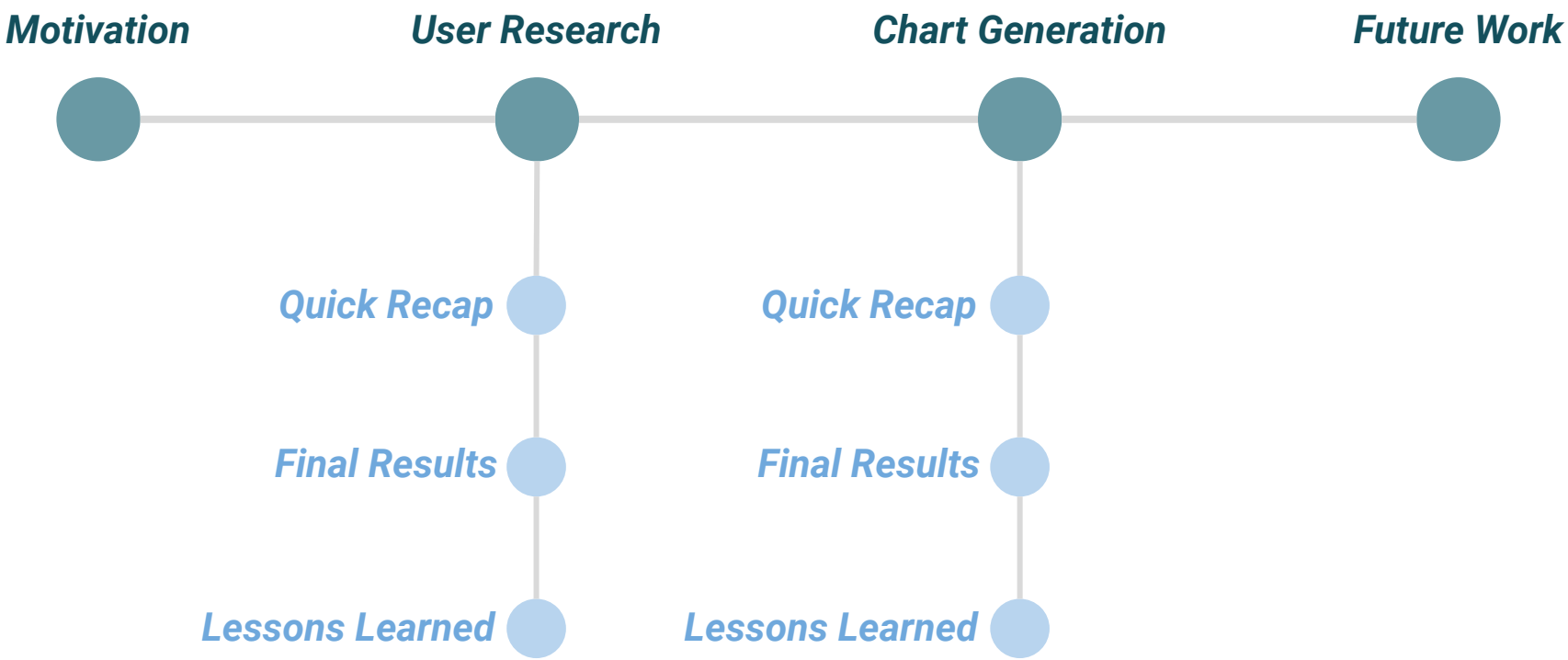
Chart Generation for Contextualized Responses to NL COVID-19 Queries

Hannah DeBalsi, Bianca Yu

CS 294W Final Presentation

Outline


Motivation
User Research
Chart Generation
Future Work
Quick Recap
Final Results
Lessons Learned
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Lessons Learned

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Motivation

Alexa, how many COVID-19 cases are there currently worldwide?

There are 6.8 million confirmed cases of COVID-19 worldwide, as of June 7.

Ok.

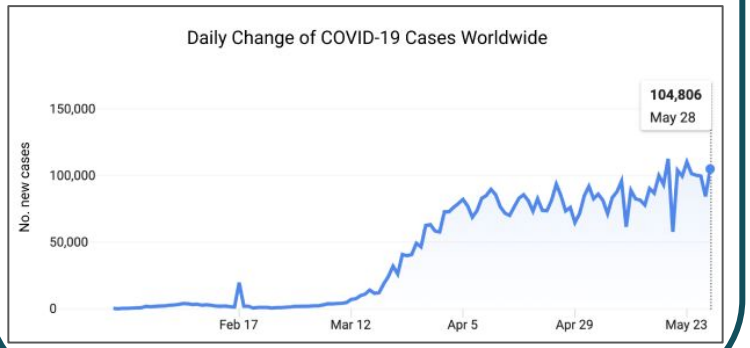
Motivation

✓ **Answered Question**

Motivation

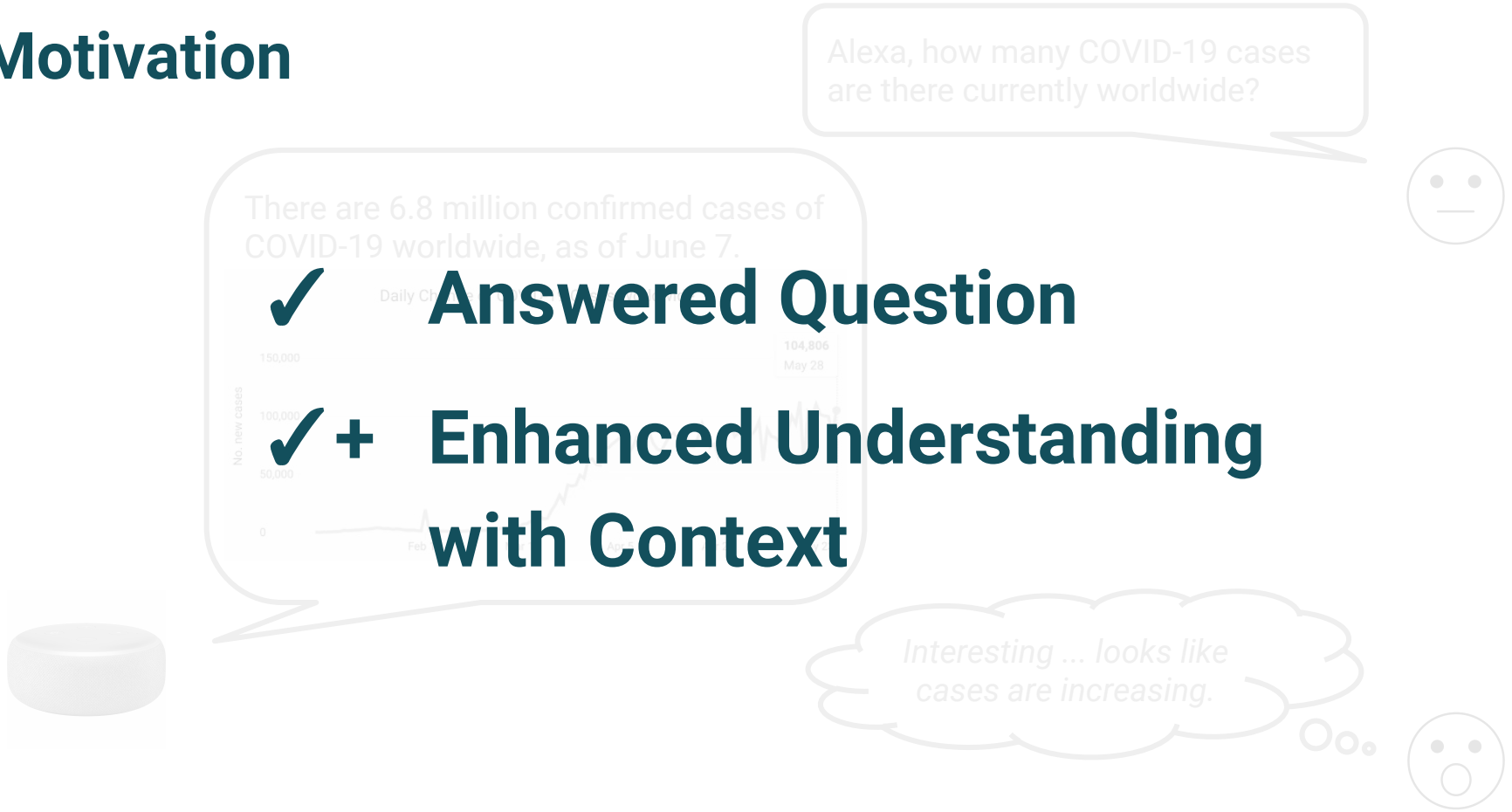
Alexa, how many COVID-19 cases are there currently worldwide?

There are 6.8 million confirmed cases of COVID-19 worldwide, as of June 7.



Interesting ... looks like cases are increasing.

