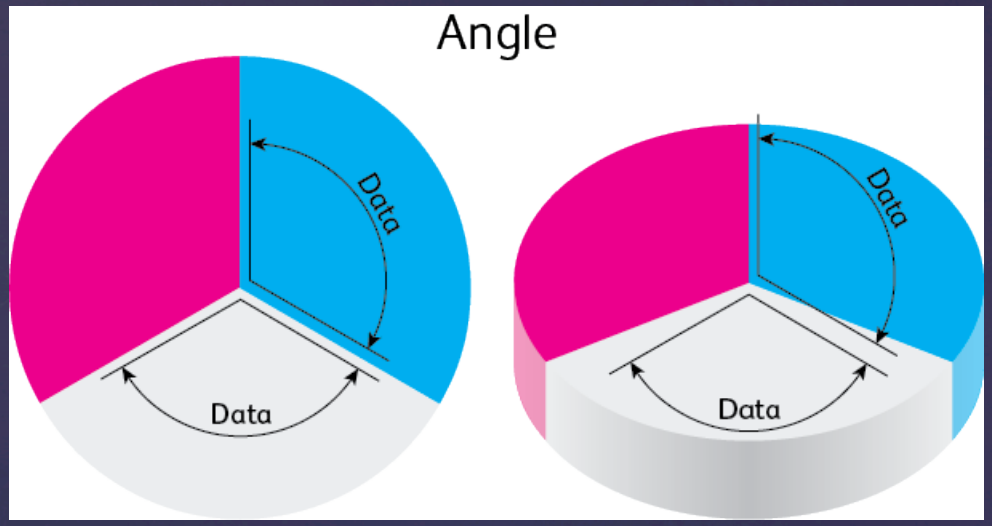
The legend reads:
The Areas of the blue, red, & black wedges are each measured from the centre as the common vertex. The blue wedges measured from the centre of the circle represent area for area the deaths from Preventable or Mitigable Zymotic diseases, the red wedges measured from the centre the deaths from wounds, & the black wedges measured from the centre the deaths from all other causes. The black line across the red triangle in Nov. 1854 marks the boundary of the deaths from all other causes during the month. In October 1854, & April 1855, the black area coincides with the red, in January & February 1855,(*) the blue coincides with the black. The entire areas may be compared by following the blue, the red, & the black lines enclosing them.

There are caveats…

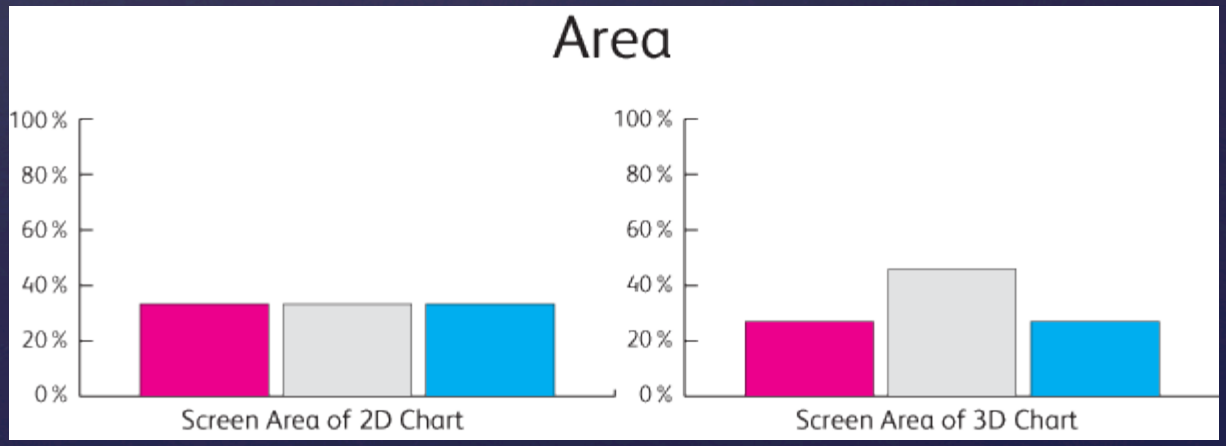




“2D’s Company, 3D’s a Crowd”

