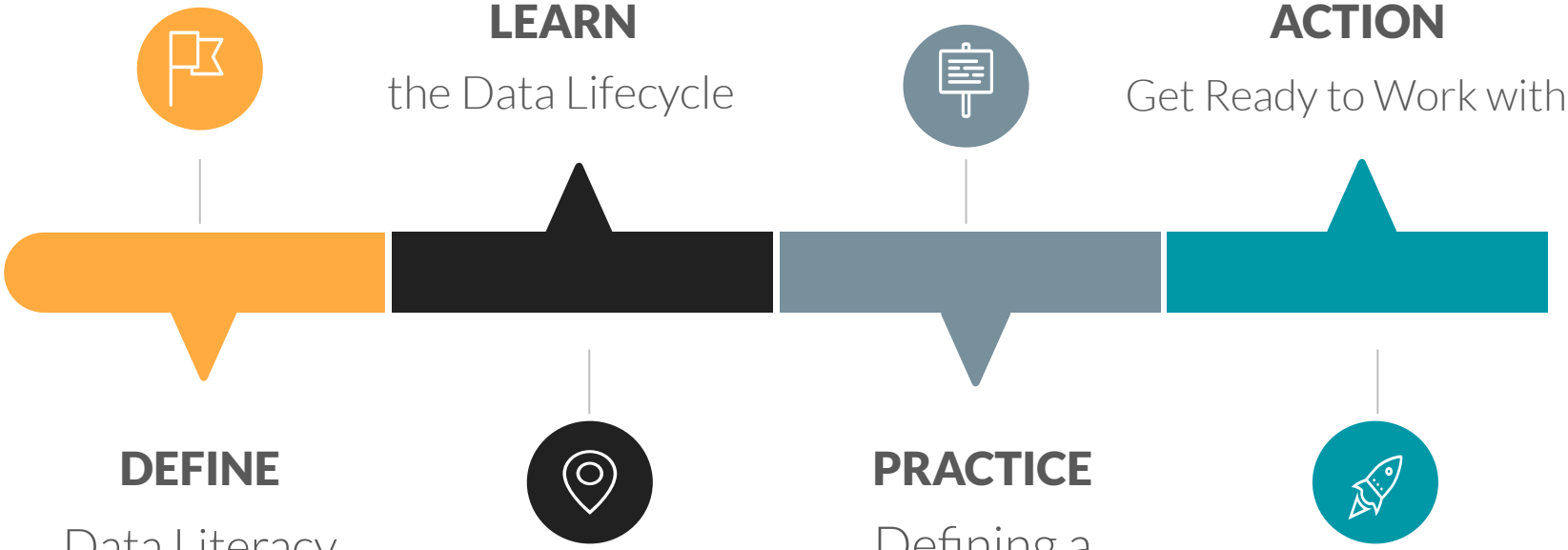
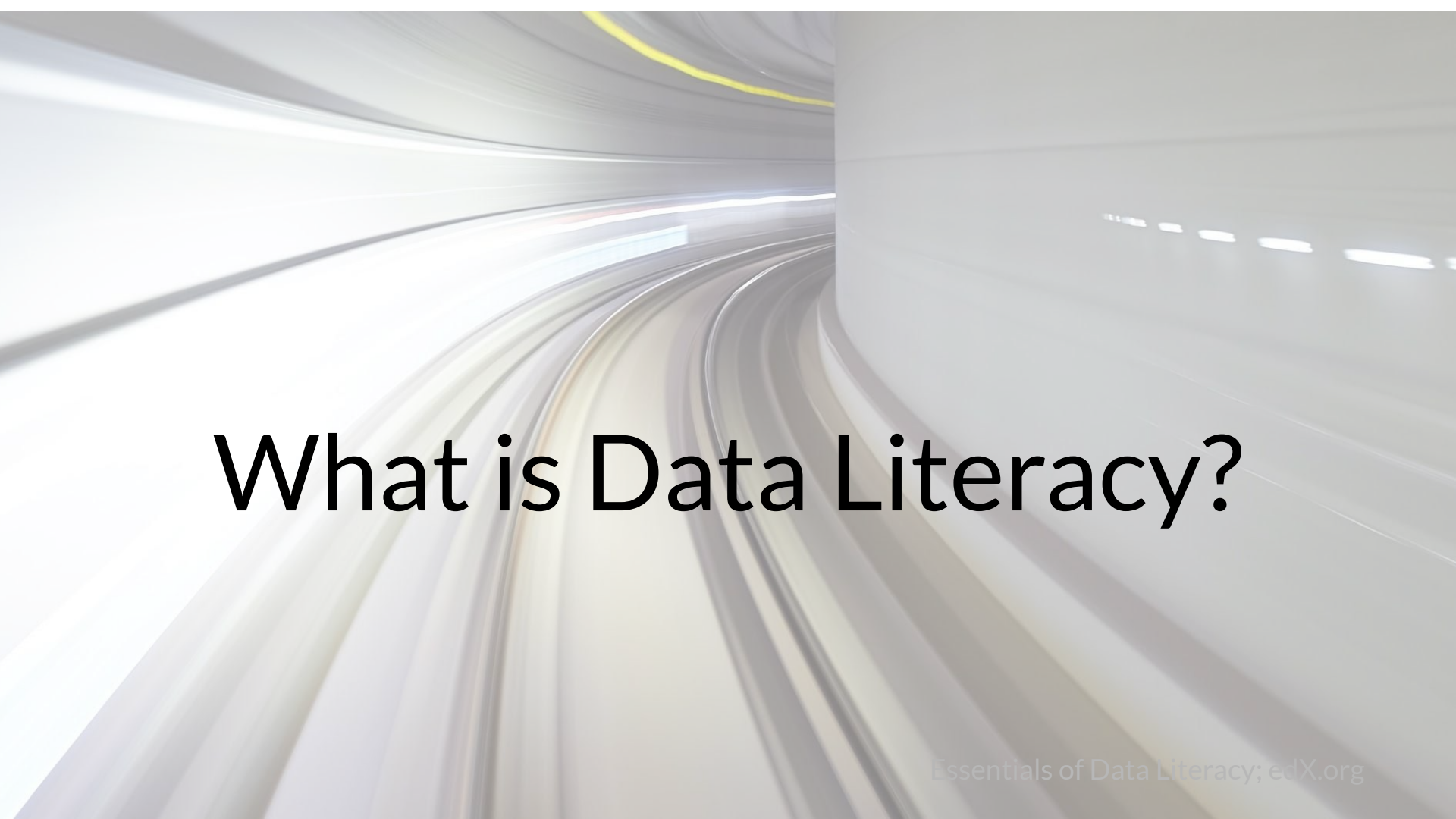
Welcome!

Let’s Get Started!


