

# Designing Great Maps for **Web and Mobile**



Allen Carroll and Larry Orman

# About Allen and Larry



## Allen Carroll, Program Mgr, Storytelling

- Family cartographer and navigator since age 5
- 27 years at National Geographic, 12 of them as Chief Cartographer
- Believer in the power of maps to inform and inspire



## Larry Orman, Exec. Dir. Emeritus, GreenInfo Network:

- Magic marker map maker for years pre-GIS
- 19 years NGO advocacy and 19 geotech world
- Maps are a powerful lens for seeing the world



# Why we're here



## About this workshop series

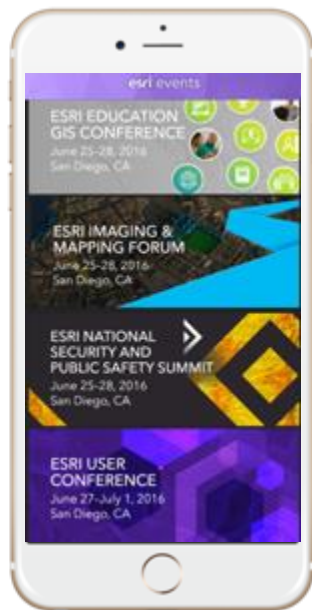
### 1: Print / image

- Thursday, 10:30 a.m. Room 15A

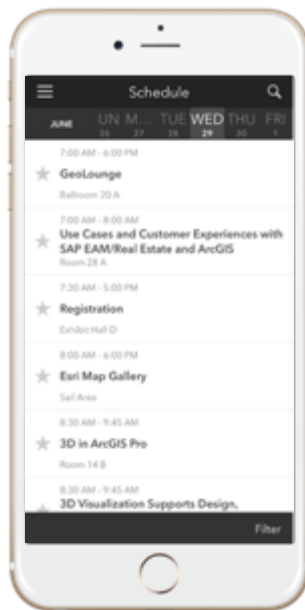
### 2: Web / mobile

# Please take our survey

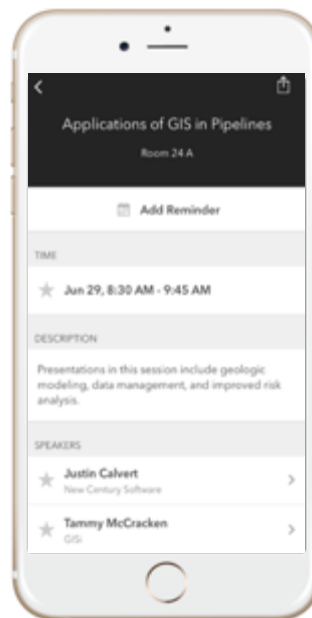
Find your event in the Esri  
Events App



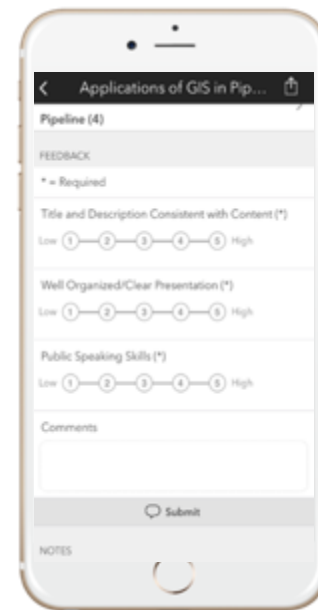
Find the session  
you want to review



Scroll down to the bottom of  
the session



Answer survey questions  
and submit



Your feedback allows us to help maintain high standards and to help presenters

# What we'll cover in **this session**

- 1 What's different about maps in the digital age?
- 2 Elements of web and mobile maps
- 3 The process: it's linear – sort of
- 4 CLUES to making great maps
- 5 Some tips on designing digital maps
- 6 What to remember

But first, a **quiz** for you





We'll ask . . .

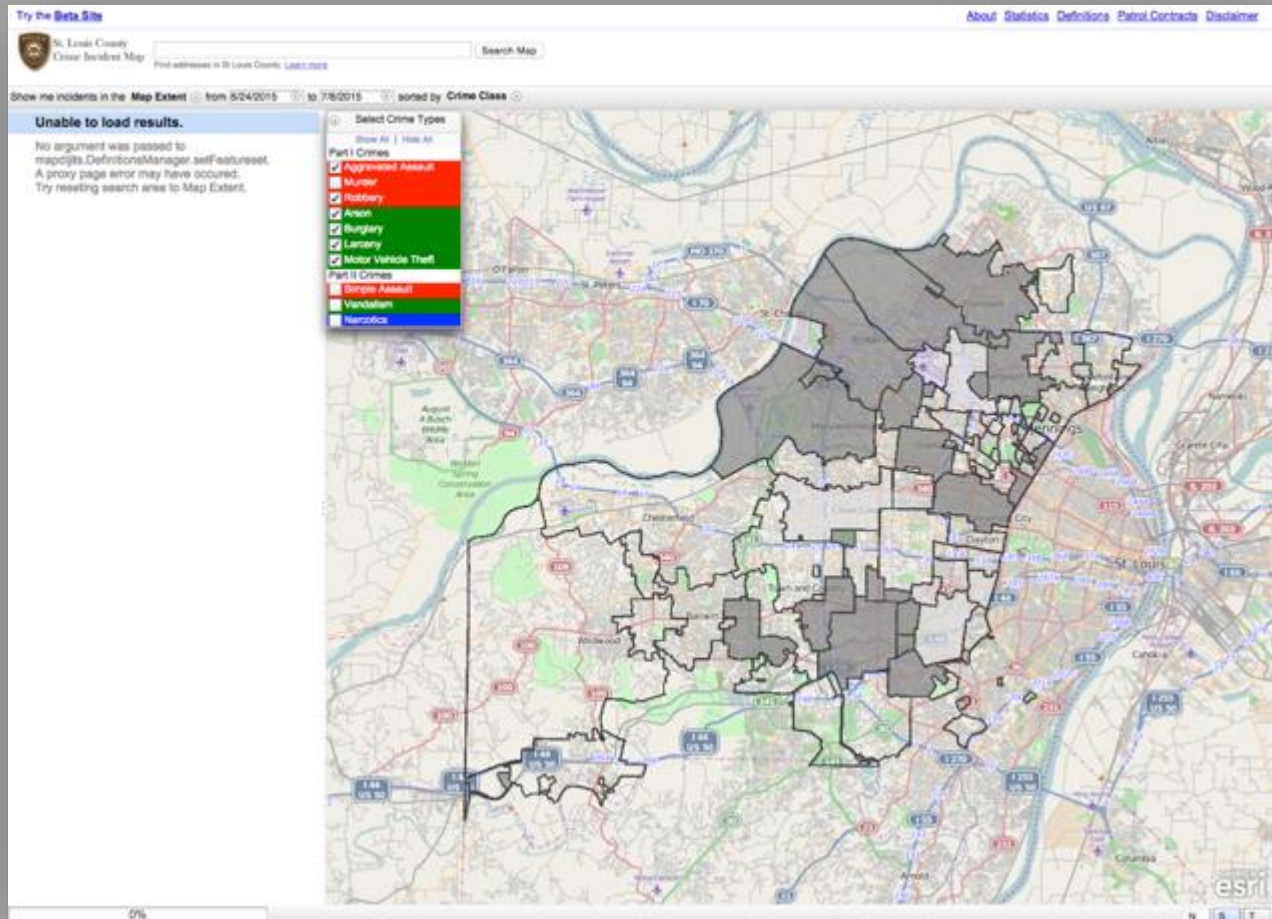
- Is it **appealing** to you?
- Would you **stick around** ...or **move on**?





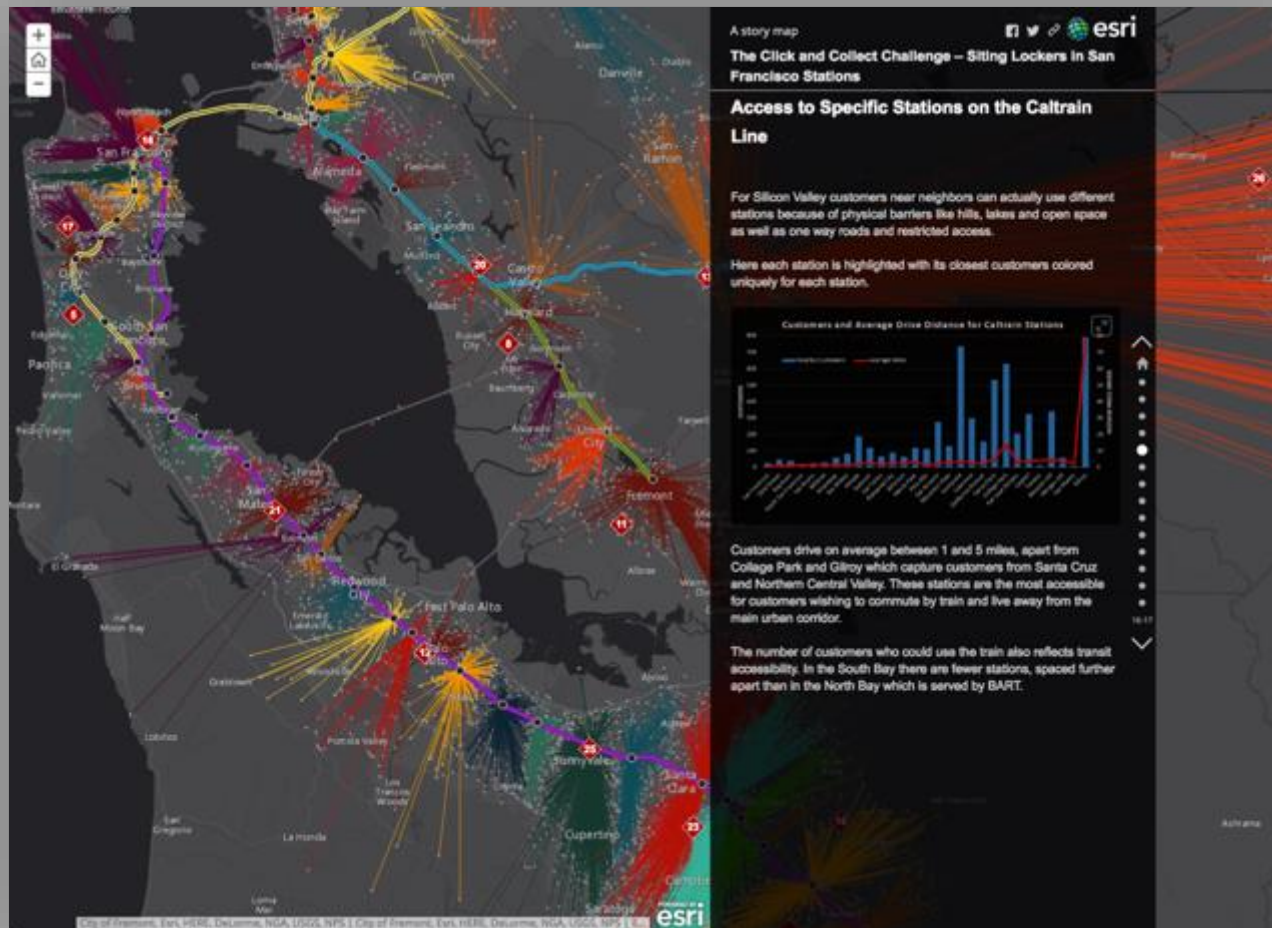


1?





or 2?





1?





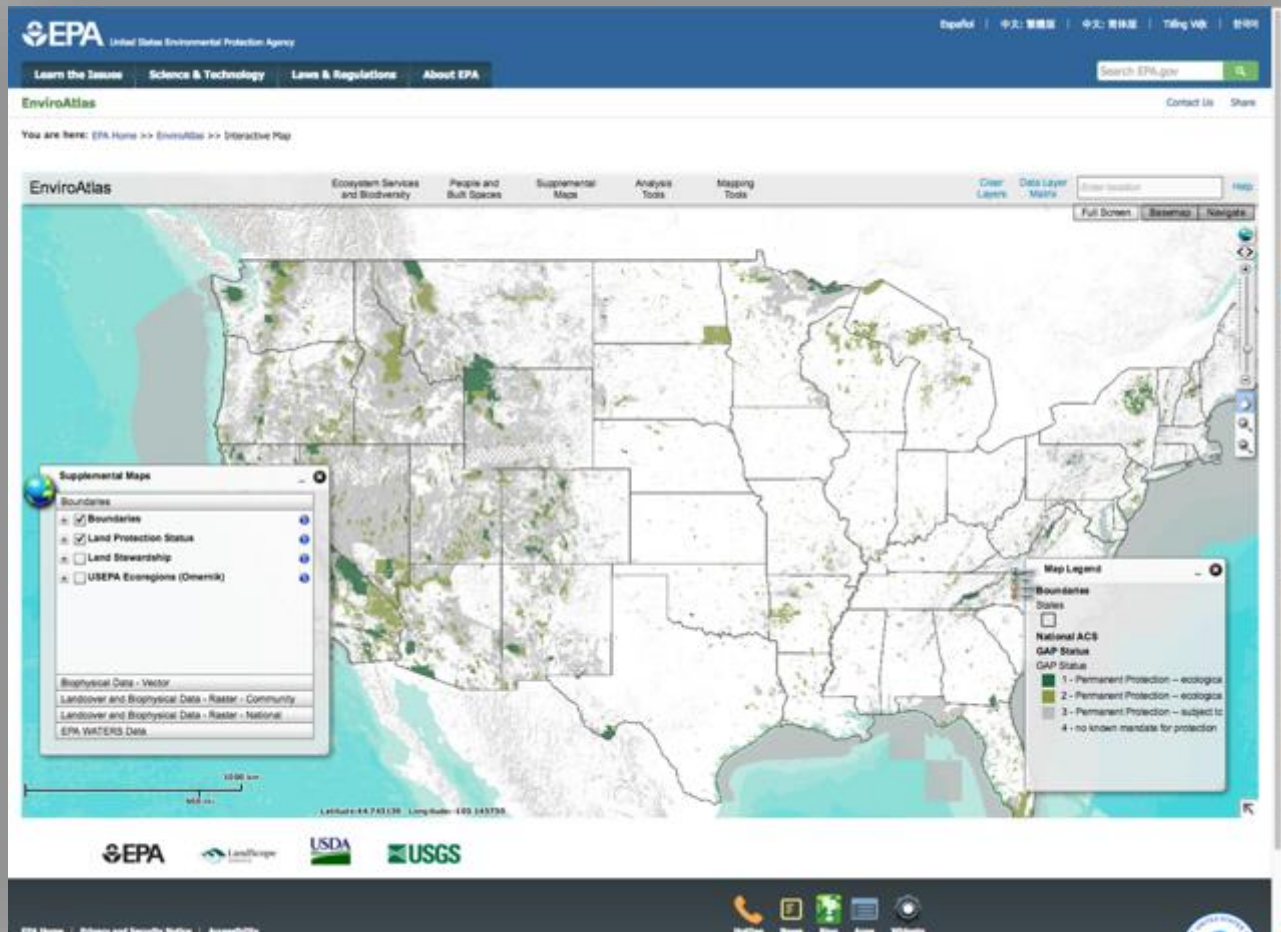
or 2?







1?





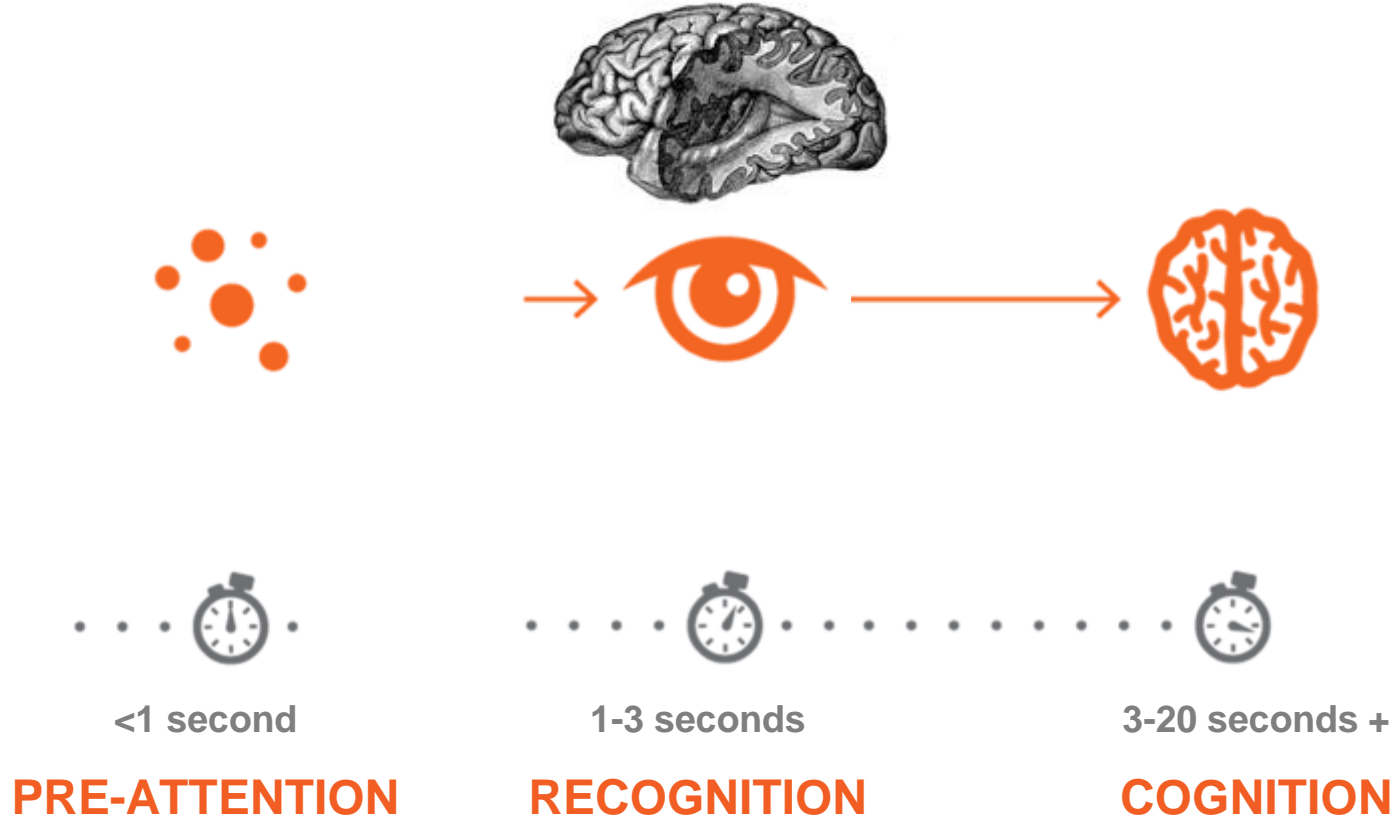
or 2?