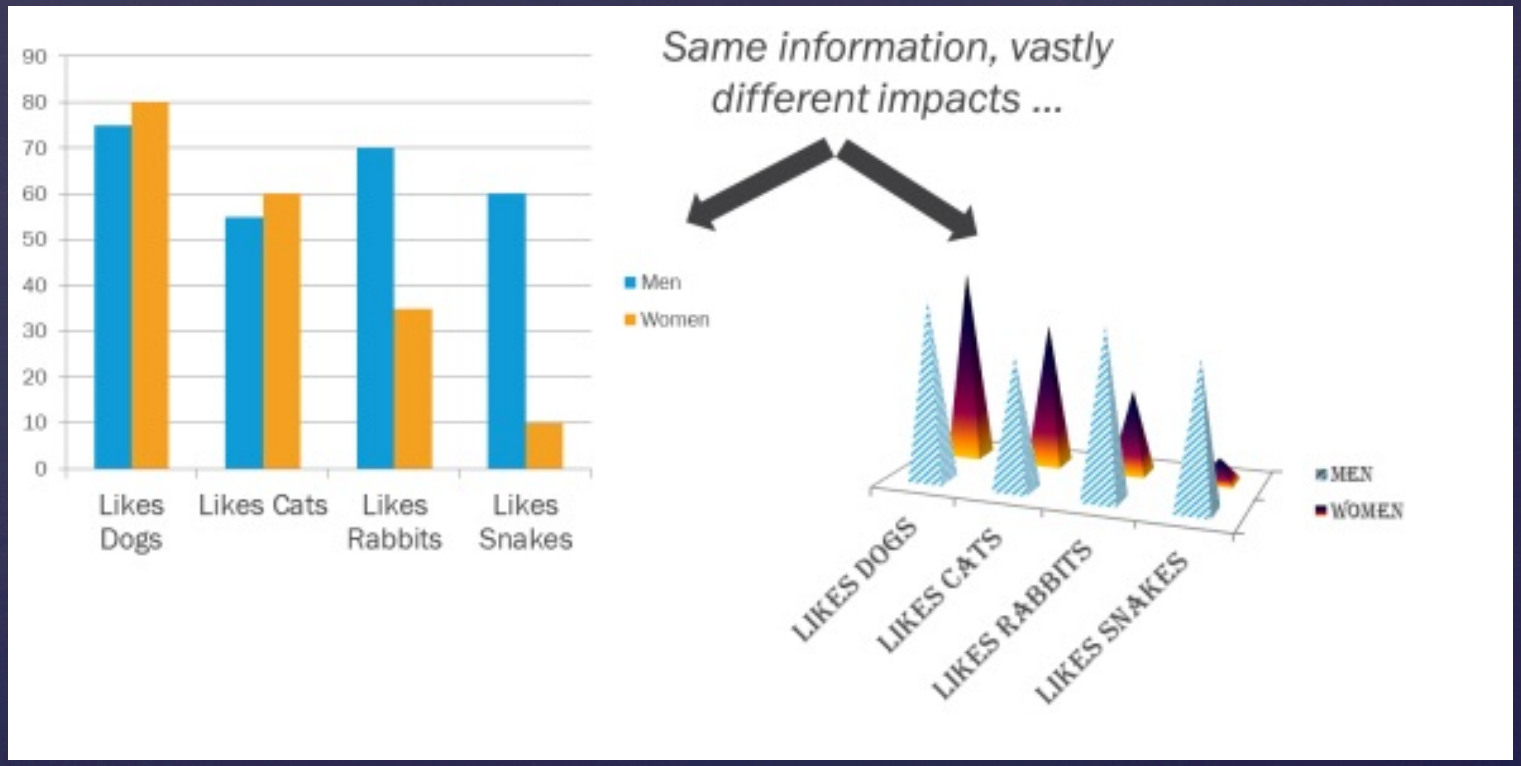


Violation of the
Area Principle