LEARN
the Data Lifecycle
ACTION
Get Ready to Work with R
DEFINE
Data Literacy
PRACTICE
Defining a
Research Question


What is Data Literacy?
Essentials of Data Literacy; edX.org

Defining Data Literacy

Understand

Work with

Communicate

Ways We Use Data

Planning & Programming

Experimentation & Intervention

Tracking

Reporting

Demonstrate Impact

Decision-making

Visualization

The Language of Data

Working with data is like cooking

Sorted


Arranged

Visually Presented

DATA

SORTED

ARRANGED

PRESENTED VISUALLY

Photography by Brandon Rossen Photography | www.brandonrossen.com

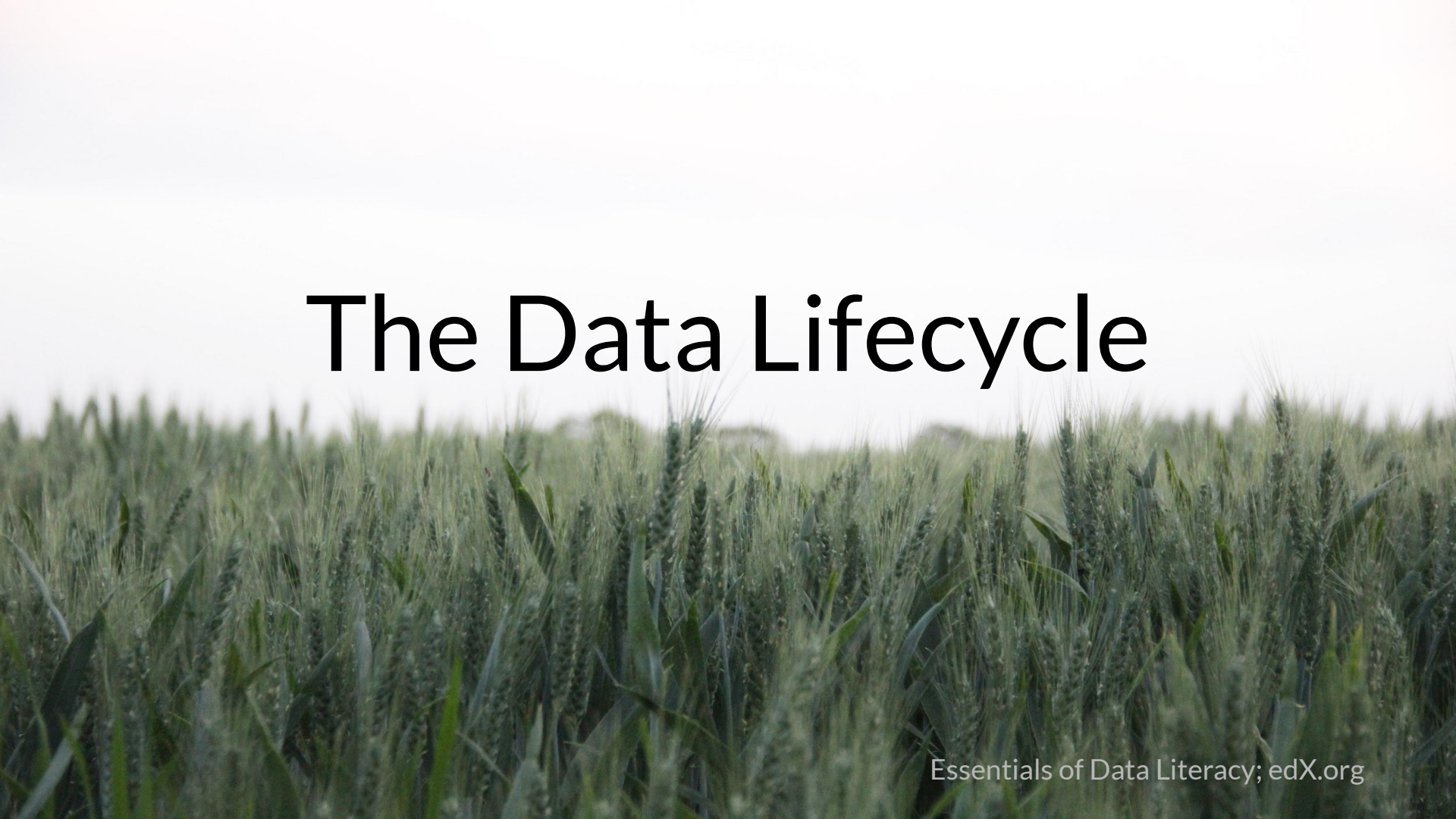
Take Home Messages

- **Know** the definition of data literacy
- **Recognize** that data is like a language, and it's also like cooking
- We will **practice** translating ideas into actionable data steps
- The **goal** is to know enough to be **conversant**, not necessarily fluent

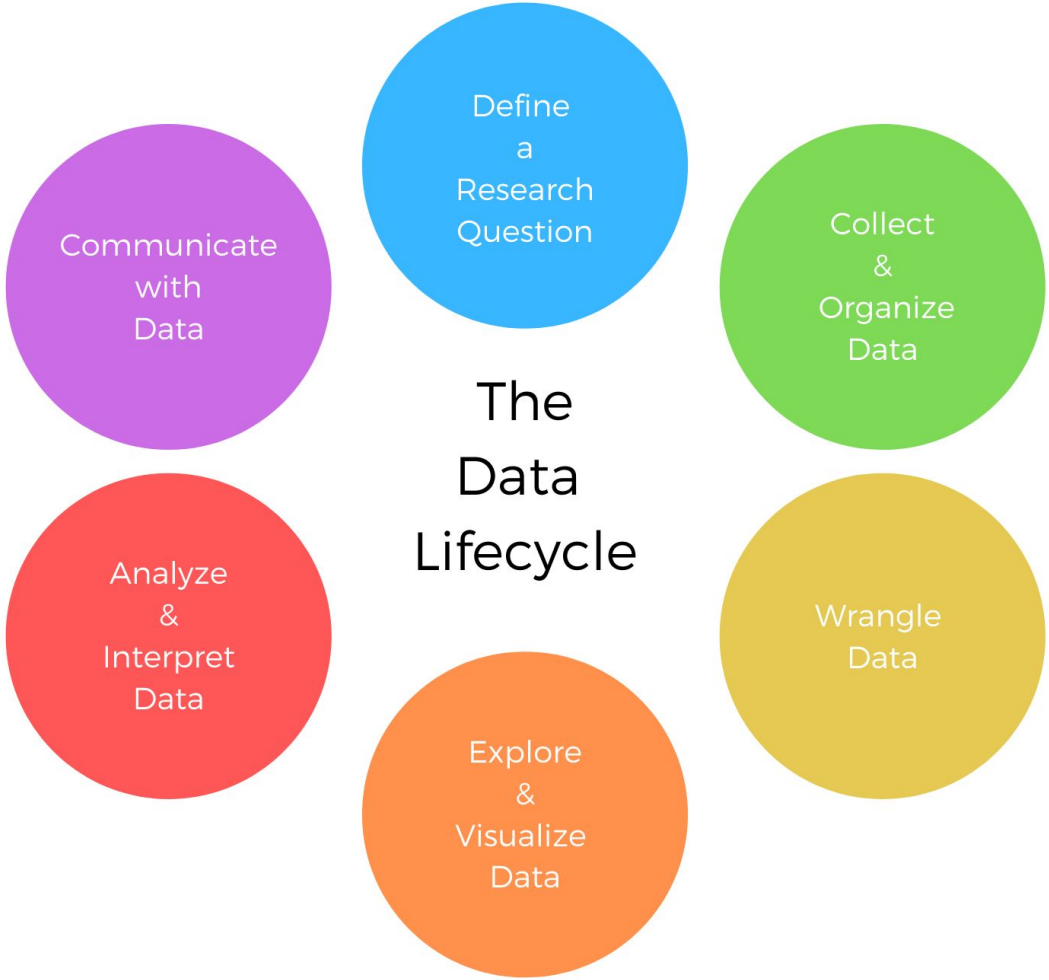
Take Home Messages

- You **don't have to become** a data scientist or data engineer
- The **benefits** of being data literate in your field/organization
  - You **help to bridge gaps** between technical and non-technical
  - You can **translate** a question or idea into a compelling story
  - You **help to make** others more data literate; **change the culture** of your organization to be more data-driven

The Data Lifecycle



Essentials of Data Literacy; edX.org


Define a Research Question
Collect & Organize Data
Wrangle Data
Explore & Visualize Data
Analyze & Interpret Data
Communicate with Data
The Data Lifecycle

