

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. 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: General Overview

#2: Print/image

#3: Web/mobile

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

- 1** What's different about maps in the digital age?
- 2** Elements of digital 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

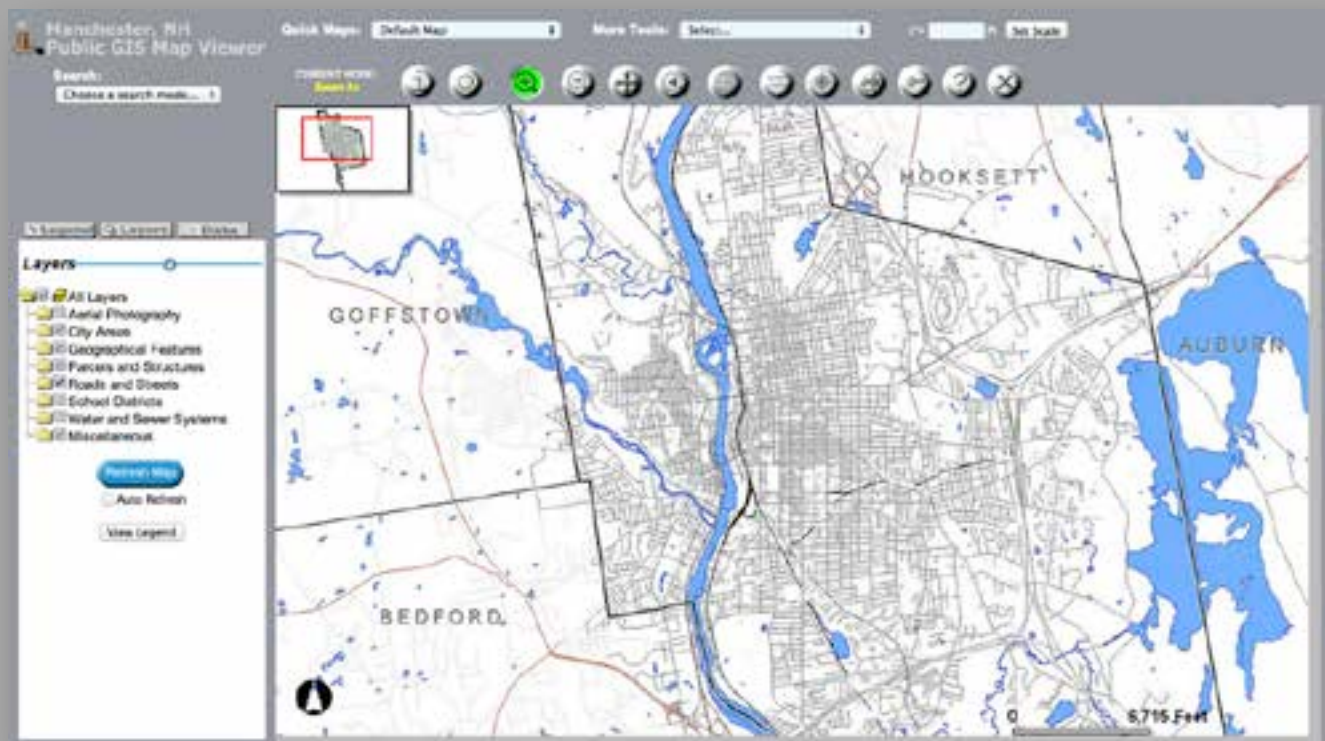




We'll ask . . .

- **What** is this map/site about?
- Is it **appealing** to you?
- Would you **stick around**
...or move on?

1?



or 2?

Presentación Guía temática Búsqueda

Momentos de Sevilla

Sevilla, Real Academia de Bellas Artes de San Fernando

SEVILLA www.sevilla.org



1
2
3
4
5
6
7
8
9
10
11
12
13
14

En las calles de Sevilla se puede ver una rica colección de esculturas, fuentes, establos, mosaicos y otras piezas que hacen gala de un gusto refinado. Cuenta otra historia de Sevilla desde el siglo I hasta la edad contemporánea. Importantes autores como Diego de Perugina, Antonio Susillo, Manuel Delgado Escobedo, Lorenzo Coullaut Valera, Roberto Macía y Eva Leizaola dejaron su huella.

La guía muestra 54 piezas catalogadas por el Servicio de Proyectos y Obras de la Gerencia de Urbanismo. Son solo una pequeña parte de los 1.385 elementos que contiene el inventario.

[Mostrar lista](#)

Gerencia de Urbanismo  IDE 



1?

The screenshot displays the EPA EnviroAtlas web application. At the top, the EPA logo is visible alongside navigation links for "LEARN THE GOALS", "SCIENCE & TECHNOLOGY", "LAWS & REGULATIONS", and "ABOUT EPA". A search bar is located on the right side of the header.

The main interface features a map of the United States with several overlays. A "People and Built System" panel is open on the left, showing a list of demographic filters under the heading "National ACS (2008-2012)". The "National Demographics" section is expanded, and the "Population Density" filter is checked. Other filters include "Total Population", "Percent Density per square mile", "Percent Minority", "Percent Below Poverty Line", "Percent Age Less Than 18 Years Old", "Percent Age Less Than 65 Years Old", "Percent Population Age Greater Than 64", "Percent Housing Units Built Before 1950", "Percent 25 Years and Over (2008-2012)", and "Percent 25 Years and Over (2008-2012) High School".

A "Map Legend" panel is open on the right, showing "Boundaries" (States, Counties) and "National Demographics". The map itself shows a grid of states and counties, with various demographic data points overlaid. The bottom of the page features logos for EPA, LandUse, NRCS, and USGS. The footer contains links for "EPA Home", "Privacy and Security Notice", and "Contact Us", along with a "Last updated on 5/16/2014" timestamp and social media icons for Facebook, Twitter, and YouTube.

or 2?



1?

The screenshot displays the 'My Neighborhood' website interface. At the top, there is a search bar with the text '424 N PENNSYLVANIA ST' and a dropdown menu for 'City, County & Neighborhood' set to 'Indianapolis'. Below the search bar is a map showing a street grid with '424 N PENNSYLVANIA ST' highlighted in red. To the right of the map is a sidebar titled 'Neighborhood Search Results' which lists search results for '424 N PENNSYLVANIA ST'. The sidebar includes a list of categories: Child Care, Cultural Amenities, Education, General Neighborhood, Health Care, and Clinics. Under the 'Clinics' category, there are four search results, each with a 'Service Type', 'Name', and 'Address'.

My Neighborhood *IndyGov*

Search by Address or Name

Enter Your Address Below
424 N PENNSYLVANIA ST

City, County & Neighborhood
Indianapolis

Neighborhood Search Results

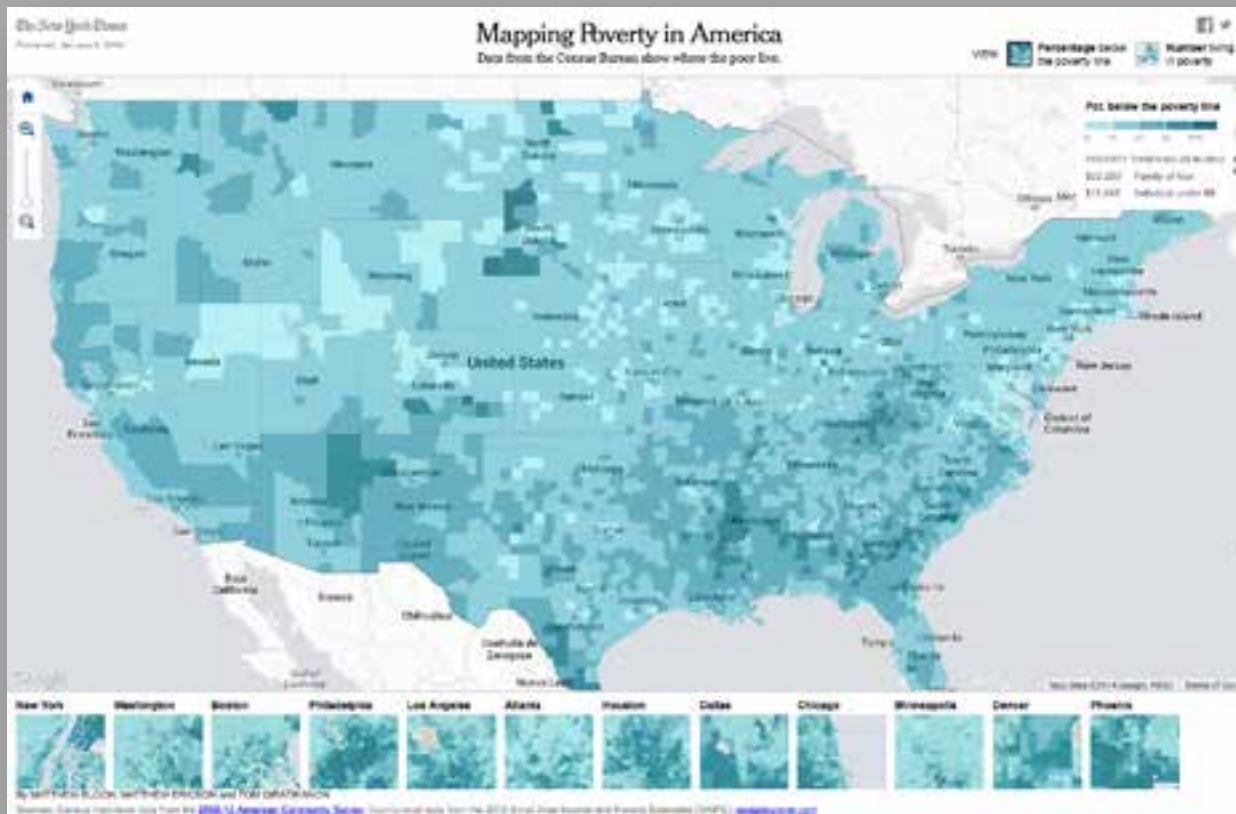
You searched for (424 N PENNSYLVANIA ST) | Neighborhood - Maribel Kessler