# Lessons?

- **First** impressions matter! Especially on the Web
- **Attractive**, limited color palettes
- **Simple**, uncluttered designs
- **Fewer “noisy” lines**, more areas of color

# How **your brain** perceives



# How **your brain** perceives



<1 second

**Will it bite me?**



1-3 seconds

**Hmm...**



3-20 seconds +

**Oh, I see!**

# 1



What's different about designing  
maps in the **digital age?**



**A lot.**

**Web and Mobile = A New Medium**

**...but our heads  
are still in the  
print age.**

**Print**

**Digital**

**What are the  
differences?**

**Print**

**Digital**

**They fall into five  
categories:**

# 1

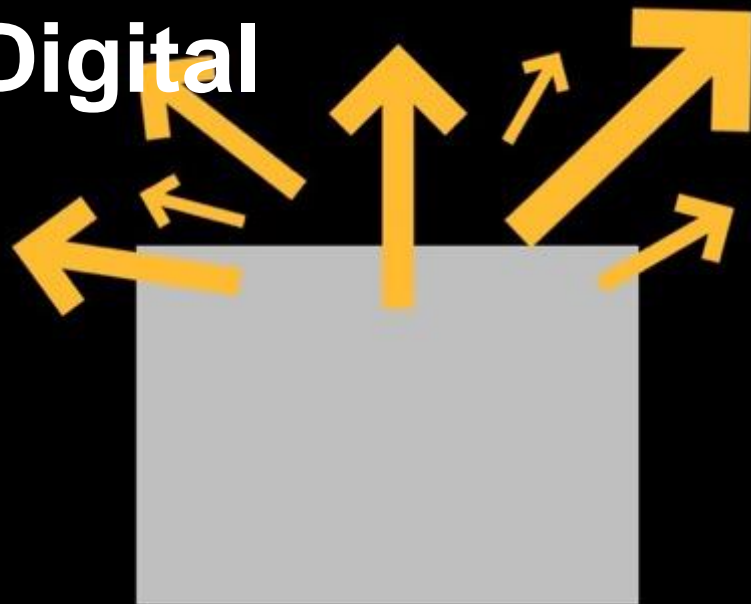
**Static**

**Print**



**Dynamic**

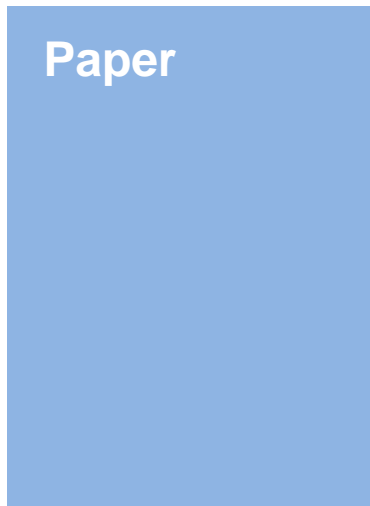
**Digital**



# 2

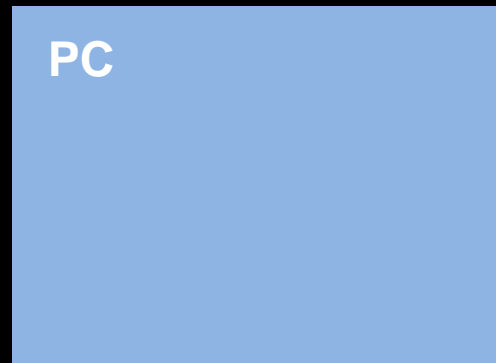
One size

**Print**



Various sizes

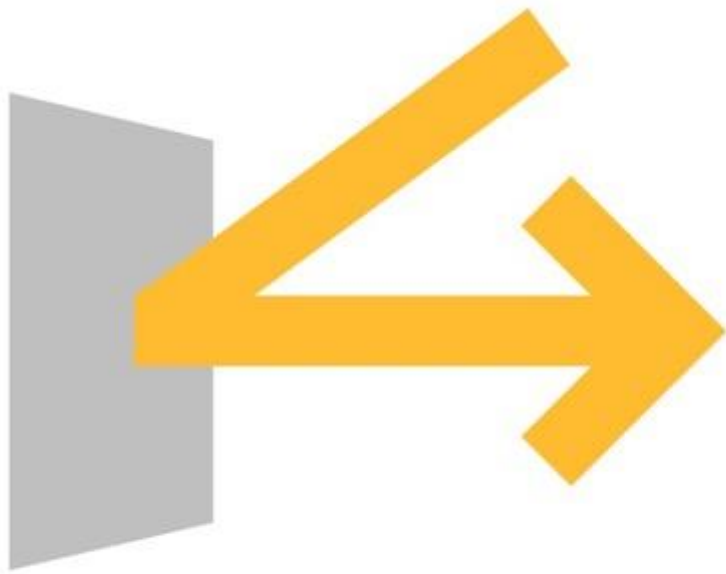
**Digital**



# 3

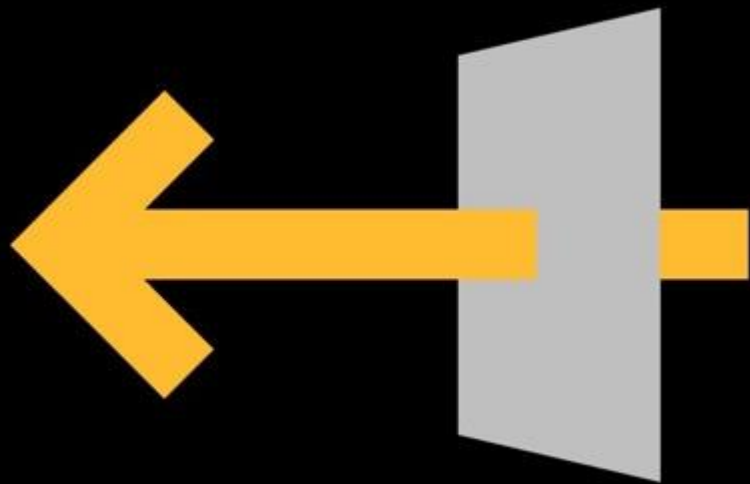
Reflects light

Print



Emits light

Digital



# 4

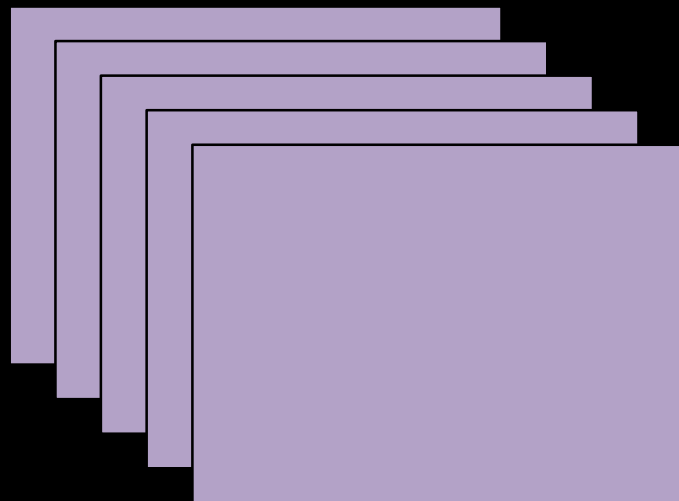
One-time  
publishing

**Print**



Continual  
publishing

**Digital**





5

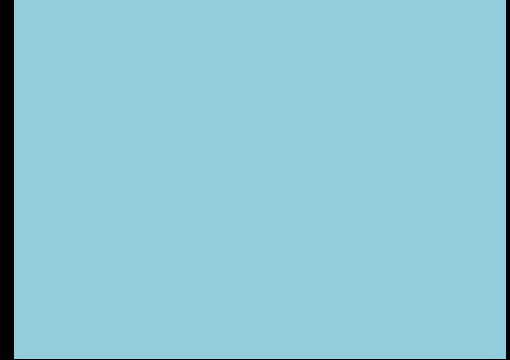
Long-lasting

Print



Ephemeral

Digital



5

Long-lasting

Ephemeral

Print

Digital



**Let's revisit these**

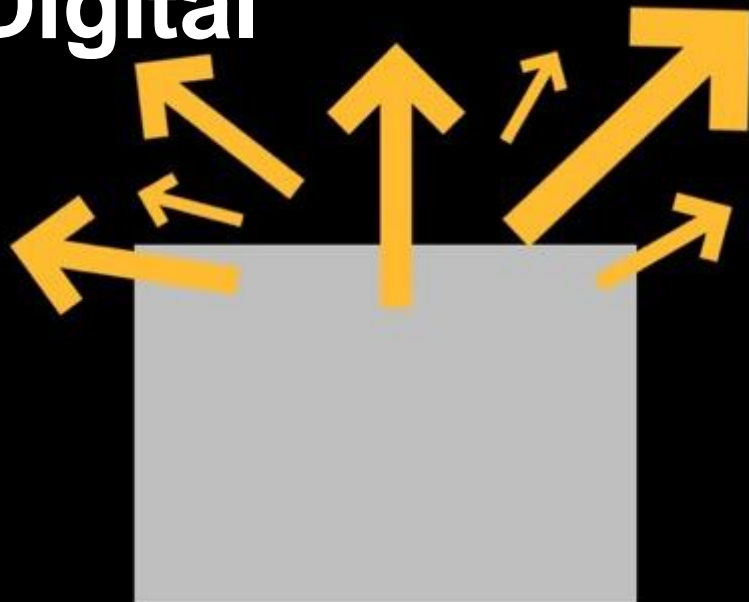
**in more detail**

# 1

**Static**  
**Print**



**Dynamic**  
**Digital**



# The challenge: information overload

Maps must compete in a  
blizzard of information...hold  
their own in an ADD world

# The challenge: users are **more easily distracted**

Hyperlink

Studies show that  
people read and  
comprehend less on  
screen than paper



Click

Click here

Hyperlink

Hyperlink

Click here

Click

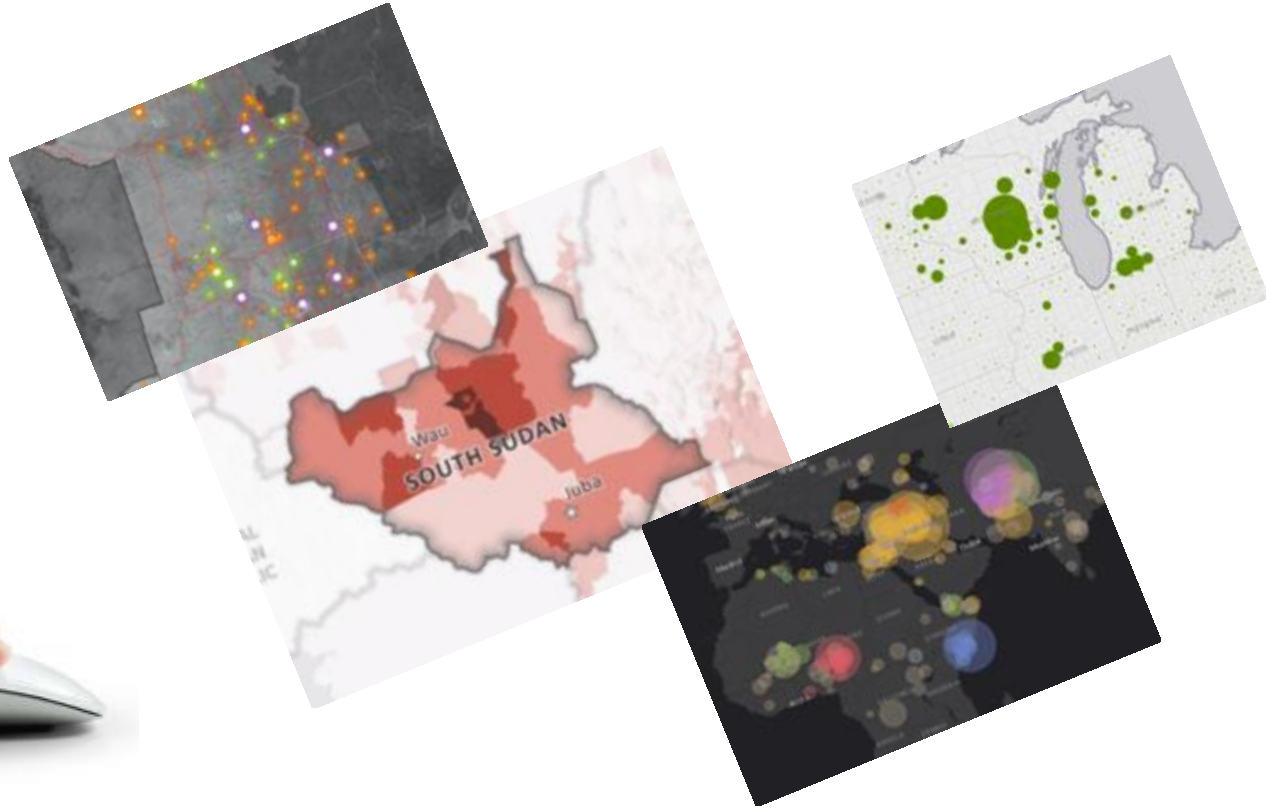
Click here

Hyperlink

Click here

# The challenge: users are **more easily distracted**

...which means  
your designs have  
to be irresistible!



**Good news: maps have  
come alive**

Cartography now includes a whole range of  
user experiences

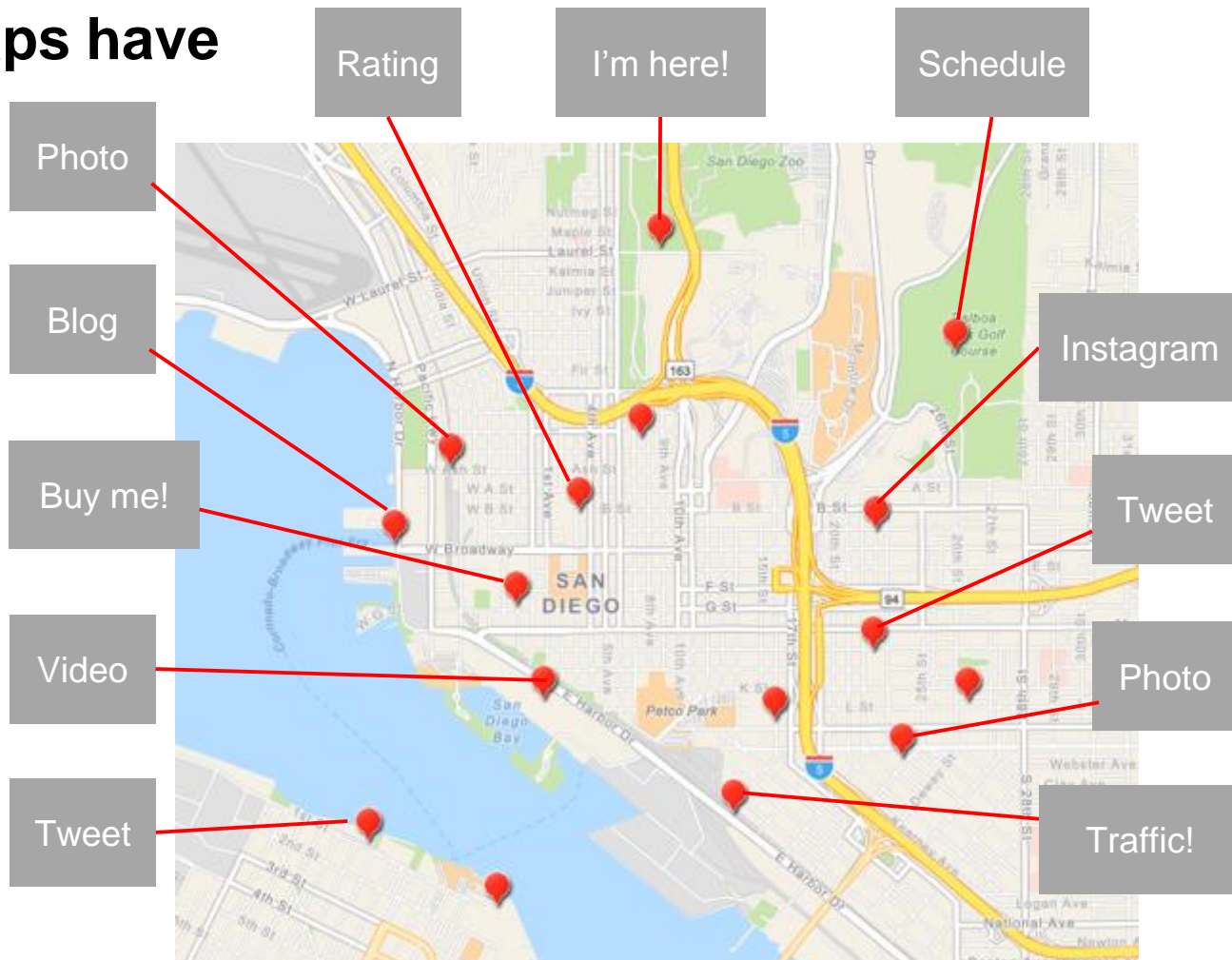
Maps can zoom, pan, scroll, change, move

Now: Map = Active verb!