The Data Lifecycle

- Define a Research Question
- Collect & Organize Data
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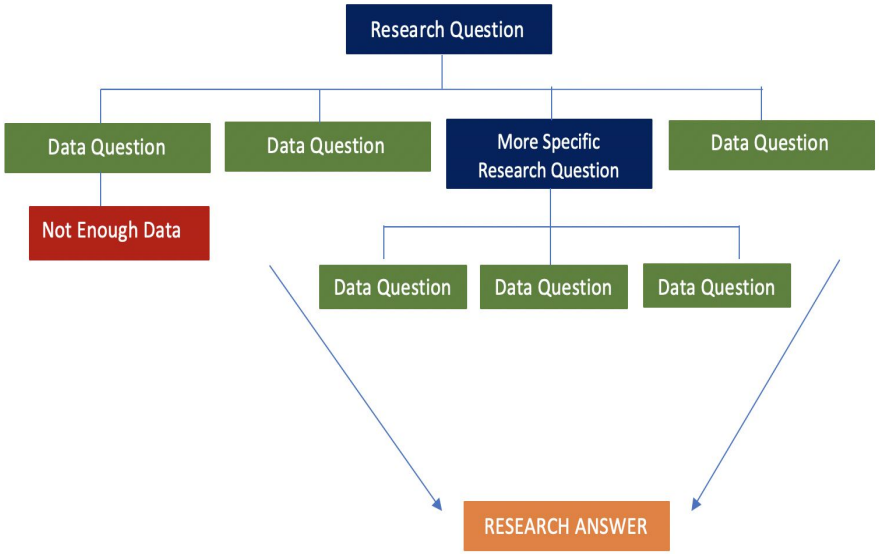
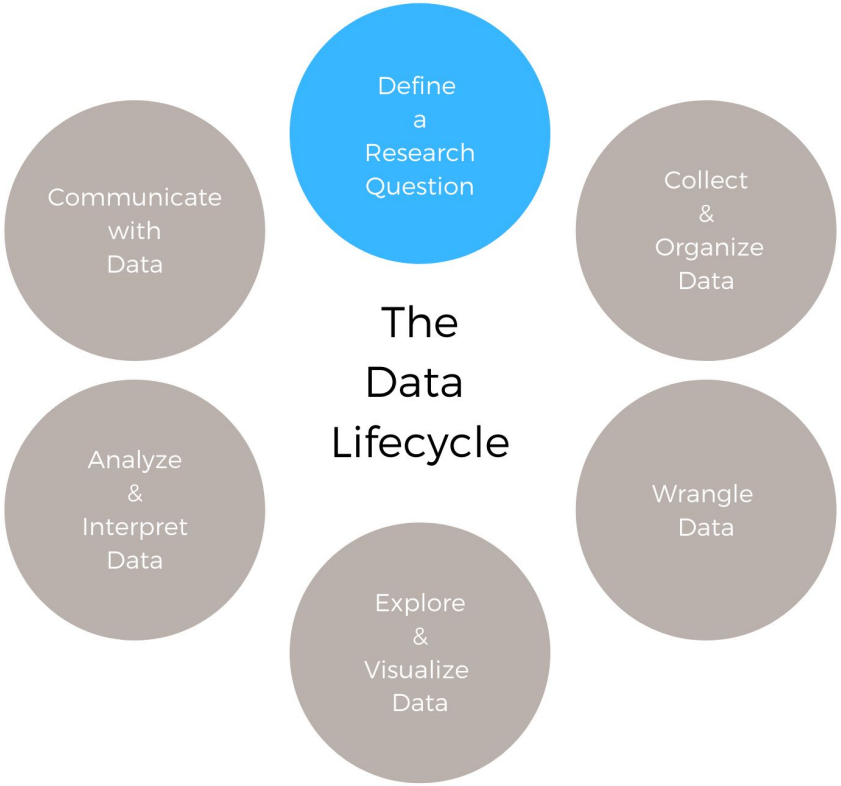
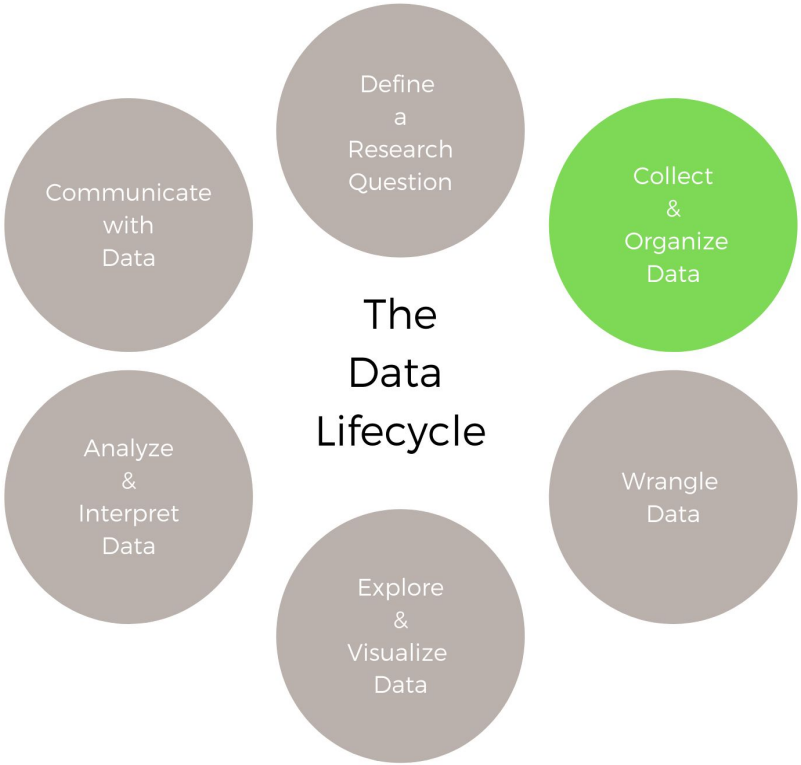
The Data Lifecycle - Define a Research Question