[View Details for 424 N PENNSYLVANIA ST on the Map](#)

- Neighborhood Information
 - Child Care
 - Cultural Amenities
 - Education
 - General Neighborhood
 - Health Care
 - Clinics
 - Search Distance:
 - View this information
 - Clinic Information for 424 N PENNSYLVANIA ST
 - [View Data Source Information](#)

Service Type	Name	Address
Community Clinics for All Ages	Citizens Health Corporation - Health Clinic	1352 N COLLEGE AVE
Community Clinics for All Ages	Health & Hospital Corporation of Marion County	5711 DR M L KING JR ST
Community Clinics for All Ages	Health & Hospital Corporation of Marion County	2808 E 38TH ST
Community Clinics for All Ages	Parish Manor Health Center (Disparities Health Services)	3740 E 38TH ST
Community Clinics for All Ages	Health & Hospital Corporation of Marion County	

or 2?



Lessons?

- **First** impressions matter!
- **Attractive** designs, accessible interfaces are key
- **Simplicity** is vital

How **your brain** perceives



<1 second

PRE-ATTENTION



1-3 seconds

RECOGNITION



3-20 seconds +

COGNITION

1



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

Cartography in the Digital Age

How have digital media changed cartography?



The good news...



...and the bad news

Cartography in the Digital Age

How have digital media changed cartography?



Small screens = small maps



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

Cartography in the Digital Age



How have digital media changed cartography?

Maps on the web are ephemeral
(how long will our work last?)



Cartography in the Digital Age

How have digital media changed cartography?



Cartography now includes a whole range of user experiences

...maps can zoom, change, and move

Cartography in the Digital Age

How have digital media changed cartography?



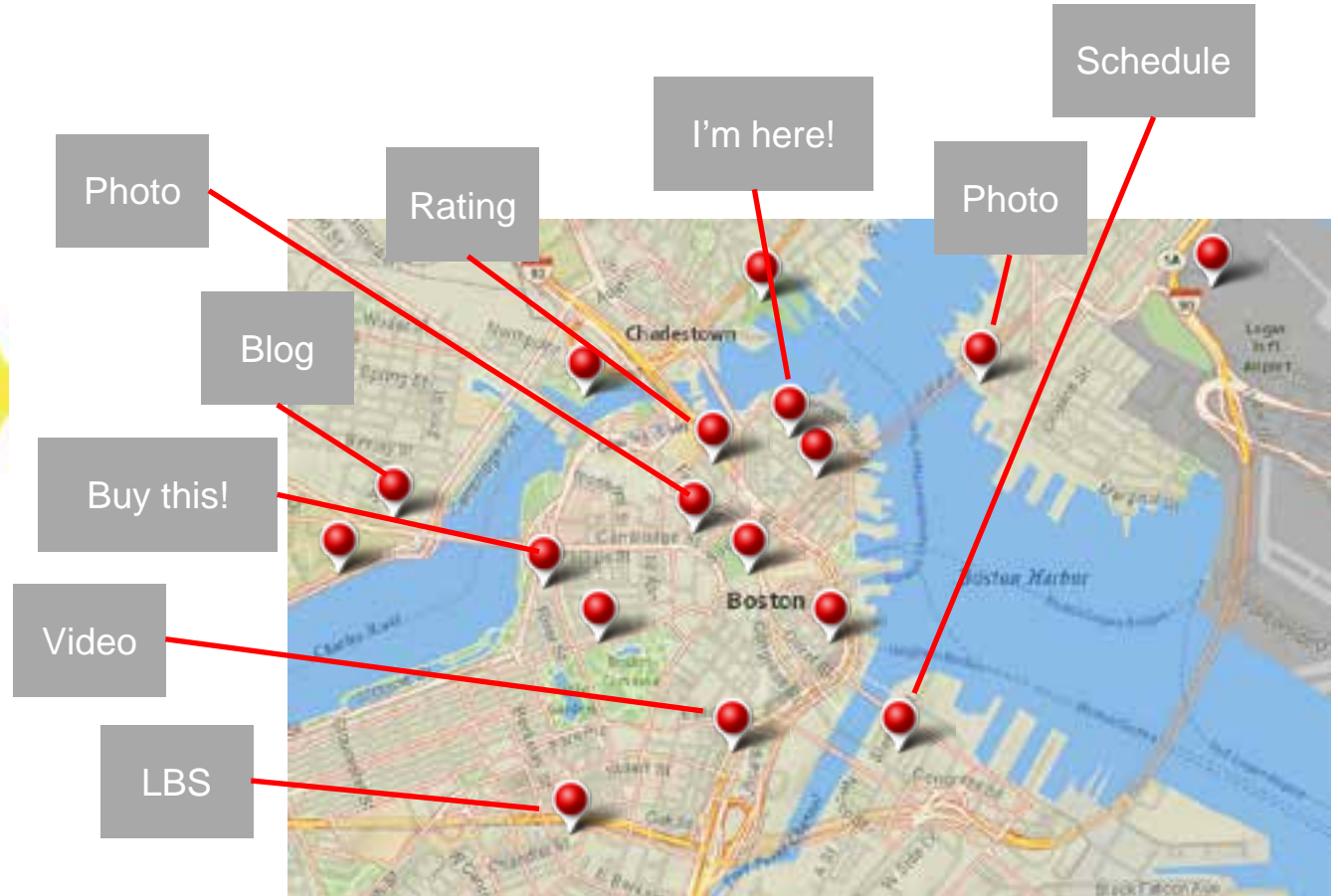
Maps are *deep*

Cartography in the Digital Age

They're a
window into
worlds of
information



This far
outweighs any
shortcoming



Lesson:
**Turn
challenges
into assets**



Sistine Chapel ceiling's awkward shapes...



...are the framework for Michelangelo's masterpiece

2



Elements of web and mobile maps

Elements of Web and Mobile Maps

App or framework
(user experience)

The White House Celebrates the Maker Faire Movement

A story map

On June 18, the White House hosts a Maker Faire, bringing together exhibitors, prominent Makers, supporting universities and libraries, and supporting mayors to celebrate a nation of innovators.

esri

1 White House Maker Faire: Exhibitors and Honored Makers

America has always been a nation of tinkers, inventors, and entrepreneurs. In recent years, a growing number of Americans have gained access to technologies like 3D printers, laser cutters, easy-to-use design software, and desktop machine tools, democratizing the act of making and enabling citizens to build just about anything. To celebrate this Maker Movement, we are hosting the first-ever White House Maker Faire on June 18th. We'll feature makers, innovators, and entrepreneurs of all ages who are using cutting-edge tools to bring their ideas to life.

In addition to the Makers

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

Popups and map
actions

The screenshot shows a web-based story map interface. At the top, the title "The White House Celebrates the Maker Faire Movement" is displayed in white text on a dark background. Below the title, a short introductory paragraph reads: "On June 18, the White House hosts a Maker Faire, bringing together exhibitors, prominent Makers, supporting universities and libraries, and supporting mayors to celebrate a nation of innovators." The Esri logo is visible in the top right corner.