# Good news: maps have come alive

They're  
windows into  
worlds of  
information

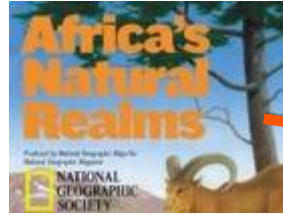


# Maps have to be simpler

Rather than presenting  
everything on a single sheet



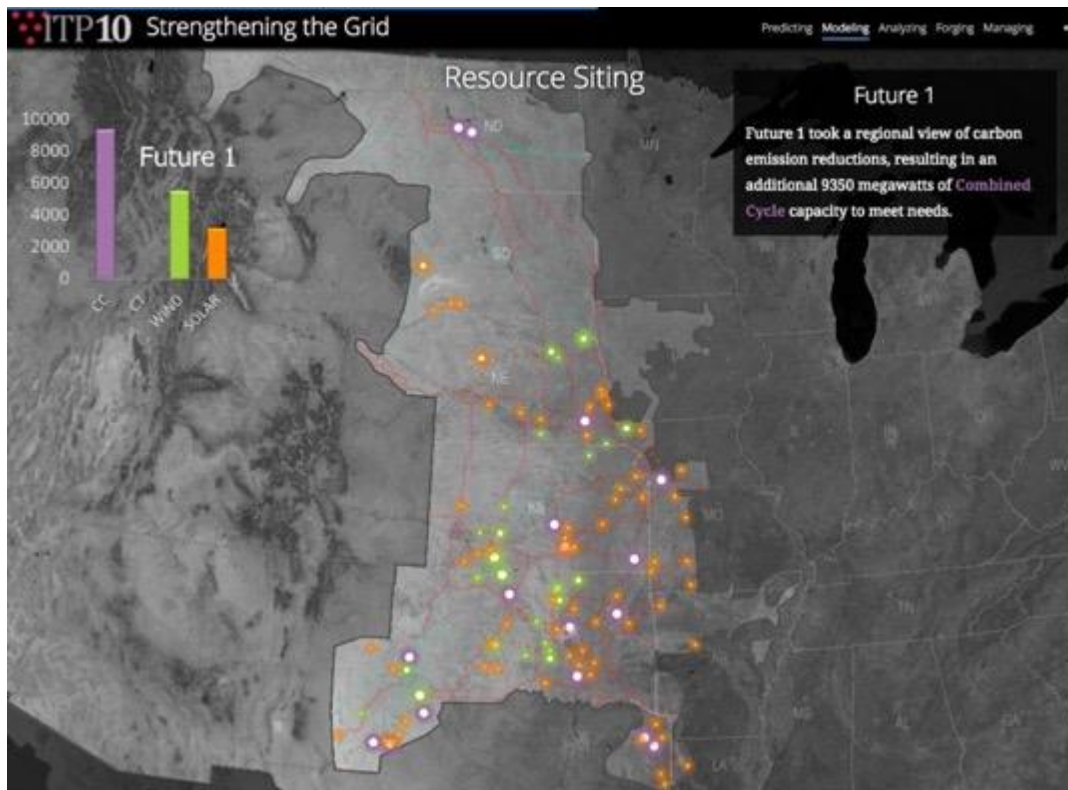
# Maps have to be simpler



Re-think your map as a *story*

# Maps have to be simpler

Parse things out as  
part of a narrative



# Maps can move

Leverage the dynamism of digital media



Animations, time sliders, swipe or scroll to advance



# Maps can be dynamically updated

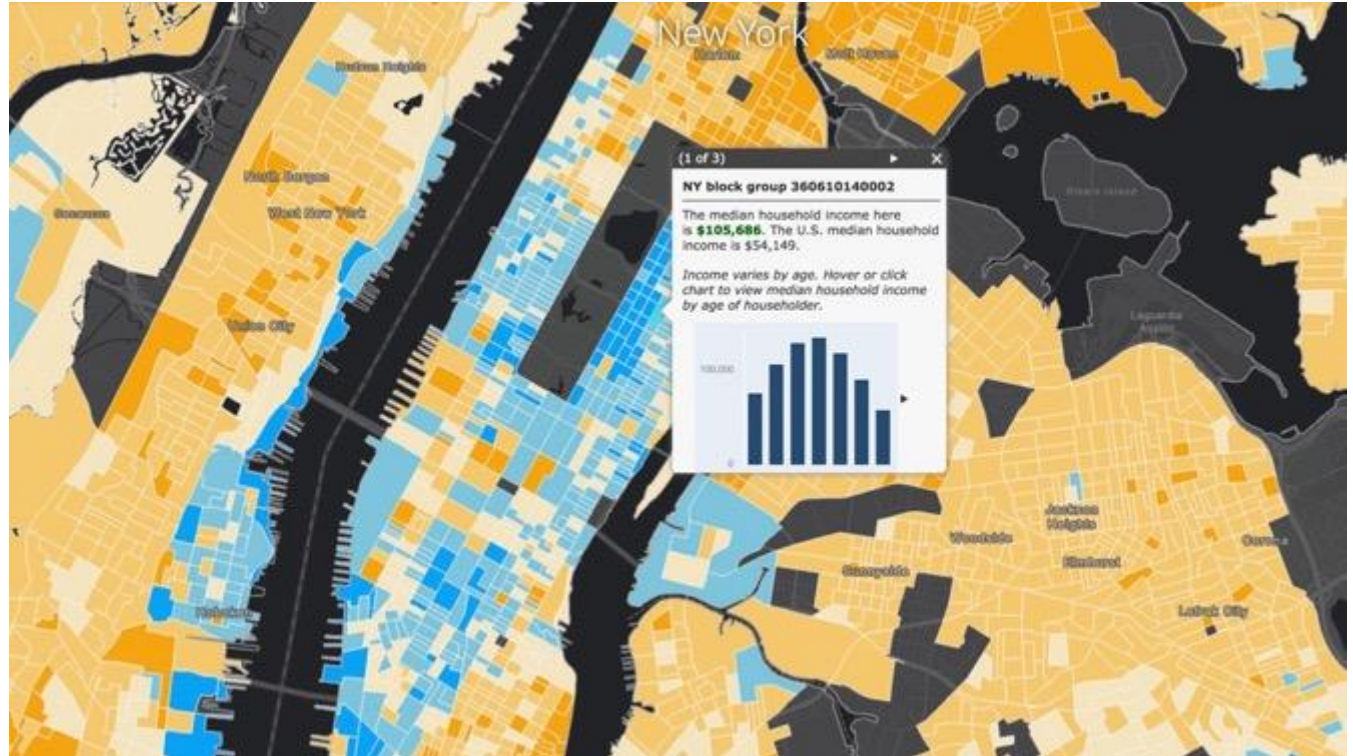
Traffic

Terrorism:  
Wikipedia



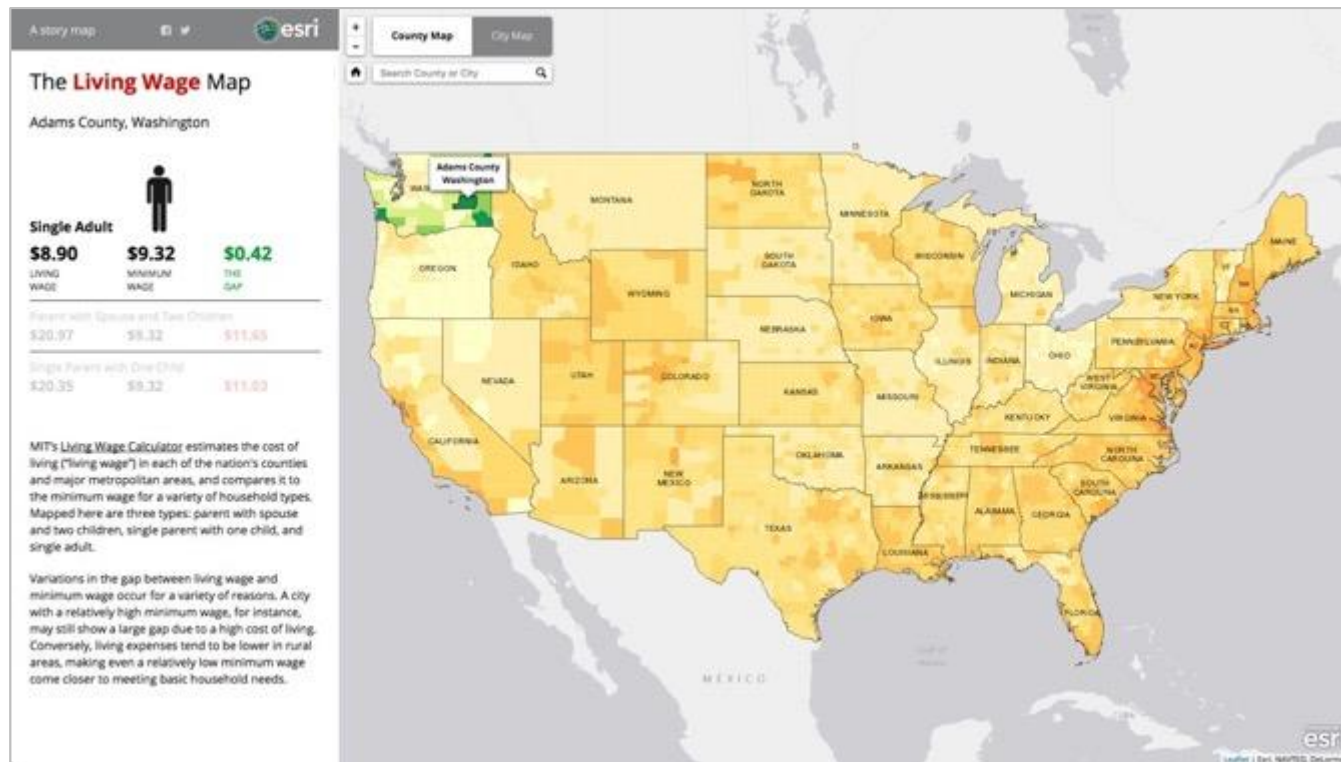
# But...interactive maps can be tedious

Especially clicking  
on a map to see  
popups



# Clicking vs. mouseovers

Mouseovers are  
better than clicks;  
popup on side  
panel

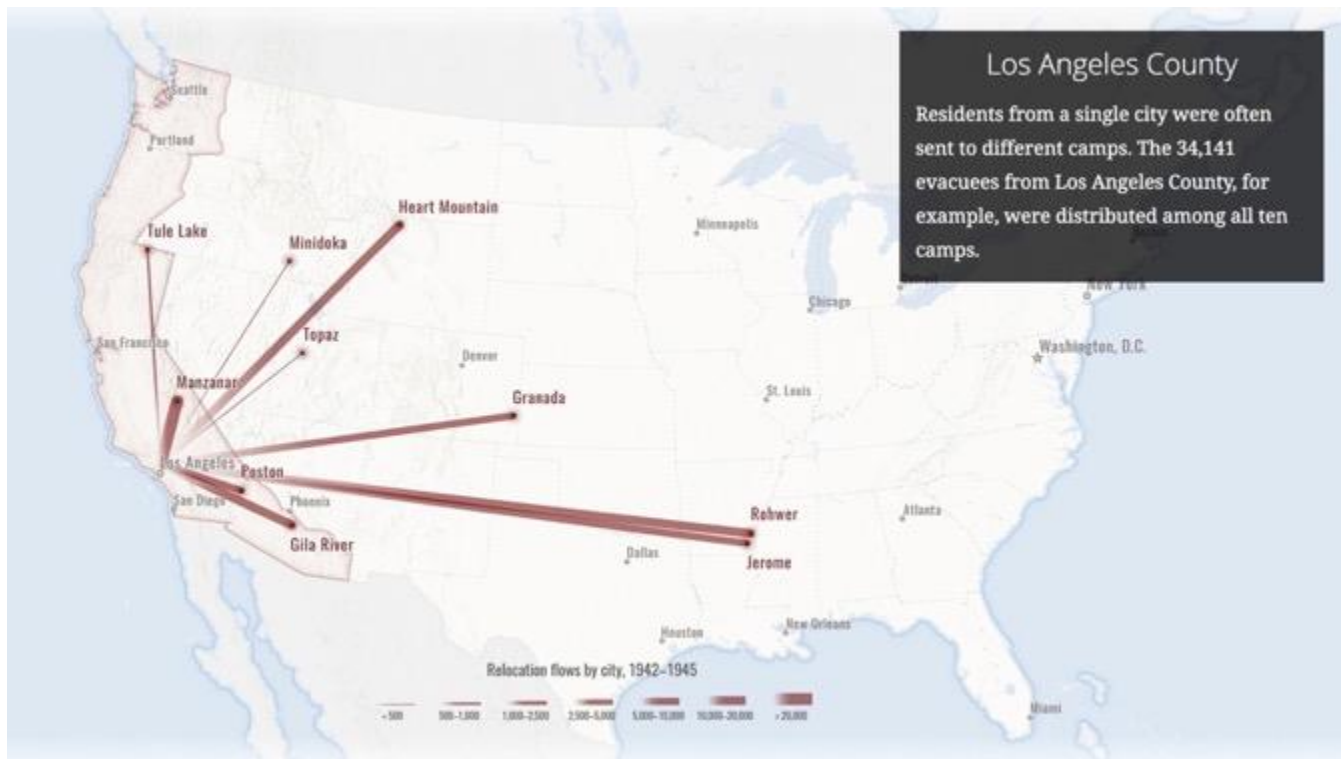




# Static maps are OK!

Studies: most  
people don't  
explore interactive  
maps

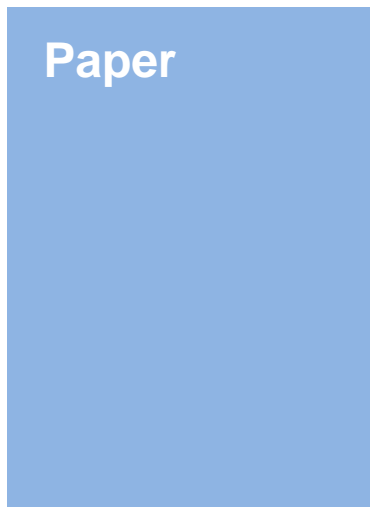
You can provide  
the illusion of  
interactivity with  
scroll actions



# 2

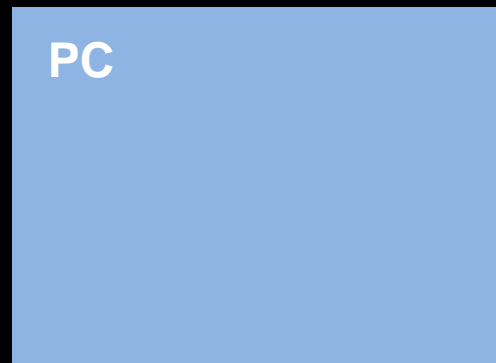
One size

**Print**



Various sizes

**Digital**



# Designs need to be responsive

Not just size, but context and user interaction

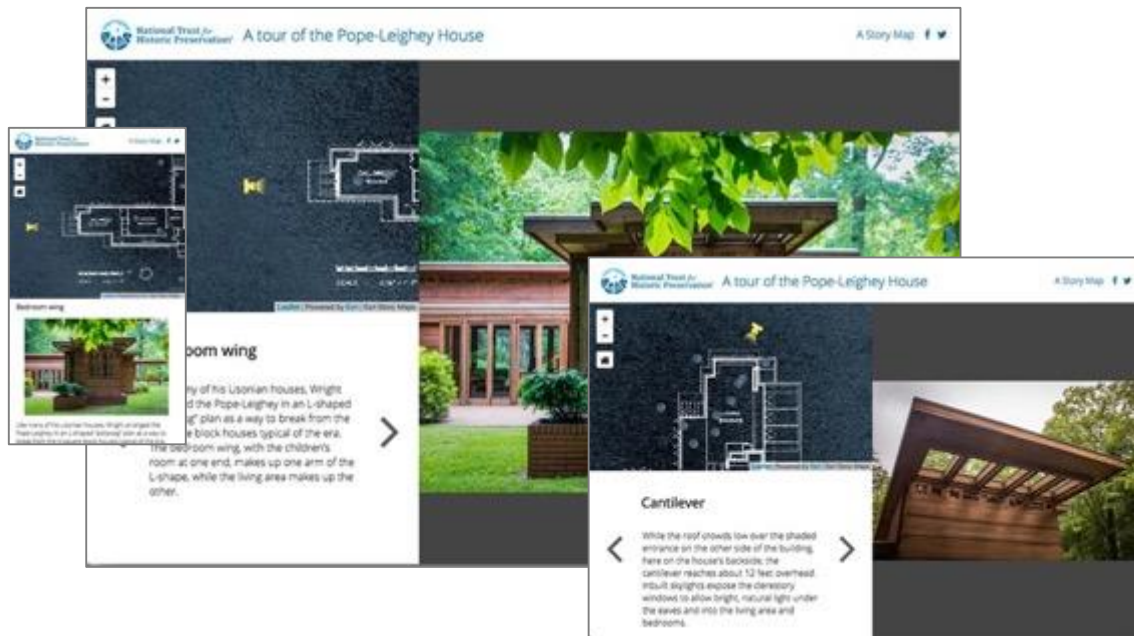
Your maps  
have to work  
with a variety  
of sizes



# Designs need to be responsive

PC: *Mouseover, click, scroll*

Mobile:  
*Tap,  
swipe*  
...and a  
modified  
*user  
experience*



Tablet:  
*Tap,  
swipe*

# Dealing With Screen Sizes



Think  
mobile first

But don't despair:

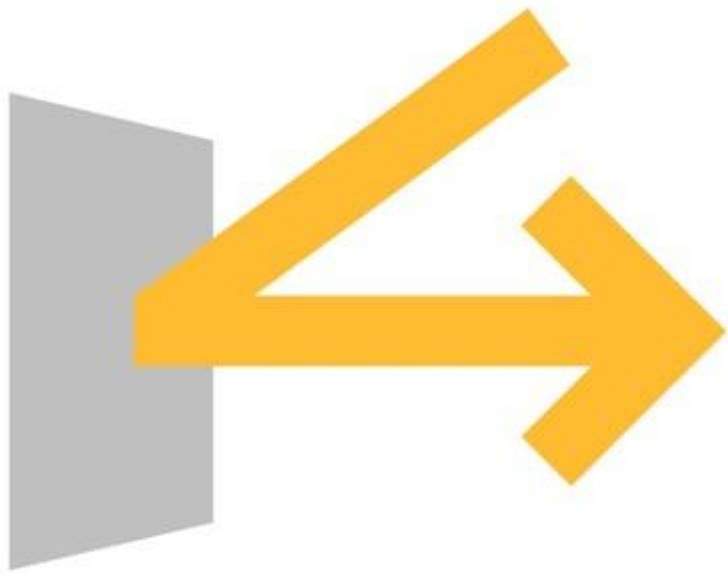
Users can zoom in

Mobile can accommodate  
more than you think

3

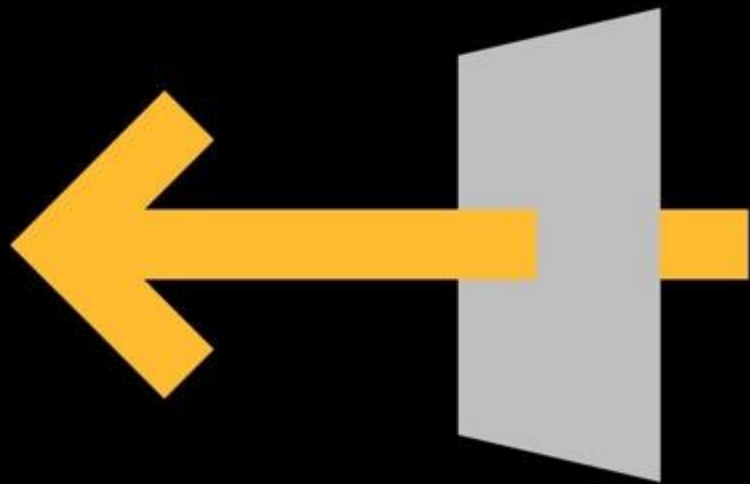
Reflects light

Print

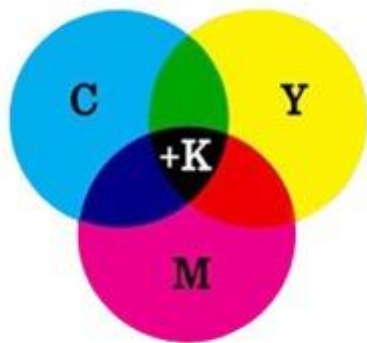


Emits light

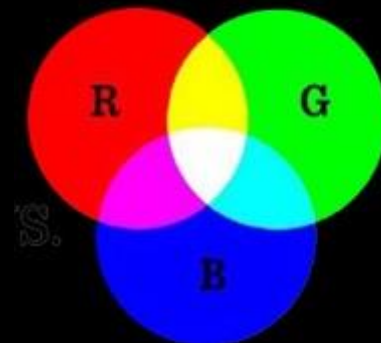
Digital



# Color treatments are different

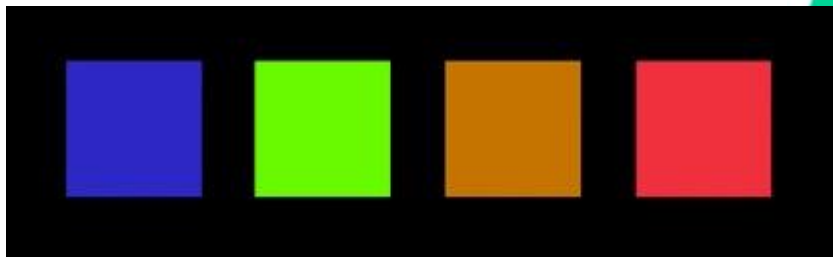


Subtractive

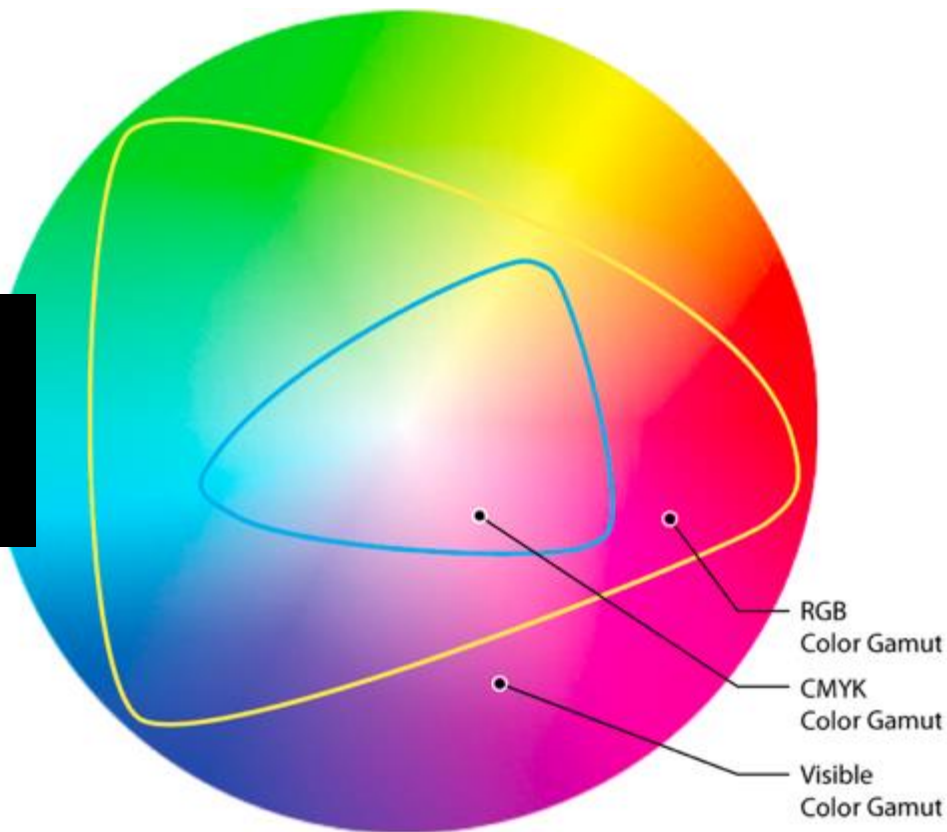


Additive

On screen you have  
**more to work with**

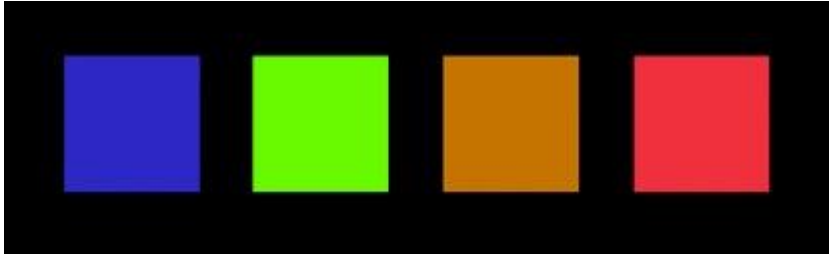


You can't use these colors in print...





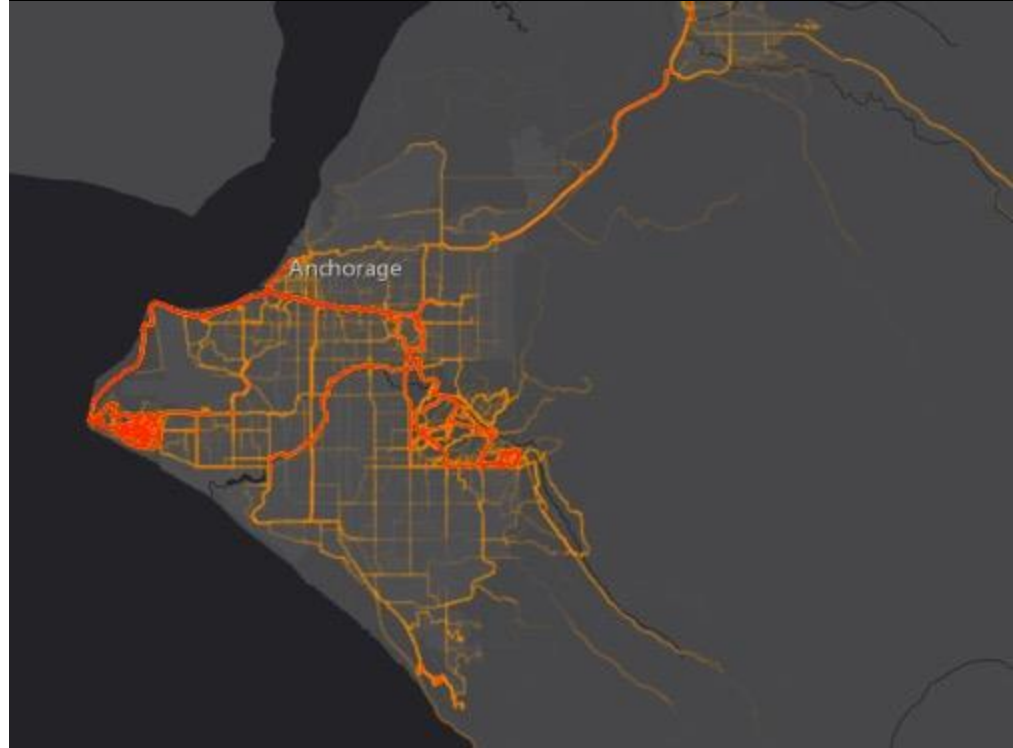
On screen you have  
**more to work with**



(but why would you want to?)



