DataScience for Development and Social Change, 2015

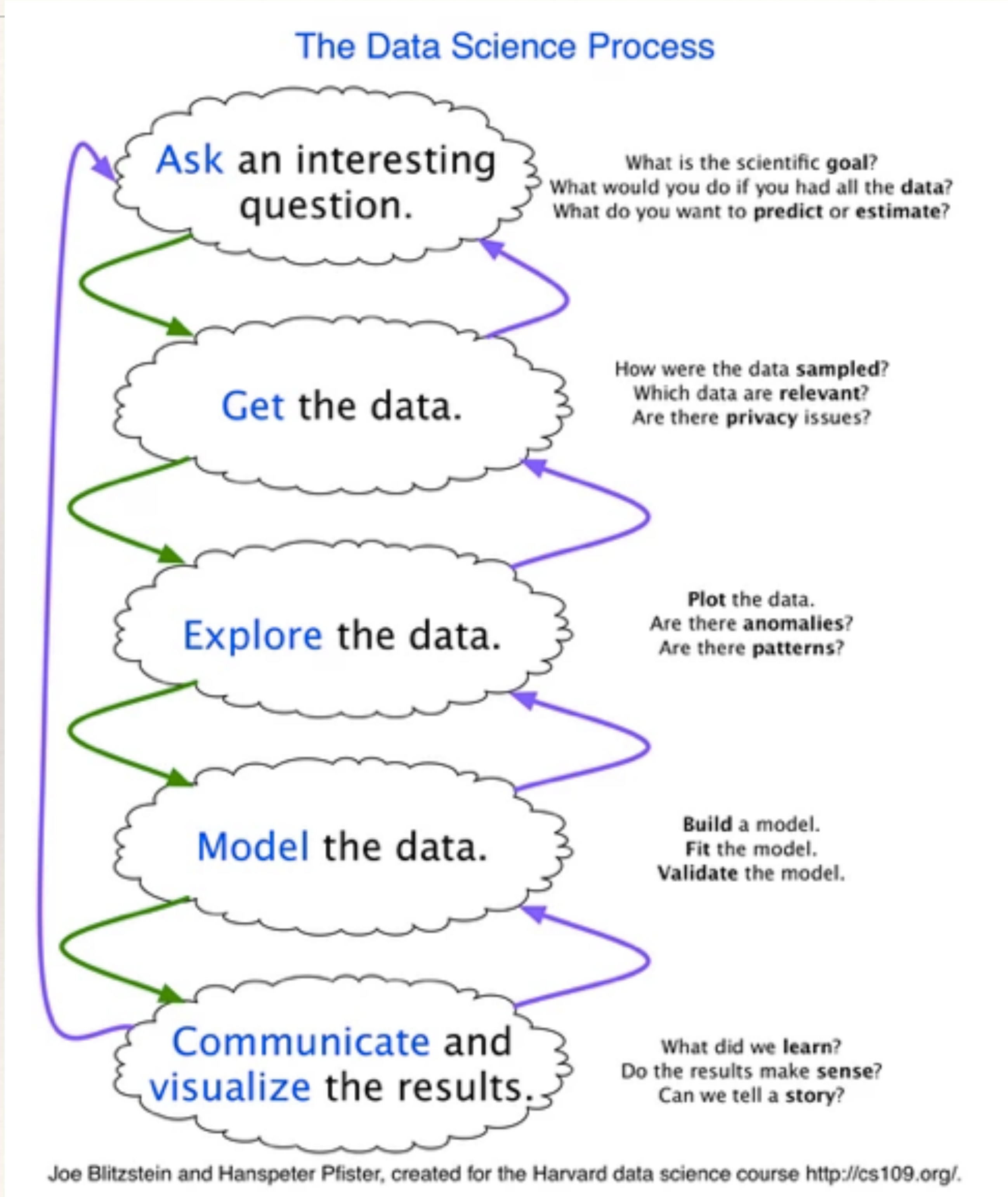
Process

Knowing what you want to build and why

Prerequisites

- None

Process



The Data Science Process

Ask an interesting question.

What is the scientific **goal**?
What would you do if you had all the **data**?
What do you want to **predict** or **estimate**?