The main content area is divided into three vertical sections. On the left, a grey sidebar contains a large white number "1" followed by the heading "White House Maker Faire: Exhibitors and Honored Makers". Below this heading is a block of text: "America has always been a nation of tinkers, inventors, and entrepreneurs. In recent years, a growing number of Americans have gained access to technologies like 3D printers, laser cutters, easy-to-use design software, and desktop machine tools, democratizing the act of making and enabling others to build just about anything. To celebrate this Maker Movement, we are hosting the first-ever White House Maker Faire on June 18th. We'll feature makers, innovators, and entrepreneurs of all ages who are using cutting-edge tools to bring their ideas to life. In addition to the Makers".

The central and right portions of the screen are dominated by a map of the United States. The map is overlaid with numerous red circular markers, each representing a location. A popup window is currently open over a marker in the San Francisco area. The popup has a white background and a dark border. It contains the following text: "(1 of 10)", "Underwater Robot Born in Garage Explores World's Oceans", and "David Lang, 29, and Eric Stockpole, 28, Berkeley California". Below the text is a small photograph showing two men working on a project in a workshop. At the bottom of the popup, the text "After learning about an underwater" is visible. The map interface includes standard navigation controls on the left (a vertical toolbar with a plus sign, a home icon, and a minus sign) and a legend in the top right corner. The Esri logo is also present in the bottom right corner of the map area.

Elements of Web and Mobile Maps

Cartography: Map details?

App or framework
(user experience)

The map

Popups and map
actions

Legends and other
ancillary items



Elements of Web and Mobile Maps

App or framework
(user experience)

The map

Popups and map
actions

Legends and other
ancillary items

Cartography: All elements of design and communication



Elements
of Web and
Mobile Maps

User Experience **Vs.** Cartography

Elements
of Web and
Mobile Maps

User Experience = Cartography

They're inseparable

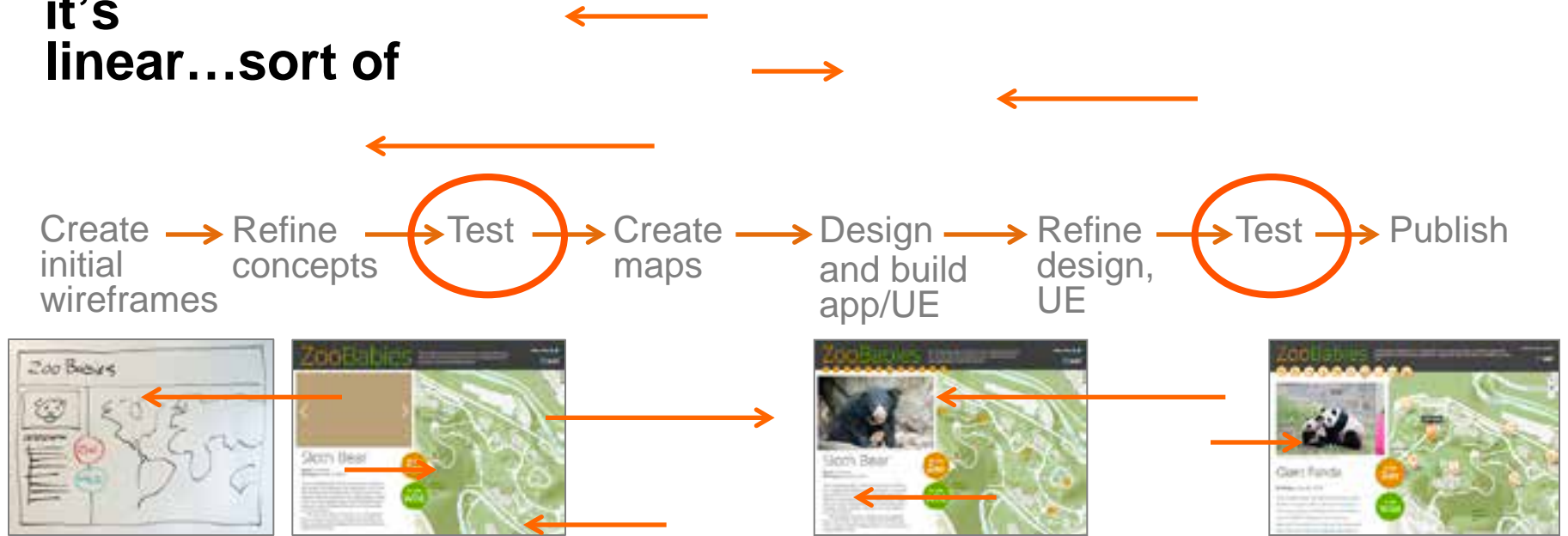
3



The process

It's linear...sort of

The process it's linear...sort of

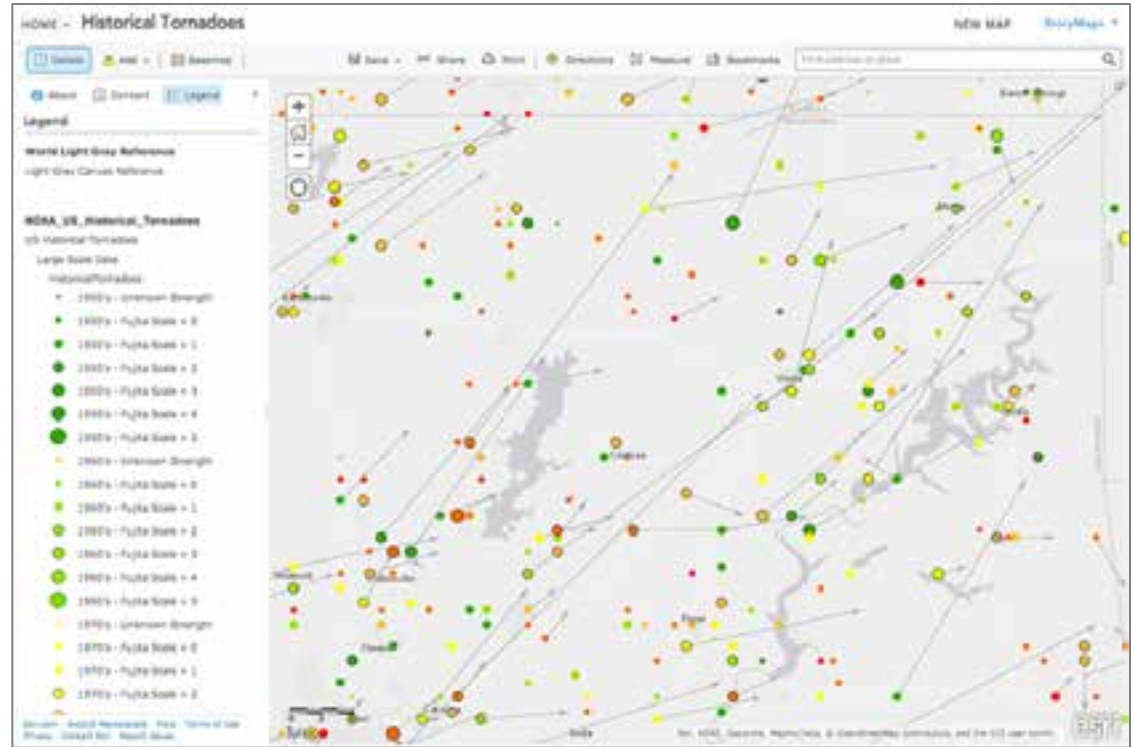


Iteration, experimentation, trial and error is part of the process

Testing is vital!

Case Study: Tornado Dashboard

Idea:
Show tornadoes
through space and
time



Case Study: Tornado Dashboard

Initial sketch

Concept:

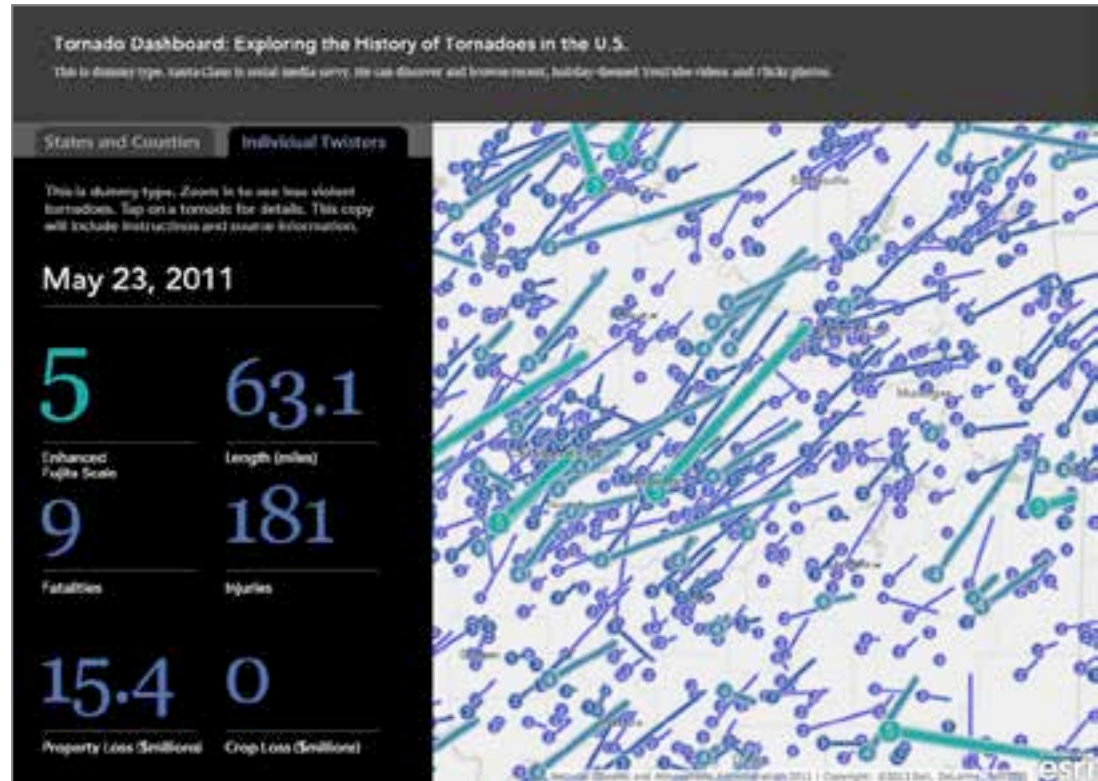
- Summarize tornado totals by state
- Facts and figures for each twister



Case Study: Tornado Dashboard

Mockups: First round

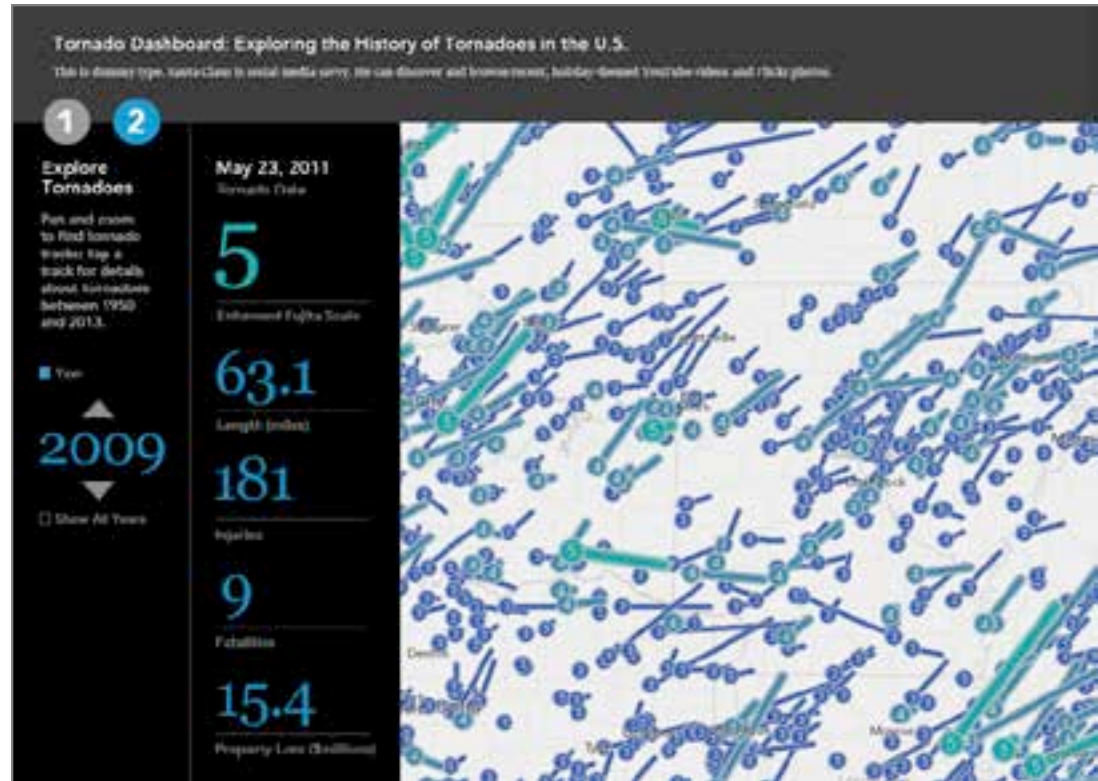
- First tab: State totals
- Second tab: Stats for individual tornadoes



Case Study: Tornado Dashboard

Second round

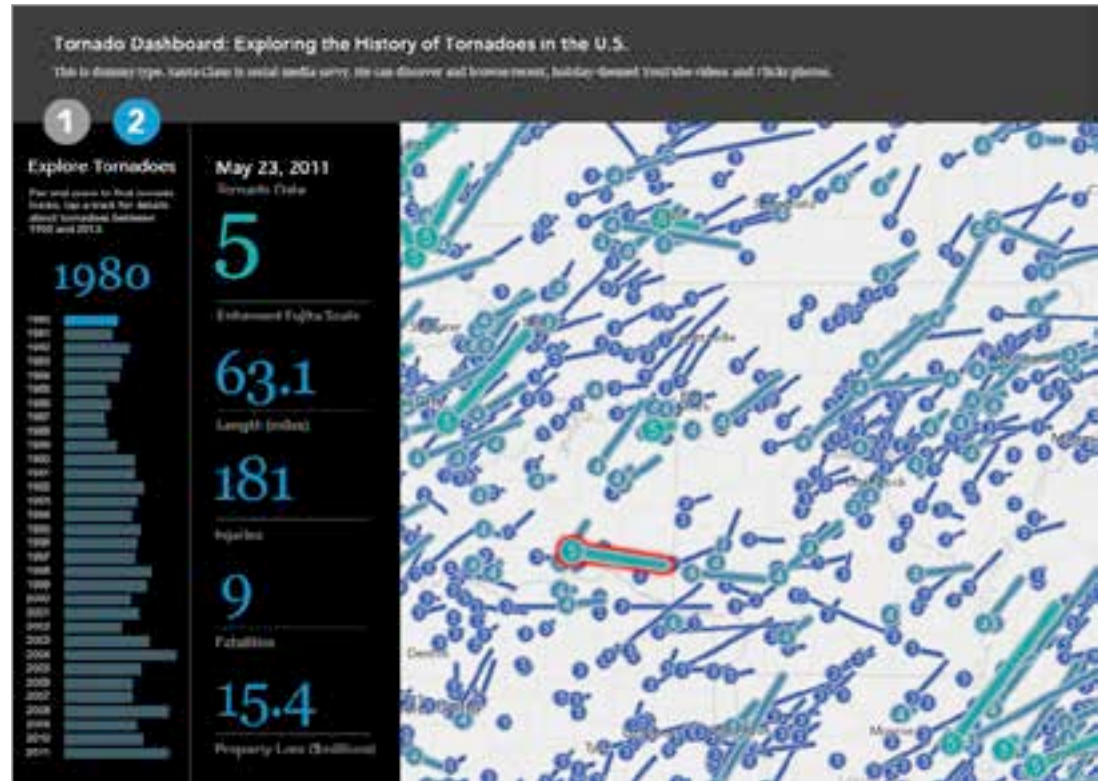
- Numbers instead of tabs
- Slide-out stat panels after click