Motivation



✓ **Answered Question**

✓+ **Enhanced Understanding with Context**

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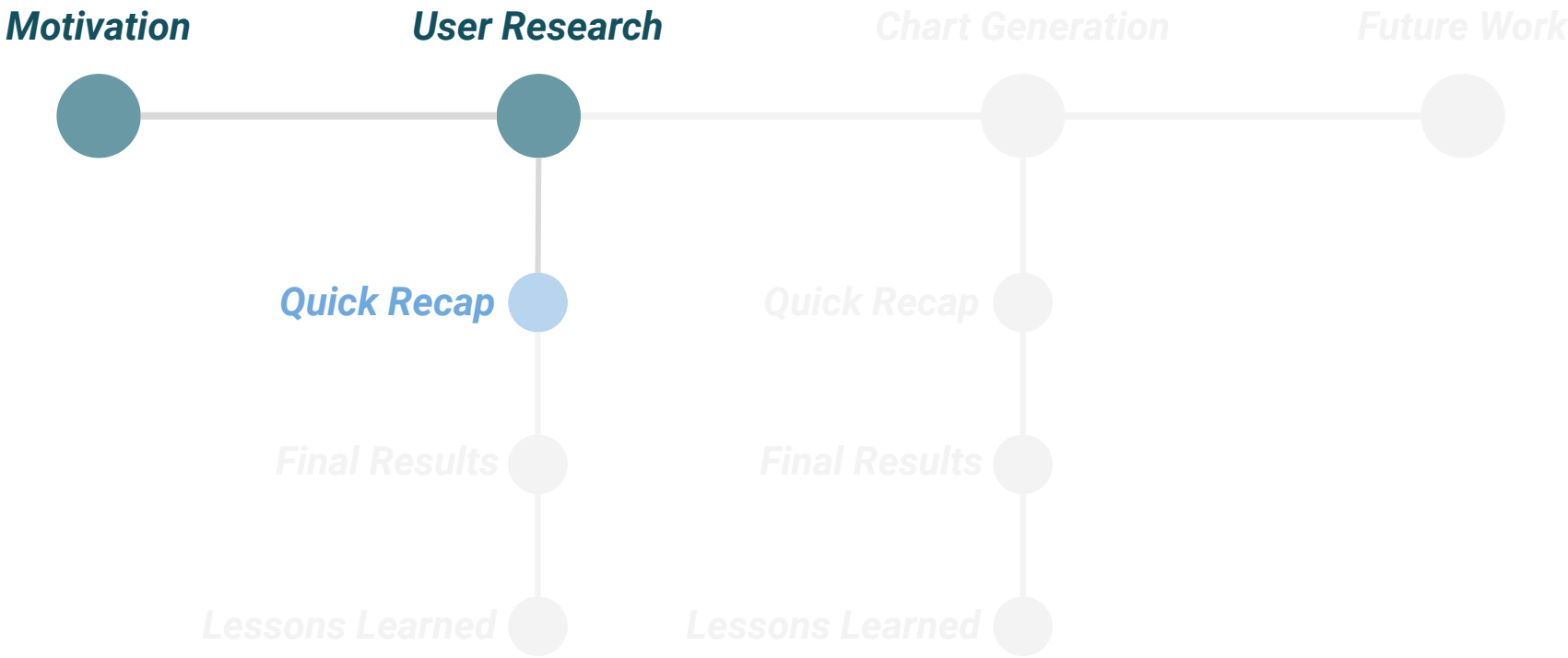
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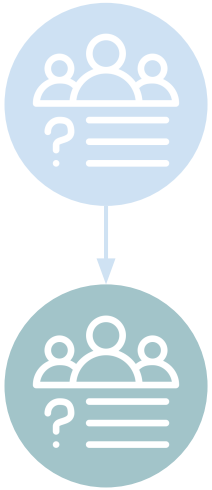
User Research / Quick Recap

Survey #1

What do users want to know about COVID-19?

+ What are the most common quantitative questions?

User Research / Quick Recap



Survey #1 What do users want to know about COVID-19?

+ What are the most common quantitative questions?

Survey #2 What kinds of COVID-19 questions are best answered visually?

+ What is the most effective graph for these questions?

User Research / Quick Recap

Survey #1 What do users want to know about COVID-19?

+ What are the most common quantitative questions?

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+ What is the most effective graph for these questions?

Preliminary Semantic Parser

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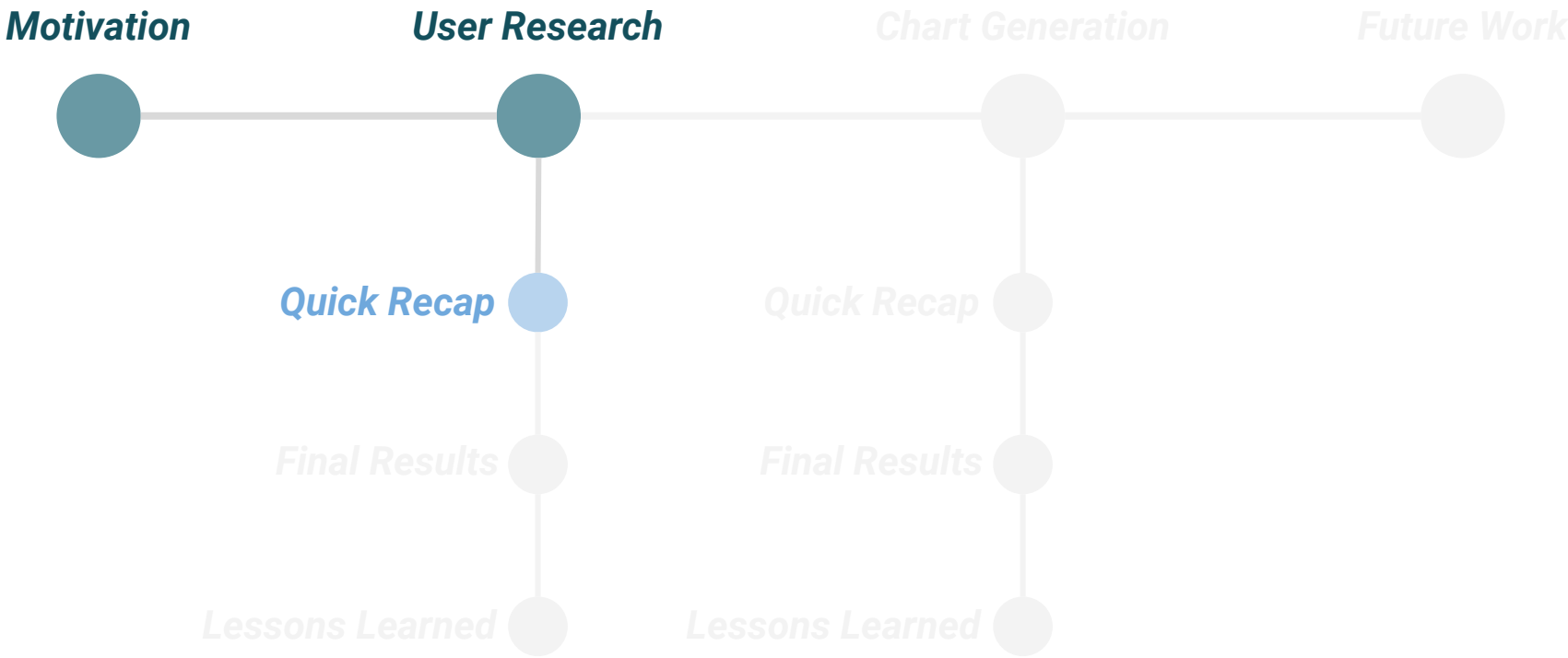
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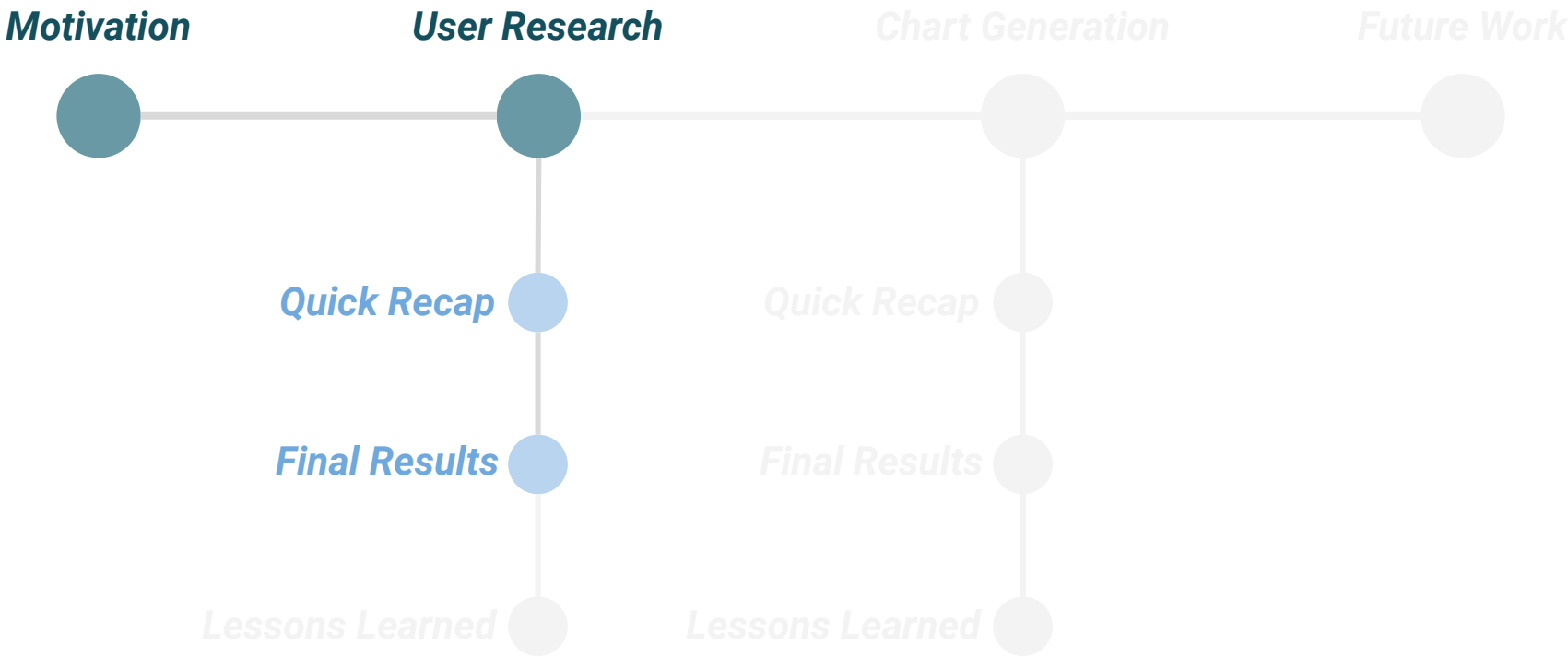
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User Research / Final Results