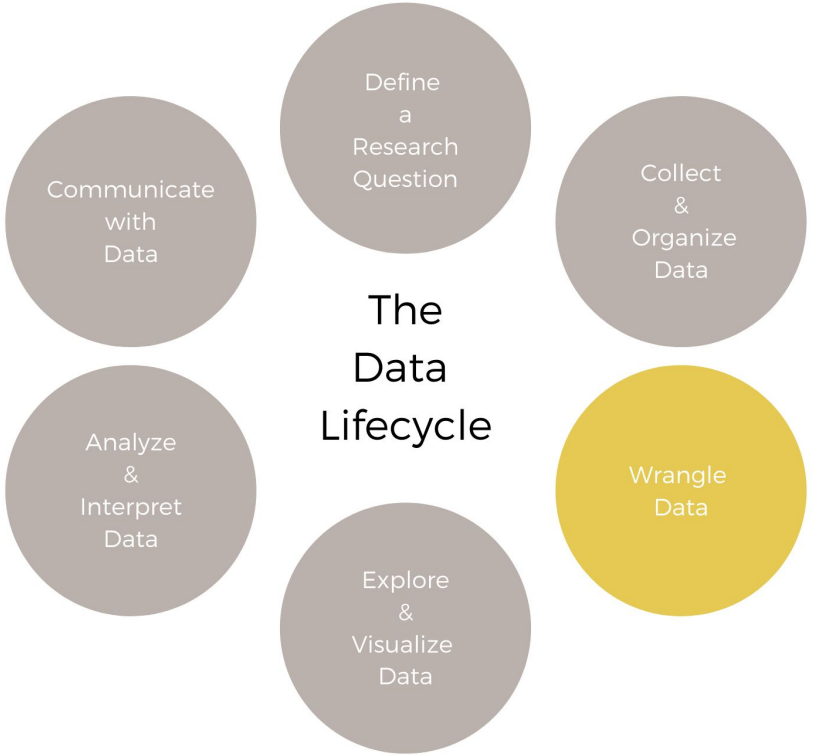




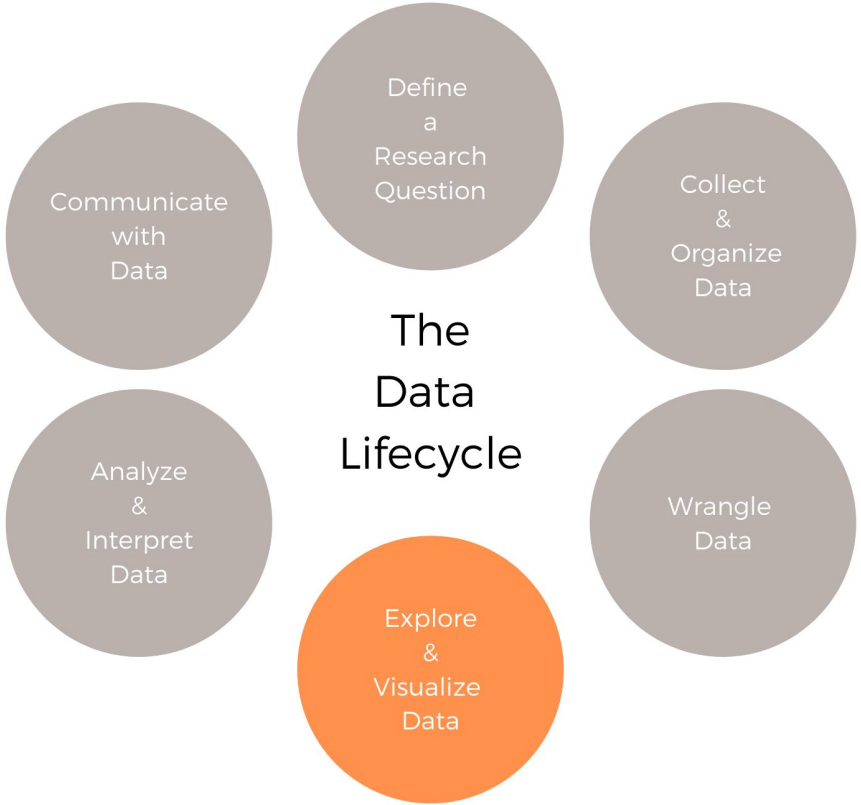
The Data Lifecycle - Collect & Organize Data



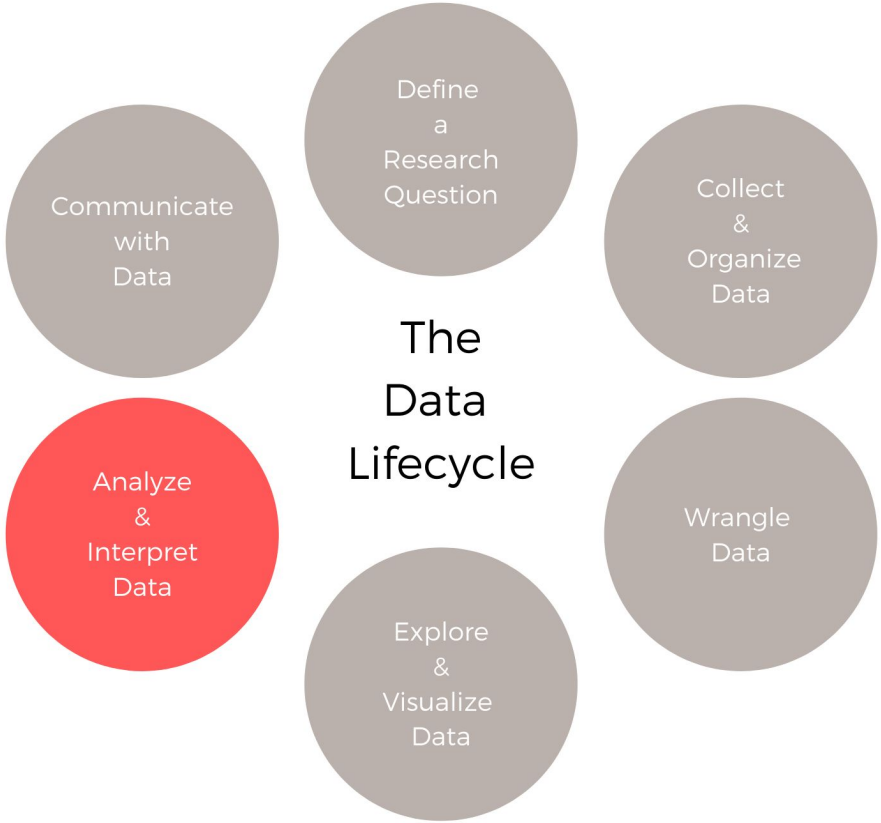
The Data Lifecycle - Wrangle Data



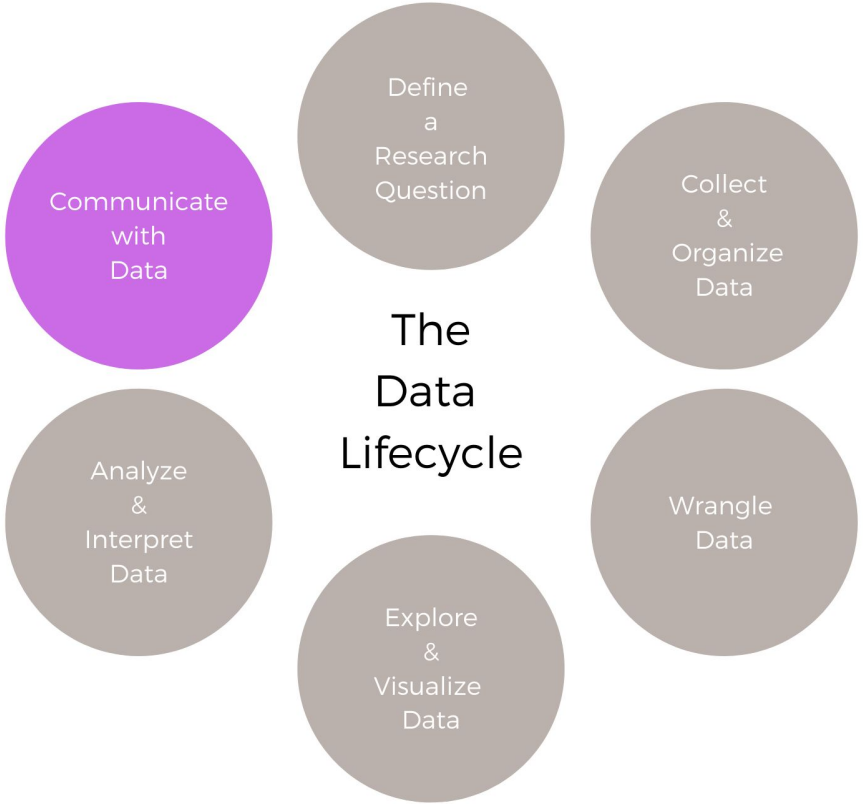
The Data Lifecycle - Explore & Visualize Data



