

Innovation Activity of Cities in the U.S

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UW CSE512: Data Visualization - Spring '22

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Motivation

To develop a novel visualization application that can enable relevant stakeholders visualize and explore innovation activities in the U.S and analyze the role of university-industry collaborations in bolstering innovation.

Preliminary Data Analysis

Table: Data Sources

Type of Data (unit)	Year
Research grant funding (\$)	2019
Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) (\$)	Averaged across 2017, 2018 and 2019 because of high year-to-year fluctuations
Venture Capital (VC) disbursed (\$)	2019

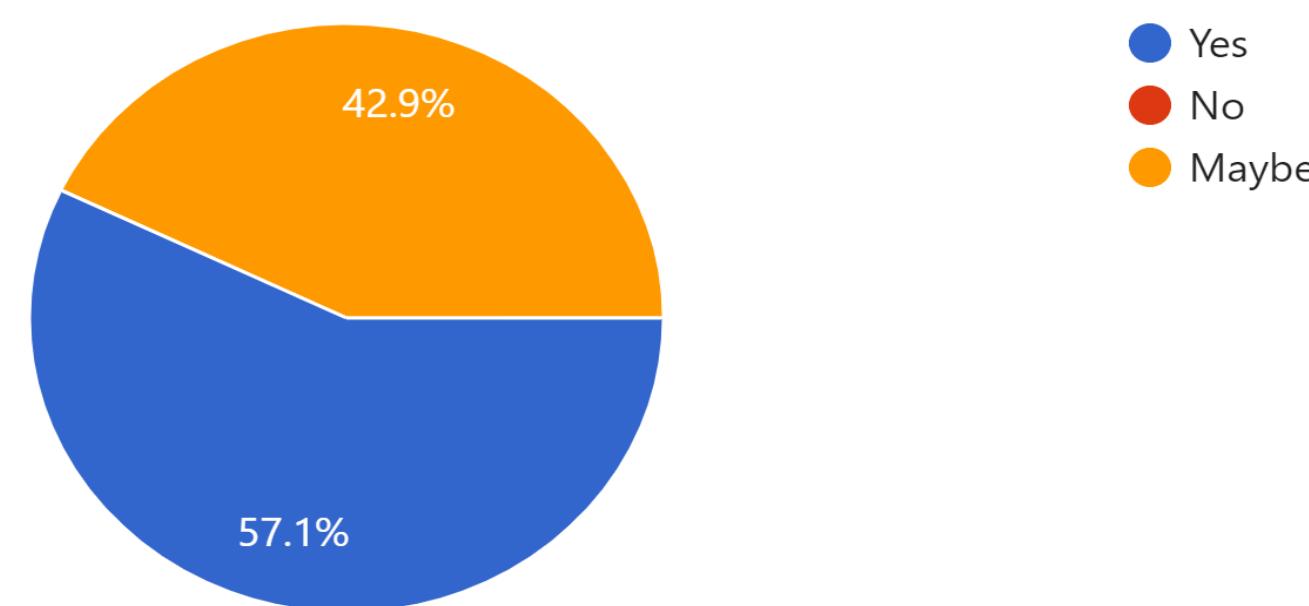
In 2019, out of 384 metropolitan area in the U.S, 37 of them received funding
□ 75% of Federal Research Funding
□ 67.1% of SBIR/STTR funding
□ 95.0% Venture Capital Funding

Evaluation/Feedback

We created an anonymous survey with a snippet of our visualization to find out:

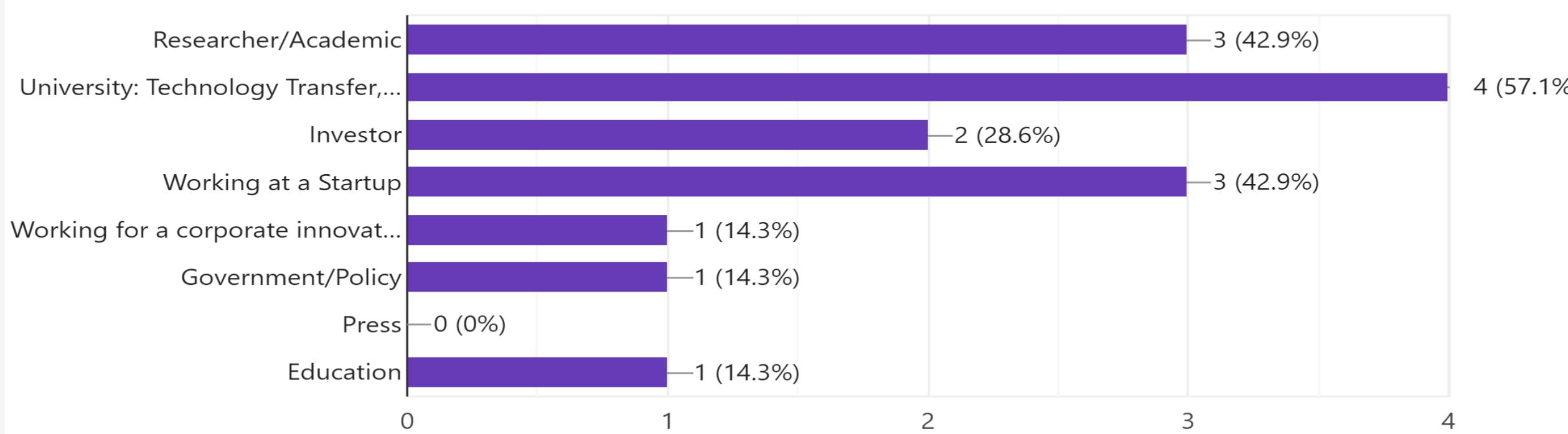
1. Who are our users?
2. Whether they find proposed dashboard useful?

Do you think having an interactive dashboard providing insight on a region's university R&D, dominant industries and employment data will directly or indirectly help you?
7 responses



Which of the following settings do you work within?

7 responses



We discovered that:

1. Our 7 seven users are employed in industries such as healthcare, artificial intelligence, and advanced manufacturing.
2. 57.1 percent of users will benefit directly or indirectly from our interactive dashboard.
3. More than half of the users work in university technology transfer, while 42 percent are from academics and a few are startup employees.

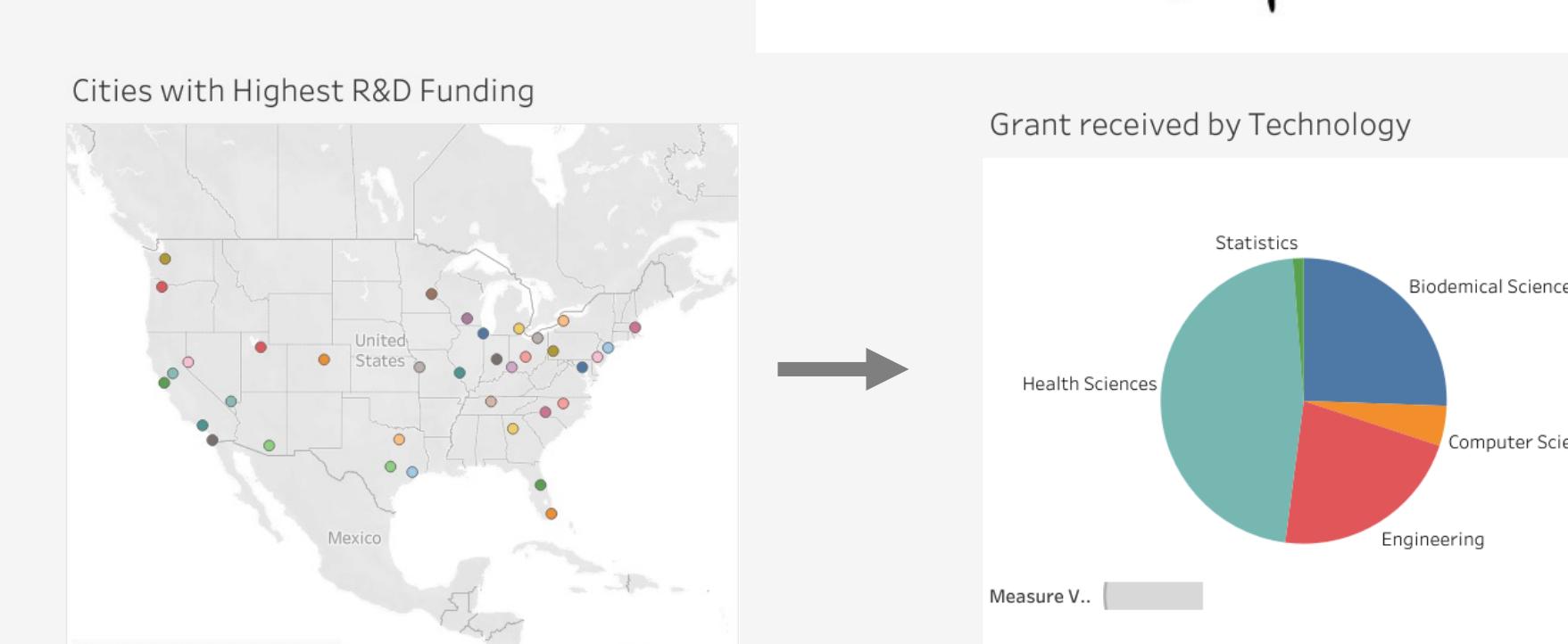
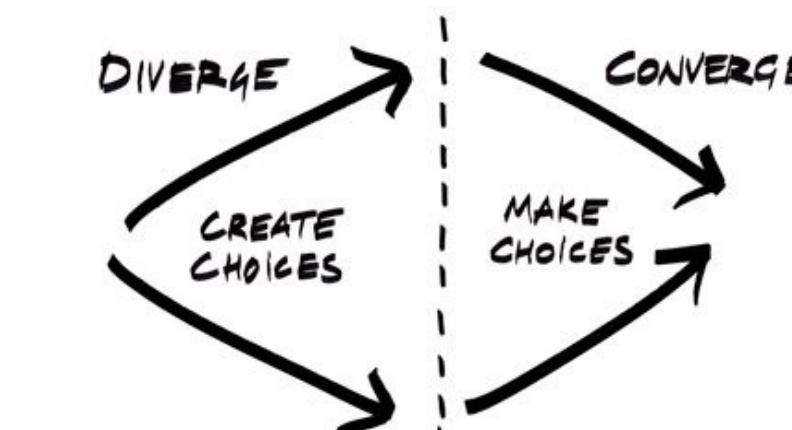
Design Goals