Get the data.

How were the data **sampled**?
Which data are **relevant**?
Are there **privacy** issues?

Explore the data.

Plot the data.
Are there **anomalies**?
Are there **patterns**?

Model the data.

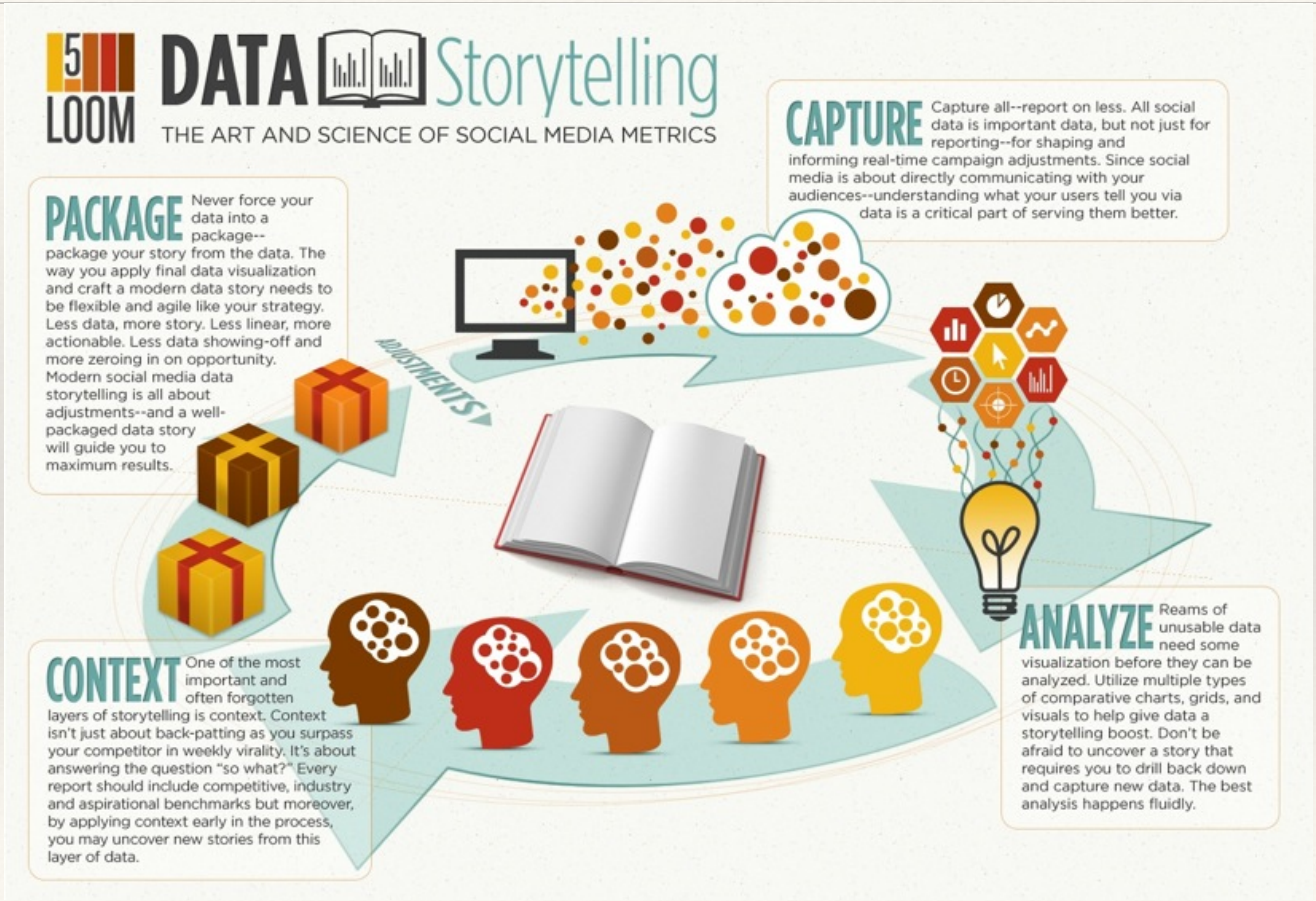
Build a model.
Fit the model.
Validate the model.