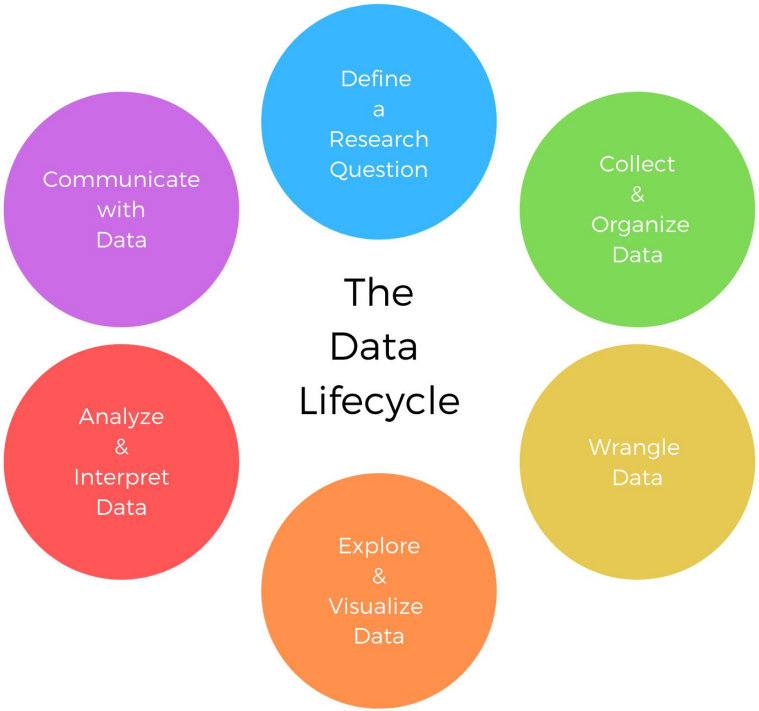
The Data Lifecycle - Analyze & Interpret Data



The Data Lifecycle - Communicate with Data



Hidden Steps in the Data Lifecycle



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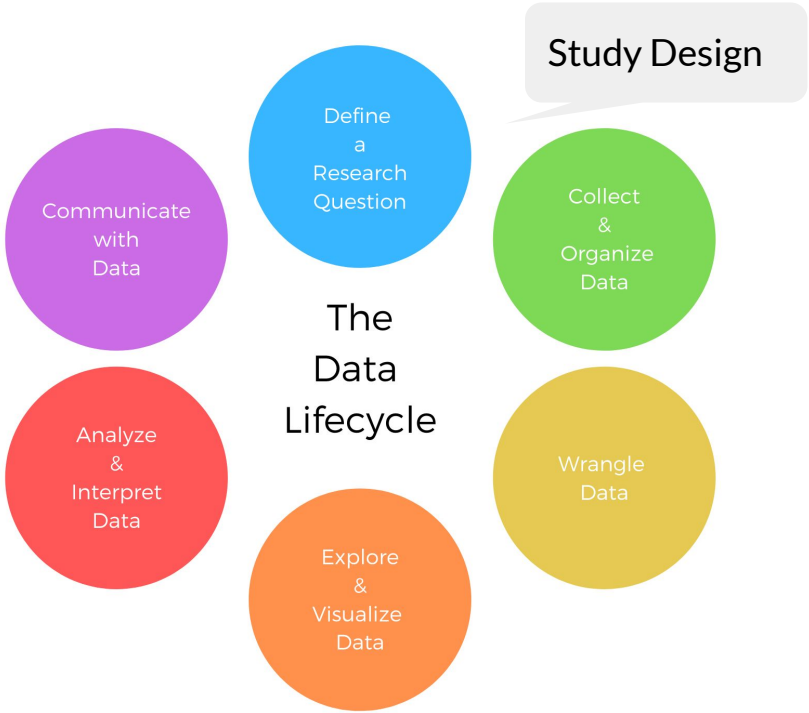

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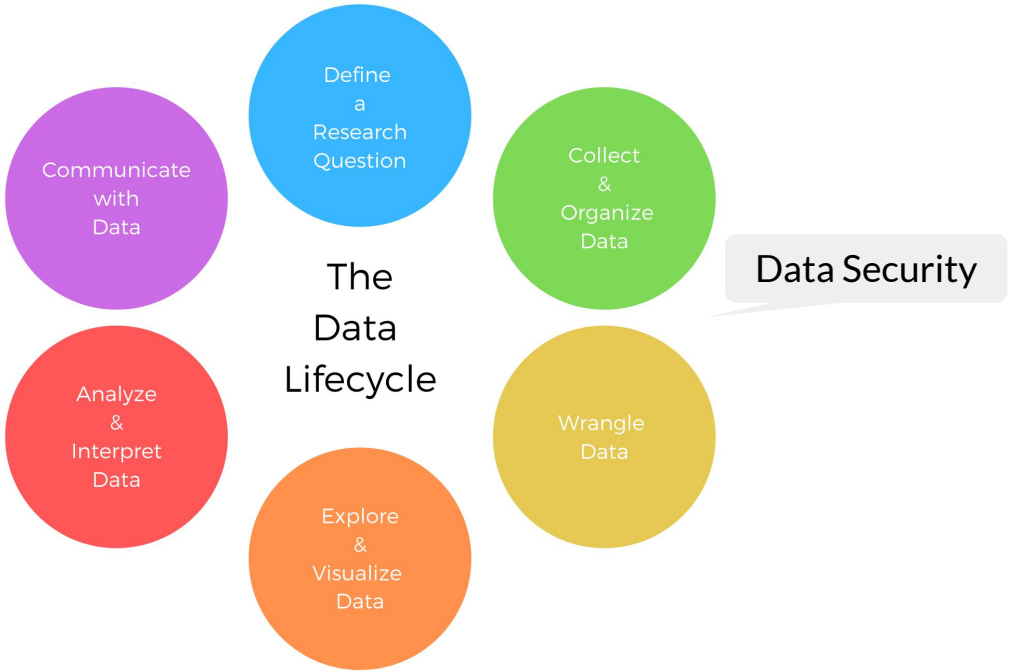

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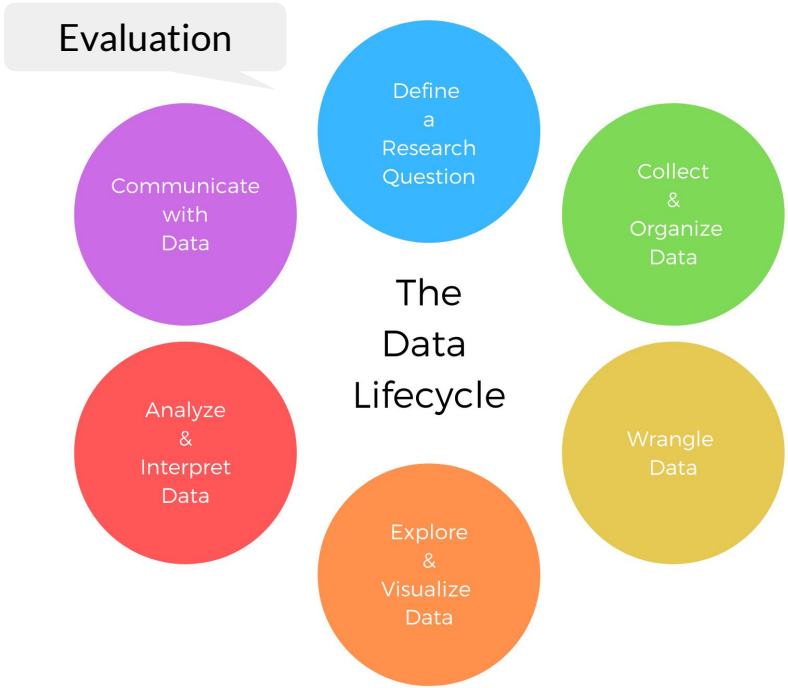