Case Study: Tornado Dashboard

Third round

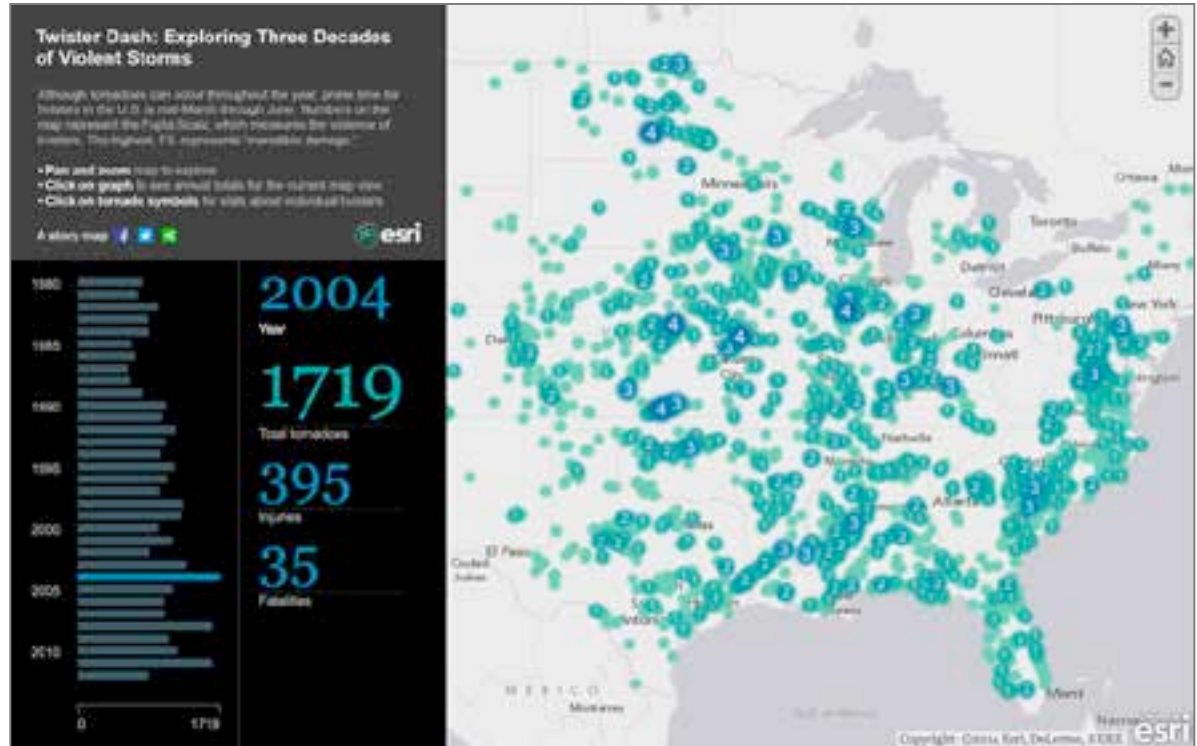
- Dynamic graph shows total twisters by map extent
- Click on tornado for individual twister stats



Case Study: Tornado Dashboard

Fourth round

- Eliminate state summaries
- Remove top banner
- Refine cartography



Case Study: Tornado Dashboard

Published app

- Removed Fujita numbers from map

Moral:
iteration,
modification,
experimentation
improved the
map



4



Some **CLUES** to making
great digital maps

Some
CLUES to
making
great maps
in the
digital age

1. **C**onnects with its audience
2. **L**imits user options
3. **U**ser experience supports the story
4. **E**asy-to-read maps
5. **S**trives for simplicity

C L U E S
**Connect
with your
audience**



Think of your mom

Step back and explain things

Avoid being technical

Be informal but respectful

CLUES

Connect with your audience

Think about your **primary** audience

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



CLUES

Limit user options

The best maps and apps do one thing really well

An all-purpose map viewer may make sense once in a while...



But a focused, single-purpose app will better serve a specific audience

CLUES

User experience supports the story

There are lots of ways to interact with maps

Locate



Navigate



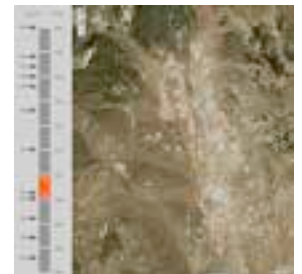
Compare



Narrate



Show change



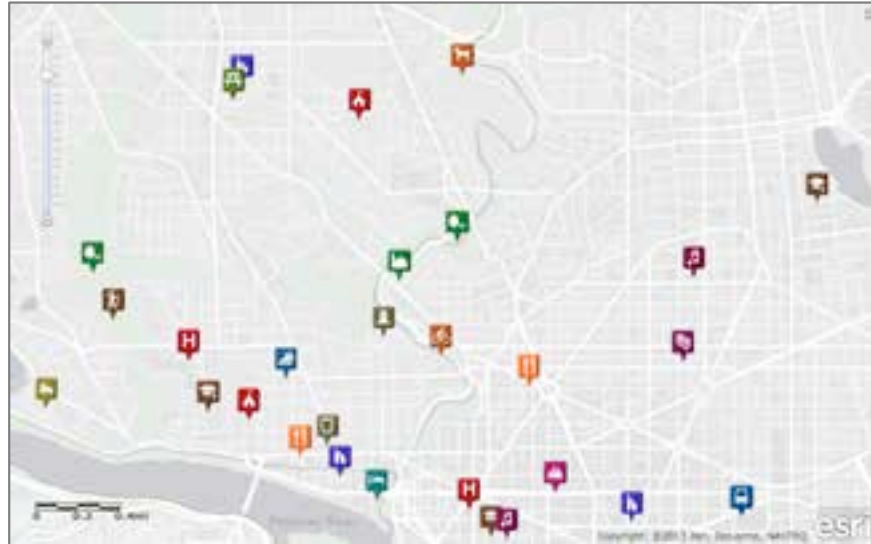
Think about the job your map is doing, and choose the means by which users will experience your story

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

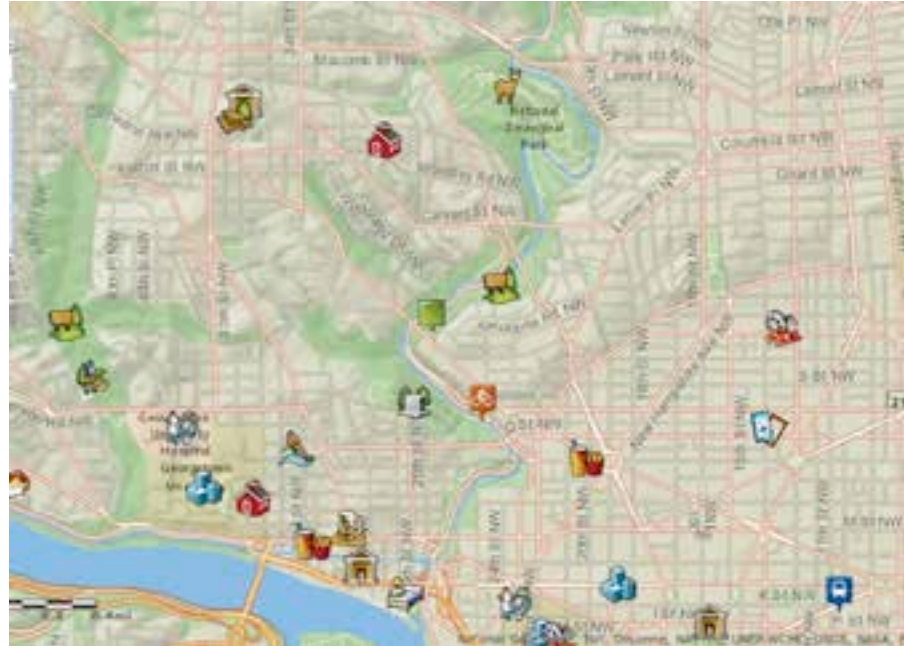


Simple
shapes are
usually
better than
pictographs

CLUES

Easy-to-read maps

Avoid visually complex symbols and icons



CLUES

Easy-to-read maps

Several simple maps are much better than one complex one



Crop yields

Yield gaps

Water use

Crop use

User experience can parse a complex story into simpler components

CLUES

Strive for Simplicity

Eliminate unnecessary options

USER EXPERIENCE



Avoid “GIS-y” functions:
No arrays of little icons

CLUES

Strive for Simplicity

Eliminate unnecessary options

USER EXPERIENCE



No rows of obscure icons, no long lists of options

VISUAL



Avoid unnecessary lines, rules, drop shadows, etc.

EDITORIAL



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

CLUES

Strive for Simplicity

Eliminate
unnecessary
options

The image is a screenshot of a digital article titled "GOOD WANDERLUST". At the top left, the word "GOOD" is in a large, bold, black font, followed by "WANDERLUST" in a smaller, bold, black font. Below this, a subtitle reads "GOOD maps out history's greatest journeys, from Hippokrat to Kinnear". In the top right corner, there is a link that says "Back to article".

The main content area features a dark grey box with the title "Cook's Endeavour Voyage 1768-1777". Below the title is a paragraph of text: "Captain James Cook was commissioned in 1768 by the British Royal Society to travel to the Pacific and observe Venus passing in front of the sun to help determine the distance between Earth and the sun (Cook's measurements—and those of the 75 other observers around the world—were accurate enough to make the calculation). After completing the assignment, Cook and the crew of his ship, the Endeavour, undertook the first complete mapping of the coast of New Zealand, Tasmania and the eastern coast of Australia." To the right of the text is a small portrait of Captain James Cook. Below the text and portrait is a button that says "EXPLORE" with a right-pointing arrow.