Survey #1

User Research / Final Results

Survey #1

Q Category	Count	# Quantitative	%
COVID Factsheet	14	3	21%
Death Count	10	10	100%
Case Count	9	8	89%
Symptoms	6	2	33%
Treatment	6	1	17%
Vaccine	5	0	0%
Infection	4	3	75%
Lockdown	4	1	25%
Testing	4	1	25%
Other	4	0	0%
Personal Safety	3	0	0%
Recovery Count	1	1	100%
Unemployment Count	1	1	100%
Total	**71**	31	

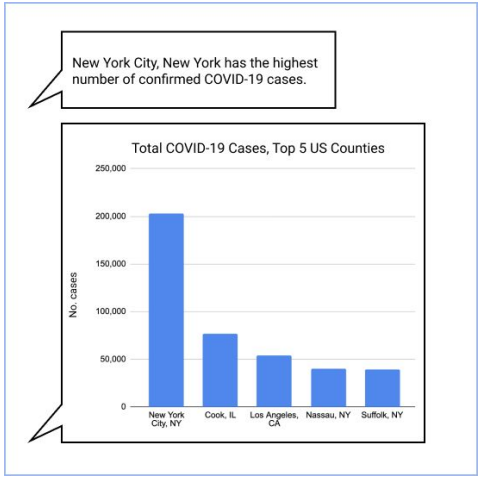
User Research / **Final Results**

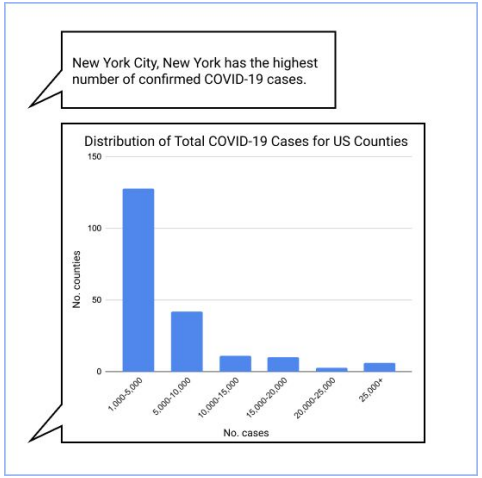
Survey #2

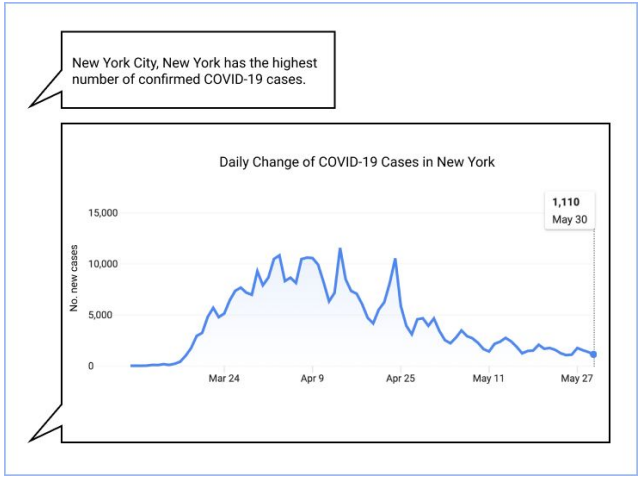
User Research / **Final Results**

“What US city has the highest number of cases?”

New York City, New York has the highest number of confirmed COVID-19 cases.







User Research / **Final Results**

Survey #2

Significant agreement:
the percentage of participants who assigned the response a particular rank is **≥ 50%**

User Research / **Final Results**

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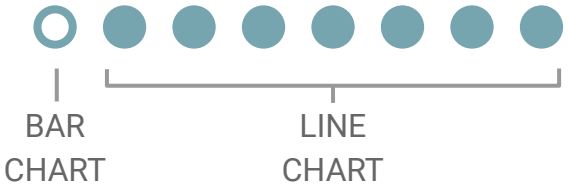
Qs w/ significant agreement on **first choice**



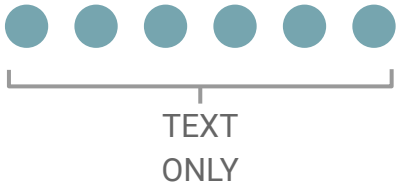
User Research / **Final Results**

Survey #2

Significant agreement:
the percentage of participants who assigned the response a particular rank is **≥ 50%**

Qs w/ significant agreement on **first choice**

Qs w/ significant agreement on **last choice**



User Research / **Final Results**

Preliminary

Semantic Parser

User Research / Final Results

LABELS

- Interrogative phrase
- Answer type (quantity)
- Answer type (noun)
- Location
- Filter (quantitative)
- Filter (date/time)

Q3

How many new cases have there been reported in Georgia today?

User Research / Final Results

LABELS

- **Interrogative phrase**
- Answer type (quantity)
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Q3

***How many** new cases have there been reported in Georgia today?*

User Research / Final Results

LABELS

- Interrogative phrase
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Q3

***How many** new **cases** have there been reported in Georgia today?*

User Research / Final Results

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- Interrogative phrase
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User Research / Final Results

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Q3

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User Research / Final Results

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- Interrogative phrase
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Q3

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User Research / Final Results

LABELS

- Interrogative phrase
- Answer type (quantity)
- Answer type (noun)
- Location
- Filter (quantitative)
- Filter (date/time)

Q3

How many new cases have there been reported in Georgia today?

User Research / Final Results

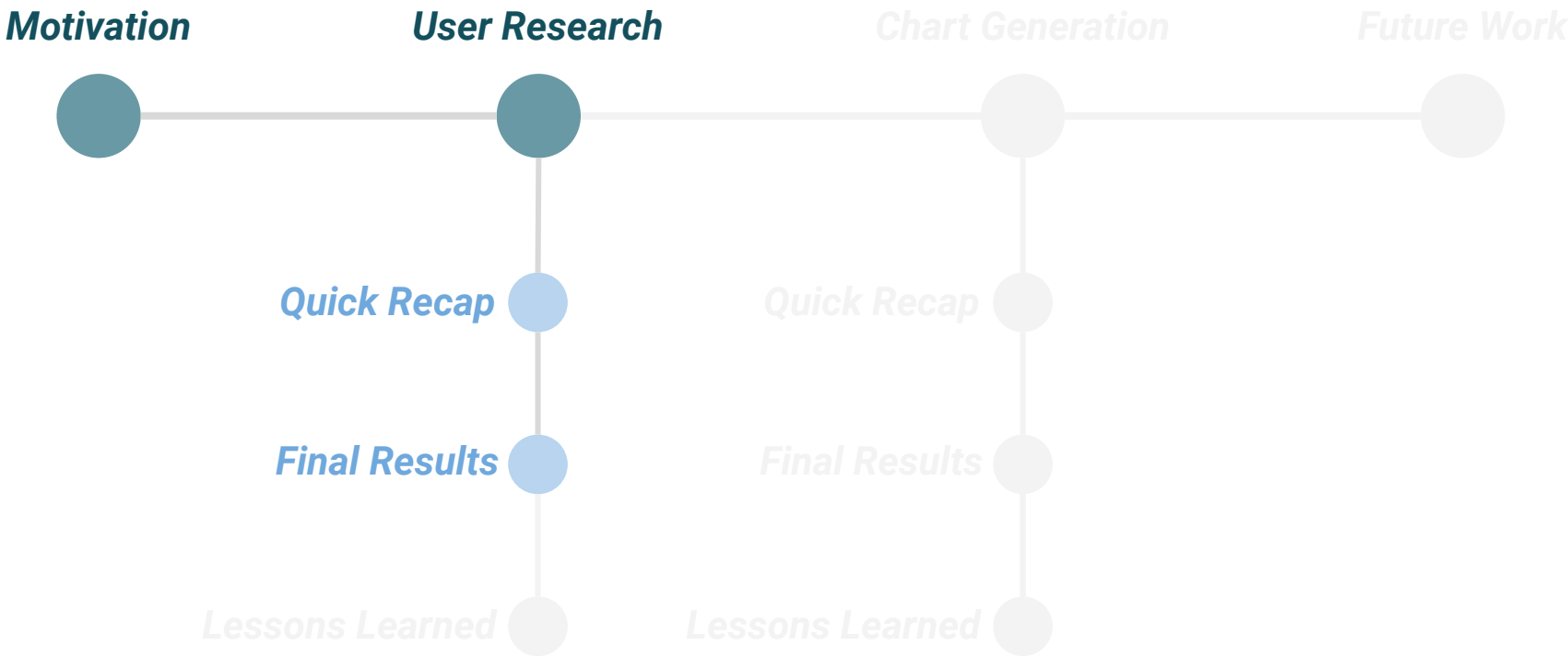
LABELS

Interrogative phrase	“How many”
Answer type (quantity)	“cases”
Answer type (noun)	
Location	“Georgia”
Filter (quantitative)	“new”
Filter (date/time)	“today”