Communicate and visualize the results.

What did we **learn**?
Do the results make **sense**?
Can we tell a **story**?

Joe Blitzstein and Hanspeter Pfister, created for the Harvard data science course http://cs109.org/.

Process



DATA Storytelling

THE ART AND SCIENCE OF SOCIAL MEDIA METRICS

CAPTURE Capture all--report on less. All social data is important data, but not just for reporting--for shaping and informing real-time campaign adjustments. Since social media is about directly communicating with your audiences--understanding what your users tell you via data is a critical part of serving them better.

ANALYZE Reams of unusable data need some visualization before they can be analyzed. Utilize multiple types of comparative charts, grids, and visuals to help give data a storytelling boost. Don't be afraid to uncover a story that requires you to drill back down and capture new data. The best analysis happens fluidly.

CONTEXT One of the most important and often forgotten layers of storytelling is context. Context isn't just about back-patting as you surpass your competitor in weekly virality. It's about answering the question "so what?" Every report should include competitive, industry and aspirational benchmarks but moreover, by applying context early in the process, you may uncover new stories from this layer of data.

PACKAGE Never force your data into a package--package your story from the data. The way you apply final data visualization and craft a modern data story needs to be flexible and agile like your strategy. Less data, more story. Less linear, more actionable. Less data showing-off and more zeroing in on opportunity. Modern social media data storytelling is all about adjustments--and a well-packaged data story will guide you to maximum results.

Process

- OSEMN: Obtain-Scrub-Explore-Model-Interpret
    - Obtain datasets
    - Clean, combine, transform data
    - Explore the data
    - Try models (classification, machine learning etc)
    - Interpret and communicate your results

http://machinelearningmastery.com/how-to-work-through-a-problem-like-a-data-scientist/

First, ask a good question

- Understand your target audience
- Write hypotheses that can be explored
  - Do people have more phones than toilets?
  - How is Ebola spreading?
  - Is using wood fires sustainable here?
  - Can we feed 9 billion people?

(Simple, Actionable,Incremental)