Below the dark grey box is a large, light-colored world map. A blue line traces the path of Captain Cook's voyage, starting in the North Atlantic, crossing the Atlantic Ocean, sailing around the southern tip of Africa, crossing the Indian Ocean, and then sailing around the southern tip of Australia and back to Europe. The continents are labeled in large, bold, black letters: "NORTH AMERICA", "SOUTH AMERICA", "AFRICA", "ASIA", and "AUSTRALIA".

In the bottom right corner of the map area, there is a small caption that reads "A collaboration between GOOD and Overseas Roberts".

awesome.good.is/features/011/Wanderlust/index.html

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

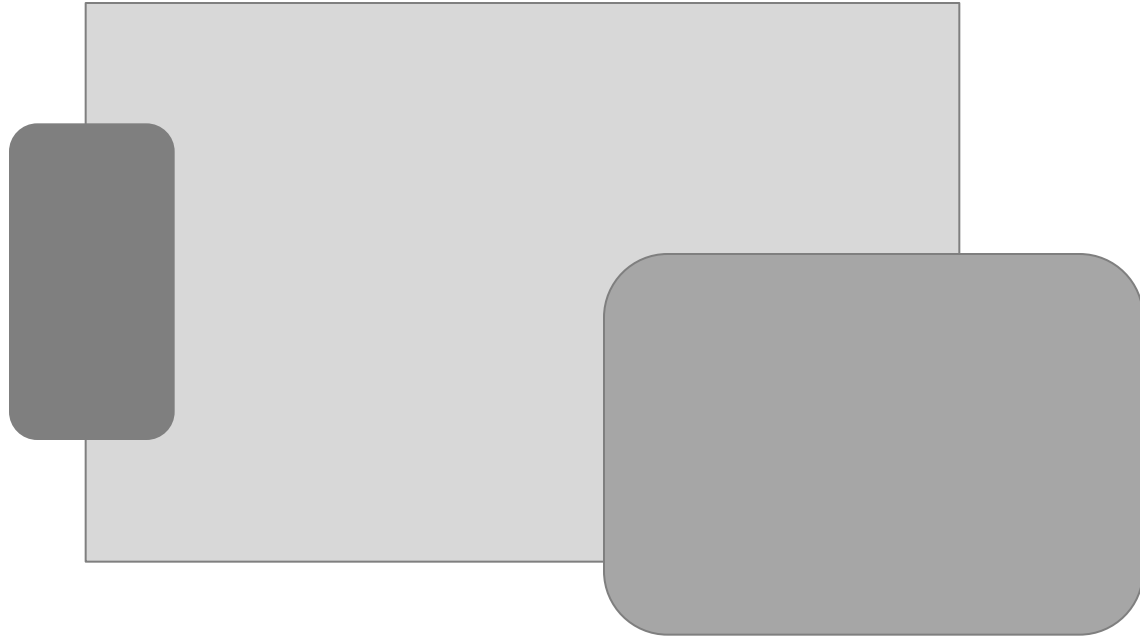


Some **tips** on
designing digital maps

PC, tablets, and mobile: the challenge of **screen** **sizes**

Not just size, but context and user interaction

Your maps
have to work
within this
variety of sizes



PC, tablets, and mobile: the challenge of **screen** **sizes**

Responsive design

PC: *Click, scroll*

Mobile:
*Tap,
swipe*



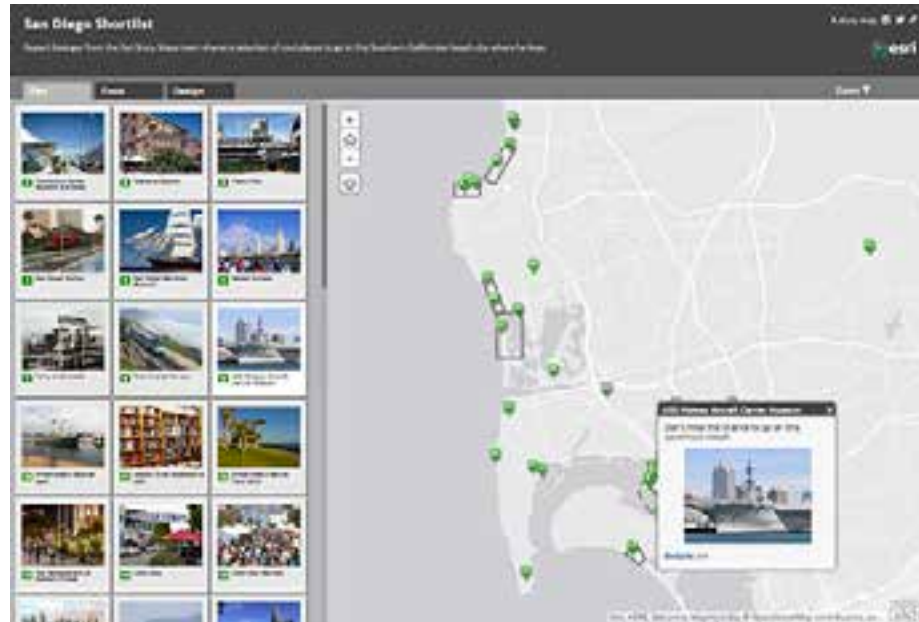
Tablet:
*Tap,
swipe*

...and *separate functions*

PC, tablets, and mobile: the challenge of **screen** **sizes**

Responsive design:
separating functions

Tabs



Popups

Thumbnails

PC, tablets, and mobile: the challenge of **screen** **sizes**

Responsive design:
separating functions

Tap



Tabs

Swipe



Thumbnails

Tap



Popups

Design tips: Minimalism

Clean, open, modern
design

Is it here to
stay?

Yes.

The image is a screenshot of a website with two distinct sections. The top section has a white background and is titled 'Build mobile and web apps'. It features a green button and an illustration of a computer monitor and a smartphone. The bottom section has a light gray background and is titled 'Design beautiful maps'. It features a blue button and an illustration of a map with a location pin and a pen nib.

Build mobile and web apps

Our open source APIs and SDKs let you quickly style and add custom maps to your application. We make it possible to pin travel spots on [Pinterest](#), find restaurants on [foursquare](#), and visualize data on [GitHub](#).

[View gallery →](#)

Design beautiful maps

Quickly create beautiful interactive maps and data visualizations using our open source design studio, [TileMill](#), and publish directly to [Mapbox.com](#) to share with the world. For basic customization, create maps with our [online Map Editor](#).

[Design maps →](#)

Design tips: Minimalism

Flat, 2-D design
(no simulated third
dimension, no drop
shadows)

Is it here to
stay?

Probably not.



Old iPhone



New iPhone

Design tips: Minimalism

Super, super skinny
type everywhere

Is it here to
stay?

Hope not.



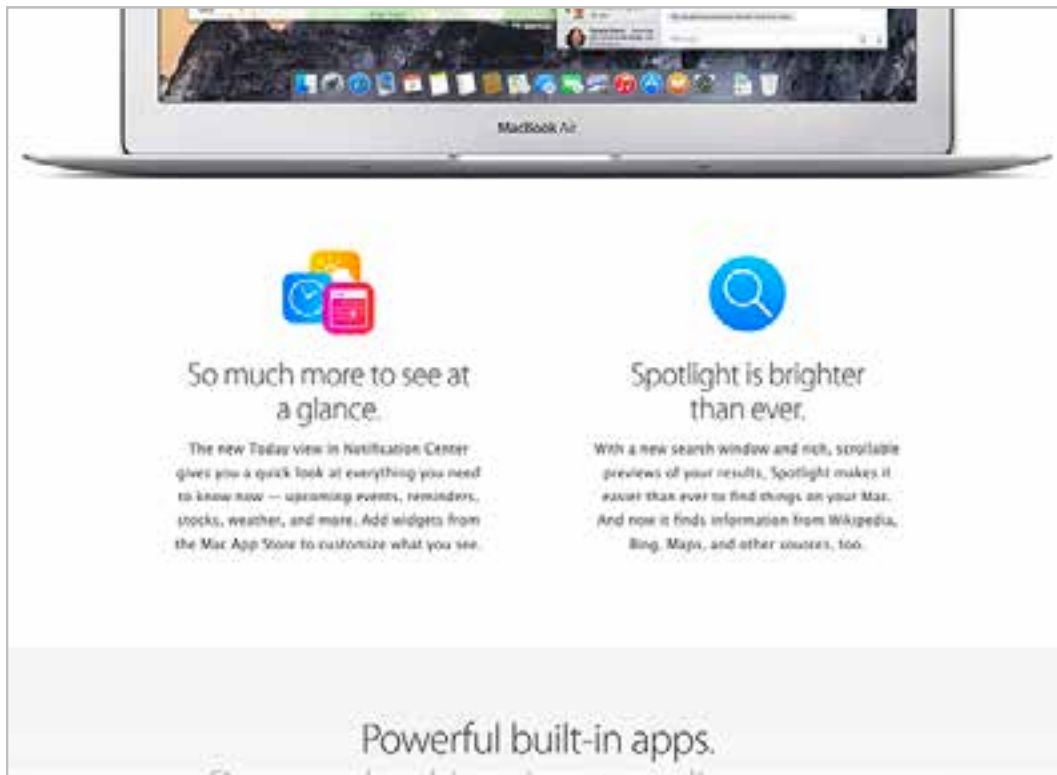
Design tips:

Think vertical

How do you make room for all that open, clean design?