Take advantage of screens' **light-emitting character**

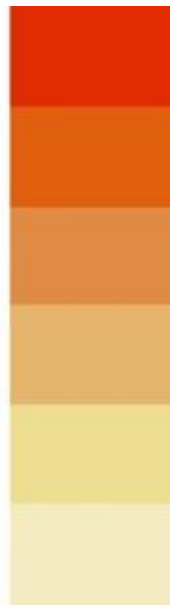
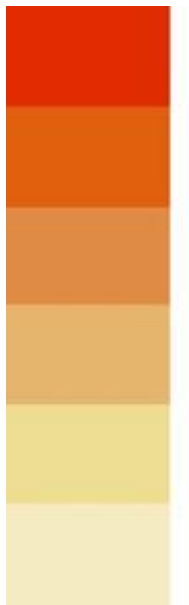


Light-on-dark maps  
can look really cool



John Nelson,  
Esri cartographer

**But**  
**beware!**



← Most contrast

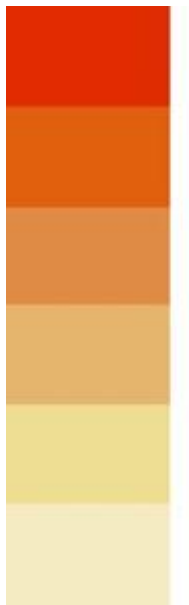
Map color palette against white...

But  
beware!



← Most contrast

But  
beware!



You need to adjust your  
color palette

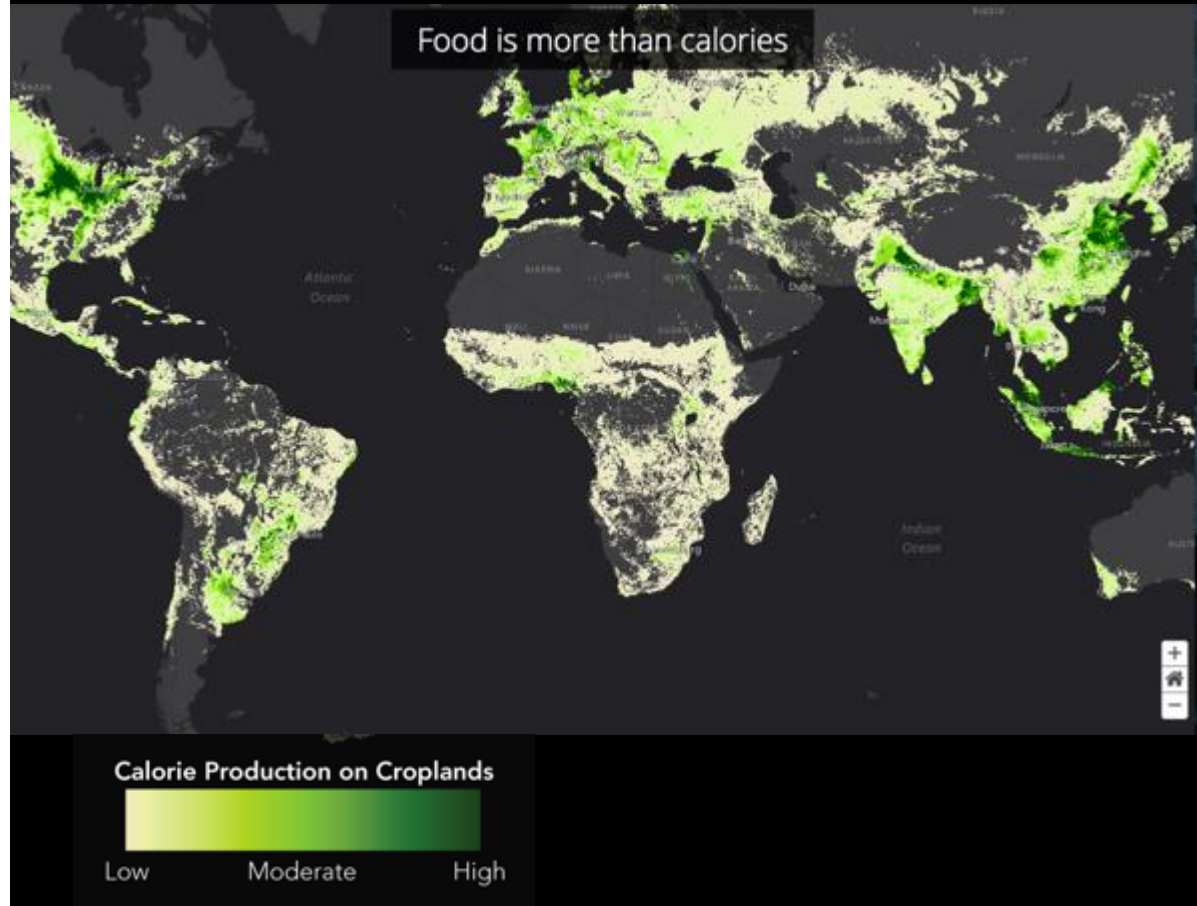


← Most contrast

This is better

But  
beware!

Here's an example of  
what can happen

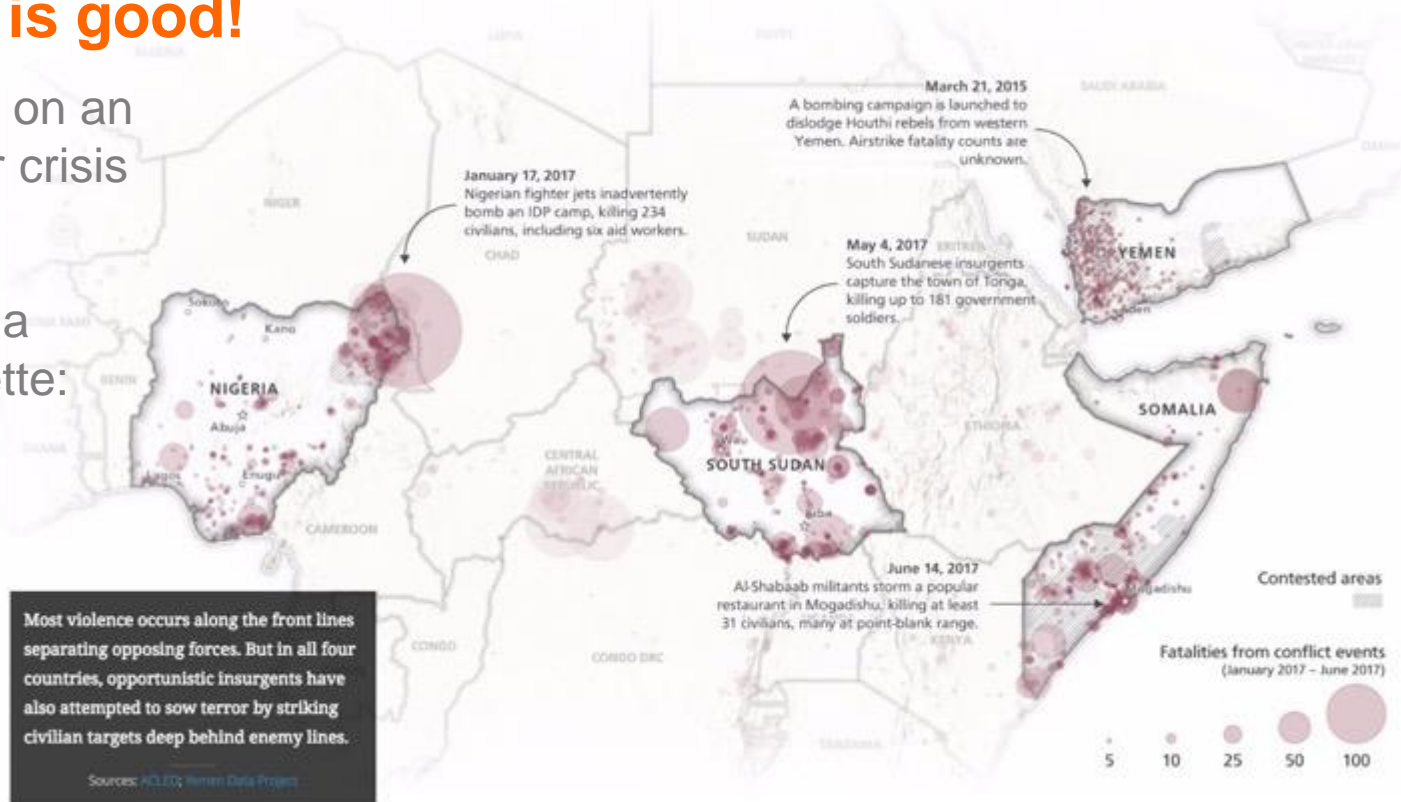


# But wait! understated is good!

A series of maps on an  
emerging hunger crisis

Each theme has a  
simple color palette:

**Conflict**





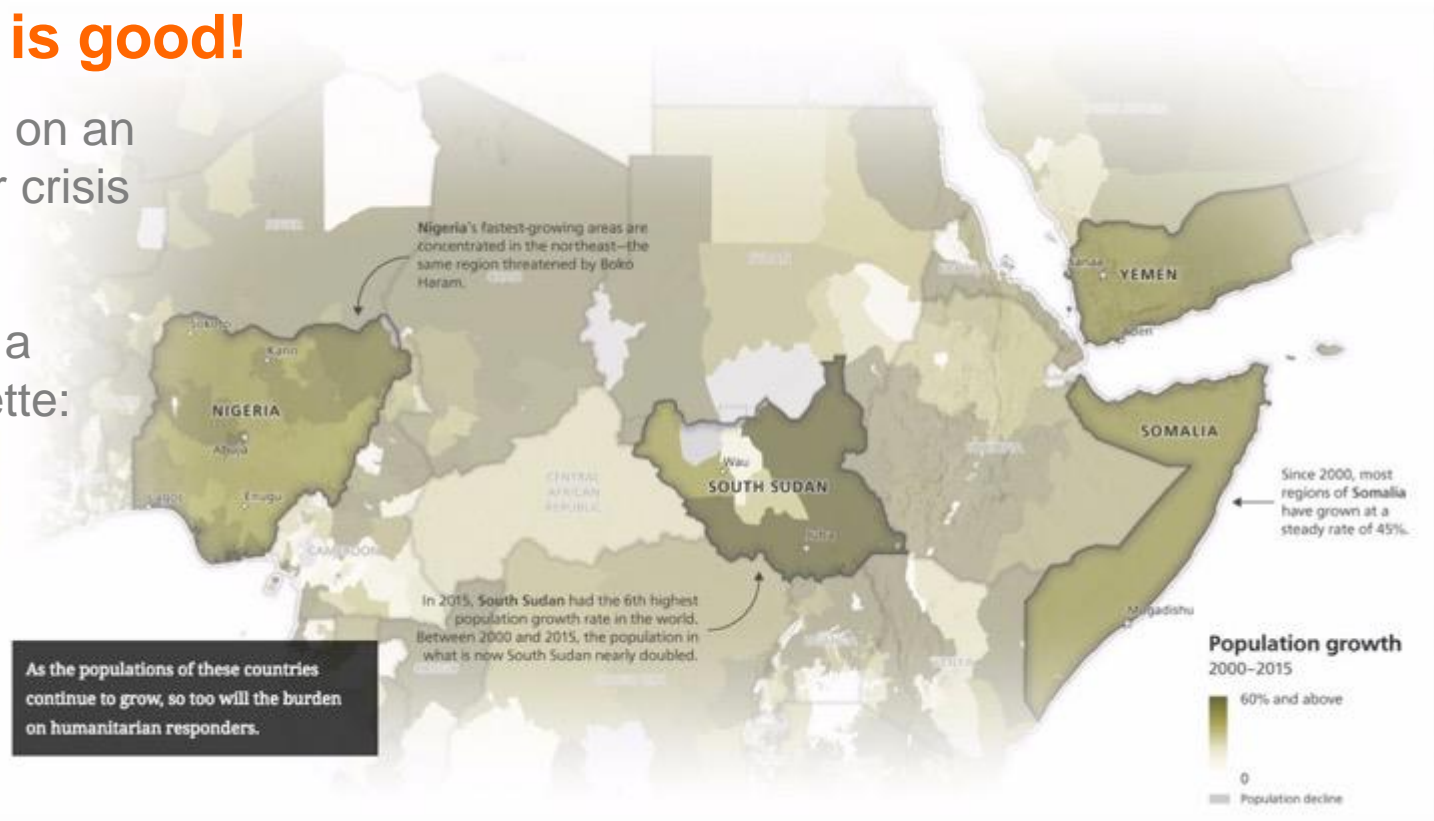
# But wait! understated is good!

A series of maps on an  
emerging hunger crisis

Each theme has a  
simple color palette:

## Population

The map has  
*no border!*



# But wait!

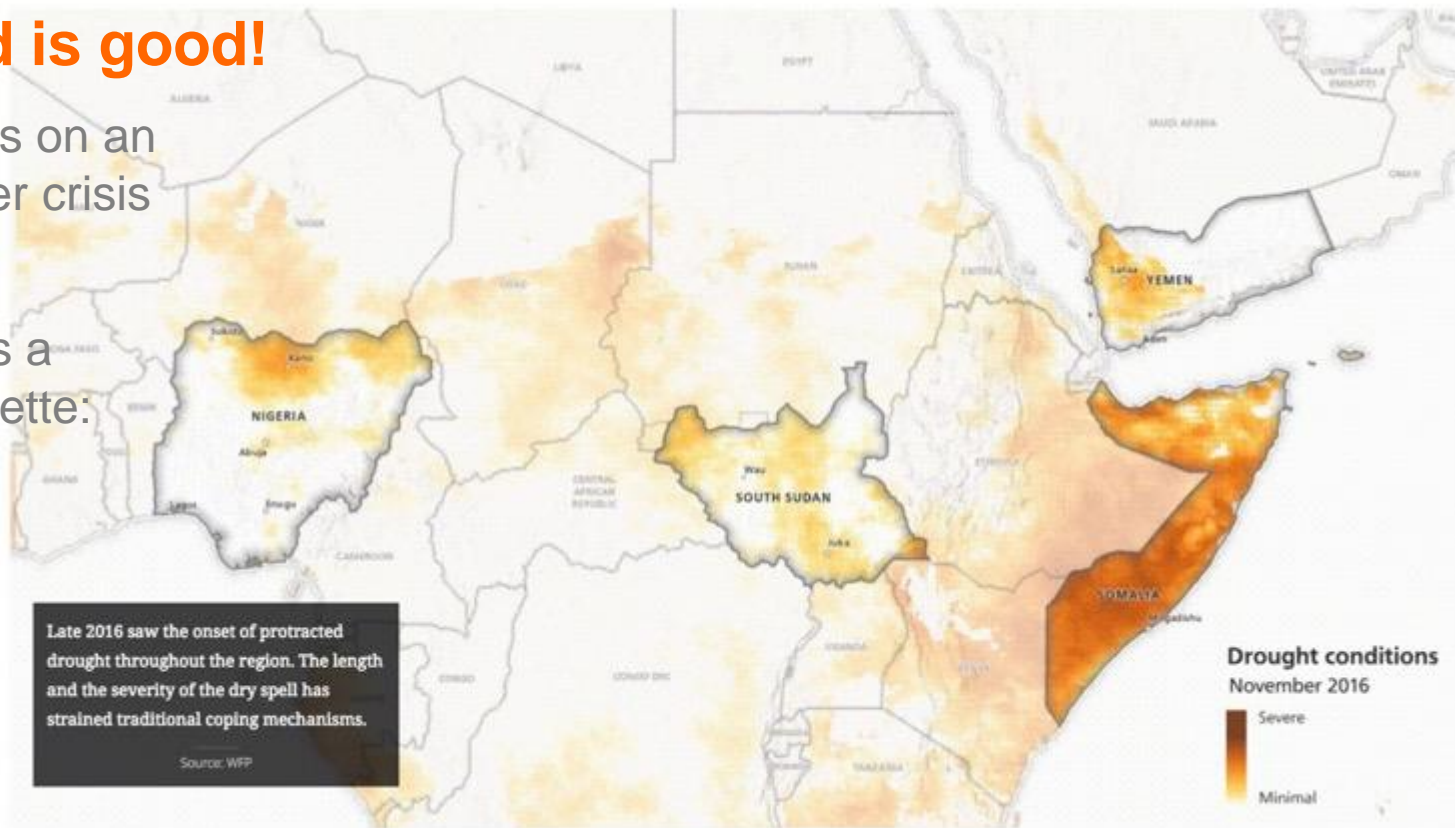
## understated is good!

A series of maps on an emerging hunger crisis

Each theme has a simple color palette:

**Drought**

This theme is  
*an animation*



# But wait!

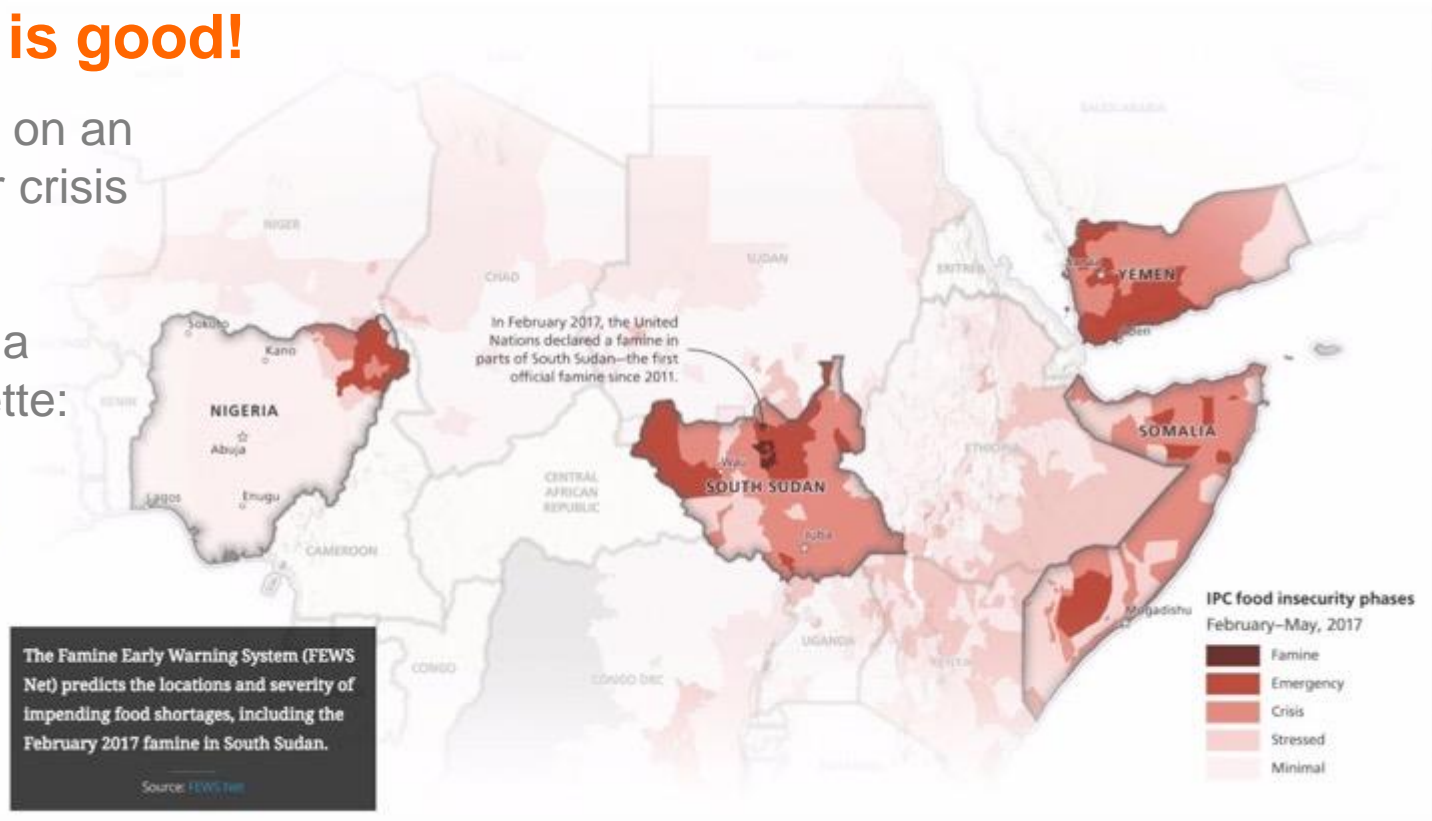
## understated is good!