Borrowing from User Experience

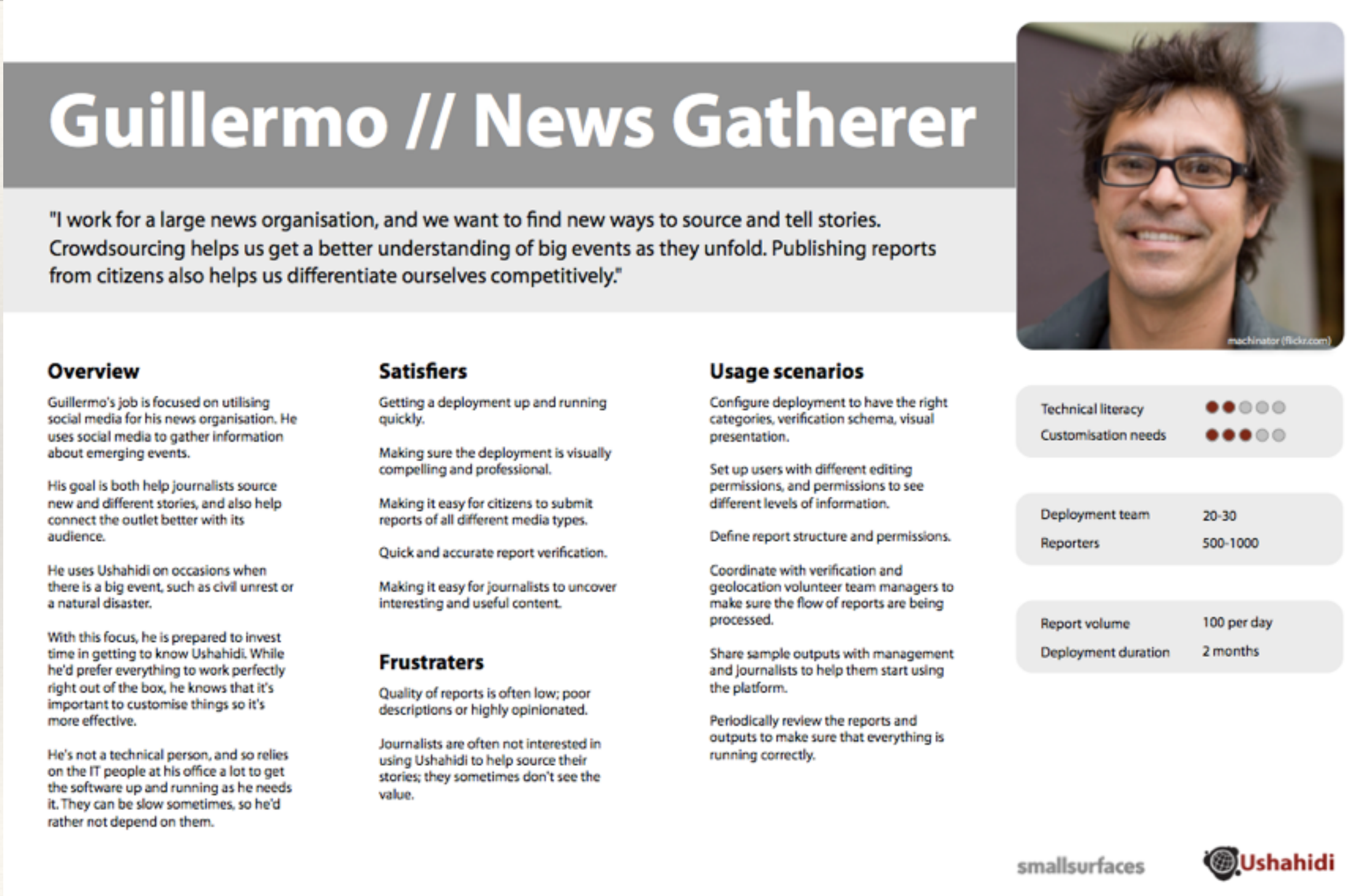
- Personas
  - Who are you trying to influence/ inform?
- User stories
  - What are your users' goals?

Good training sites: http://theuxreview.co.uk/series/beginners-guide-to-ux/ http://www.uxapprentice.com/

Personas

- Get to know the people who will use your system
- Understand their problem
- Understand how people already solve that problem
- Create **personas:** examples of each type of user
    - http://theuxreview.co.uk/personas-the-beginners-guide/

Ushahidi Persona



Guillermo // News Gatherer

"I work for a large news organisation, and we want to find new ways to source and tell stories. Crowdsourcing helps us get a better understanding of big events as they unfold. Publishing reports from citizens also helps us differentiate ourselves competitively."

machinator (flickr.com)

Overview

Guillermo's job is focused on utilising social media for his news organisation. He uses social media to gather information about emerging events.

His goal is both help journalists source new and different stories, and also help connect the outlet better with its audience.

He uses Ushahidi on occasions when there is a big event, such as civil unrest or a natural disaster.

With this focus, he is prepared to invest time in getting to know Ushahidi. While he'd prefer everything to work perfectly right out of the box, he knows that it's important to customise things so it's more effective.

He's not a technical person, and so relies on the IT people at his office a lot to get the software up and running as he needs it. They can be slow sometimes, so he'd rather not depend on them.

Satisfiers

Getting a deployment up and running quickly.

Making sure the deployment is visually compelling and professional.

Making it easy for citizens to submit reports of all different media types.

Quick and accurate report verification.

Making it easy for journalists to uncover interesting and useful content.

Frustraters

Quality of reports is often low; poor descriptions or highly opinionated.

Journalists are often not interested in using Ushahidi to help source their stories; they sometimes don't see the value.

Usage scenarios

Configure deployment to have the right categories, verification schema, visual presentation.

Set up users with different editing permissions, and permissions to see different levels of information.

Define report structure and permissions.

Coordinate with verification and geolocation volunteer team managers to make sure the flow of reports are being processed.

Share sample outputs with management and journalists to help them start using the platform.

Periodically review the reports and outputs to make sure that everything is running correctly.