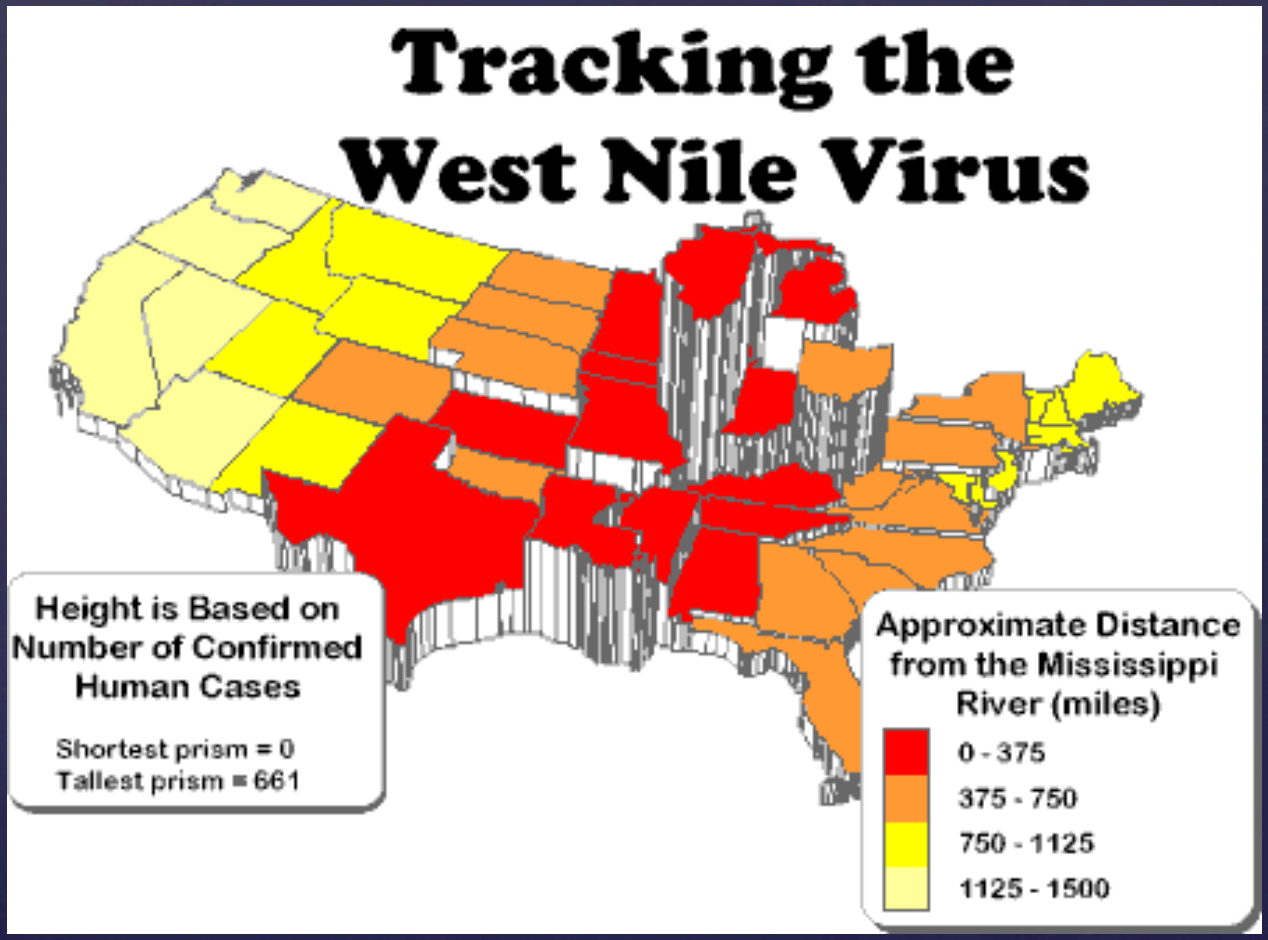
Source: http://blog.visual.ly/2ds-company-3ds-a-crowd/