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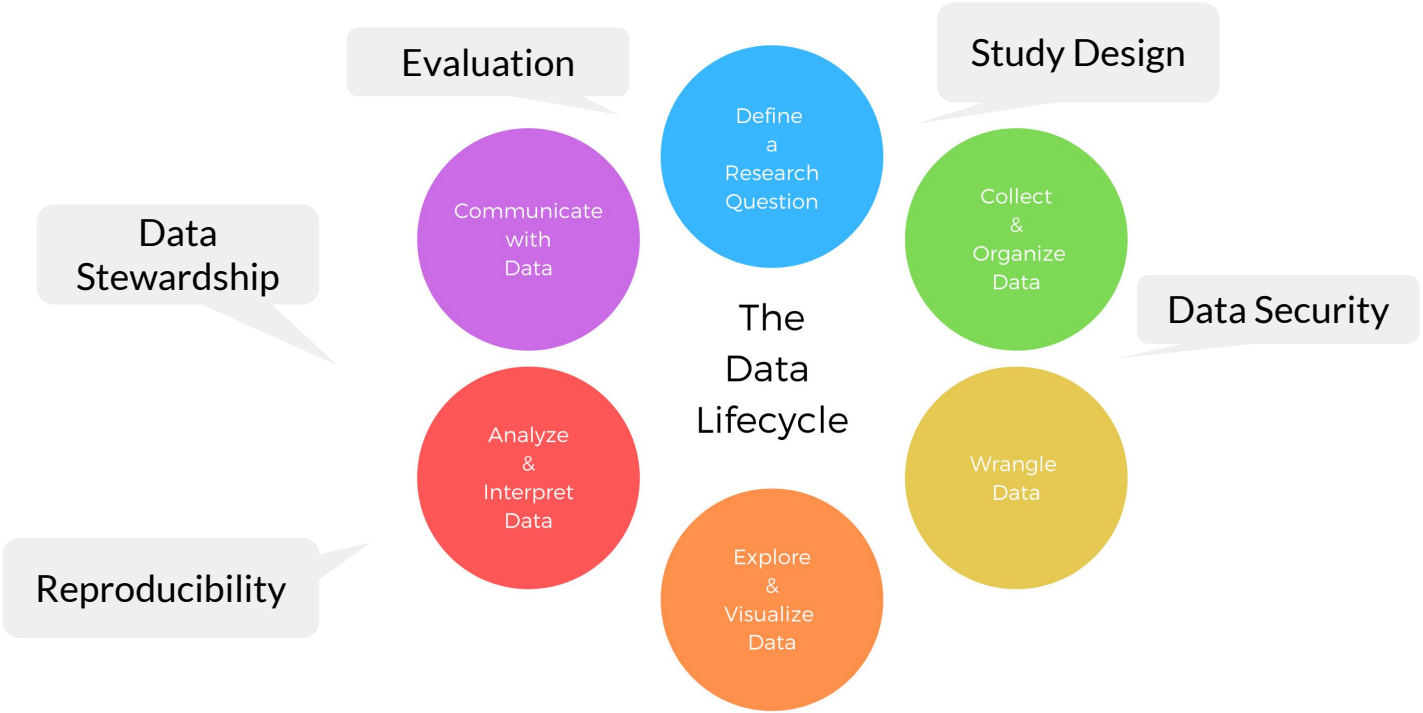

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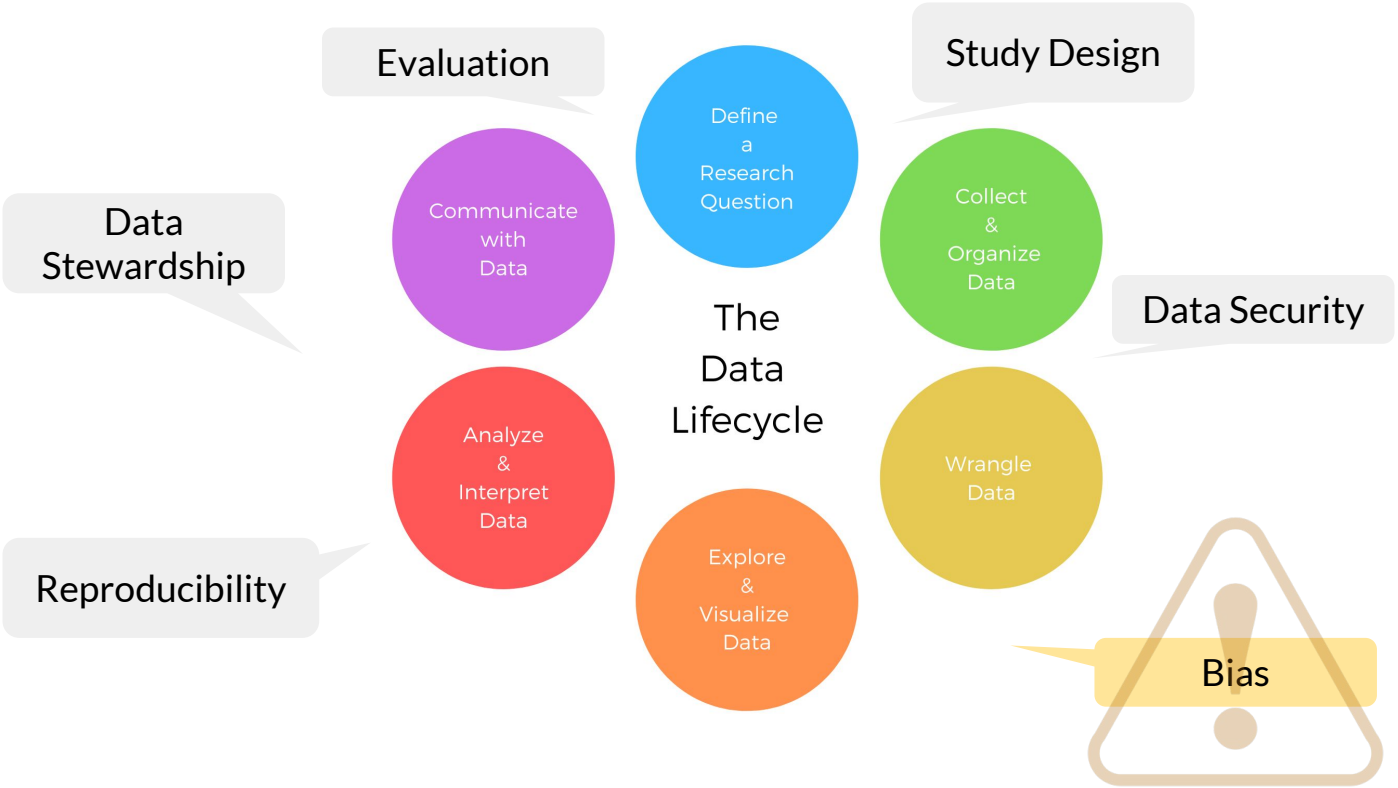