Technical literacy	●●○○○
Customisation needs	●●●○○

Deployment team	20-30
Reporters	500-1000

Report volume	100 per day
Deployment duration	2 months

smallsurfaces

Ushahidi

User Stories

- Look like this:
  - **As a** <role>
  - **I want to** <goal>
  - **in order to** <benefit>

- For example:
  - As a minister for agriculture, I want to know where wheat crops are underperforming and why, so I know where to concentrate resources like education
  - As a director of tree services, I want to predict the trees that might become dangerous in storms, so I can send crews out to manage them before that happens

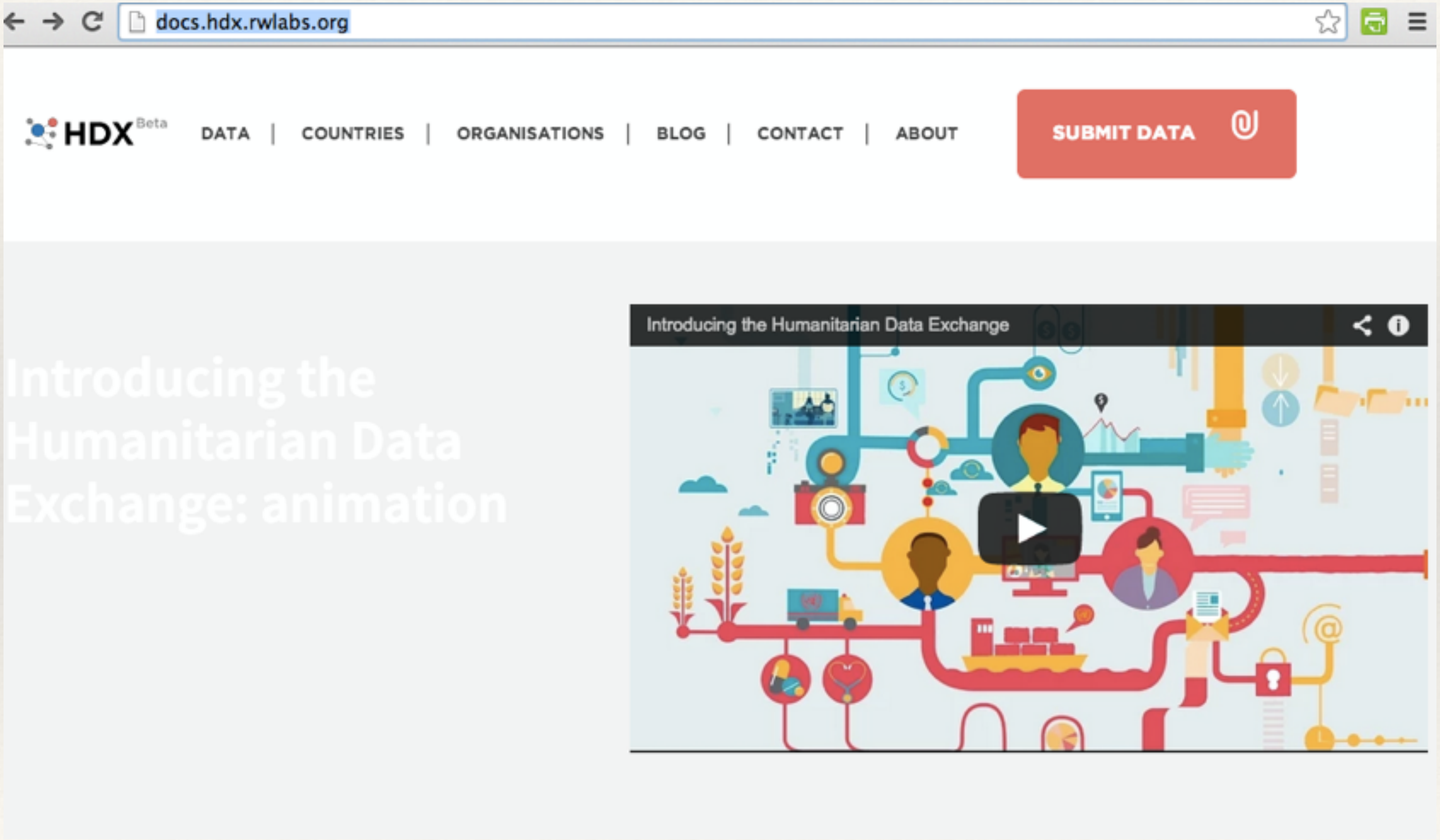
Exercise!