Scrolling is cool.

(but are we overdoing it?)

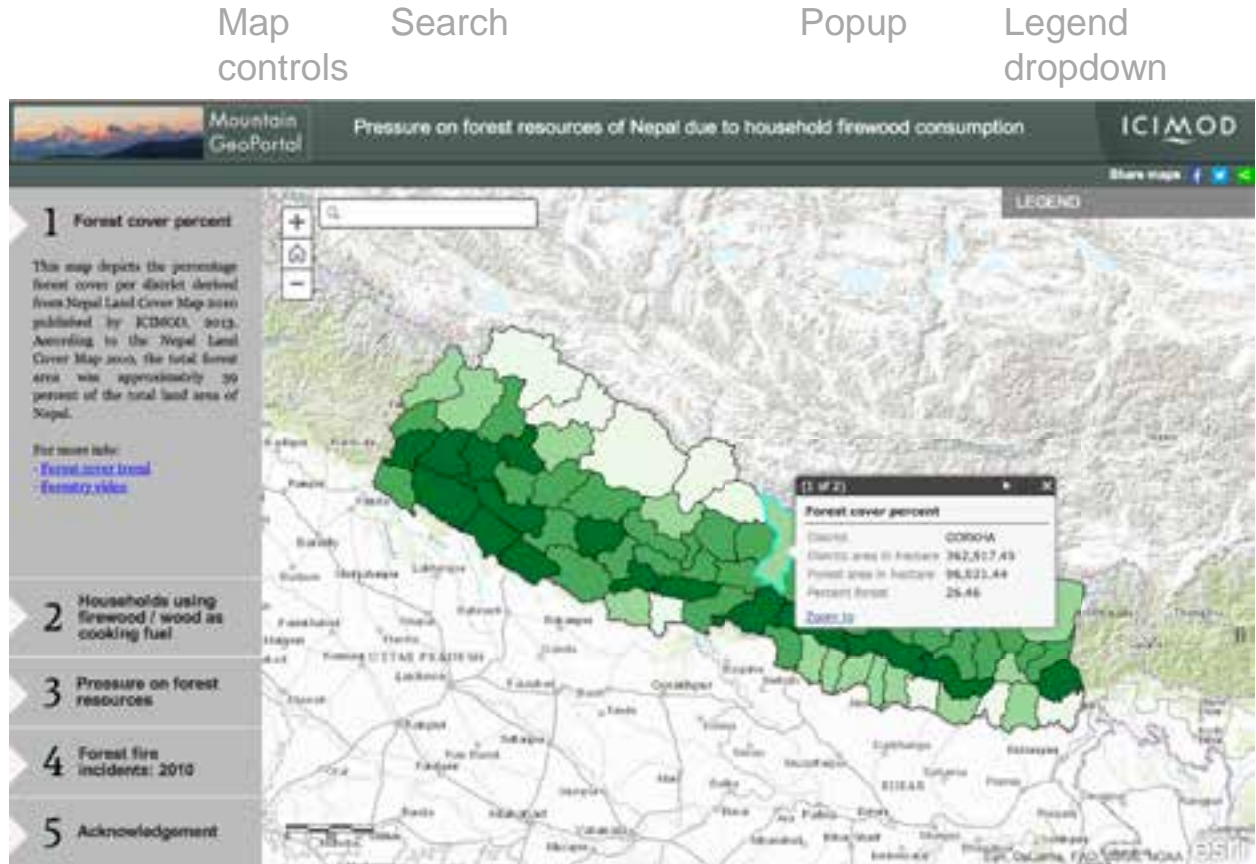


Design tips: Simple user experience

Limited choices,
intuitive design

Don't be afraid
to use overt
clues

Side
panel
tabs



Numbers

Design tips: Simple user experience

Limited choices,
intuitive design

Don't be afraid
to use overt
clues

...and to parse
UE into steps

The screenshot displays the USGS Historical Topographic Map Explorer interface. At the top, the title "USGS Historical Topographic Map Explorer" is visible alongside the USGS and Esri logos. The main map area shows a historical topographic map of New Orleans, Louisiana, with a red crosshair indicating the current location. To the left of the map, there is a search bar containing "New Orleans" and a "Go" button. Below the search bar, a green circle with the number "3" is followed by the instruction: "Slide transparency on map to compare, or drag/throw to re-order maps." Below this, there is a thumbnail of a historical map labeled "New Orleans East 1839" with a "download map" link and a transparency slider. At the bottom of the interface, there is a "Historical Map Scales" section. It features a vertical color scale legend with five levels: 250,000 (dark blue), 125,000 (medium blue), 62,500 (teal), 31,250 (light green), and 12,000 (bright green). To the right of the legend is a horizontal timeline with a red vertical line indicating the current map's scale. The timeline is labeled with "New Orleans" and various "New Orleans [Scale]" labels corresponding to the scale levels. At the bottom of the timeline, a series of numbers is displayed: 85 1896 1898 1900 1901 9 - 01 91 5 1920 02 5 1930 03 5 1 940 145 1950 19 5 1 960 196 1 970 1 975 1980 1 983 1990 1995 0000.

Design tips: Map and context

Map and
website/app should
be seamlessly
integrated (2-3
examples)

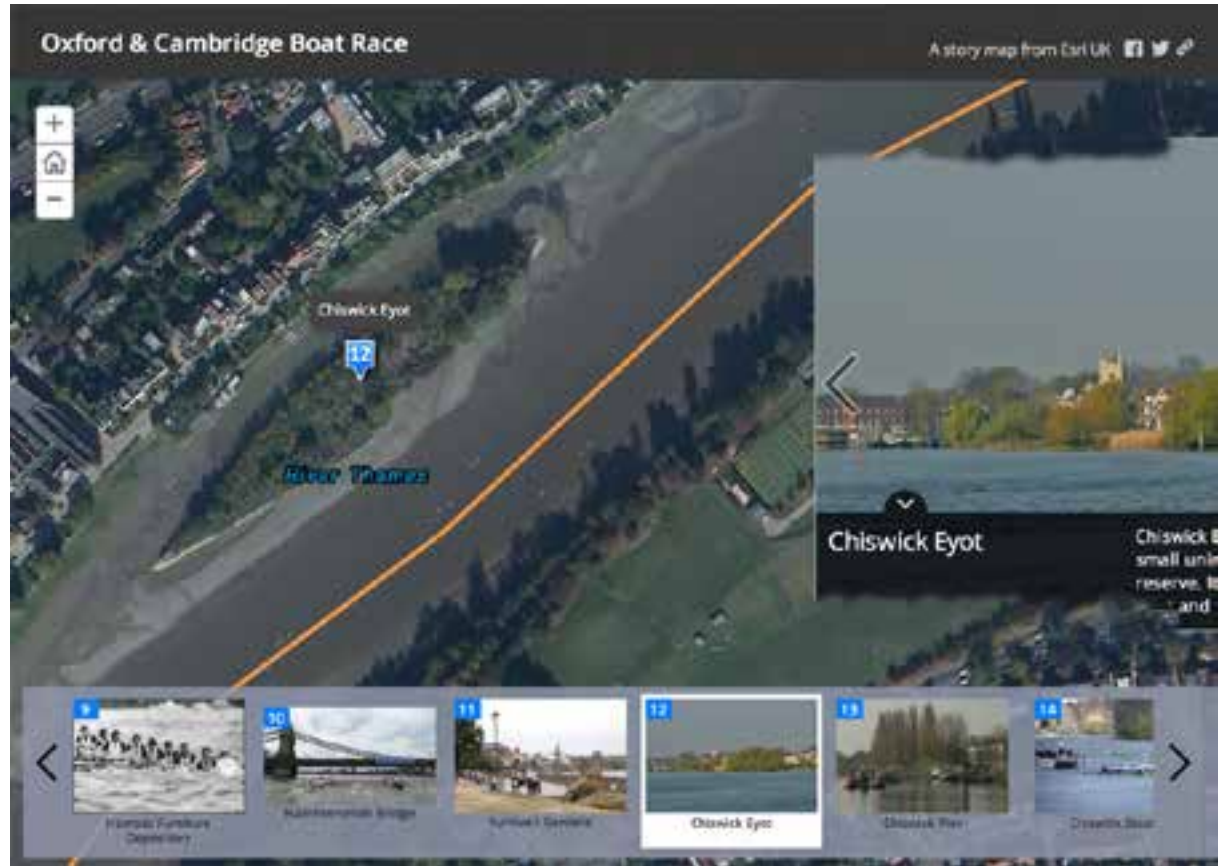
Example: City of St.
Albert, Alberta



Design tips: don't be satisfied

Current Map Tour

...is starting to feel
boxy and dated



Design tips: don't be satisfied

Future Map Tour?