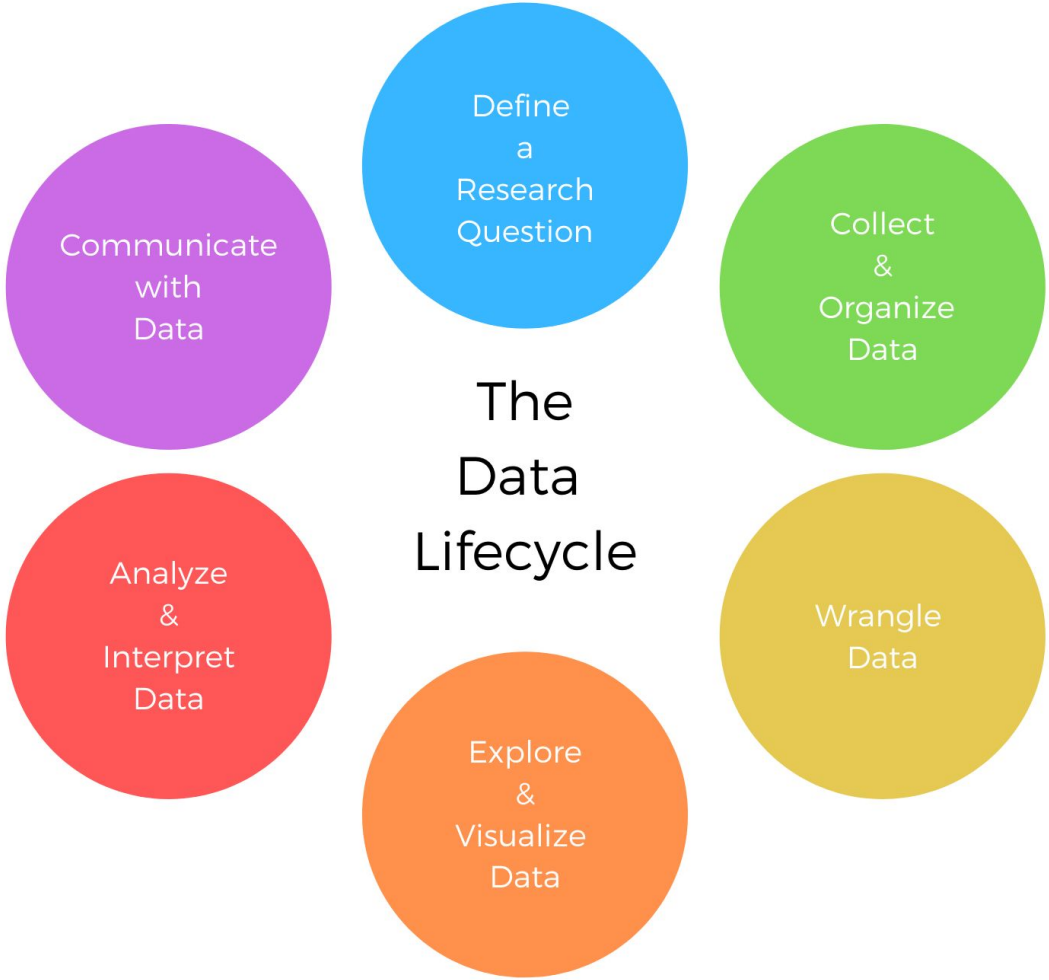
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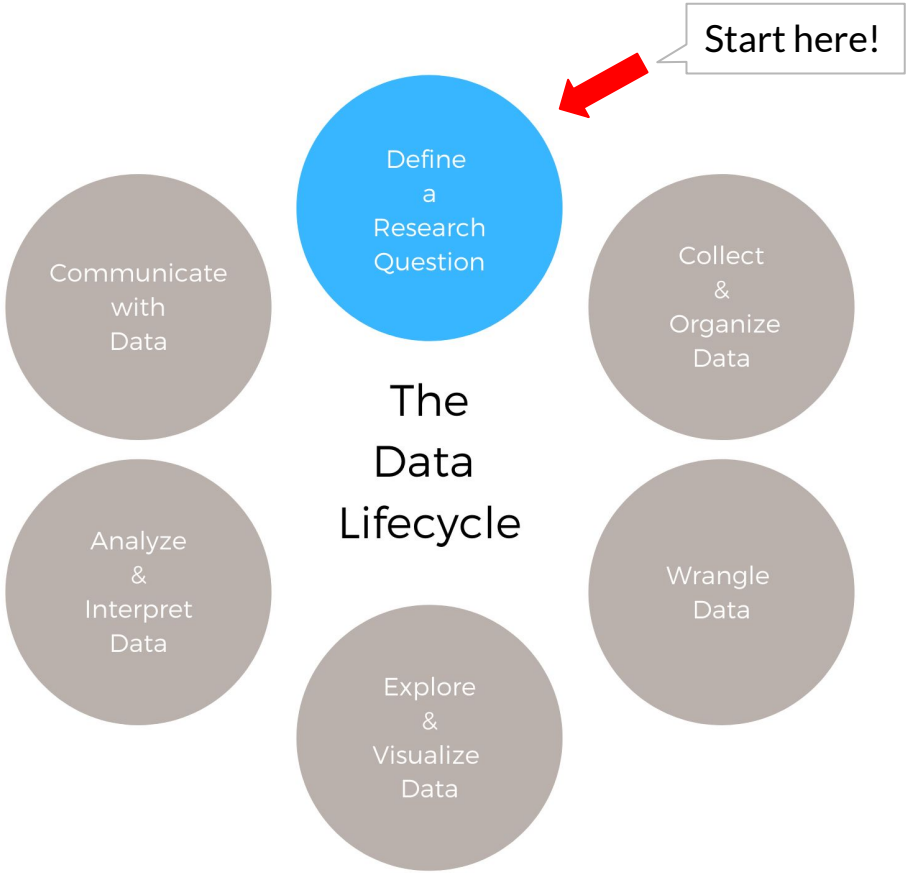
The Data Lifecycle


What makes a good Research Question?


Start here!
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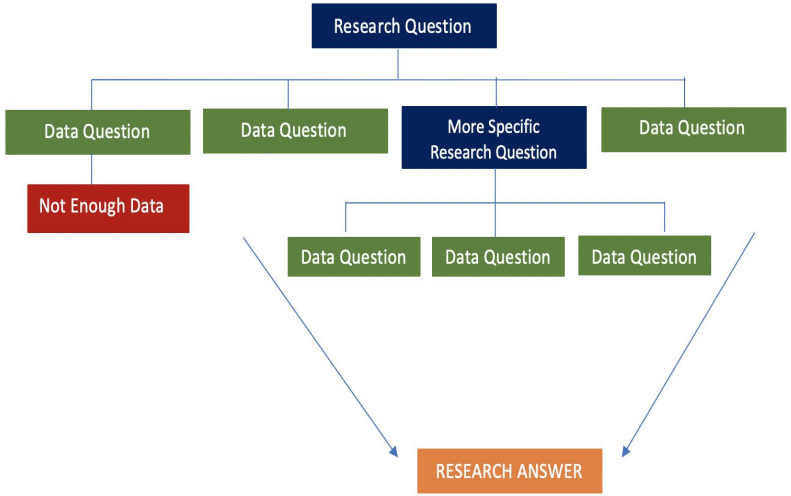

Research Question
Data Question
Data Question
More Specific Research Question
Data Question
Not Enough Data
Data Question
Data Question
Data Question
RESEARCH ANSWER

A good research question is...