User Research / Final Results

LABELS				
	Interrogative phrase	“How many”	→	**Chart Type:** Line Graph
	Answer type (quantity)	“cases”	→	**Column Name:** “Positive”
	Answer type (noun)			
	Location	“Georgia”	→	**Row:** State == “Georgia”
	Filter (quantitative)	“new”	→	*Report single cell value*
	Filter (date/time)	“today”	→	**Date:** 06/08/2020

Outline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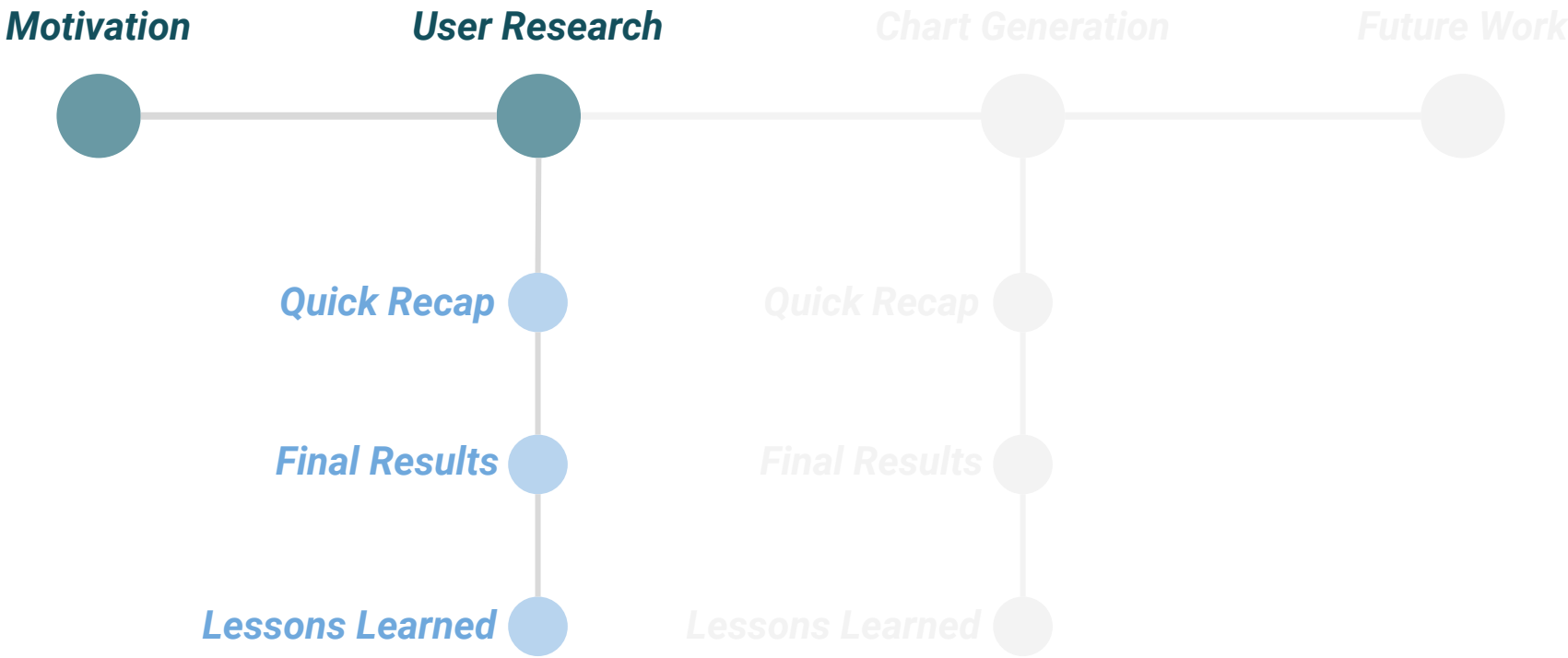
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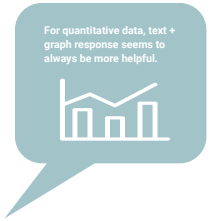
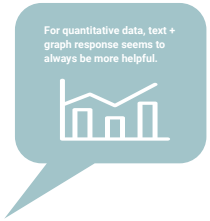
User Research / Lessons Learned



A text + graph response is more helpful than just text.

User Research / Lessons Learned



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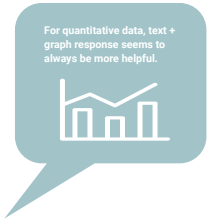
Users are mostly interested in change over time.

User Research / Lessons Learned

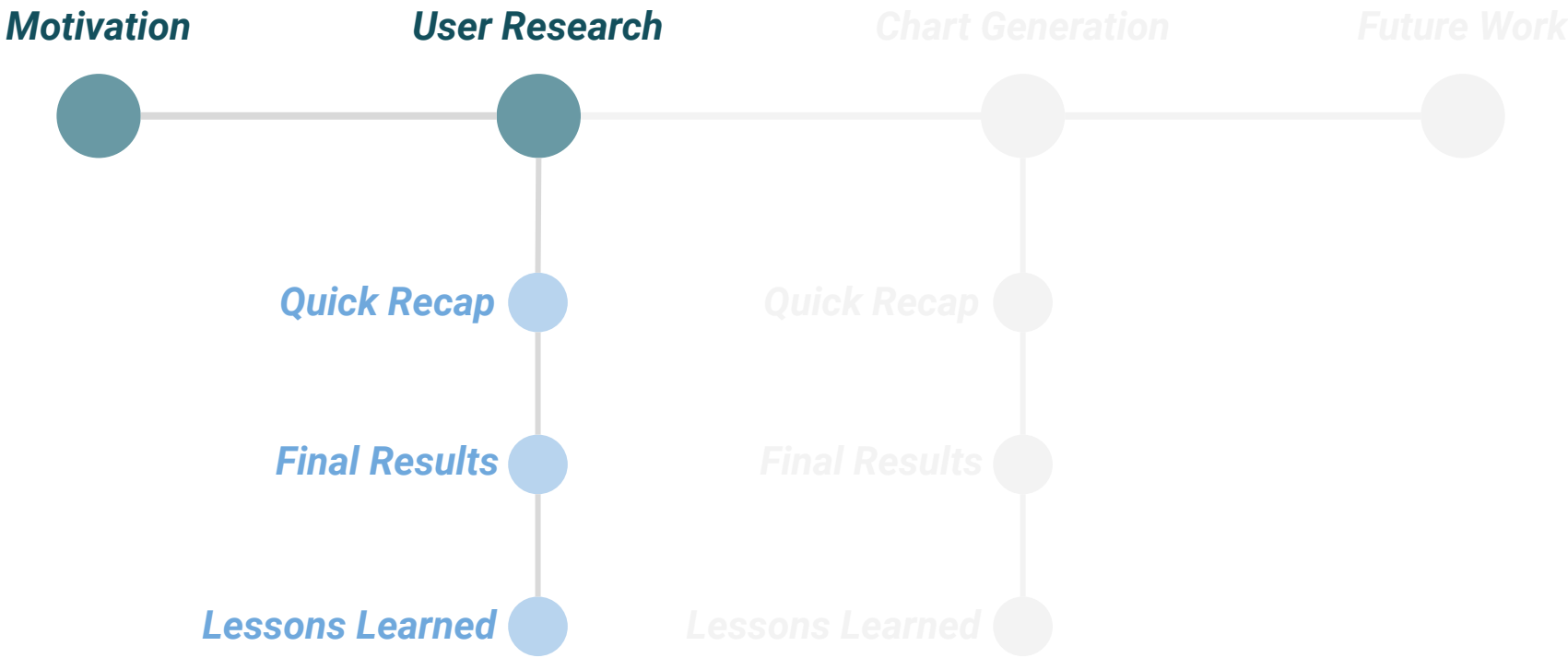


A text + graph response is more helpful than just text.

Users are mostly interested in change over time.

The graph content itself is critical.