- The objective is to design a cohesive, expressive dashboard that allows users to track, analyze, and leverage the data that interests them.
- This project is based on comparing metrics of innovation in the three categories above across different cities in the U.S for 2019.
 - How did the expenditures of higher education R&D vary across different metro cities in 2019?
 - How did industry structure differ in different metro cities in 2019?
 - How does venture capital differ in different metro cities in 2019?

Data Collection

- Federal R&D Funding Data: [Grants.gov](#) and National Science Foundation Databases
- Industry Structure Data: Bureau of Labor Statistics Database and Pitchbook
- Venture Capital Data: Pitchbook

Approach



- We gathered data from a variety of sources, including Fred economic data and labor statistics, to identify the 36 cities with the most SBIR and Federal funding and capital investment.
- We also compiled data on the top five industries for 36 cities and analyzed it to see how they contribute to employment and if there is a correlation between grants and employment industry.
- Final design includes a University Map (filtered by city), Static Pie Charts, Pie Charts to show top 5 industry sectors, top 5 VC investments, and a percentage breakdown by industry sector.

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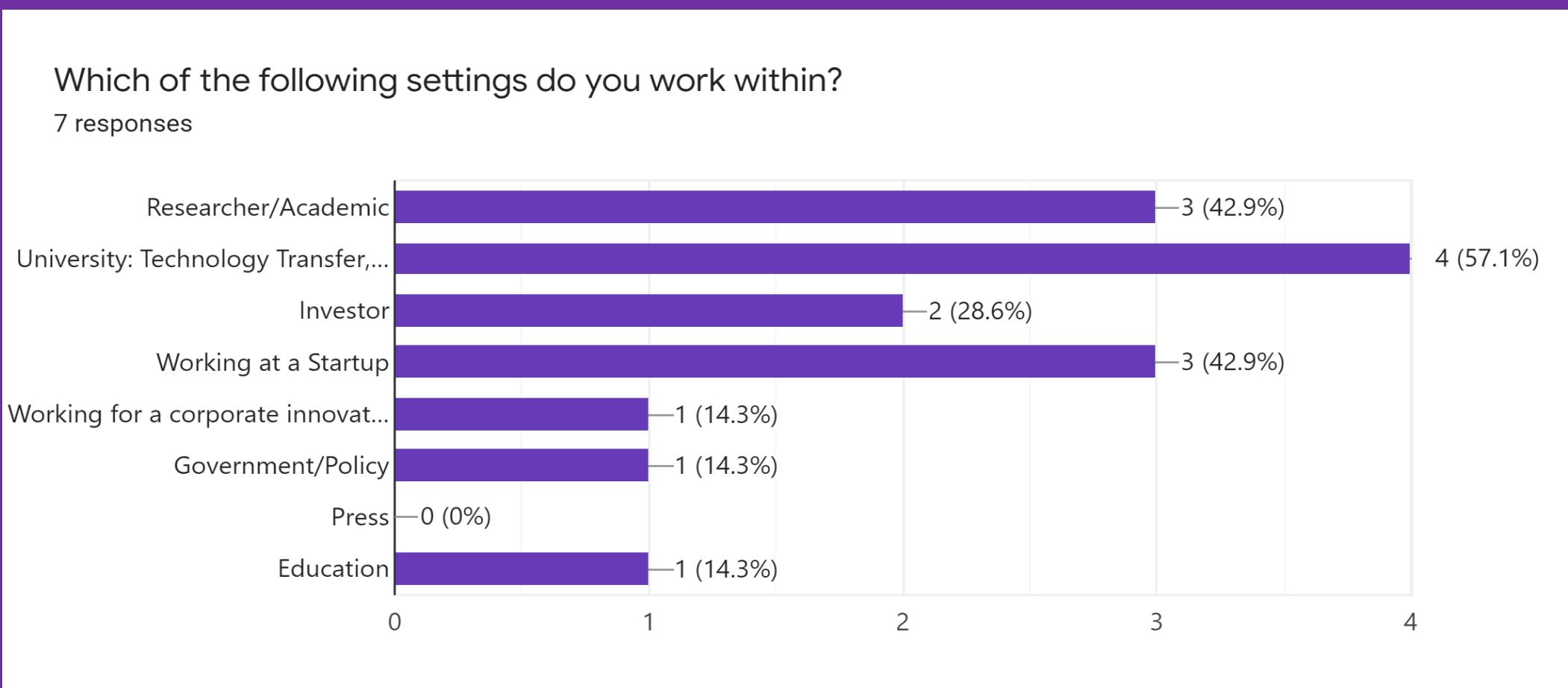
UW CSE512: Data Visualization - Spring '22