A series of maps on an emerging hunger crisis

Each theme has a simple color palette:

**Food**

Non-subject areas are *screened back*



# 4

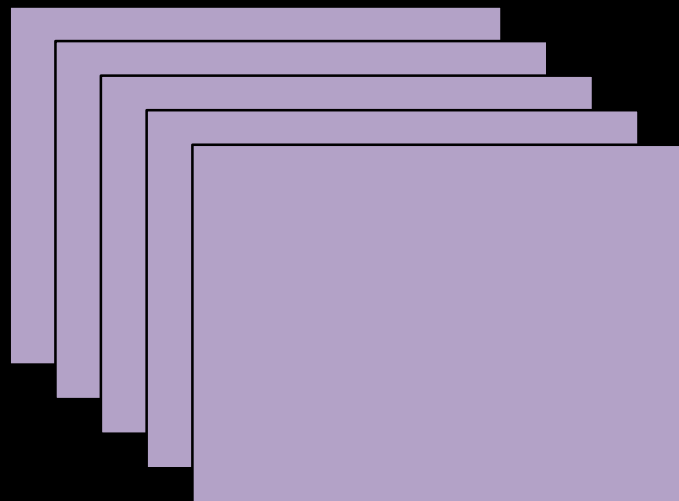
One-time  
publishing

**Print**

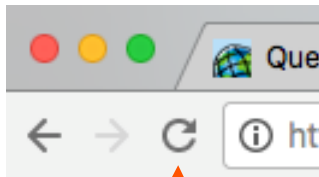


Continual  
publishing

**Digital**



Updating, tweaking, correcting  
is easy

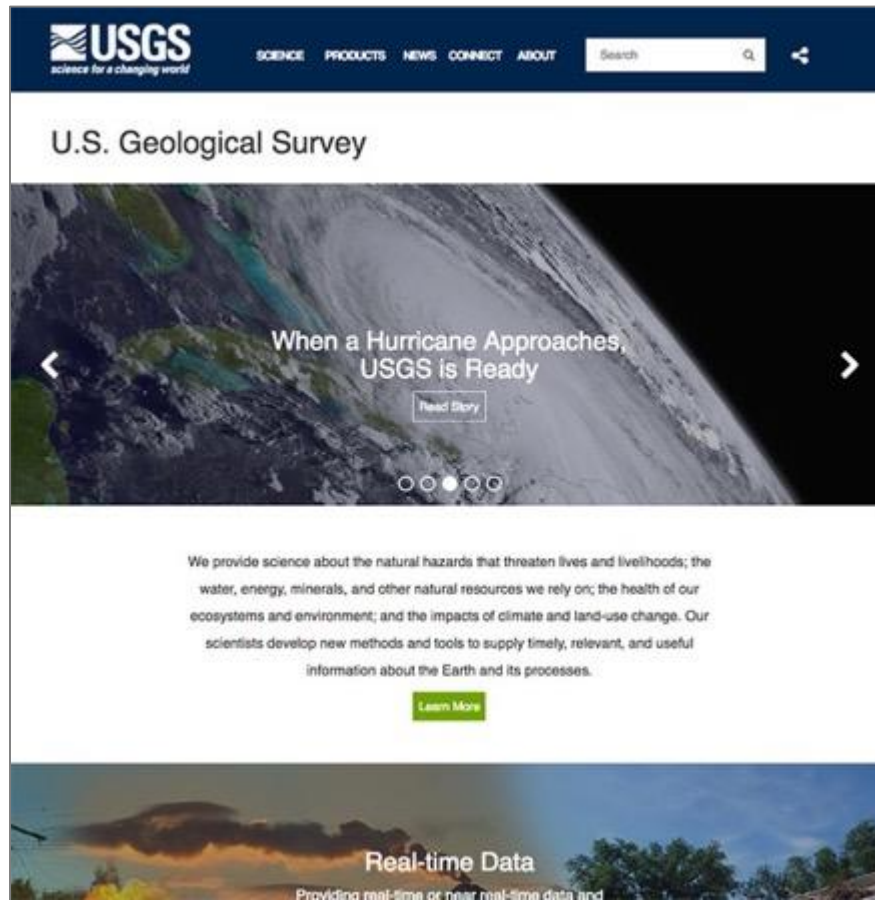


It's so liberating...just hit **refresh!**

# Feeding the monster

People will shun you  
if your site looks old

People expect your  
maps to be up-to-date

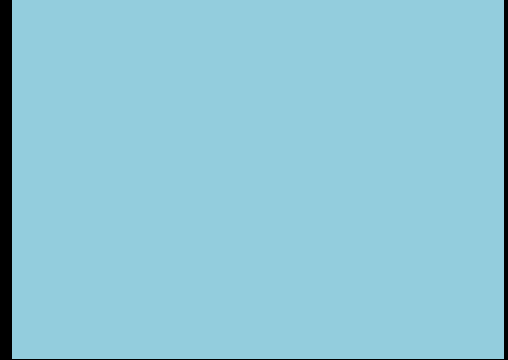


5

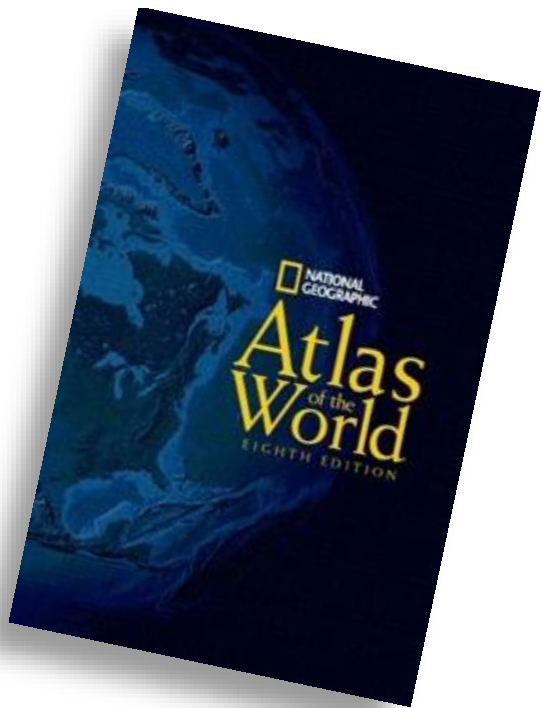
Long-lasting  
**Print**



Ephemeral  
**Digital**



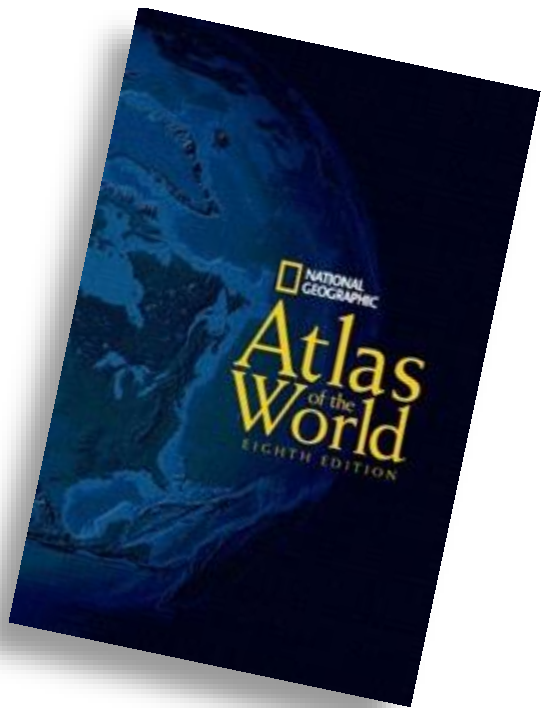
# How long will our web maps last?



My great-granddaughter might find this  
world atlas...

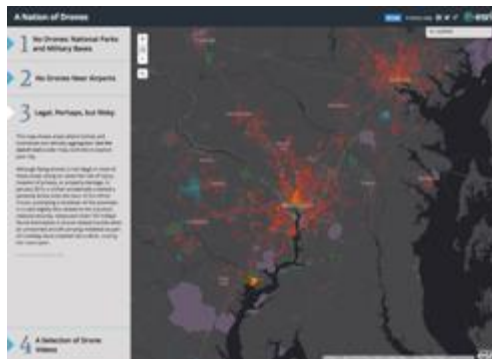


# How long will our web maps last?



My great-granddaughter might find this  
world atlas...

...but will she find this web map?



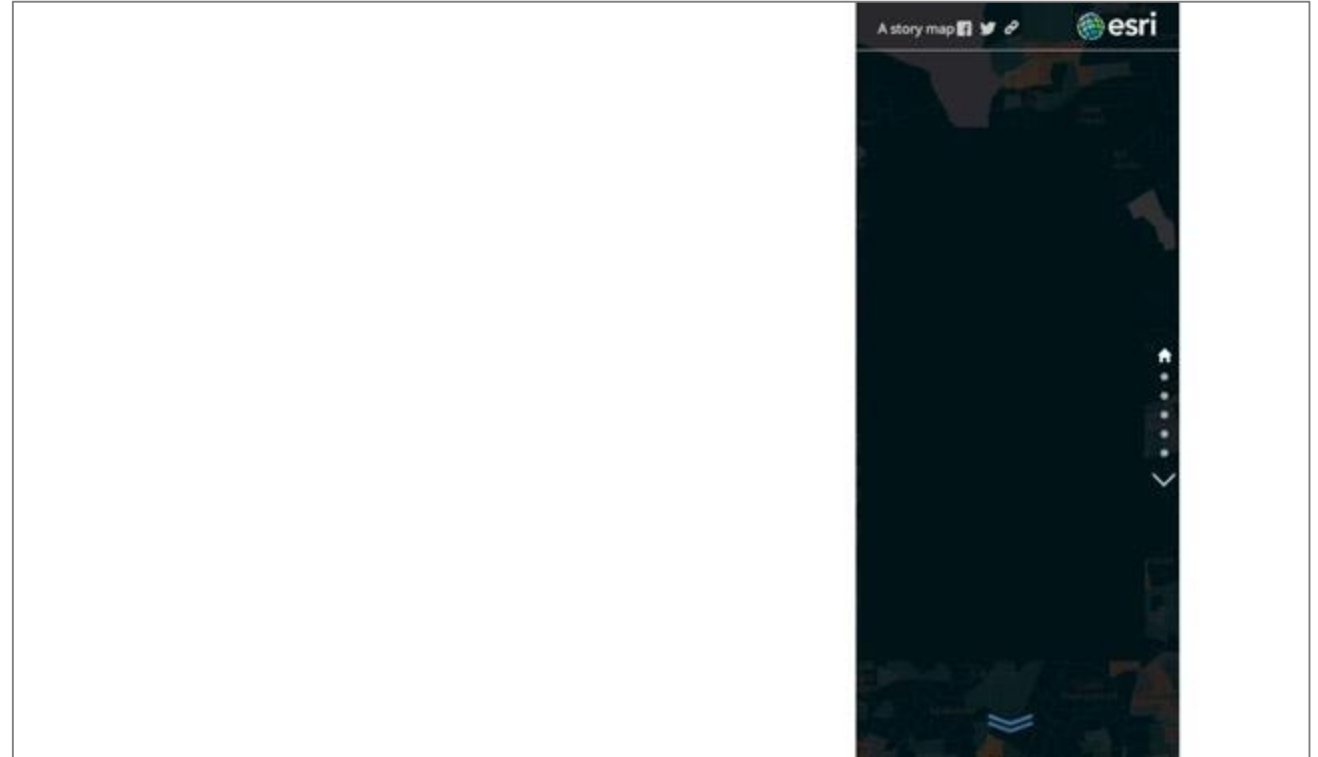
2



# Elements of web and mobile maps

# Elements of Web and Mobile Maps

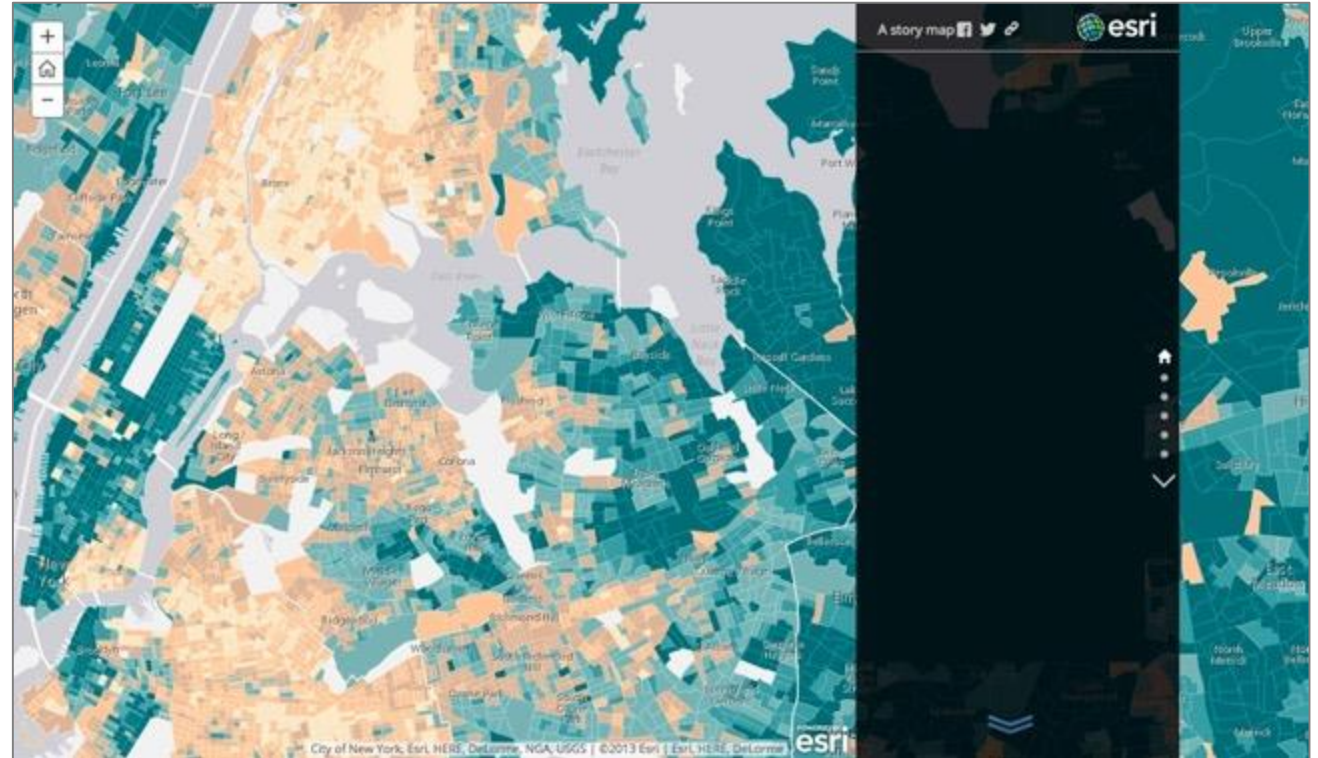
App or framework  
(user experience)



# Elements of Web and Mobile Maps

App or framework  
(user experience)

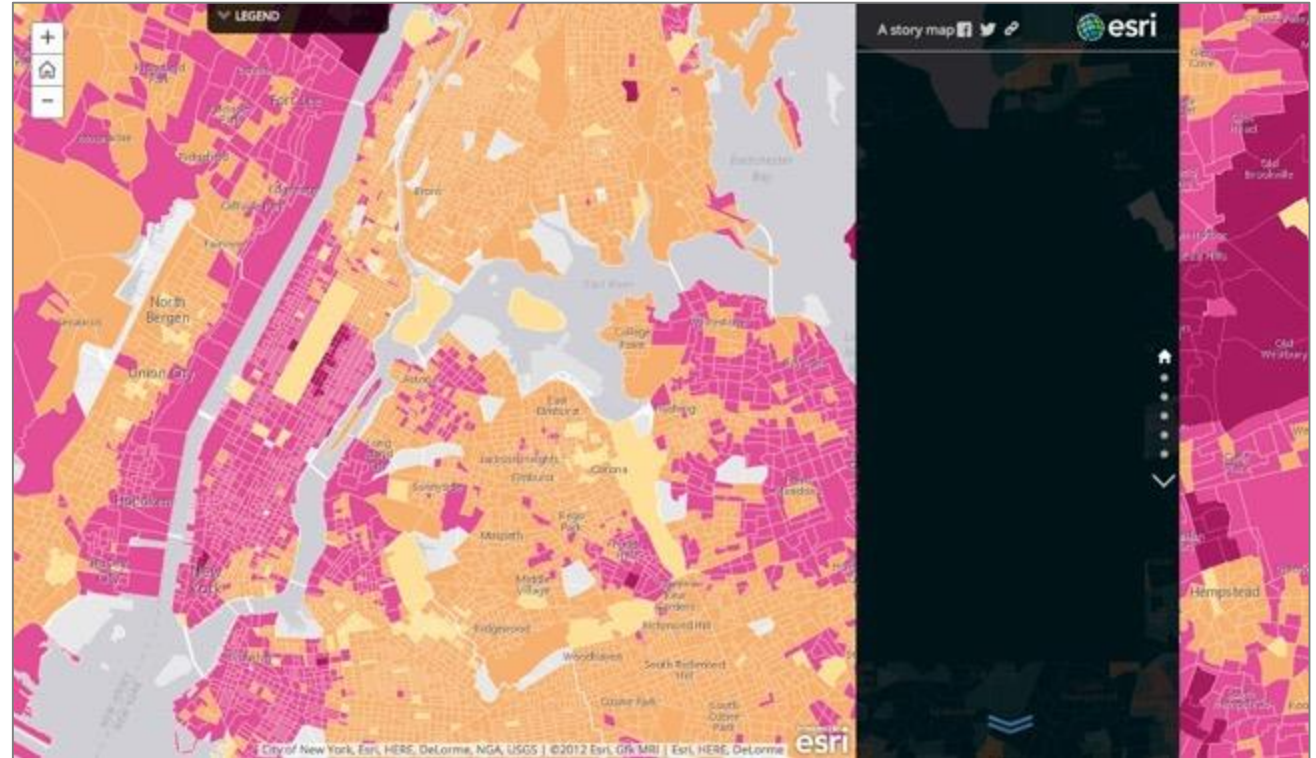
The map



# Elements of Web and Mobile Maps

App or framework  
(user experience)

The map (or maps)

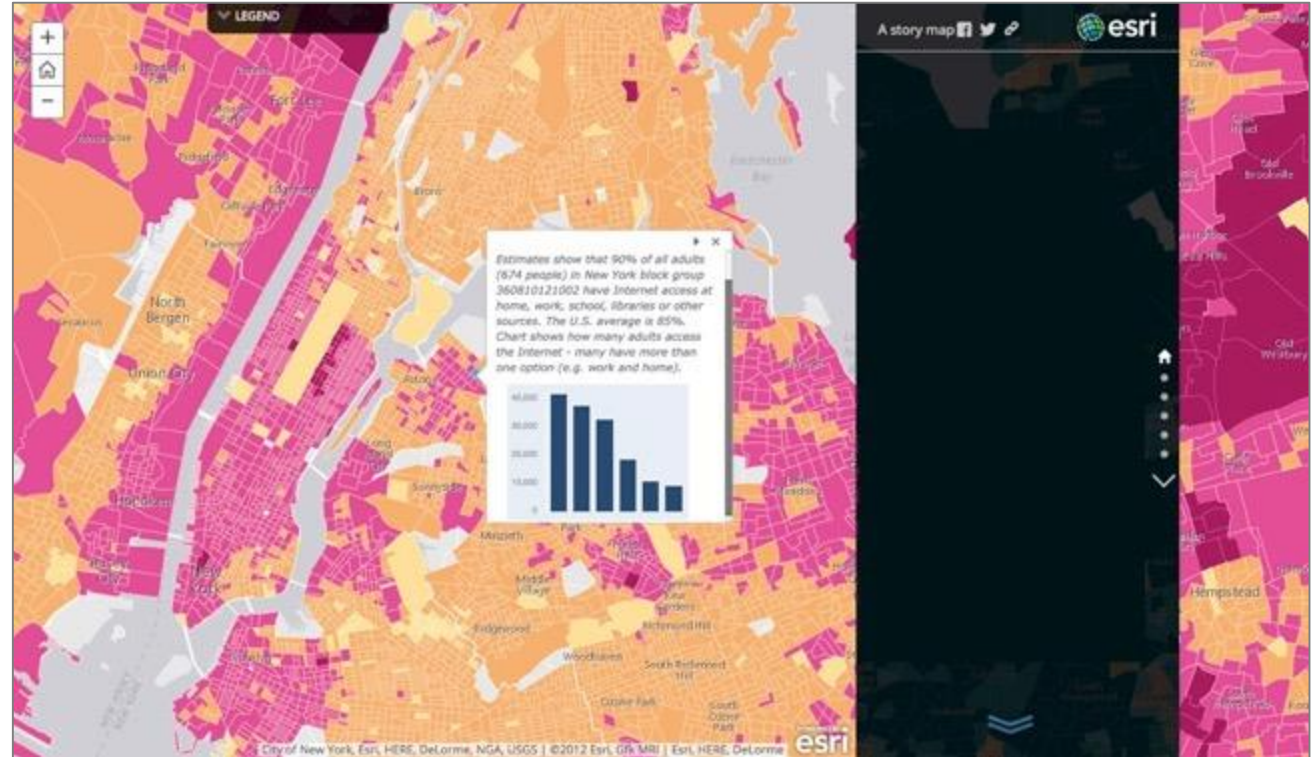


# Elements of Web and Mobile Maps

App or framework  
(user experience)