More immersive



Design tips: don't be satisfied

Future Map Tour?

Give user choices



Design tips: Publishing isn't a **one-time** **thing**

You can (and should)
tweak, improve,
enhance

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

The image shows the Esri Story Maps website homepage. At the top, there is a navigation bar with links for 'Story Maps', 'APPS', 'GALLERY', 'COLLECTIONS', 'SUPPORT', and 'BLOG'. The Esri logo is in the top right corner. The main header features a blue background with the text 'Use Story Maps to Inform and Inspire Your Audience'. Below this, a sub-header reads 'Story maps combine interactive maps and multimedia content into elegant user experiences. They make it easy for you to harness the power of maps to tell your stories.' There are two buttons: 'WHAT'S A STORY MAP?' and 'FOLLOW US'. To the right, a tablet and a smartphone display various Story Map examples. Below the header is a section titled 'Featured Story Maps' with the subtext 'Get ideas for your own story maps from these examples created by a growing community of authors. View more story maps in our Gallery.' This section contains two rows of six Story Map thumbnails each, each with a title below it: 'iStockphoto Twitter Map', 'Birds Beyond The Borders', 'Zoo Babies', 'World Cup Venues', 'Full or Empty?', 'Elephant Poaching', 'Twitter Dashboard', 'The White House Celebrates', 'Invasive Tomahawk, Little Fish, Big', 'The Unknown World on the Ocean Floor', 'A Year in the Life of a Piping Plover', and 'San Diego Essential'.

Design tips: Look around!

Be inspired by what
others are doing

Snow Fall | 7:48 AM | TO THE PLAN | SEARCH NEWS | SIGN UP NOW | TAGS | NEWS FEEDS | APP THE GOOP

Middle East: Battlelines drawn
By Michael Peck

Fears are growing the Syrian war might become a region-wide religious conflict

The Syrian soldier unlocked a bullet-pocked gate at south Damascus's Rayada Zahra shrine, revealing a near-deserted street where sandbags and concrete blocks walled off the side roads from the battlezone beyond.

The neutral thoroughfare of this more religiously-minded area has for the past year been a dividing line, separating the powerful government-controlled Shia Muslim majority district on one side of the mainline from the rebellious Sunni-dominated suburbs on the other.

Choose a location and filter the content below and above the map.

- Syria (30.0%)
- Turkey (20.0%)
- Jordan (15.0%)
- Lebanon (10.0%)
- Iraq (5.0%)
- Egypt (5.0%)
- Other

► Reset map

THE MYSTERIOUS DISAPPEARANCE OF MALAYSIA AIRLINES FLIGHT MH370

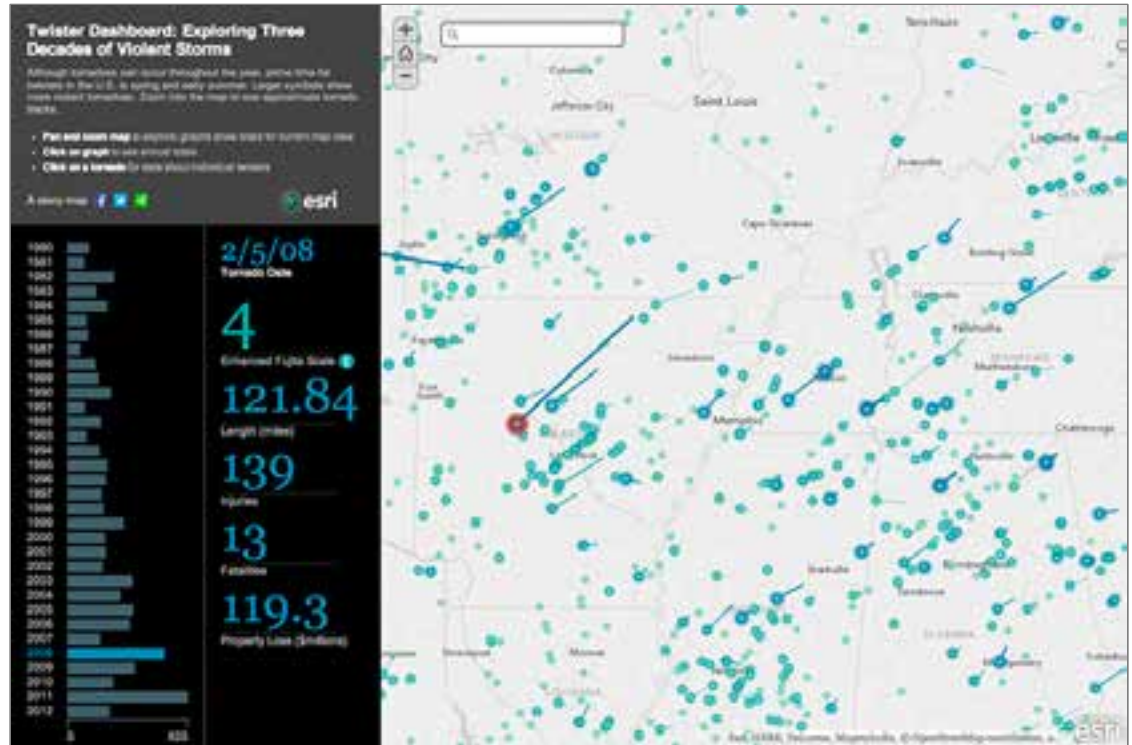
Malaysia's flight MH370 disappeared on the night of March 8, 2014, and a successful search is underway to find the missing plane. The likelihood is a combination of errors, with no signs in Malaysian local time according to an recent statement by government officials in London.

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



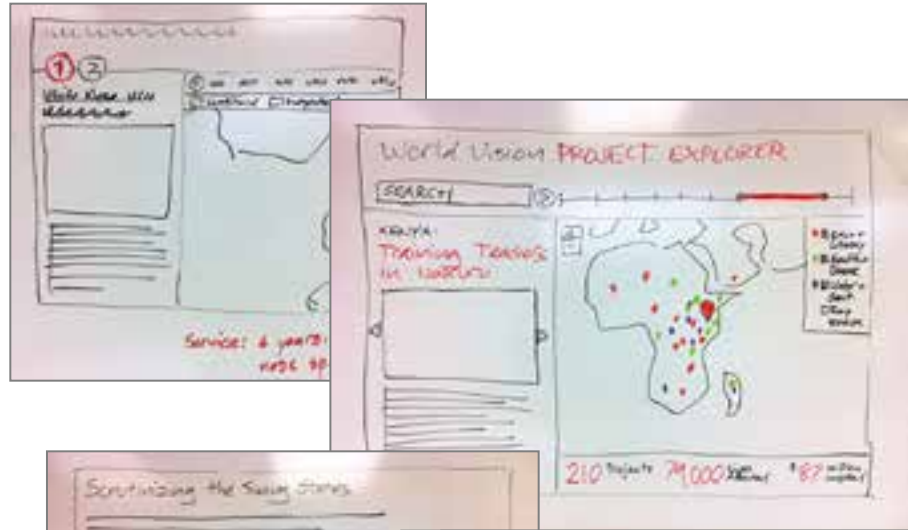
The process: Brainstorm and sketch

Great digital tools:
Markers and whiteboard

Outline key elements

Develop rough
wireframes

Tools? Balsamiq,
Photoshop,
PowerPoint, Pencil!



The process: Iterate and test

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

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

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**; eliminate non-essentials
- **Single**-purpose to fit priority audience
- Map and context work **together**
- Cartography includes **user** experience
- Digital - screens small, but maps **deep** (it's a new medium...take advantage of it!)

Thank you...

Please fill out the session survey:

ID: 1382

Online – www.esri.com/ucsessionsurveys

Paper – pick up and put in drop box

Open Discussion

Larry Orman

larry@greeninfo.org

www.greeninfo.org



Allen Carroll

acarroll@esri.com

www.esri.com/storymaps