Motivation

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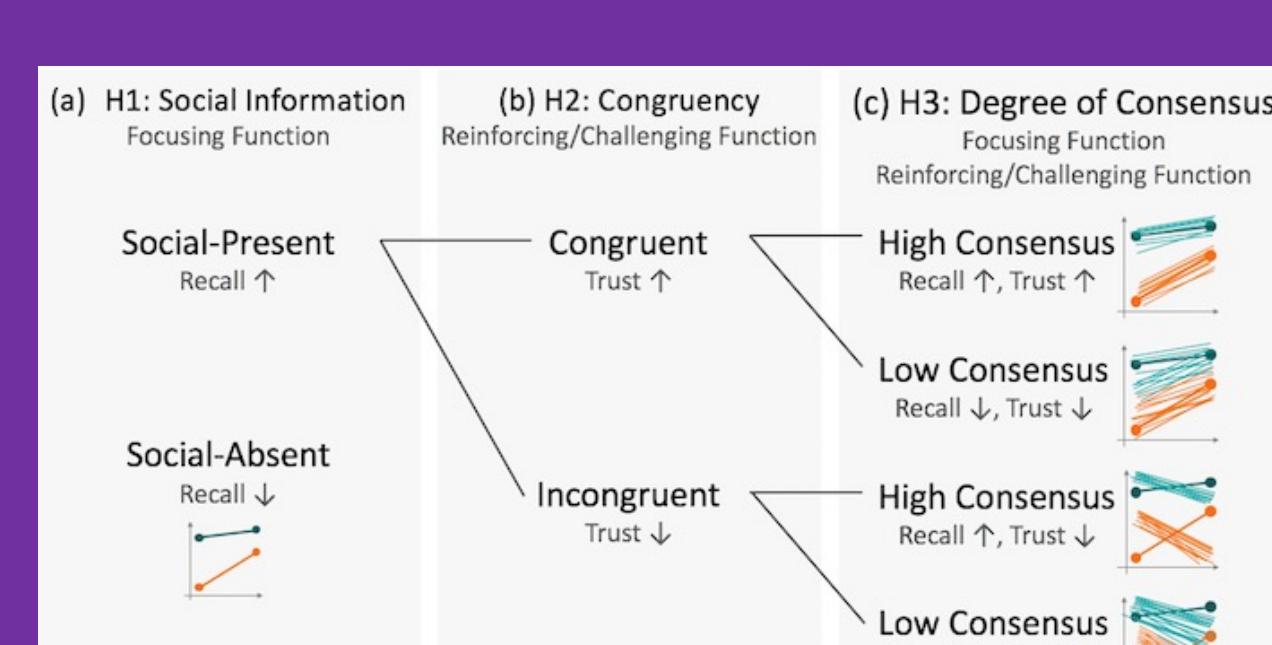
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Evaluation/Feedback