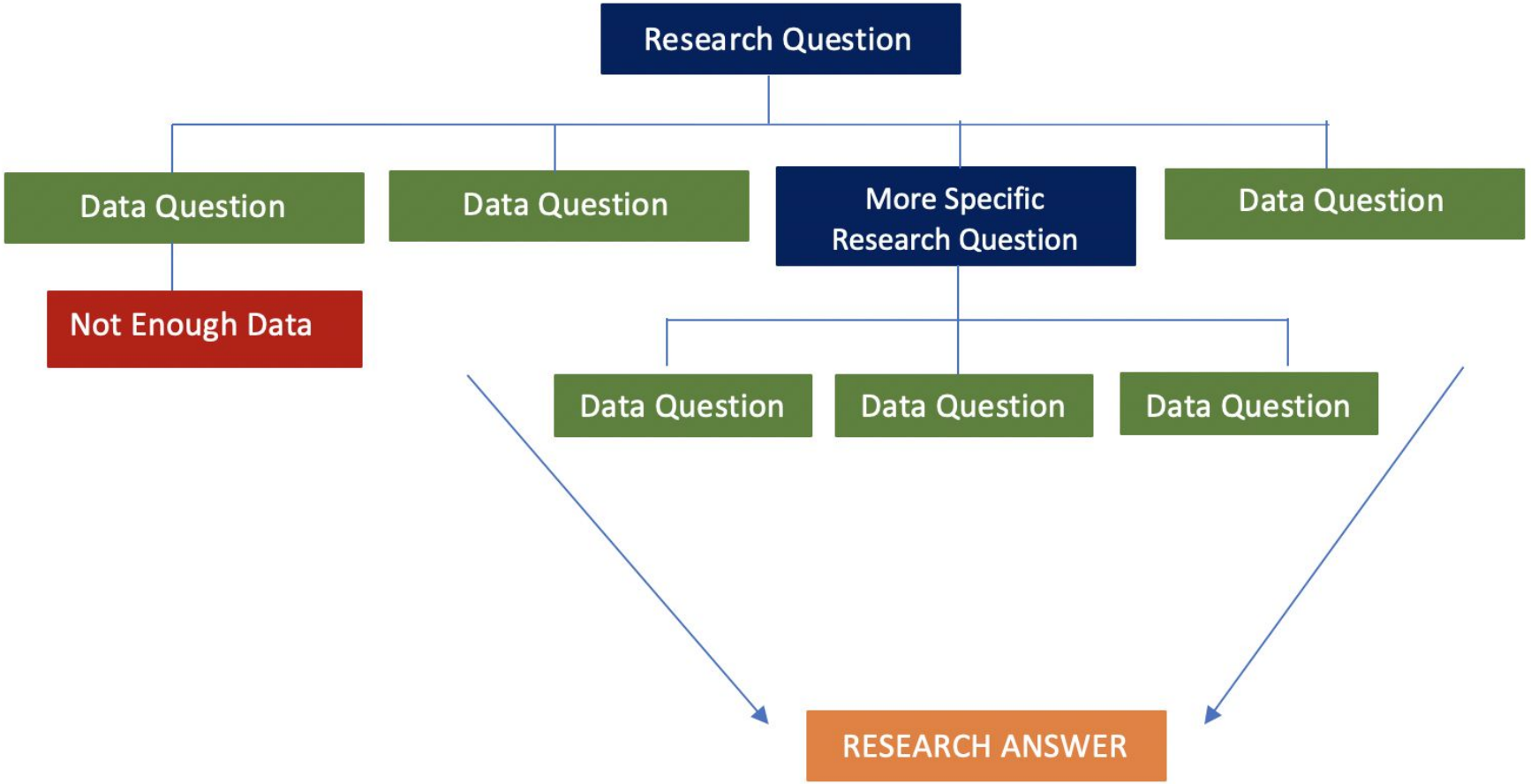
An actual question

Open-ended

Grounded in theory, prior research, or practice

Not too simple, not too complex

Figure adapted from: twitter.com/BecomingDataSci



Reference: https://dougenterprises.com/data-science/encouraging-data-analytics-questions/

Evaluating your research question

Does the question strike the **right balance** between simple and complex? ✔

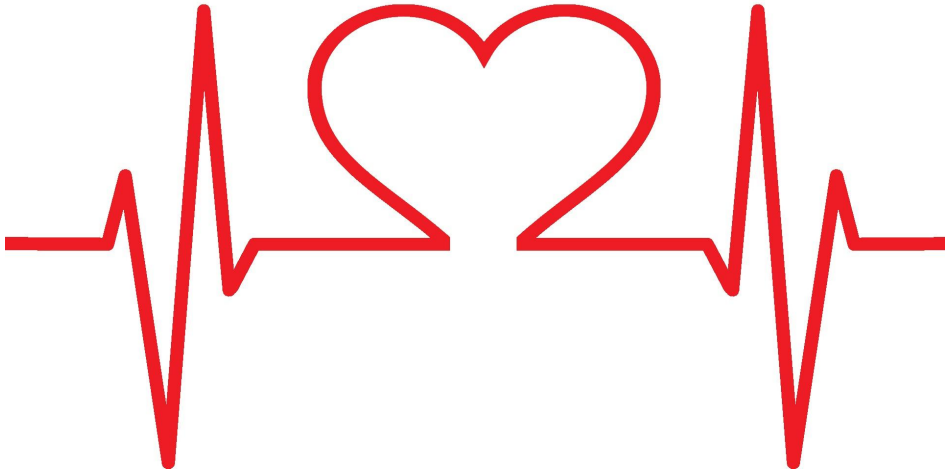
Will it **take more than** a simple data analysis or a single visualization to answer the question? ✔

Do we have **access** to the right amount and the right types of data to sufficiently answer the question? ✔

Will it be clear when we've **sufficiently answered** the question? ✔

Reference: Ratan, Anand, and Ratan (2019), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6322175/

Example: Life expectancy around the world



Dataset: Global Life Expectancy in 2015

	Country	BMI	Population	Life_expectancy_female	Life_expectancy	CHE GDP(%)	GDP
1	Afghanistan	22.9	34413603	64.7	63.2	10.1	1.990711e+
2	Albania	26.7	2880703	78.2	76.1	NA	1.138693e+
3	Algeria	25.5	39728025	77.2	76.2	7.0	1.659780e+
4	Andorra	27.0	78011	NA	NA	10.3	2.811489e+(
5	Angola	22.9	27884381	64.5	62.2	2.6	1.161940e+
6	Antigua and Barbuda	26.6	93566	77.4	75.0	4.7	1.336693e+(
7	Argentina	27.6	43131966	80.1	76.8	8.8	5.947490e+
8	Armenia	26.5	2925553	77.9	74.6	10.1	1.055334e+
9	Australia	27.4	23815995	84.5	82.6	9.3	1.351690e+
10	Austria	26.0	8642699	83.8	81.4	10.4	3.818180e+

Information on
194 countries

194 rows

9 columns

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11	Azerbaijan						

Defining a Research Question

- Which **factors** are associated with longer life expectancy?
- How do the GDP and population of a country **relate** to its life expectancy?

Defining a Research Question

- Which **factors** are associated with longer life expectancy? ✅

- How do the GDP and population of a country relate to its life expectancy?

Evaluating a Research Question

	Not too simple nor too complex?	***Will it take more than a simple analysis?***	***Do we have enough and the right kind of data?***	***What would be a sufficient answer?***
Which factors are associated with longer life expectancy?				

Evaluating a Research Question

	Not too simple nor too complex?	*Will it take more than a simple analysis?*	*Do we have enough and the right kind of data?*	*What would be a sufficient answer?*
Which factors are associated with longer life expectancy?	✔			

Evaluating a Research Question

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Which factors are associated with longer life expectancy?	✔	✔		

Evaluating a Research Question

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Which factors are associated with longer life expectancy?	✔	✔	✔	

Evaluating a Research Question

	Not too simple nor too complex?	*Will it take more than a simple analysis?*	*Do we have enough and the right kind of data?*	*What would be a sufficient answer?*
Which factors are associated with longer life expectancy?	✔	✔	✔	✔

Take Home Messages

- A good research question is **open ended**, and not easy to answer with a quick data analysis
- **Always revisit your research question**
- It's **okay to change/refine** your research question, **within reason**

Collect & Organize Data

The Data Lifecycle

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Looking Ahead

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