Outline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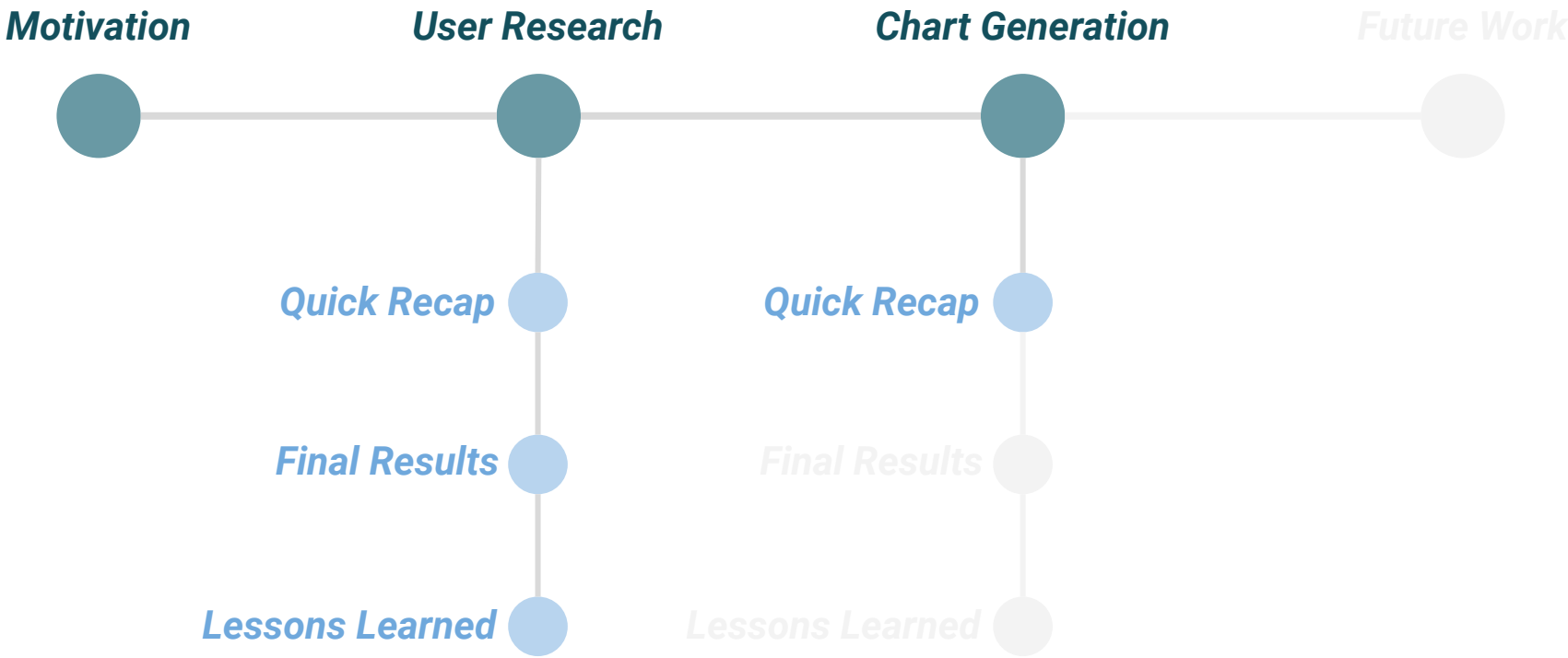
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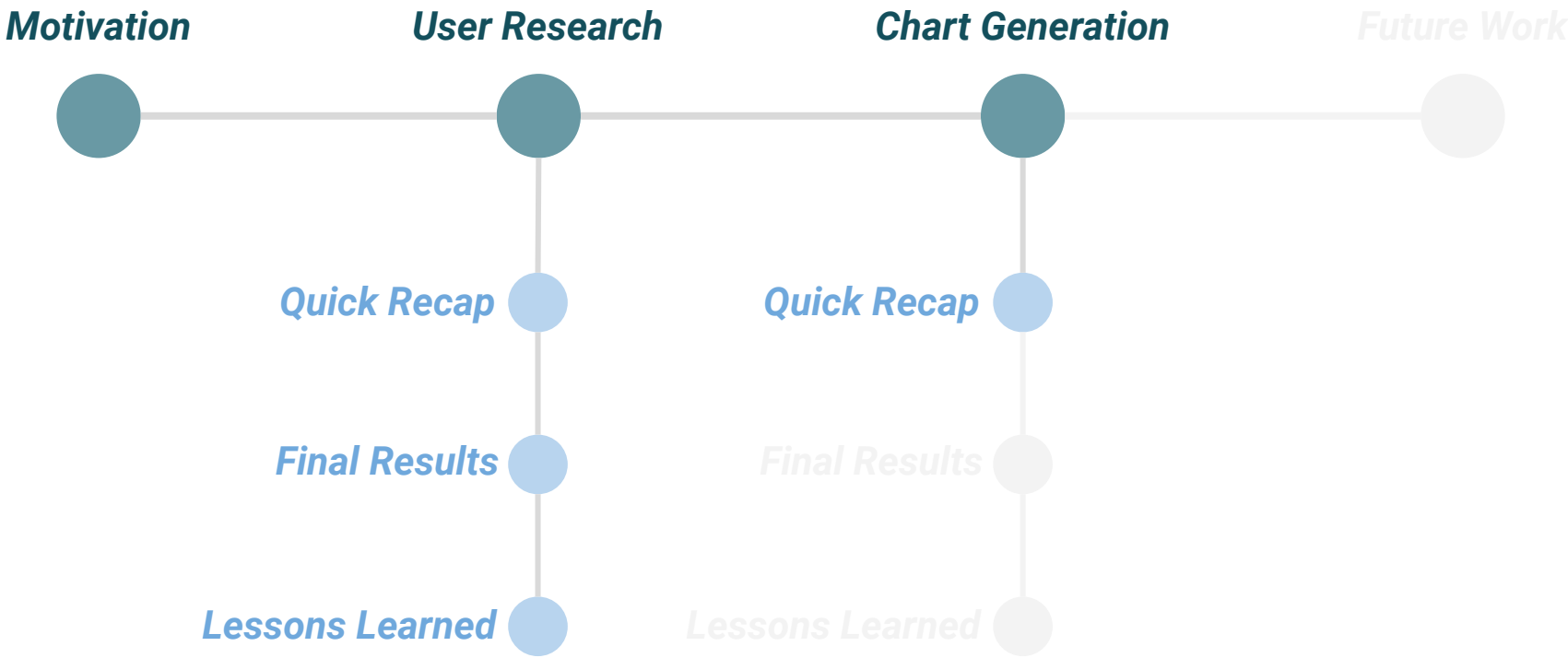
Chart Generation / Quick Recap

- Goal: Generate graphical representations to questions about COVID-19

- Started with:
  - Generating plots for questions already supported by ThingTalk (ie weather)
  - Generating plots in Python and then displaying an image of the plot to the user

- Moved to:
  - Generating plots for questions about coronavirus
  - Generating plots in Javascript using Chart.js

Outline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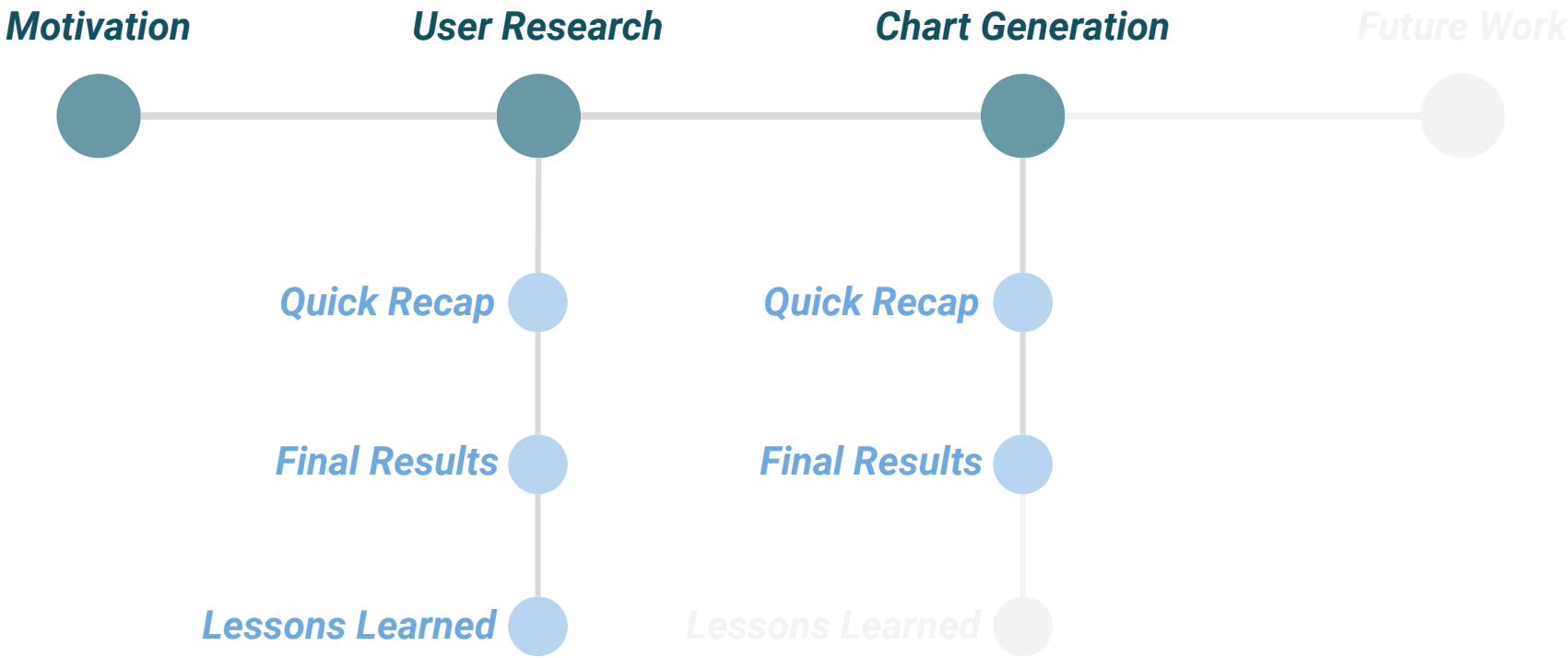
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Chart Generation / Final Results

```
\t now => @com.covidtracking.state(state='ca') => notify;
```

Chart Generation / **Final Results**

Tuesday, March 3, 2020: 0 new confirmed cases, 0 new death in ca. In total, 53 confirmed cases, 0 death, 0 recovered.