- Think about the people you want to inform/influence
- Write 1-paragraph persona description for 1-2 of these
- Write 1 or more user stories for them:
    - **As a** <role>
    - **I want to** <goal>
    - **in order to** <benefit>

Get your data

- find data
- pull data (automatically)
- clean data
- reformat data

Find Data


docs.hdx.rwlabs.org

Introducing the Humanitarian Data Exchange: animation

Introducing the Humanitarian Data Exchange

Pull Data

- Download
- Use APIs
- Scrape
- Create your own (surveys, crowdsourcing, sensors etc)

Exercise!

- List the data you need for your user stories
- Look for that data (see example code directory)
- Think about what you'll do if data isn't available
  - Use proxy datasets
  - Create datasets: surveys, crowdsourcing etc
- Download some example data (if available)

Clean Data

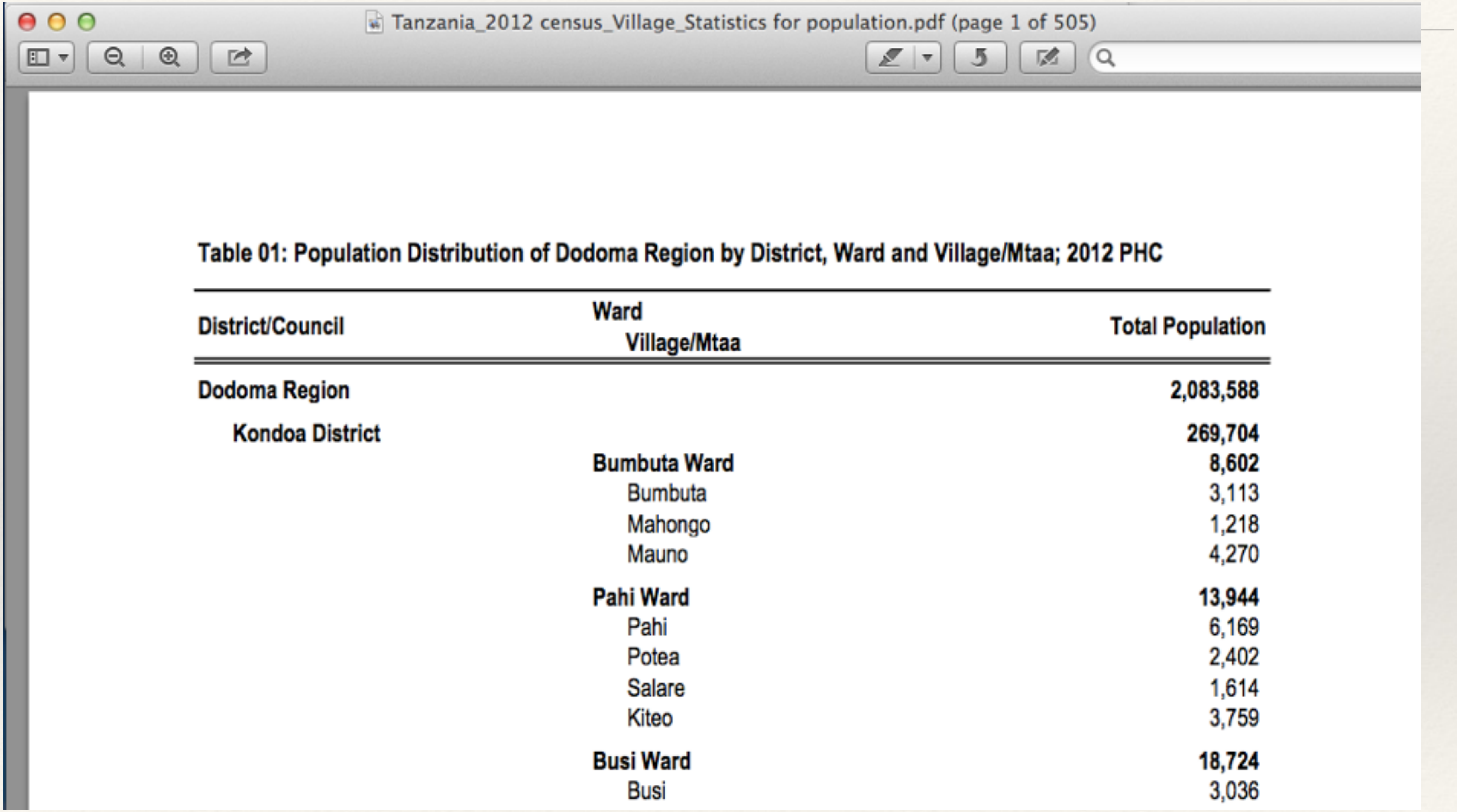

Tanzania_2012 census_Village_Statistics for population.pdf (page 1 of 505)

Table 01: Population Distribution of Dodoma Region by District, Ward and Village/Mtaa; 2012 PHC

District/Council	Ward		Total Population
		Village/Mtaa	
Dodoma Region			2,083,588
Kondoa District			269,704
	Bumbuta Ward		8,602
		Bumbuta	3,113
		Mahongo	1,218
		Mauno	4,270
	Pahi Ward		13,944
		Pahi	6,169
		Potea	2,402
		Salare	1,614
		Kiteo	3,759
	Busi Ward		18,724
		Busi	3,036

Development data often comes in pdfs. **Big** pdfs.