2D's Company, 3D's a Crowd – Pie chart is not alone



Source: http://www.enterpriseappstoday.com

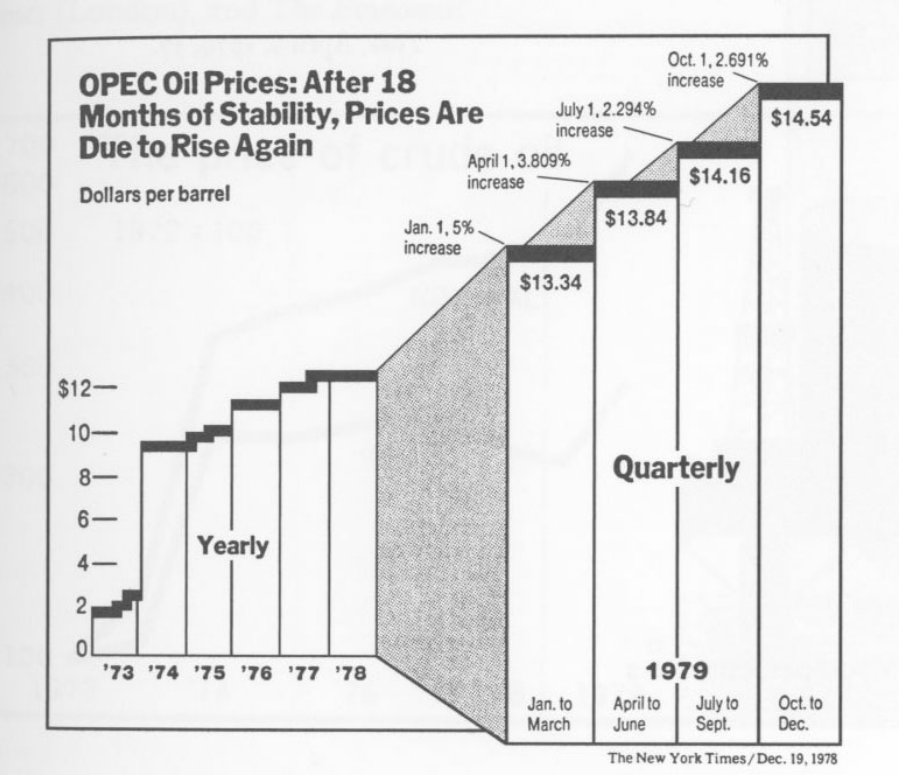
2D's Company, 3D's a Crowd



Four Principles

Ref: Edward Tufte, *The Visual Display of Quantitative Information*

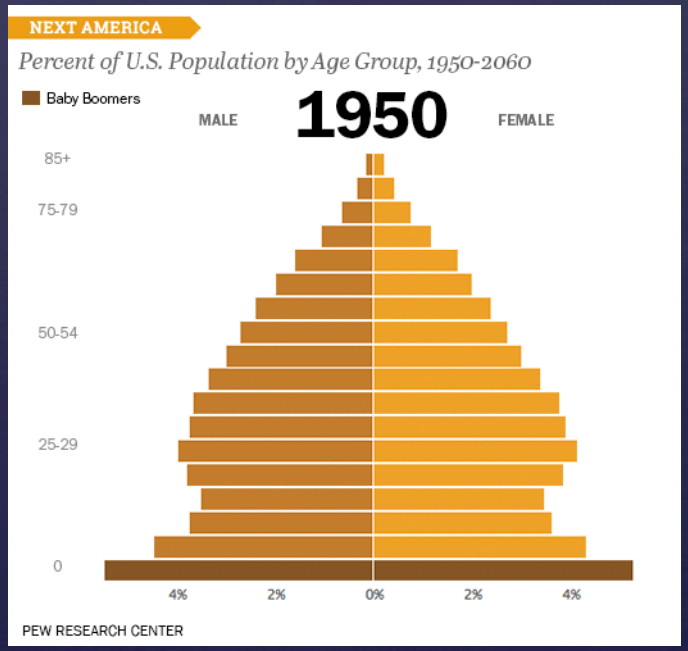
1. "Area Principle"
2. Labeling → Graphical distortion & ambiguity
3. Show data variation, not design variation