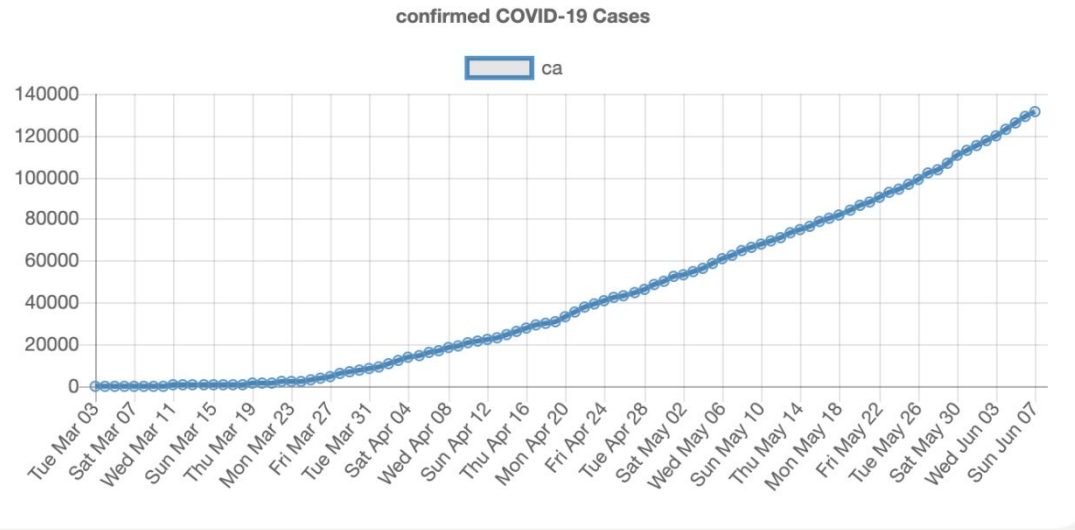

Chart Generation / Final Results

Friday, March 6, 2020: 0 new confirmed cases, 0 new death in ct. In total, 0 confirmed cases, 0 death, 0 recovered.