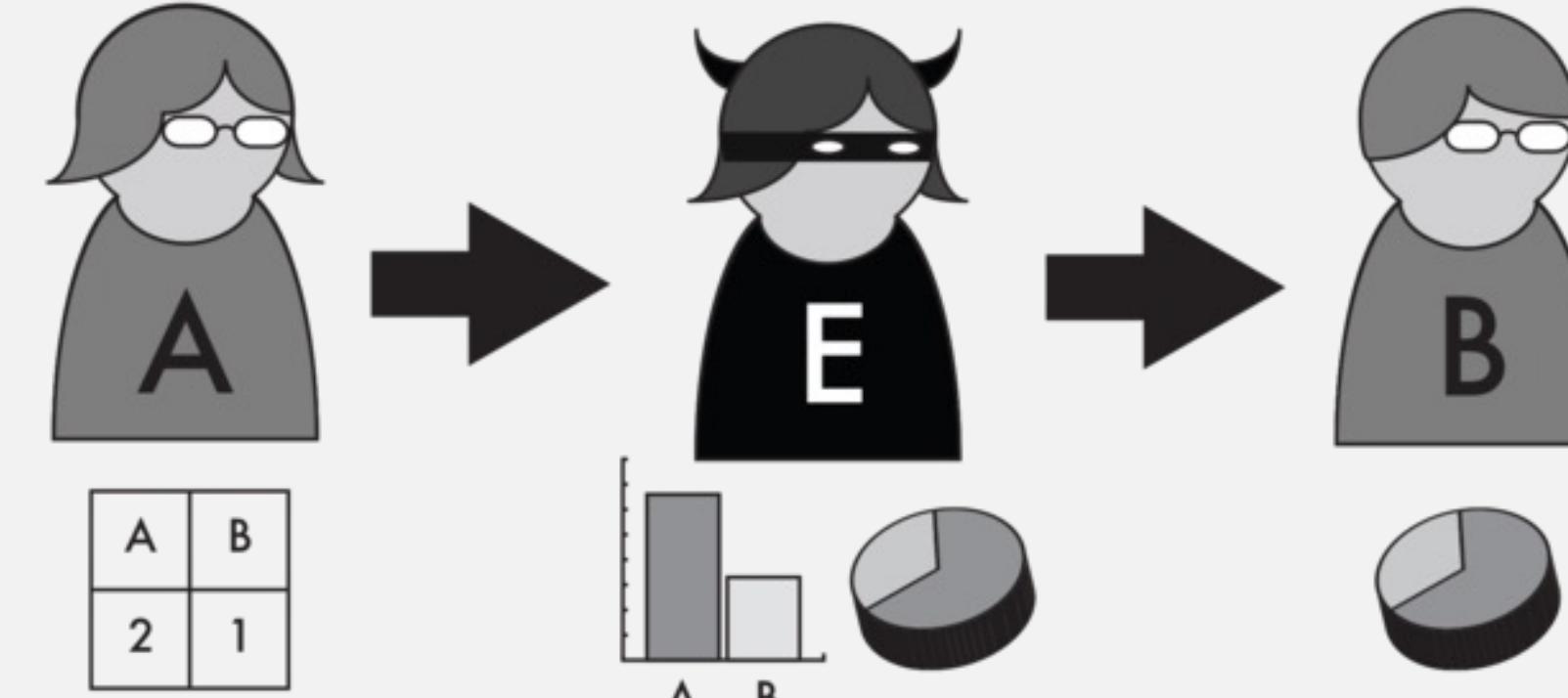


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Design Goals



As part of Shruti's dissertation, she is developing a novel visualization application that can enable relevant stakeholders visualize and explore innovation activities in the U.S and analyze the role of university-industry collaborations in bolstering innovation. In this context, innovation activities include research and development activities (R&D), venture capital activities and entrepreneurial activities.