The map

Popups and map  
actions





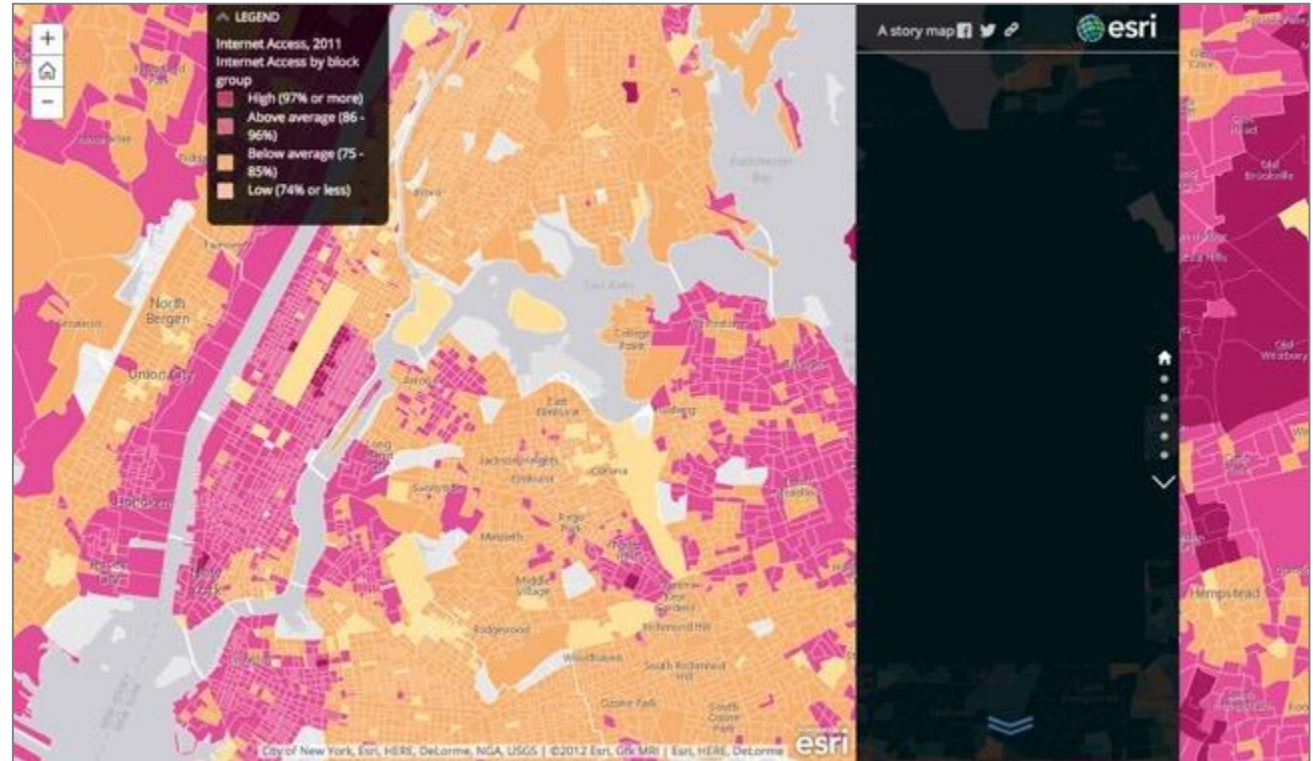
# Elements of Web and Mobile Maps

App or framework  
(user experience)

The map

Popups and map  
actions

Legends, scale  
bars, north arrows



# Elements of Web and Mobile Maps

App or framework  
(user experience)

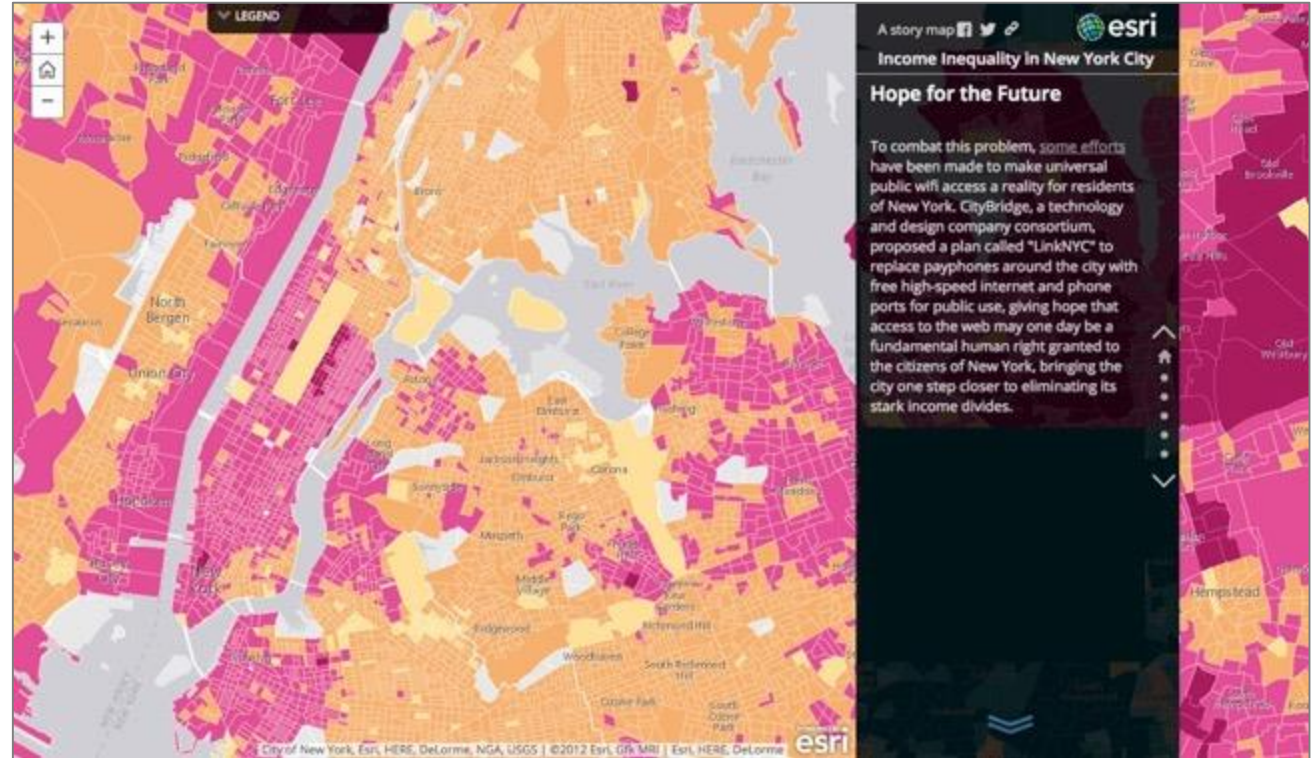
The map

Popups and map  
actions

Legends and other  
ancillary items

Text, narrative

Cartography: All elements of design and communication





**Elements**  
of Web and  
Mobile Maps

**Cartography**  
**first**

**User Experience**  
**later**

**Elements**  
of Web and  
Mobile Maps

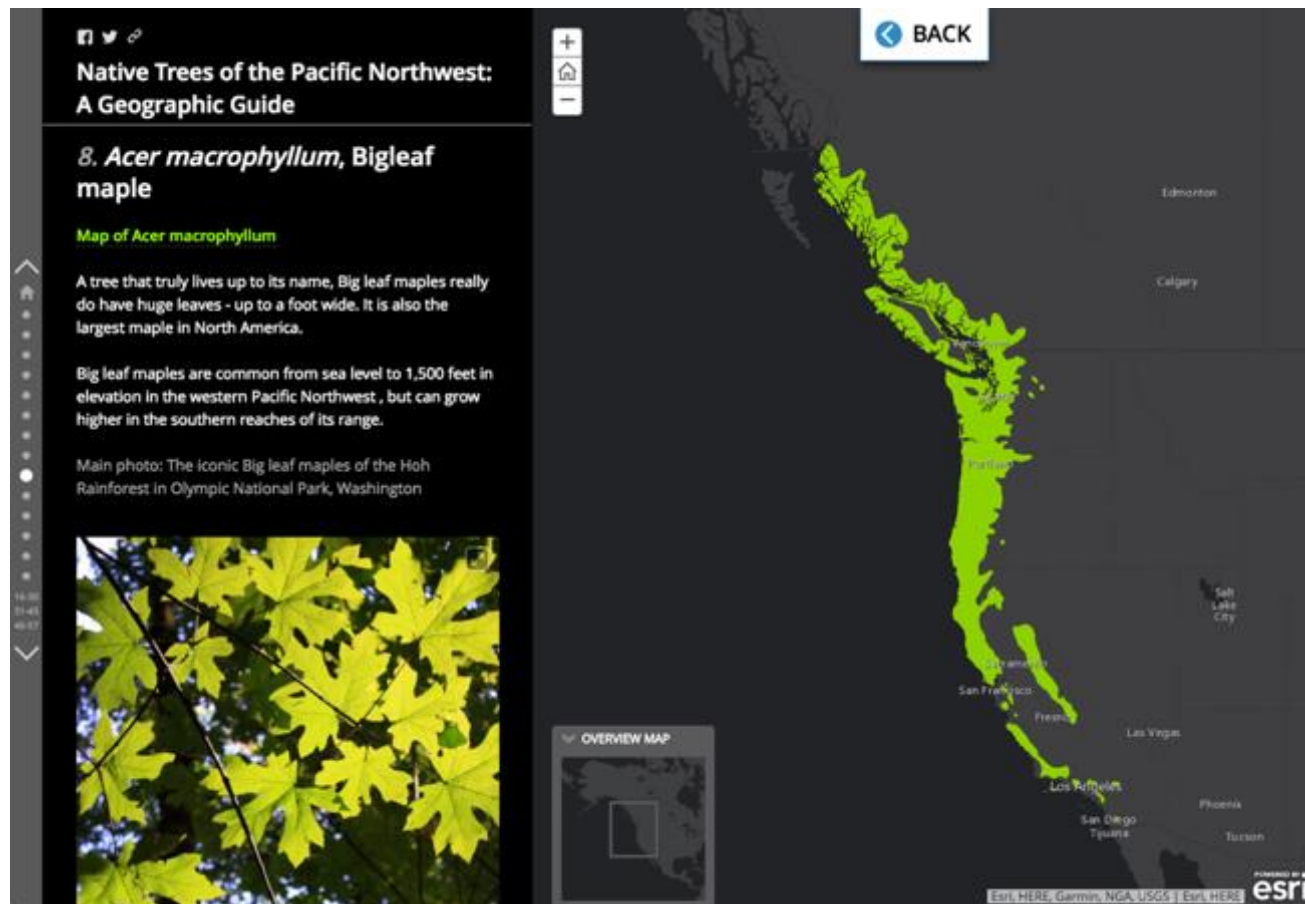
**Cartography = User Experience**

**They're inseparable**

# What does this mean?

It can mean a lot of  
things, including...

Visually uniting the  
map with other  
elements



# What does this mean?

It can mean a lot of things, including...

## Incorporating map actions into text


Amazon Conservation Team  
Celebrating 30 Years (1986 - 2016)

## The Amazonian Travels of Richard Evans Schultes

traveled and collected in all of them.


### The Putumayo River

The great Putumayo – born in the Sibundoy Valley, where Schultes collected extraordinary hallucinogenic plants – is the only major navigable river in the Colombian rainforest, with large boats able to sail as far up as Puerto Leguizamó. The river also forms part of the border with Ecuador and most of the border with Peru.

 View Map of the Putumayo Watershed


### The Caquetá River

The Caquetá is a whitewater river with two major rapids inhibiting river travel at Aracua and at Córdoba. It has several major tributaries that drain from the Andes, including the Orteguzza and Caguan rivers. Farther south, the remote Apaporis and Yarí rivers cut through the quartzitic "Lost World" mountains of Chiribiquete, a spectacular ecosystem that harbors pre-Columbian cave paintings and a xerophytic flora related to the distant Guiana Highlands to the east.

 View Map of the Caquetá Watershed

### The Vaupés River

The Vaupés is a blackwater river that feeds into the Rio Negro in Brazil, one of the Amazon's largest tributaries. The rainforests of the Vaupés are inhabited mostly by the Indians that have always lived there, with many of the traditional practices preserved and relatively little external pressures and deforestation. The Vaupés has isolated massifs similar to Chiribiquete, but the flora is related to the Brazilian Shield to the southeast. The lower Vaupés is flanked by many caatingas, white sand savannas with numerous unique plants



# What does this mean?

It can mean a lot of  
things, including...

Making maps  
respond to scroll



3



**The process**  
It's linear...sort of

**The process**  
it's linear...sort of

Before you start:

**What** is the purpose of your map?

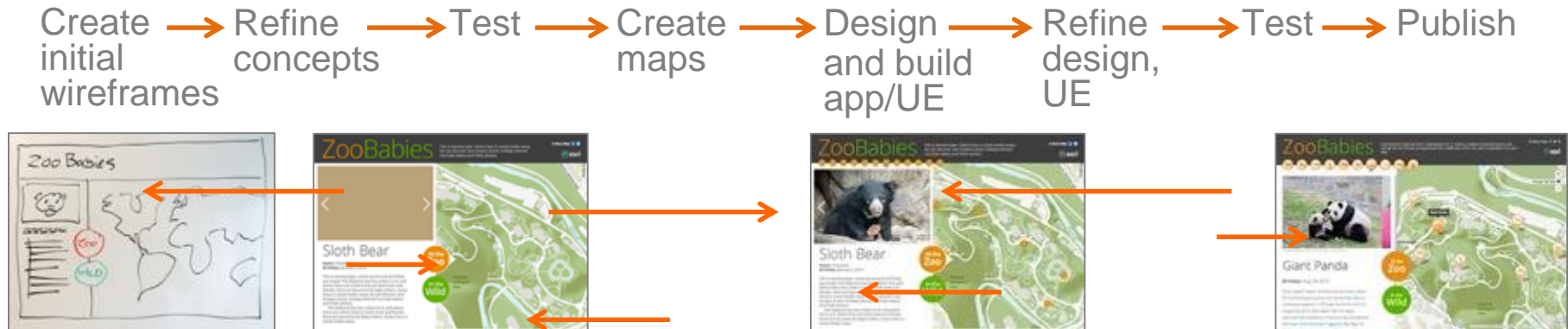
**Who** is your audience?

**What** is your production environment?

Web map, app, etc.



# The process it's linear...sort of



Iteration, experimentation, trial and error is part of the process



4



Some **CLUES** to making  
great digital maps

# Some **CLUES** to making great maps in the digital age

1. **C**onnect with your audience
2. **L**imit user options
3. **U**ser experience supports the story
4. **E**asy-to-read maps
5. **S**trive for simplicity

**C** L U E S

**Connect  
with your  
audience**

C L U E S

Connect  
with your  
audience

Who *is* your  
audience?



# CLUES

## Connect with your audience



Think of your mom

Step back and explain things

Avoid being technical

Be informal but respectful

# C L U E S

## Connect with your audience

Think about your **primary** audience

Lots of people may see your map, but whom do you *really* want to convince?