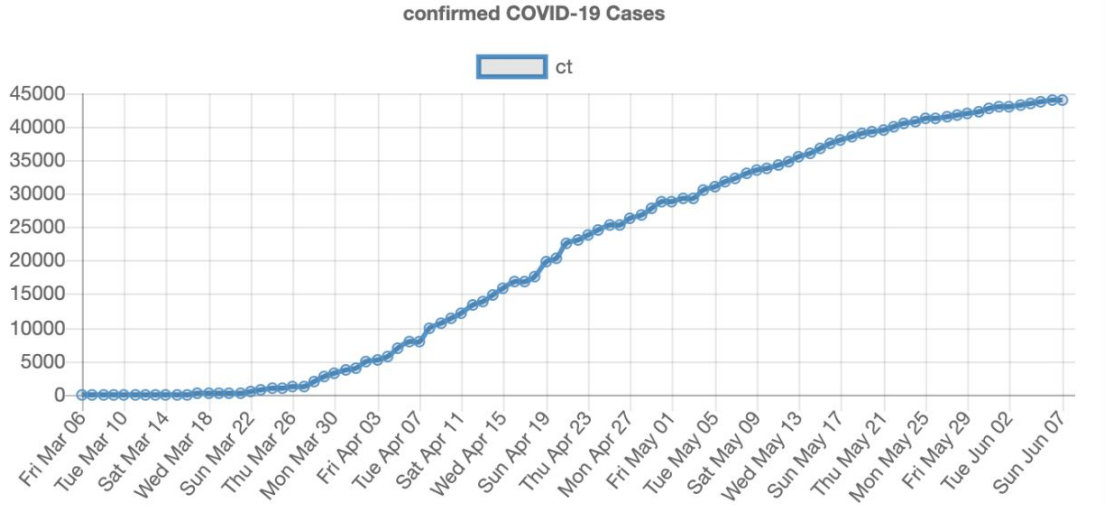

Chart Generation / Final Results

```
\t now => @com.covidtracking.us() => notify;
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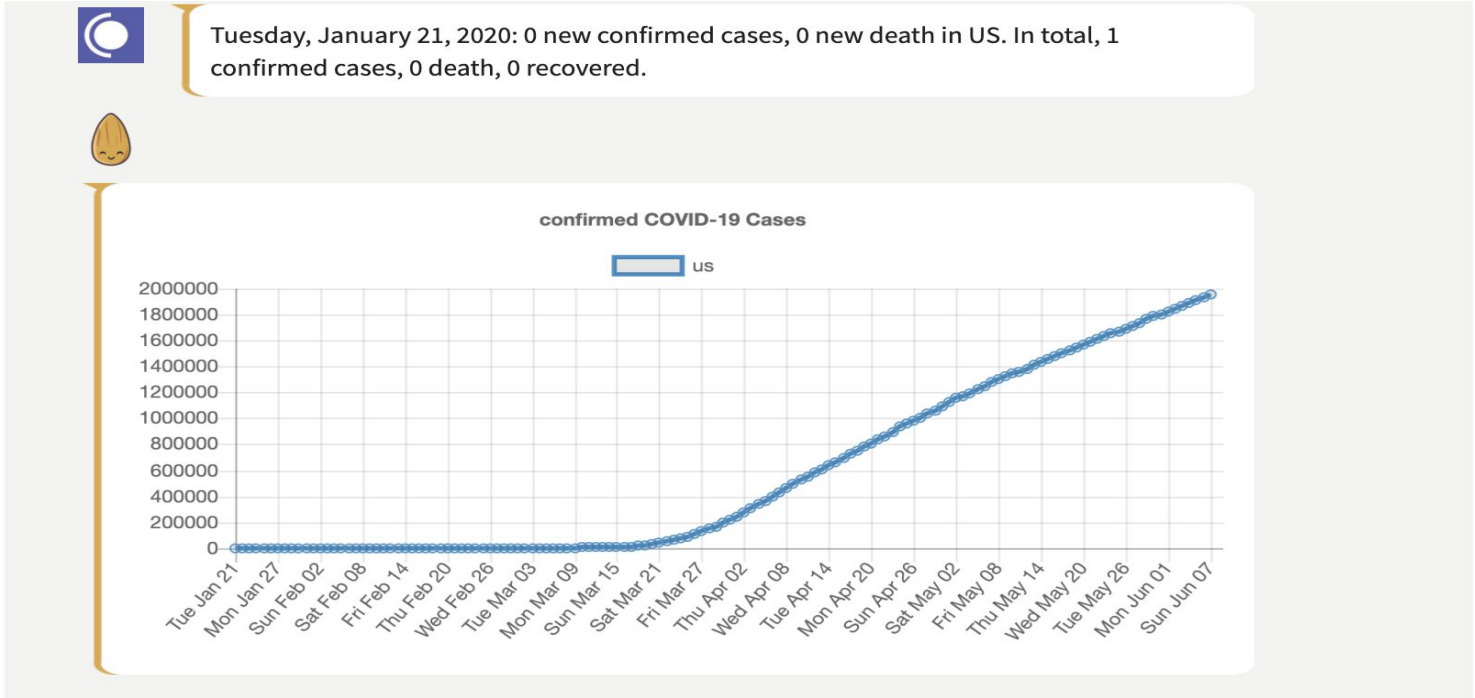

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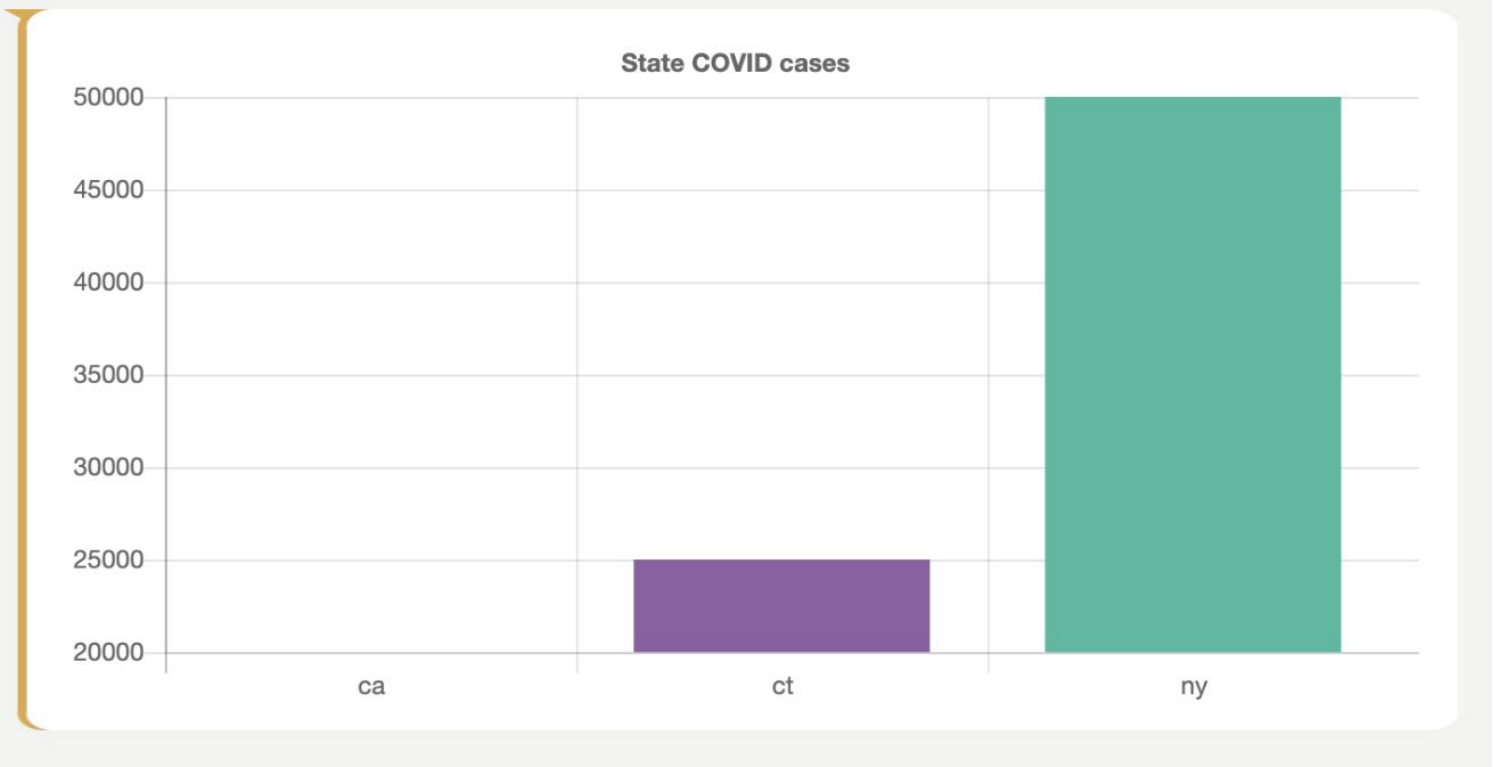

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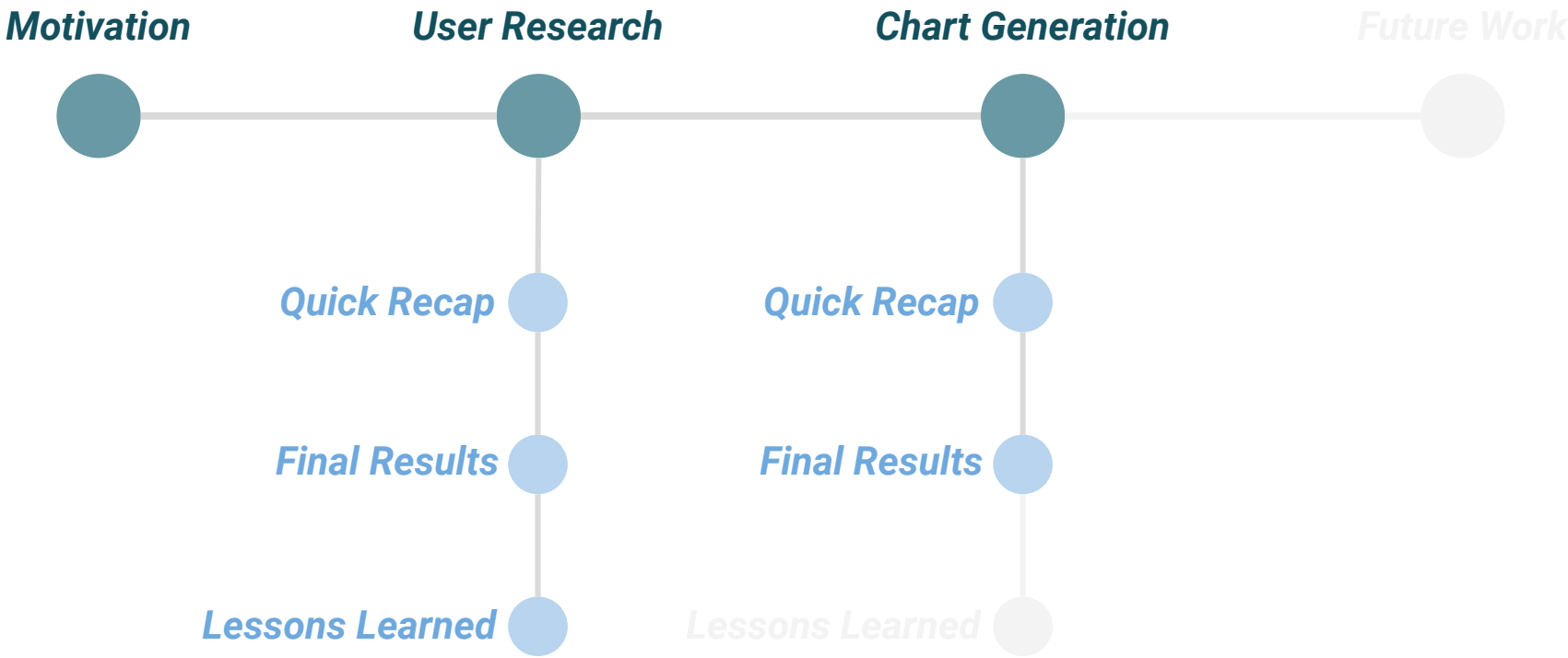
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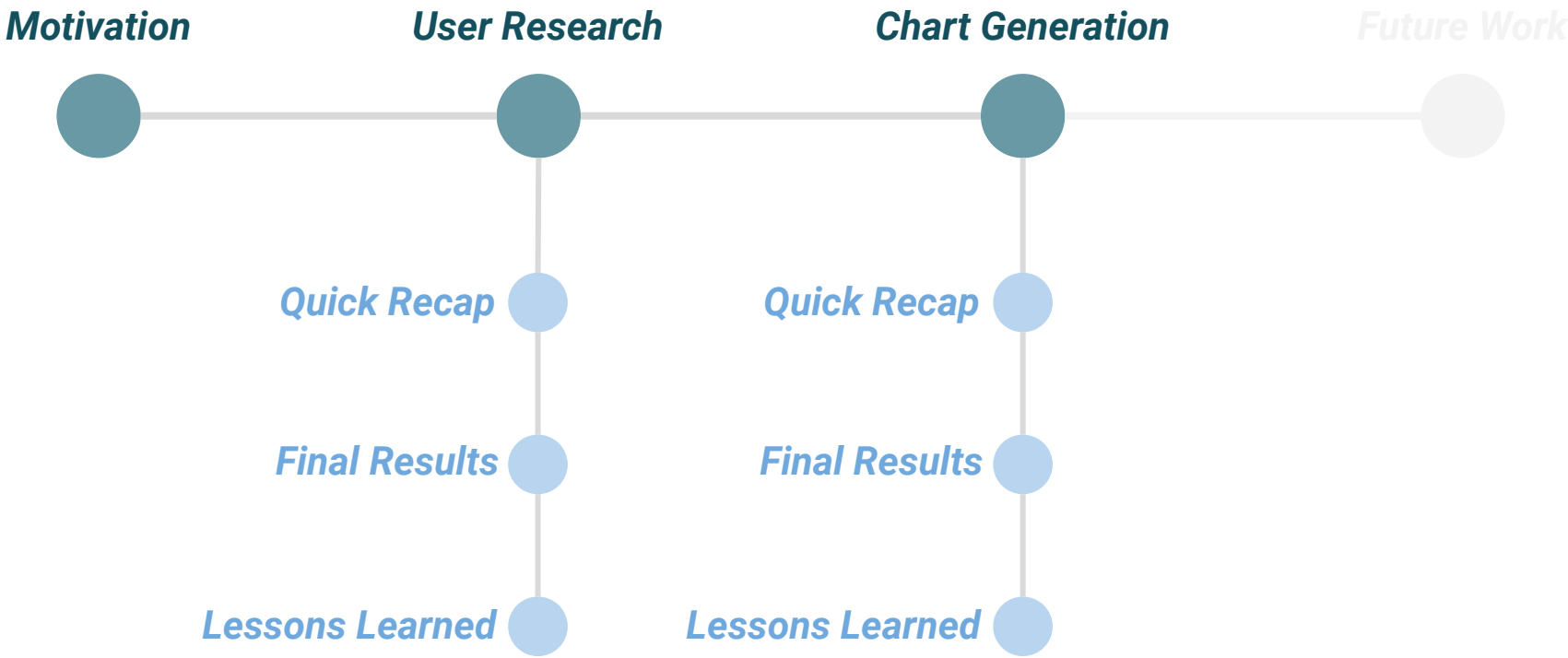
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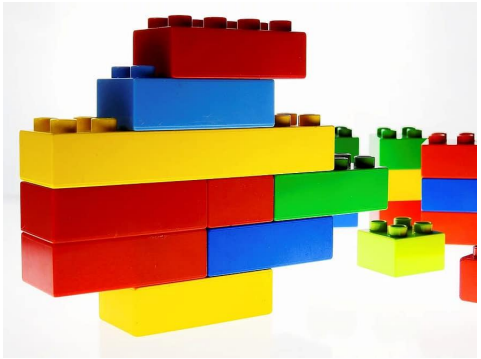