Four Principles

Ref: Edward Tufte, *The Visual Display of Quantitative Information*

1. "Area Principle" and beyond;
2. Labeling → Graphical distortion & ambiguity
3. Show data variation, not design variation
4. No. of Dimensions (Plots) ≤ No. of Variables (Data)



GitHub

{ Version control;
Code management;
Collaboration

1. Create a private repository if you just want your teammates see your codes before the submission (students' account automatically have this feature, open on with UNI@columbia.edu
2. Send your teammates the link, they can all contribute to the repository

Collaboration

Get started with GitHub

Option 1:

1. **Install git (** https://git-scm.com/book/en/v2/Getting-Started-Installing-Git**)**
2. **Xcode – to initiate (you don't need this step, if your Xcode was initiated before.**
3. **Open Terminal (ConEmu in Window)**

Get started with GitHub

Option 2:

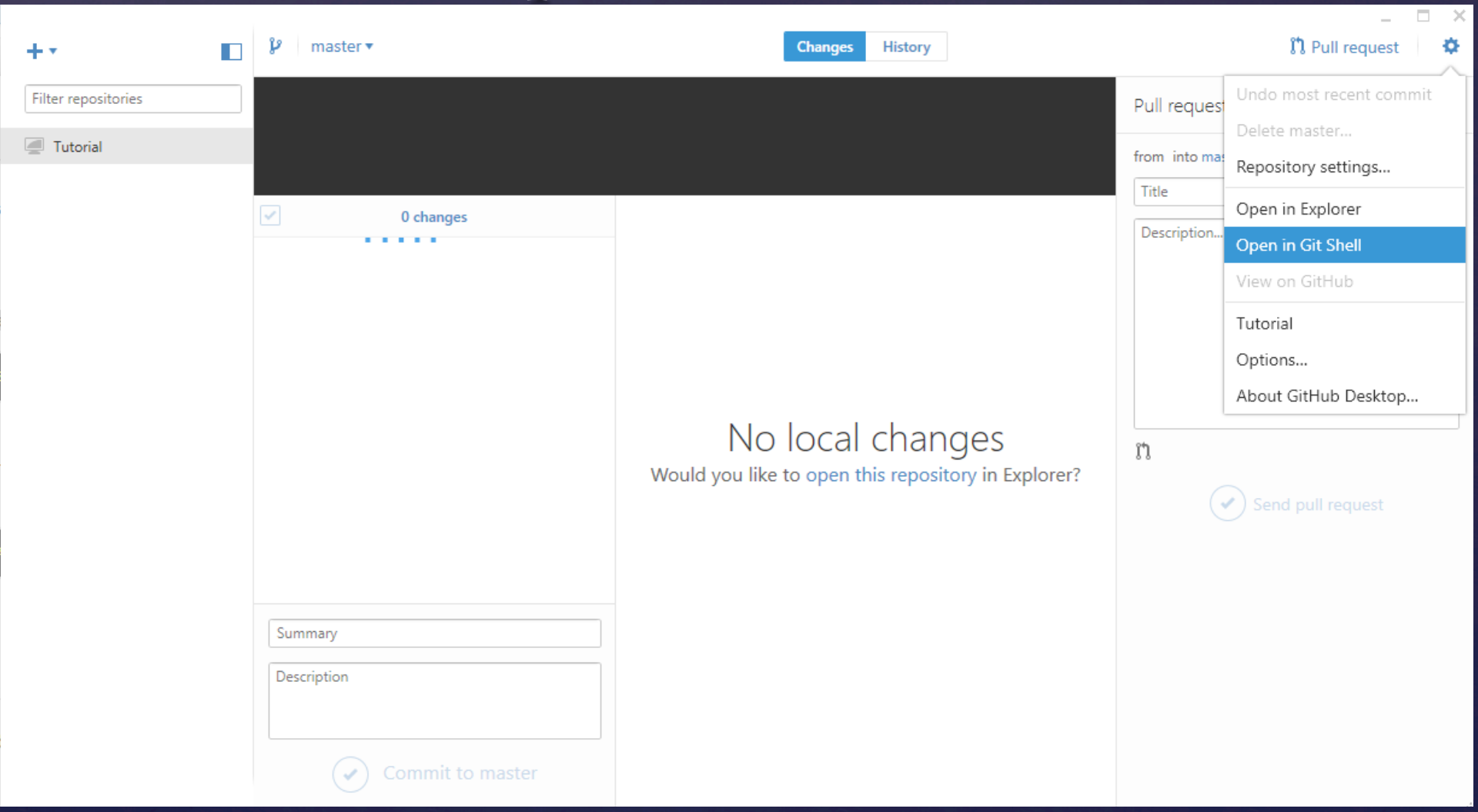
1. GitHub Desktop (https://guides.github.com/introduction/getting-your-project-on-github/)
2. Download: (https://desktop.github.com)
   Available for Mac and Windows
3. Install GitHub