# CLUES

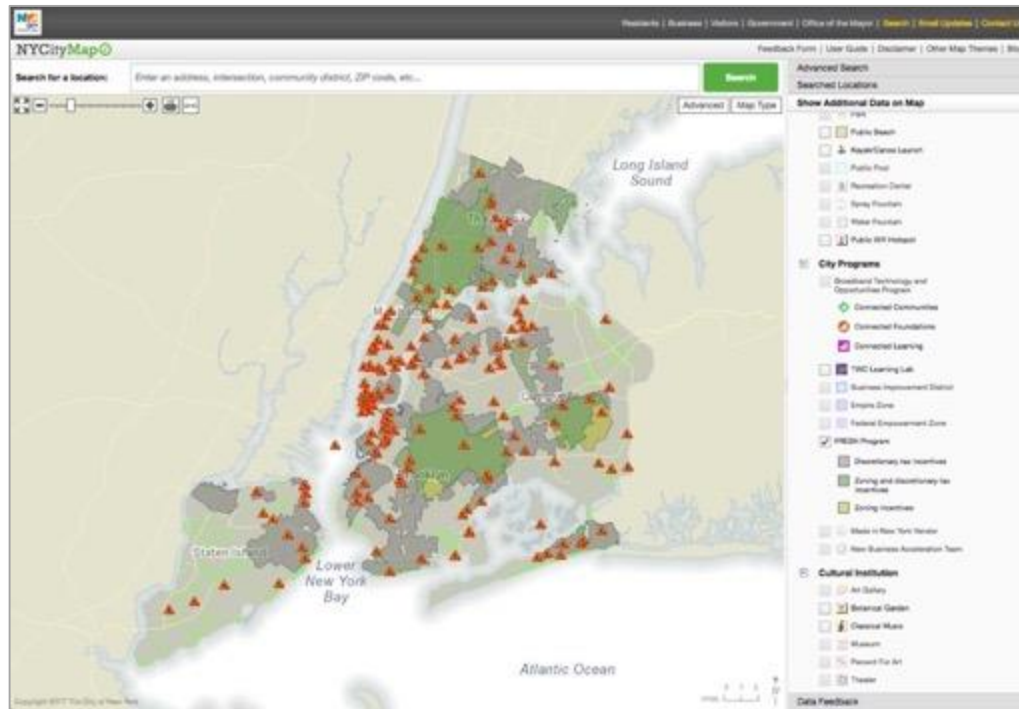
## Limit user options

# CLUES

## Limit user options

If general  
purpose  
map  
viewers  
ever made  
sense

The best maps and apps do one thing really well



...they don't  
any more

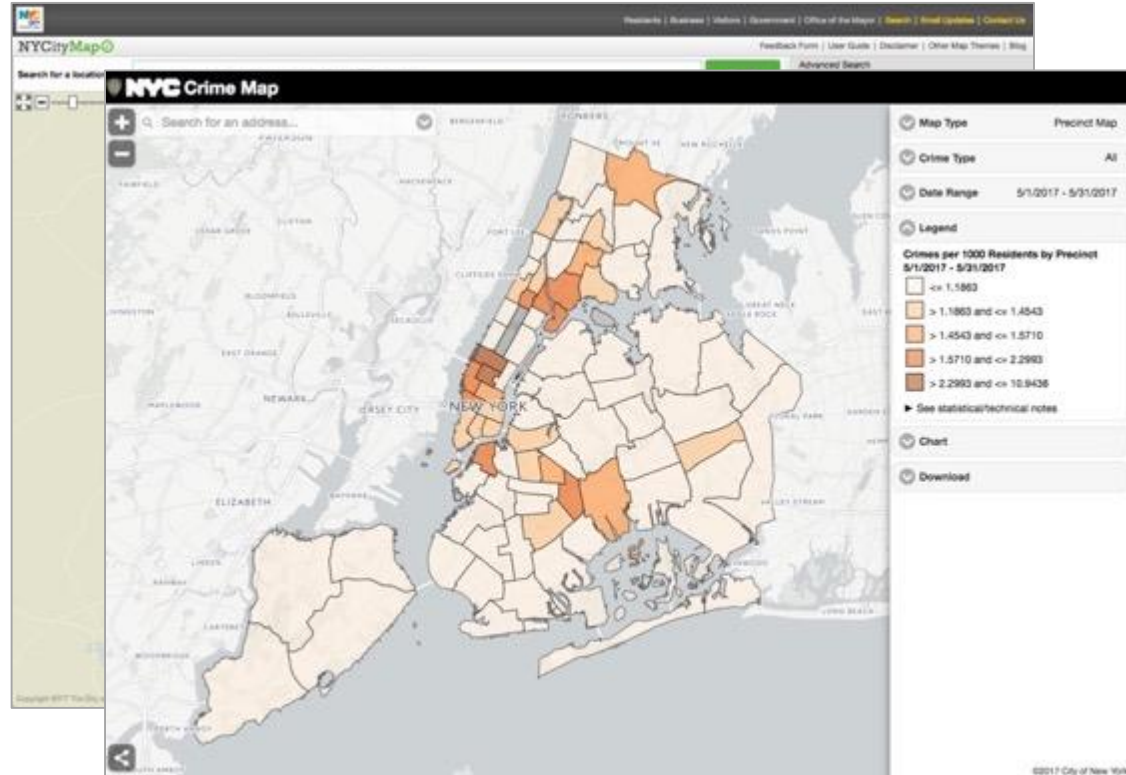


# CLUES

## Limit user options

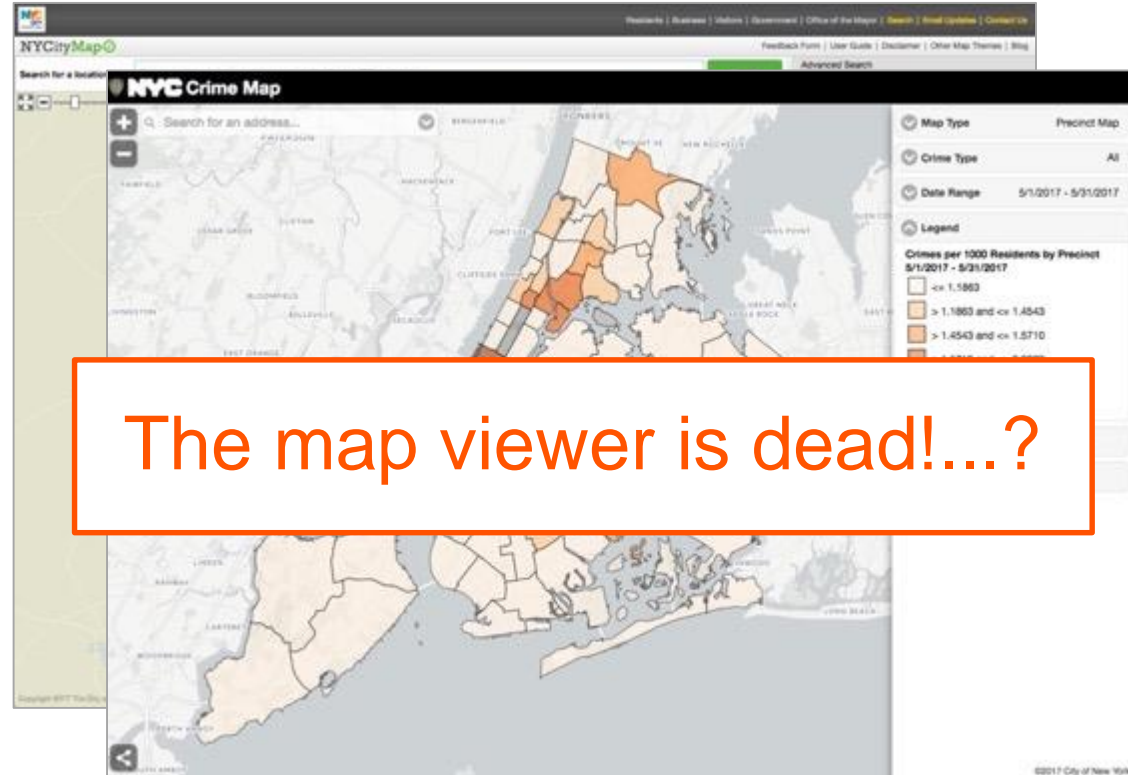
The best maps and apps do one thing really well

Focused,  
single-purpose  
apps better  
serve specific  
audiences



# CLUES

## Limit user options



**CLUES**

**User  
experience  
supports the  
story**

# CLUES

## User experience supports the story

Maps serve lots of purposes...

Locate



Navigate



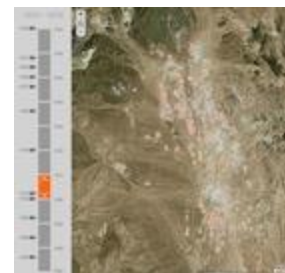
Compare



Narrate



Show change



Each purpose suggests different functions and user experiences

# CLUES

## User experience supports the story

Locate



Static

Navigate



Turn-by-  
turn  
directions

Compare



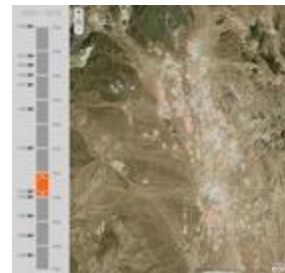
Swipe

Narrate



Previous/  
next

Show change



Play/pause

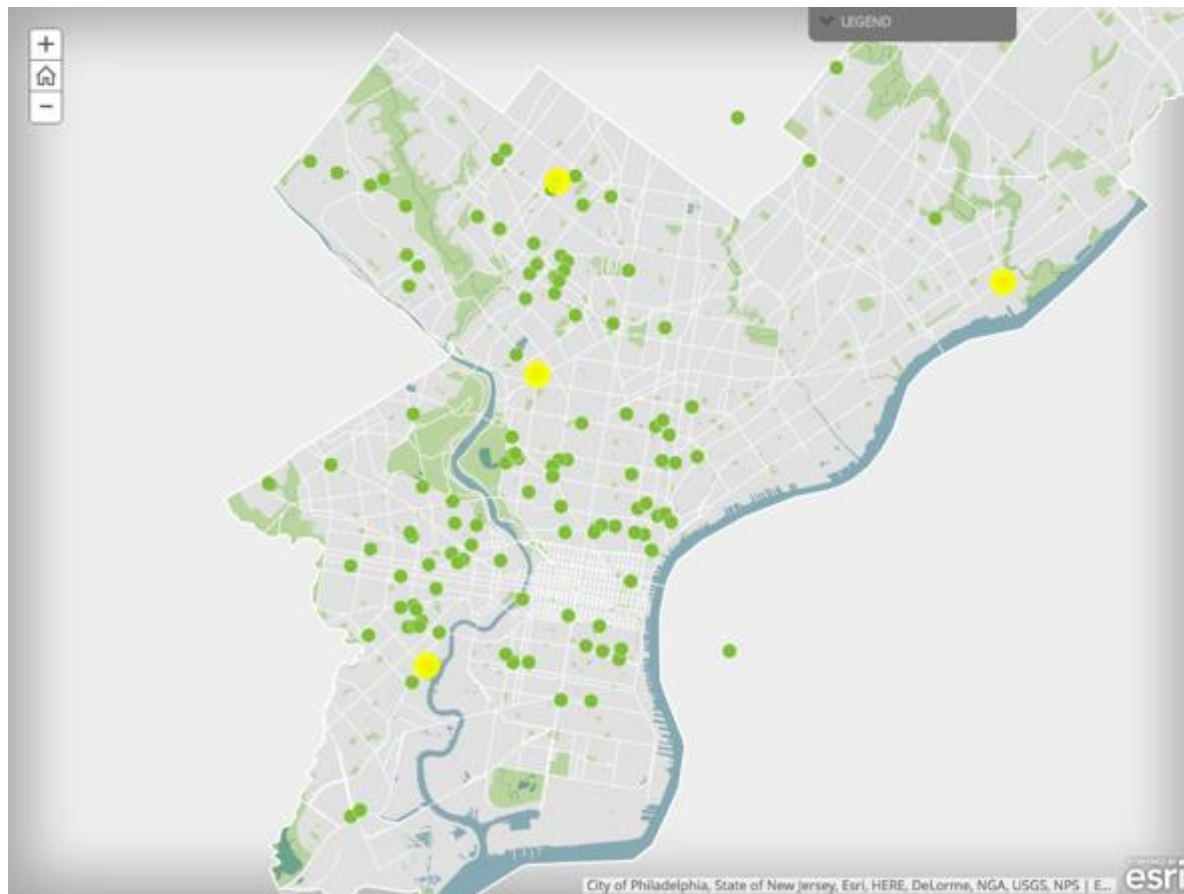
**CLUES**

**Easy-to-read  
maps**

# CLUES

## Easy-to-read maps

A map for  
storytelling is  
very different  
from a map for  
analysis

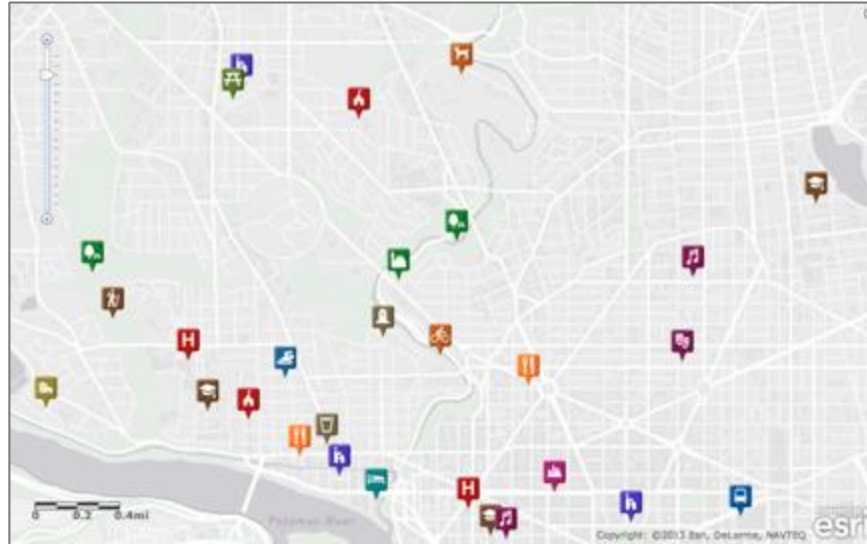


# CLUES

## Easy-to-read maps

A map for  
storytelling is  
very different  
from a map for  
analysis

Base map as context—not competition

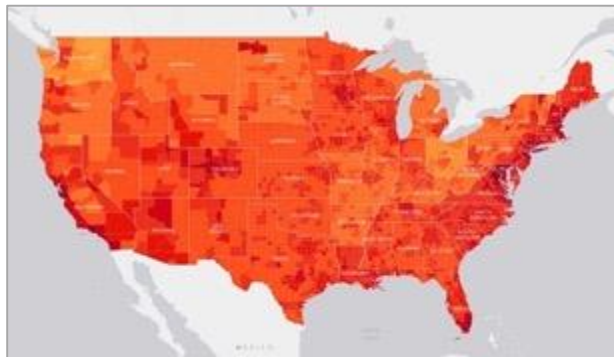




# CLUES

## Easy-to-read maps

Simple,  
accessible  
thematic maps



Strip off non-  
essential information

Use limited color  
palettes

# CLUES

## Easy-to-read maps

Avoid  
visually  
complex  
symbols and  
icons



Simple shapes  
are usually better  
than pictographs



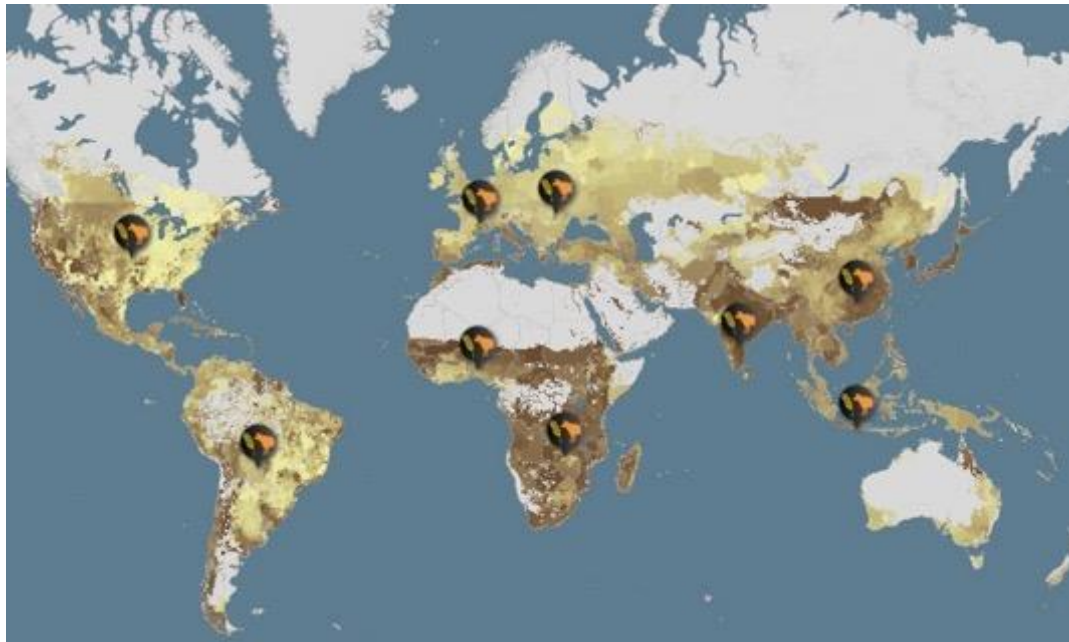
Which looks better?

# CLUES

## Easy-to-read maps

Several simple maps are much better than one complex one

This can be done *additively* as well



Crop yields

Yield gaps

Water use

Crop use

User experience can parse a complex story into simpler components

# CLUES

## Strive for Simplicity

### Simplicity in

### User Experience



Avoid GIS-y functions

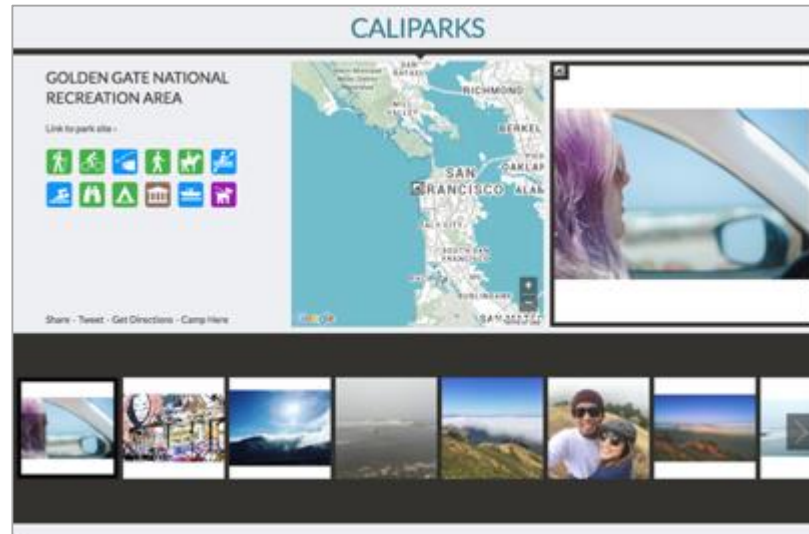
Avoid multiple options and drop-downs

# CLUES

## Strive for Simplicity

### Simplicity in

### Visual Design



Avoid unnecessary lines, rules, drop shadows, etc.

# CLUES

## Strive for Simplicity

### Simplicity in

### Visual Design



Strive for clarity and elegance...

Limited color palettes are usually more effective

# CLUES

## Strive for Simplicity

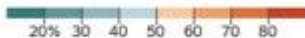
### Simplicity in

#### Editorial Approach

Keep titles, text, and legends clear, simple, and descriptive

**Americans want to restrict carbon emissions from coal power plants.  
The White House and Congress may do the opposite.**

Percentage of adults per congressional district who support strict CO2 limits on existing coal-fired power plants



NATIONAL AVERAGE: 69%

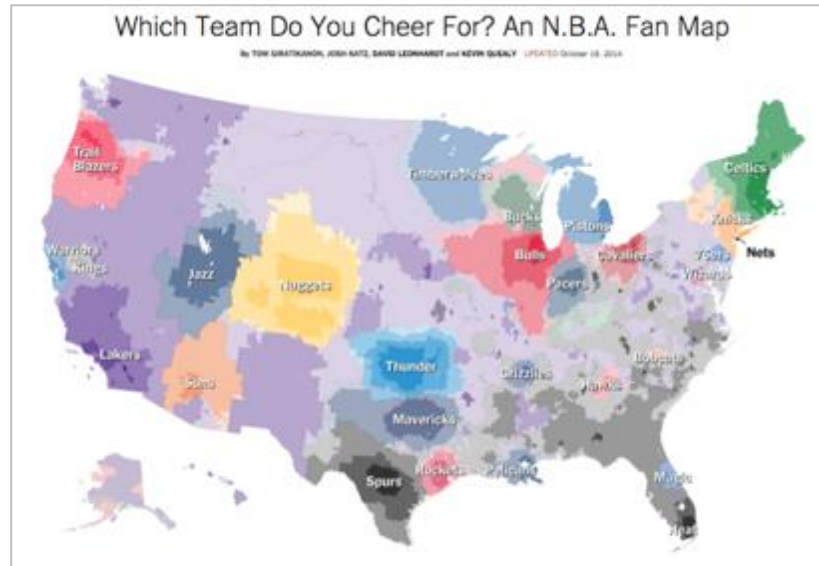


# CLUES

## Strive for Simplicity

Simplicity in

Editorial Approach



Here: No  
legend; map  
does the work



# CLUES

## Strive for Simplicity

Eliminate

Edit! Shorten! Reduce! Distill! Simplify!

Digital media =  
**ADHD** media



“Not that the story need be long, but it will take a long while to make it short.”

— Henry David Thoreau, *Letters to Various Persons*

# CLUES

1. **C**onnect with your audience
2. **L**imit user options
3. **U**ser experience supports your story
4. **E**asy-to-read maps
5. **S**trive for simplicity