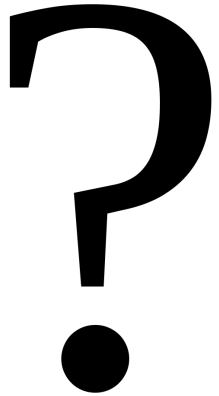
Chart Generation / Lessons Learned

JavaScript



High level ideas → actual implementation



People

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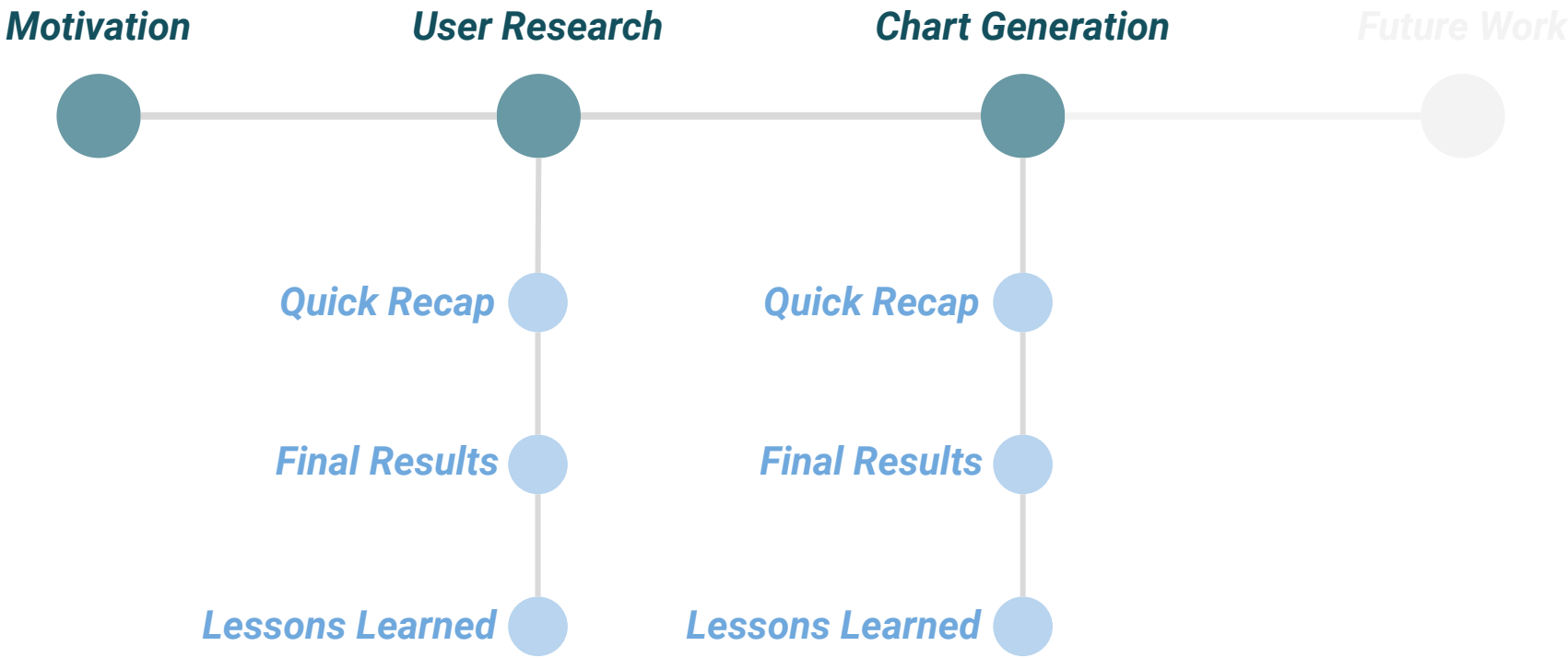
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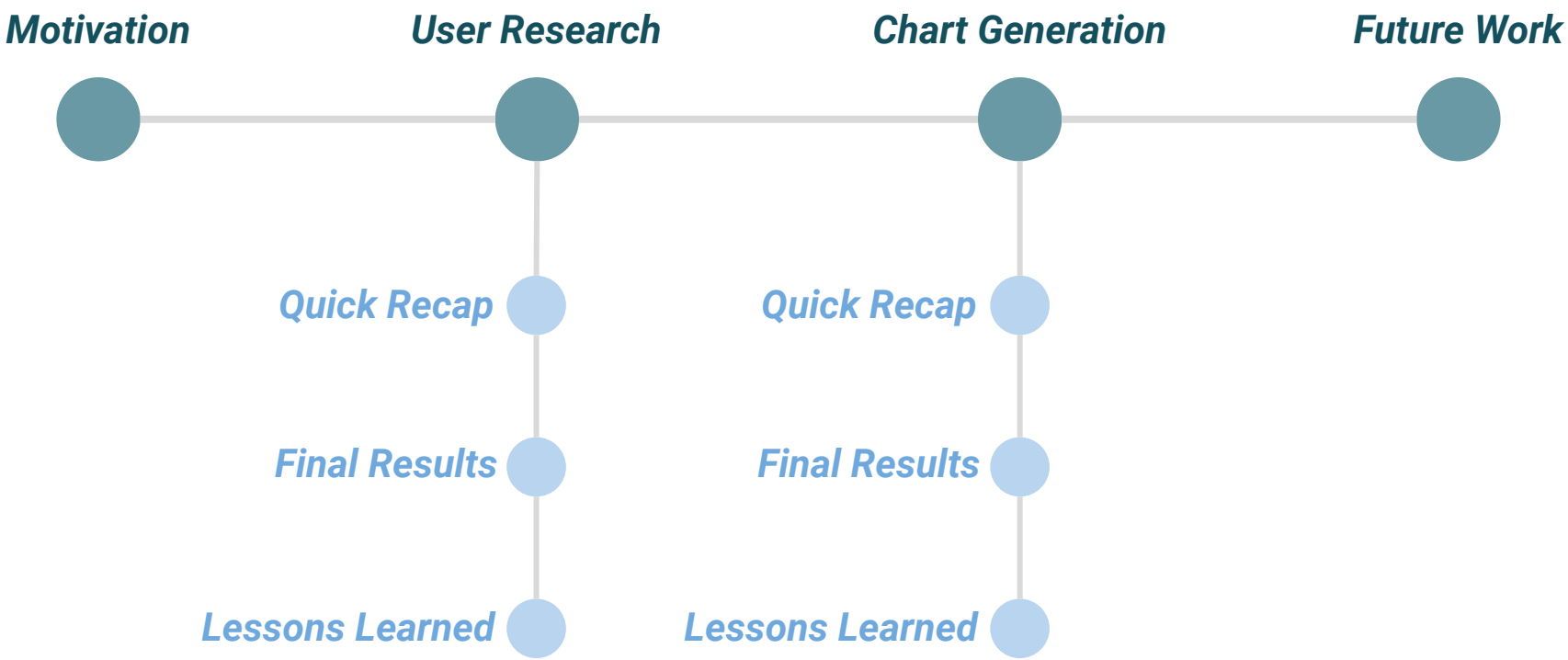
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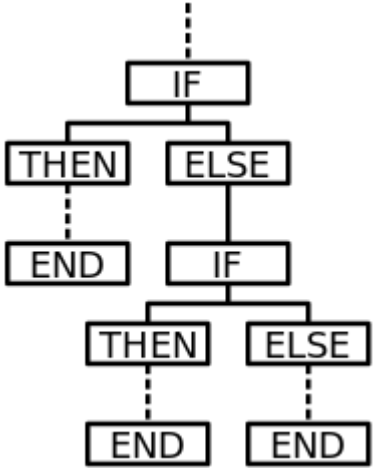
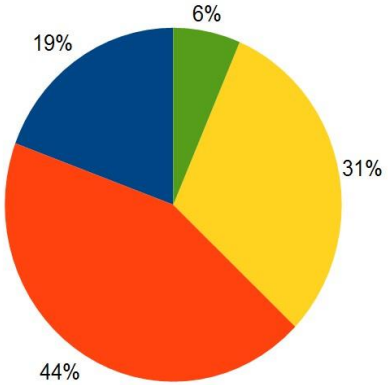
Future Work

Connect the pipeline



More robust mappings



More types of charts