Setting up Git

```
$ git config --global user.name “YOUR NAME”
$ git config --global user.email "YOUR
EMAIL ADDRESS"
```

Windows Users

Where to “Open in Git Shell” –



Existing Repository

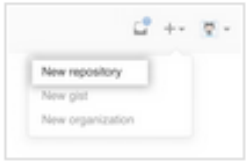
```
$ cd LOCAL
$ git clone http://github.com/YOUR NAME/HW1
$ git status # everything seems updated
$ vi README.md
$ git status # Now I have a new “README.md”
$ git add README.md
$ git commit –m”add README”
$ git push
```

1. Has to do with version control;
2. If two work with the same folder, you both push your updates to the Github.com from version last updated at time A, one guy successfully push updates, the other will not.
3. To fix it: **You can only push updates with the old version is the same as on Github.com**

Just on problem …

Create a new repository on GitHub

1. In the upper-right corner of any page, click +, and then click **New repository**.



2. Create a short, memorable name for your repository. For example, "hello-world".

3. Optionally, add a description of your repository. For example, "My first repository on GitHub."

4. Choose between creating a *public* or *private* repository.

   - **Public** repositories are a great choice for getting started! They're visible to any user on GitHub, so you can benefit from a collaborative community.
   - **Private** repositories require a little more setup. They're only available to you, the *repository owner*, as well as any *collaborators* you choose to share with. Private repositories are only available for paid accounts. For more information, see "What plan should I choose?."

5. Select **Initialize this repository with a README**.

6. Click **Create repository**.

Congratulations! You've successfully created your first repository, and initialized it with a *README* file.