5



# Some **tips** on designing digital maps

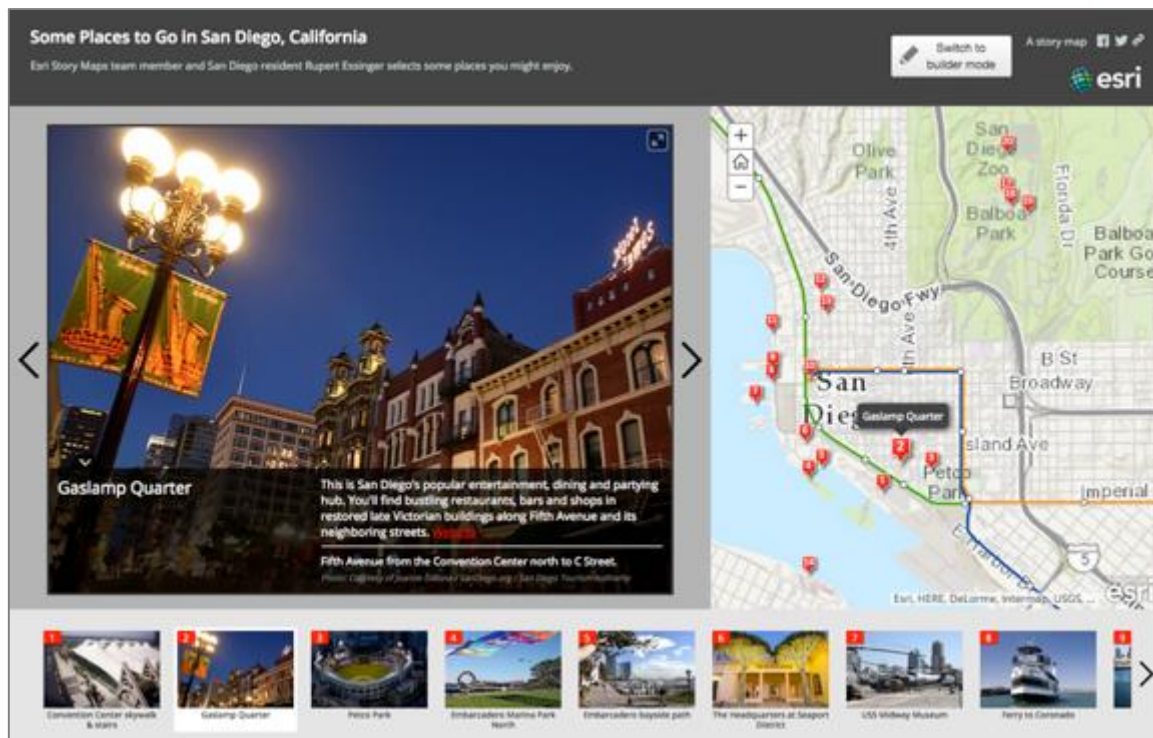
# Dealing With Screen Sizes

Responsive design

Photo & Text

Carousel

Map

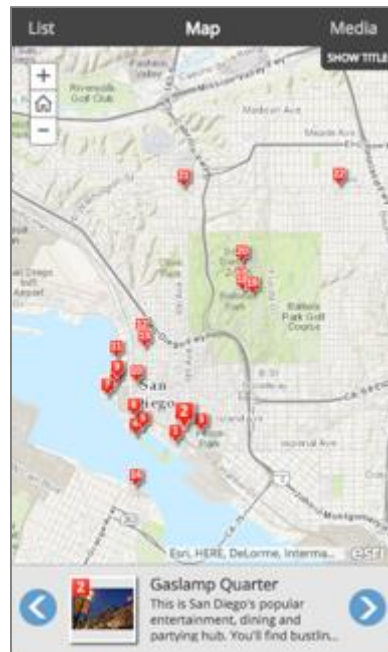


# Dealing With Screen Sizes

## Responsive design: Separating Functions



Photo & Text



Map



List

# Dealing With Screen Sizes

Responsive design: Separating Functions...Some



Photo, Text, & Map



List

# Dealing With Screen Sizes

Responsive design



## Mobile First!

- Increasing mobile usage
- Good discipline

# Creating a Consistent Style

**Branding:**  
Website and maps  
seamlessly styled

City of St. Albert,  
Alberta

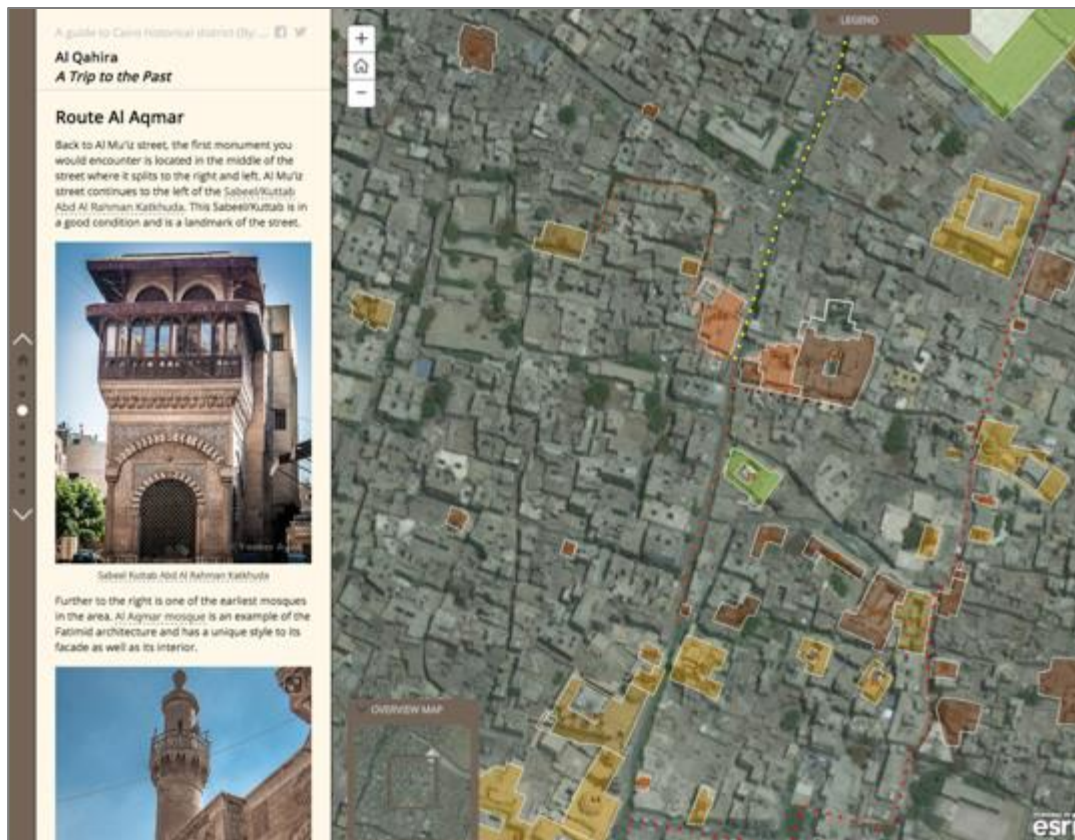




# Creating a Consistent Style

Cartography:  
Story and maps  
seamlessly styled

Al Qahira:  
A Trip to the Past



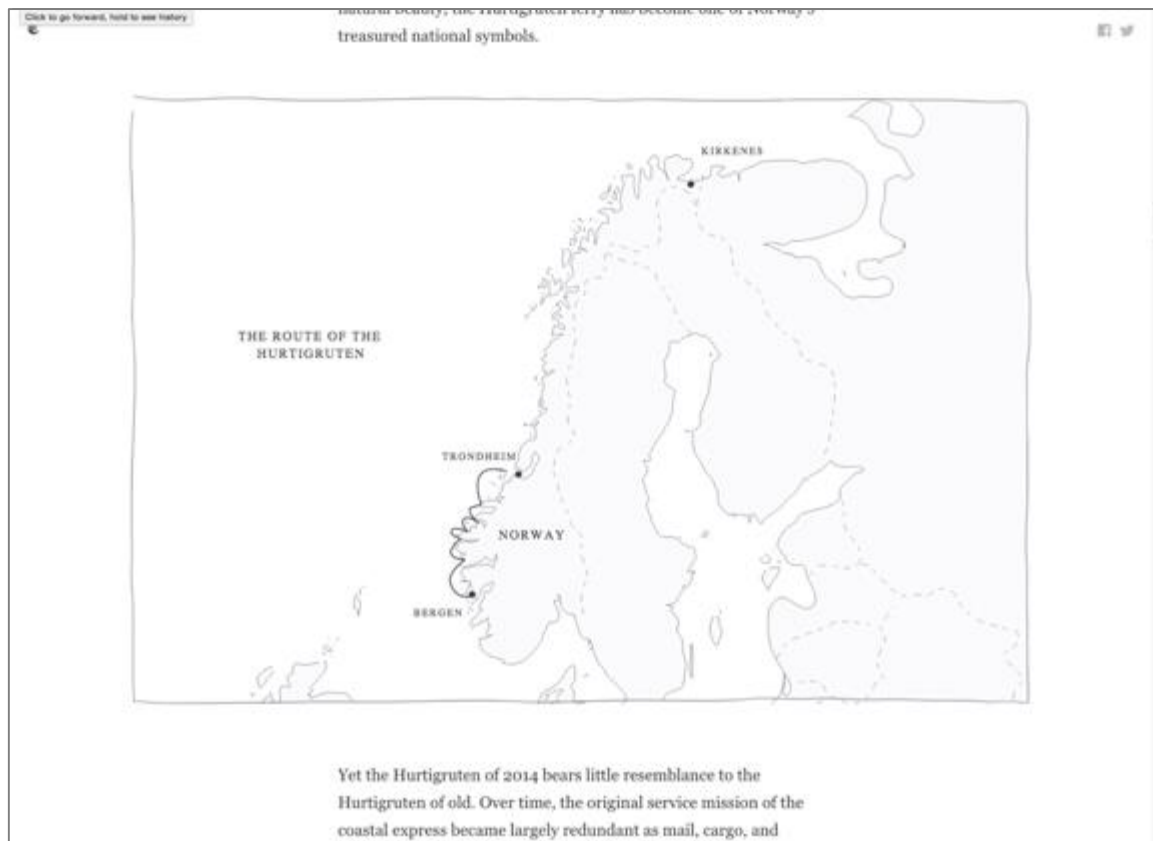
# Creating a Consistent Style

## Mood:

An immersive atmosphere

New York Times:  
A Journey in  
Which...

[DEMO](#)



# Creating a Consistent User Experience

## The Power of Scroll

- Opens up real estate
- Incorporates other actions

## Story Map: Farmers' Markets

[DEMO](#)

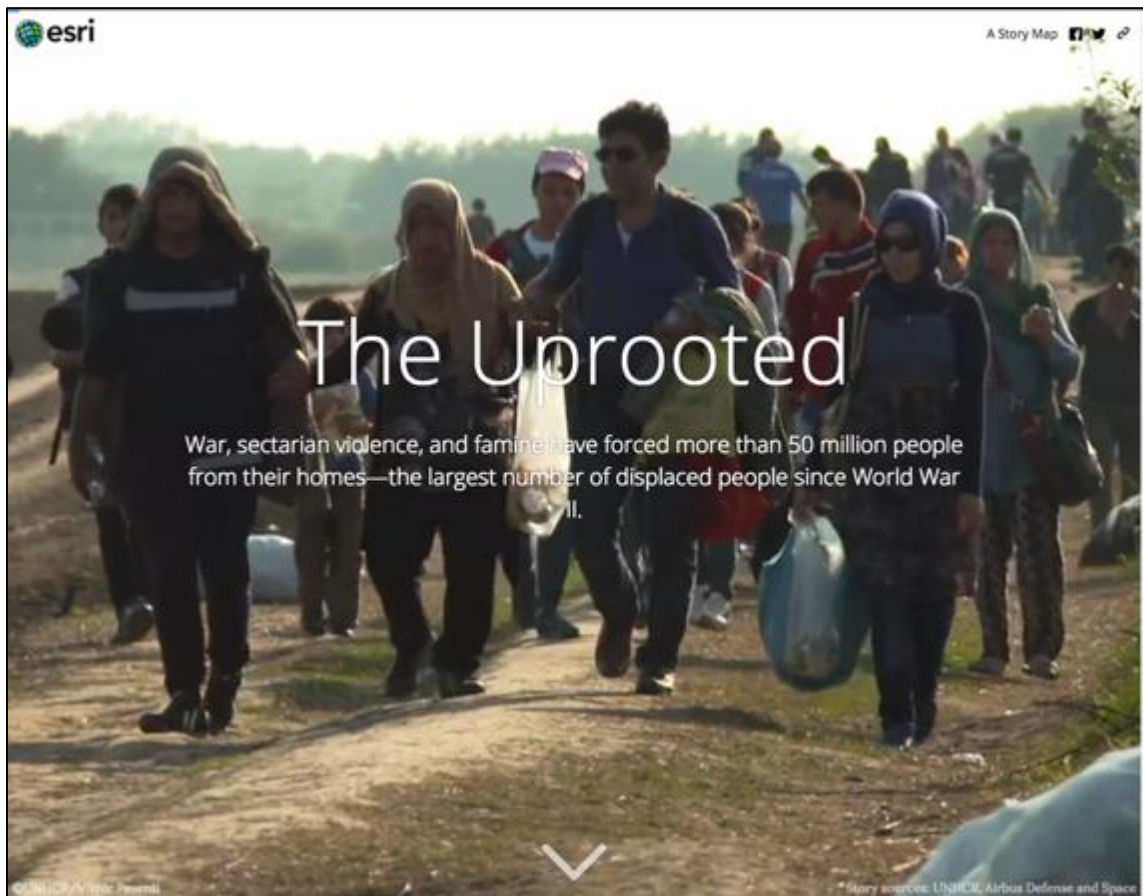


# Creating a Consistent User Experience

## The power of Scroll

- Maps move as users scrolls
- TREND: Less interactivity, especially point and click

[DEMO](#)





# Feeding the Monster

You can (and should) tweak, improve, enhance

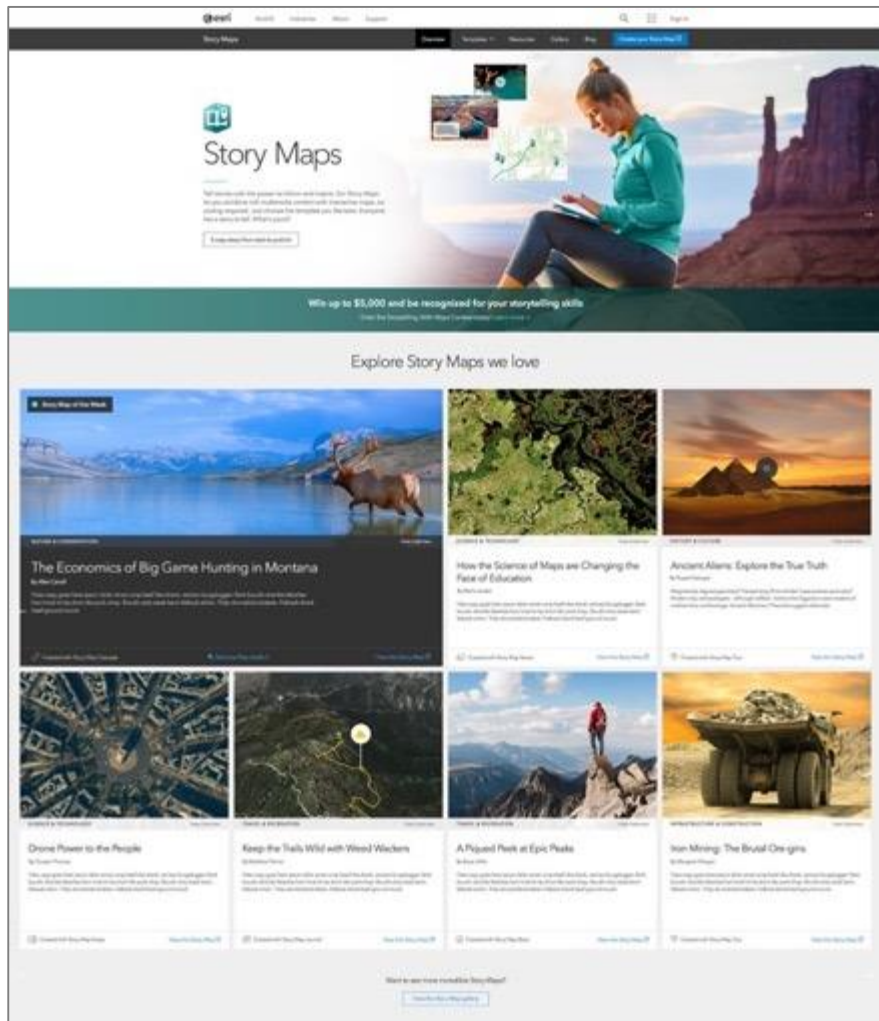
You've created a monster—you'll need to feed it

Four years, three versions



# Feeding the Monster

We're planning another redesign!

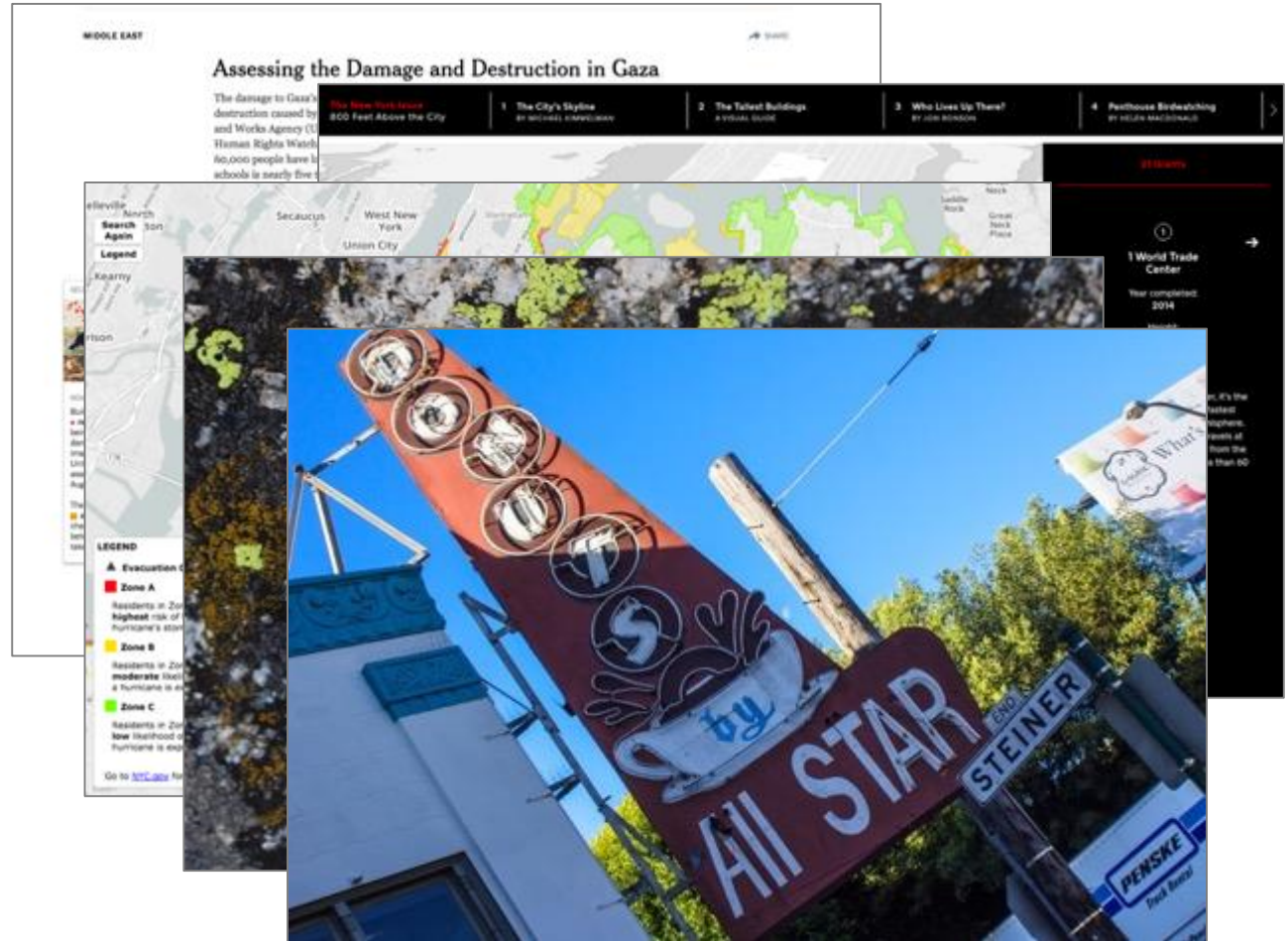


# Look Around!\*

Be inspired by what  
others are doing

Be inspired by  
the world!

\*Steal!

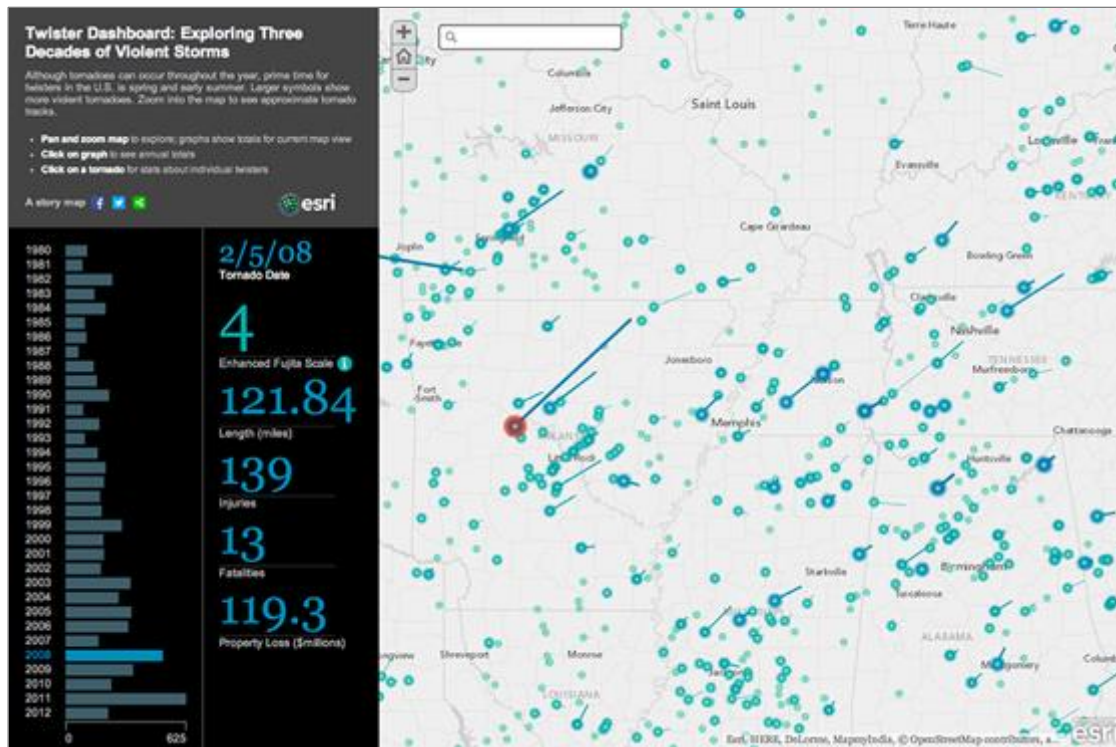


# The process: Start fresh

Don't stick with what you have (GIS analysis, older website)

Think anew about

- Who is your audience
- What is your goal
- How you'll interpret and represent for your audience





# The process: Brainstorm and sketch

Great digital tools:  
Markers and whiteboard

Outline key elements

Develop rough  
wireframes

Tools? Balsamiq,  
Photoshop,  
PowerPoint,  
Whiteboard,  
Pencil!



# The process: **Iterate and test**

Be willing to **abandon** “great” ideas

Digital media are flexible, malleable; **try things**,  
explore options

**Collaborate:** different minds, different ideas

**User testing** is key (with whom?--fresh eyes,  
non-tech people)

- Early in process with static screens, rough implementations
- Later: Refining user experience, terminology, etc.

6



# What to Remember



- Keep it **simple**; reduce the noise and let the signal come through
- **Single**-purpose to fit priority audience
- Map and context work **as a seamless whole**
- A simple, unified **user experience**
- It's a new medium - screens are small, but maps **can do so much!**

# Open Discussion

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