Approach

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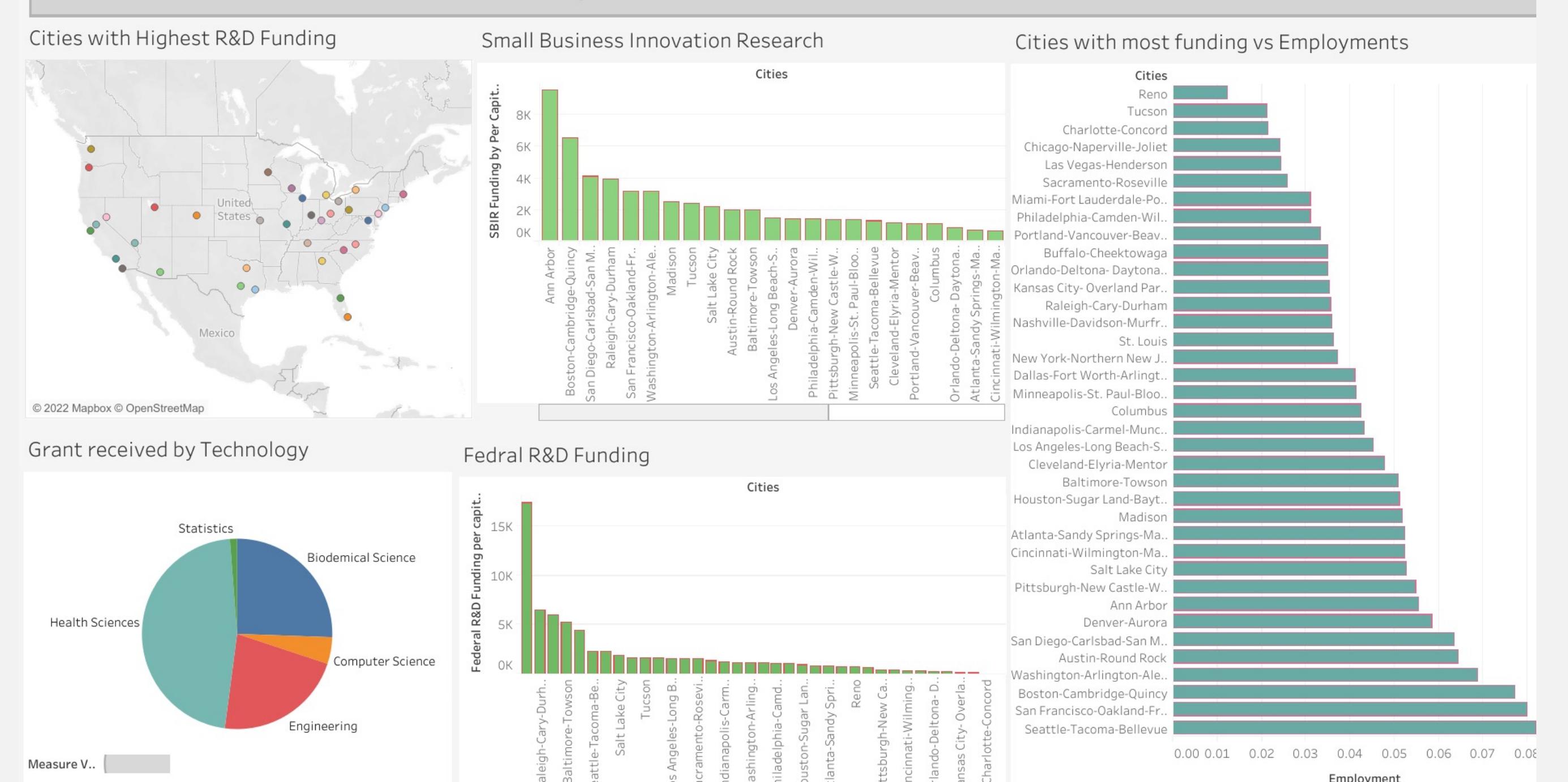
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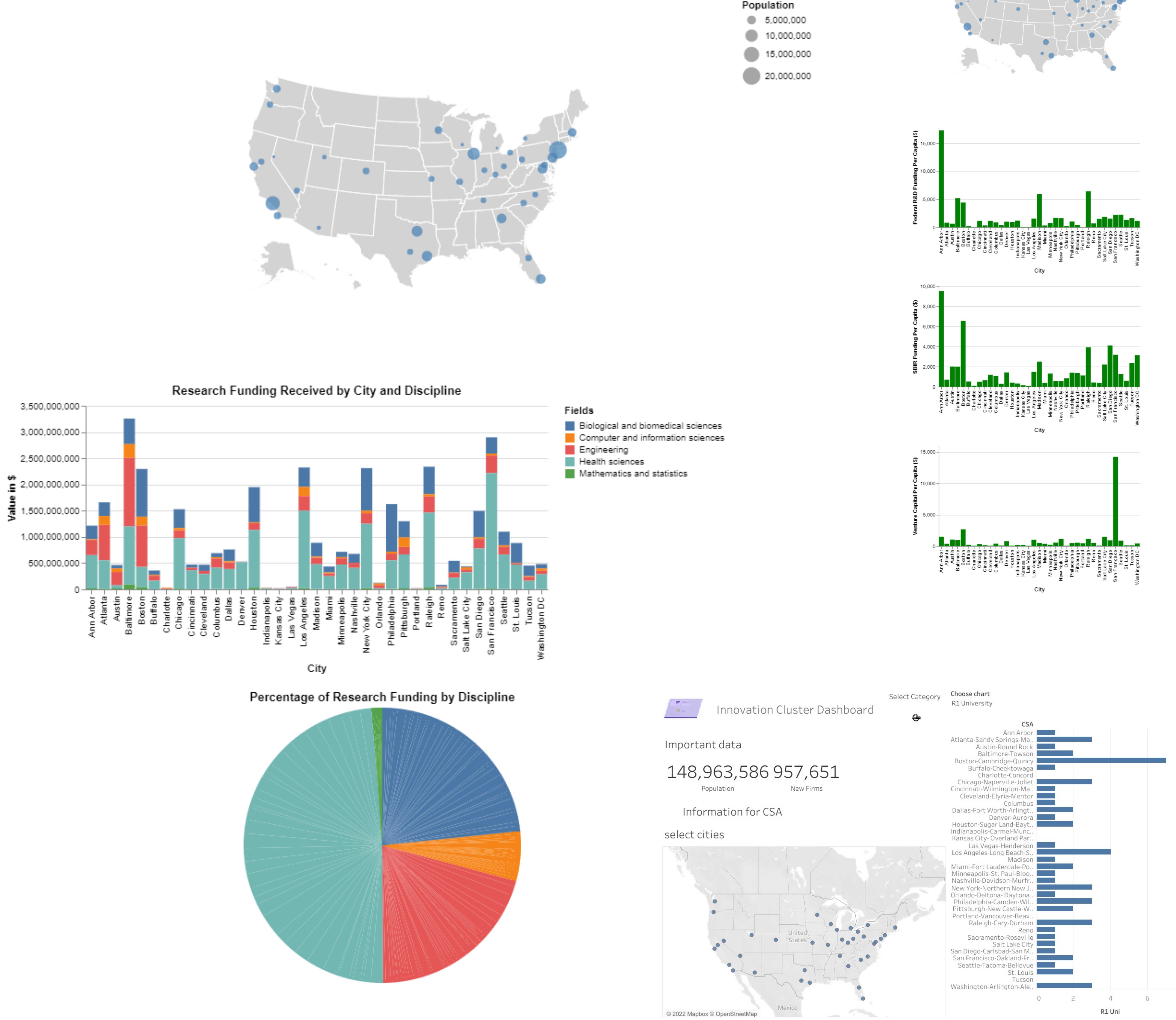
University R&D and Innovation Statistics 2019