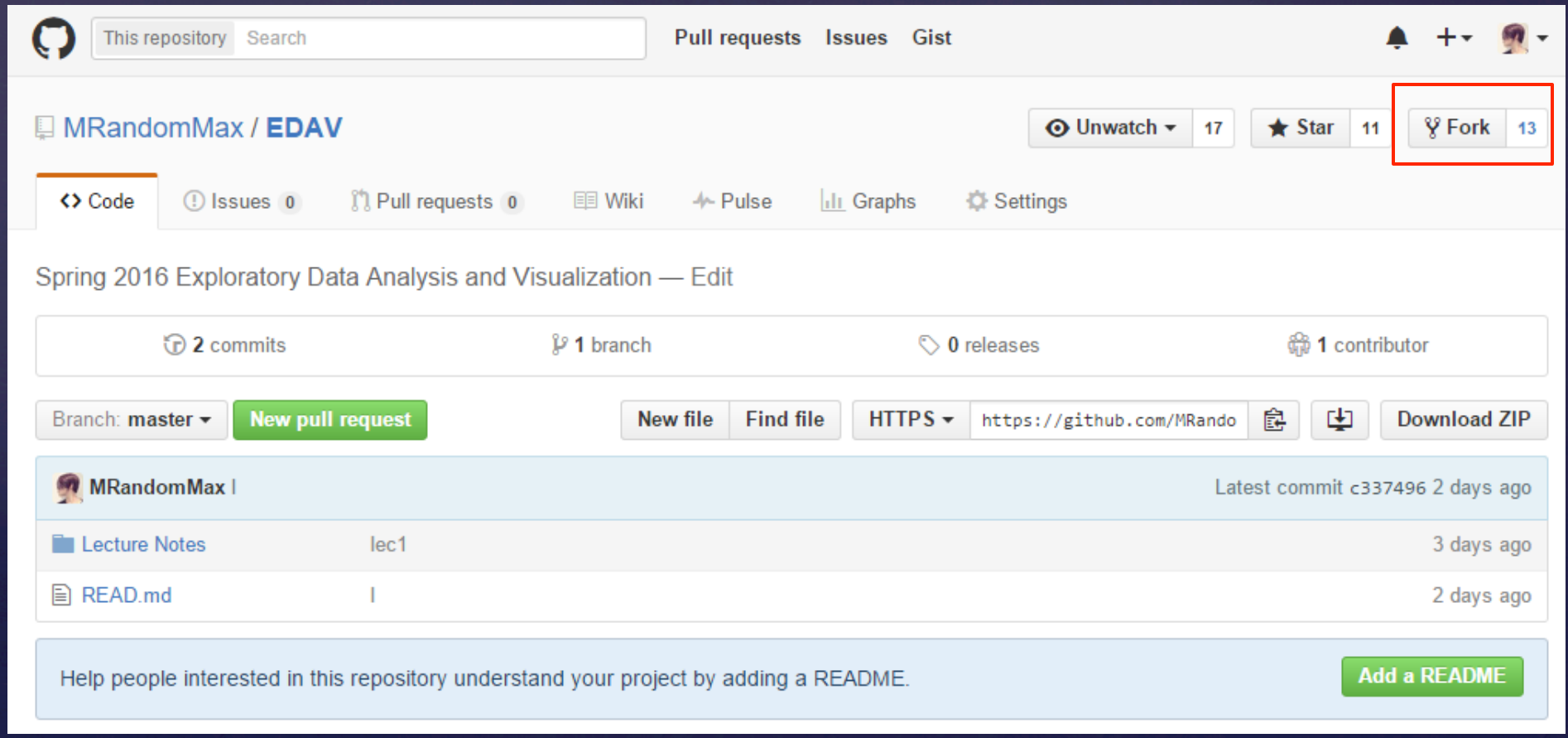
Fork A Repository

- A *fork* is a copy of a repository.
- Forking a repository allows you to freely experiment with changes without affecting the original project.
- Forks are used to
  1. **Propose changes to someone** else's project
  2. **Use someone else's project, you can't change!**
- Good for debug:

1. Fork the repository
2. Make the fix
3. Submit a *pull* request to the owner

How to Fork

- On GitHub



Keep your fork synced

- In Terminal

```
$ git clone https://github.com/USERNAME/EDAV
```

Now you have a local copy of your fork of my EDAV repository.

Then you need to configure Git to sync your fork with my original EDAV repository

Configure Git to sync your fork with the original repository

```
$ cd LOCAL
$ git remote -v
origin https://github.com/YOUR_USERNAME/EDAV.git (fetch)
origin https://github.com/YOUR_USERNAME/EDAV.git (push)
$ git remote add upstream https://github.com/MRandomMax/EDAV.git
$ git remote -v
origin https://github.com/YOUR_USERNAME/EDAV.git (fetch)
origin https://github.com/YOUR_USERNAME/EDAV.git (push)
origin https://github.com/MRandomMax/EDAV.git (fetch)
origin https://github.com/MRandomMax/EDAV.git (push)
```

Syncing a fork

```
$ git fetch upstream
remote: Counting objects: 75, done.
remote: Compressing objects: 100% (53/53), done.
remote: Total 62 (delta 27), reused 44 (delta 9)
Unpacking objects: 100% (62/62), done.
From https://github.com/ORIGINAL_OWNER/ORIGINAL_REPOSITORY
 * [new branch]      master     -> upstream/master

$ git checkout master
Switched to branch 'master'

$ git merge upstream/master
Updating a422352..5fdff0f
Fast-forward
 README                    |    9 -------
 README.md                 |    7 ++++++
 2 files changed, 7 insertions(+), 9 deletions(-)
 delete mode 100644 README
 create mode 100644 README.md

$ git merge upstream/master
Updating 34e91da..16c56ad
Fast-forward
 README.md                 |    5 +++--
 1 file changed, 3 insertions(+), 2 deletions(-)
```