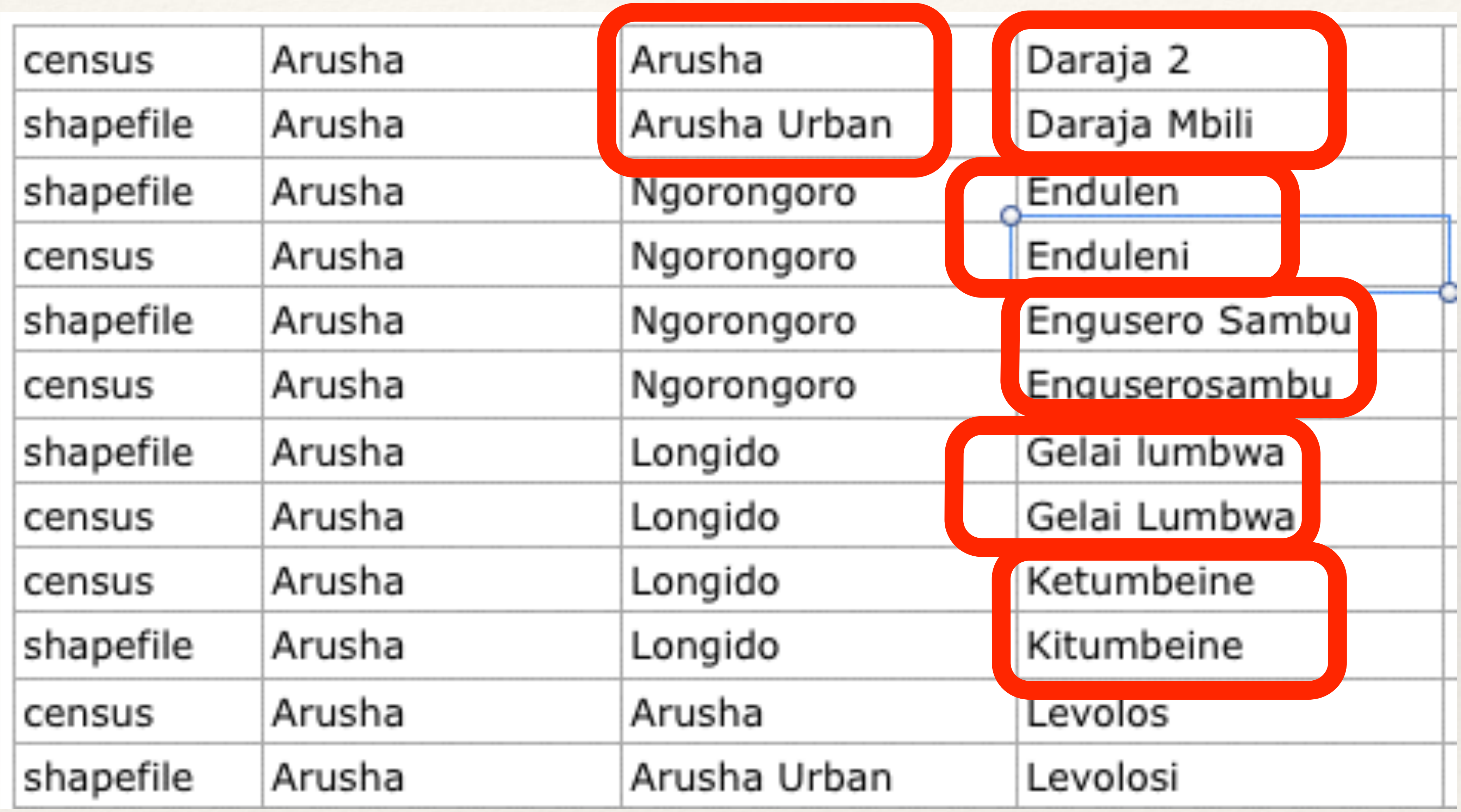
Clean Data

DR Congo in data.UN.org: “Congo, Democratic Republic of the”, “Congo Democratic”, “Democratic Republic of the Congo”, “Congo (Democratic Republic of the)”, “Congo, Dem. Rep.”, “Congo Dem. Rep.”, “Congo, Democratic Republic of”, “Dem. Rep. of Congo”, “Dem. Rep. of the Congo”

DR Congo in common standards: “Democratic Republic of the Congo” (UN Stats), “Congo, The Democratic Republic of the” (ISO3166), “Congo, Democratic Republic of the” (FIPS10, Stanag), “180” (UN Stats), “COD” (ISO3166, Stanag), “CG” (FIPS10)

Even the standards don’t agree. Your datasets won’t either

Clean Data



census	Arusha	Arusha	Daraja 2
shapefile	Arusha	Arusha Urban	Daraja Mbili
shapefile	Arusha	Ngorongoro	Endulen
census	Arusha	Ngorongoro	Enduleni
shapefile	Arusha	Ngorongoro	Engusero Sambu
census	Arusha	Ngorongoro	Enguserosambu
shapefile	Arusha	Longido	Gelai lumbwa
census	Arusha	Longido	Gelai Lumbwa
census	Arusha	Longido	Ketumbeine
shapefile	Arusha	Longido	Kitumbeine
census	Arusha	Arusha	Levolos
shapefile	Arusha	Arusha Urban	Levolosi

Happens almost every time you combine two datasets

Exercise!

- Think about the cleaning you'd need to do to your data
  - Is it in a difficult format? (for this weekend, that means not CSV, json, Geojson or Geotiff)
  - Does it have missing values? Missing = no data, data marked as missing ("-9999", "-1", "n/a"), missing dates, missing areas etc
  - Do you have different datasets? Do they code things differently (e.g. 1/0 vs m/f vs male/female etc)?

Do the science

- explore data
- model data
    - interpret
    - predict
    - test hypotheses

Explore Data

- Spend time with your dataset:
  - Understand where it came from - can you live with the assumptions the data collectors made?
  - Look at it
  - Plot it
  - Where are there holes? Inconsistencies? Anomalies?
  - Clean your data, find better datasets, get more data

Storytelling

- Interpret data
- Results aren’t useful if they don’t *do* something
    - e.g. Persuade a decision-maker
- Good visualisation = insight, persuasion
- Great visualisation = a compelling story using data

Exercise!

- Think about the ways you could meet your use cases:
  - What are your stories
  - Which visualisations might be useful
  - What data would users want to drill into?
- Look at example visualisations - think about what inspires you, or might fit your use cases
  - Tableau gallery: https://www.tableau.com/public/gallery
  - D3 gallery: https://github.com/mbostock/d3/wiki/Gallery