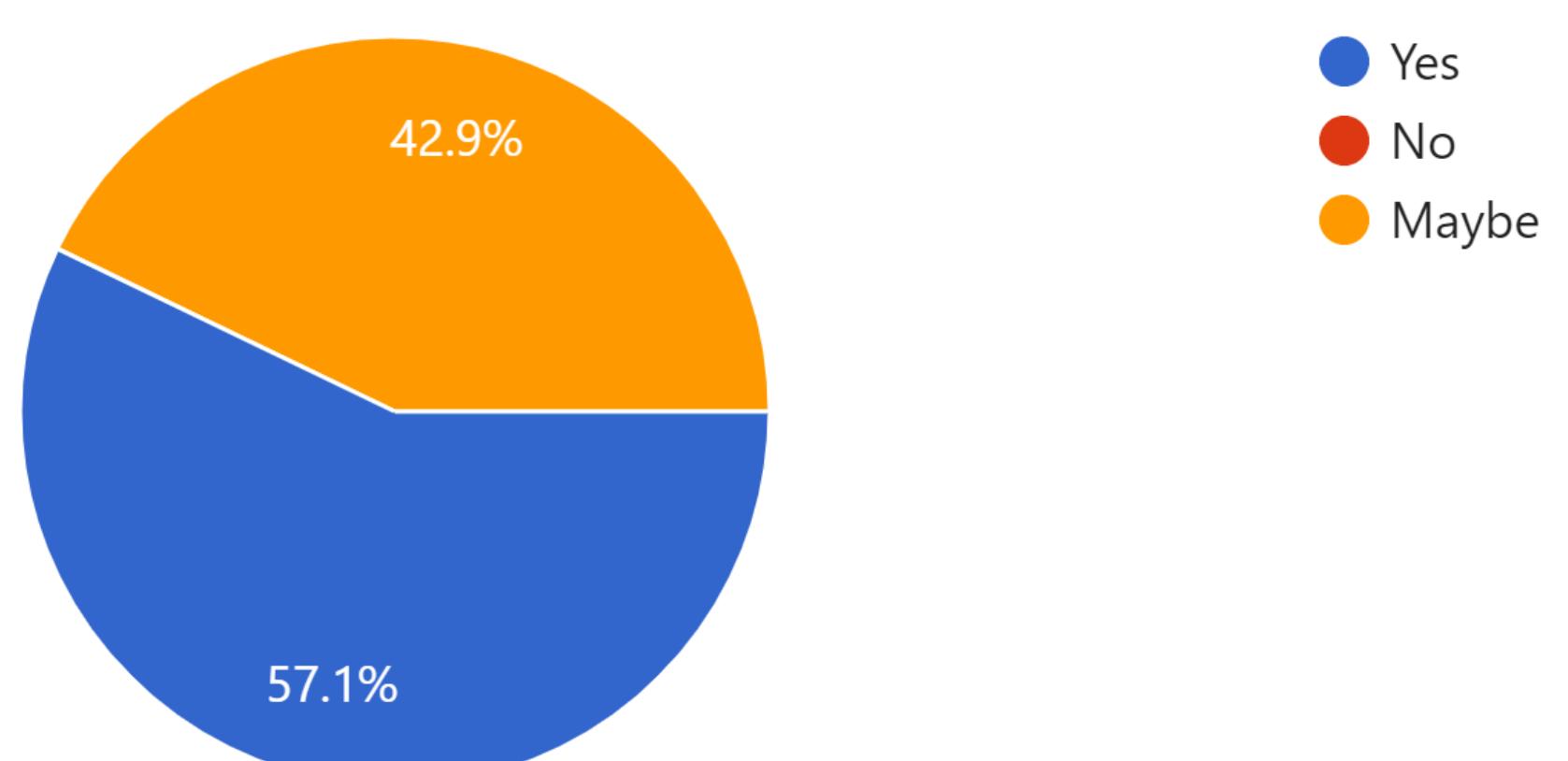
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Innovation Dashboard 2019

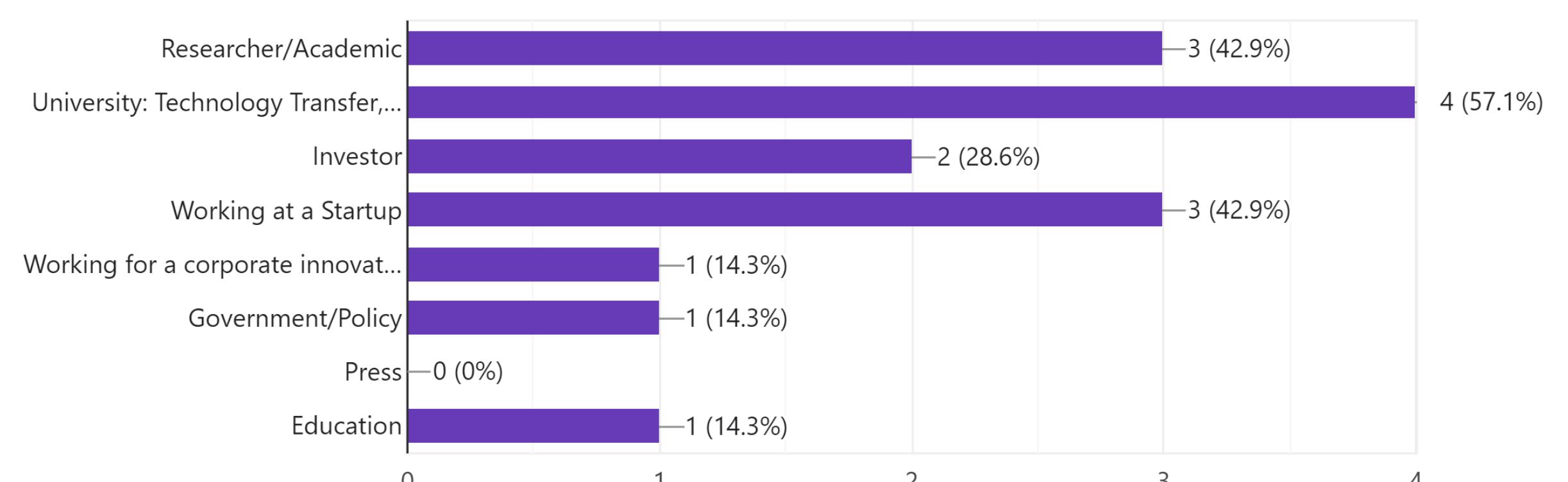


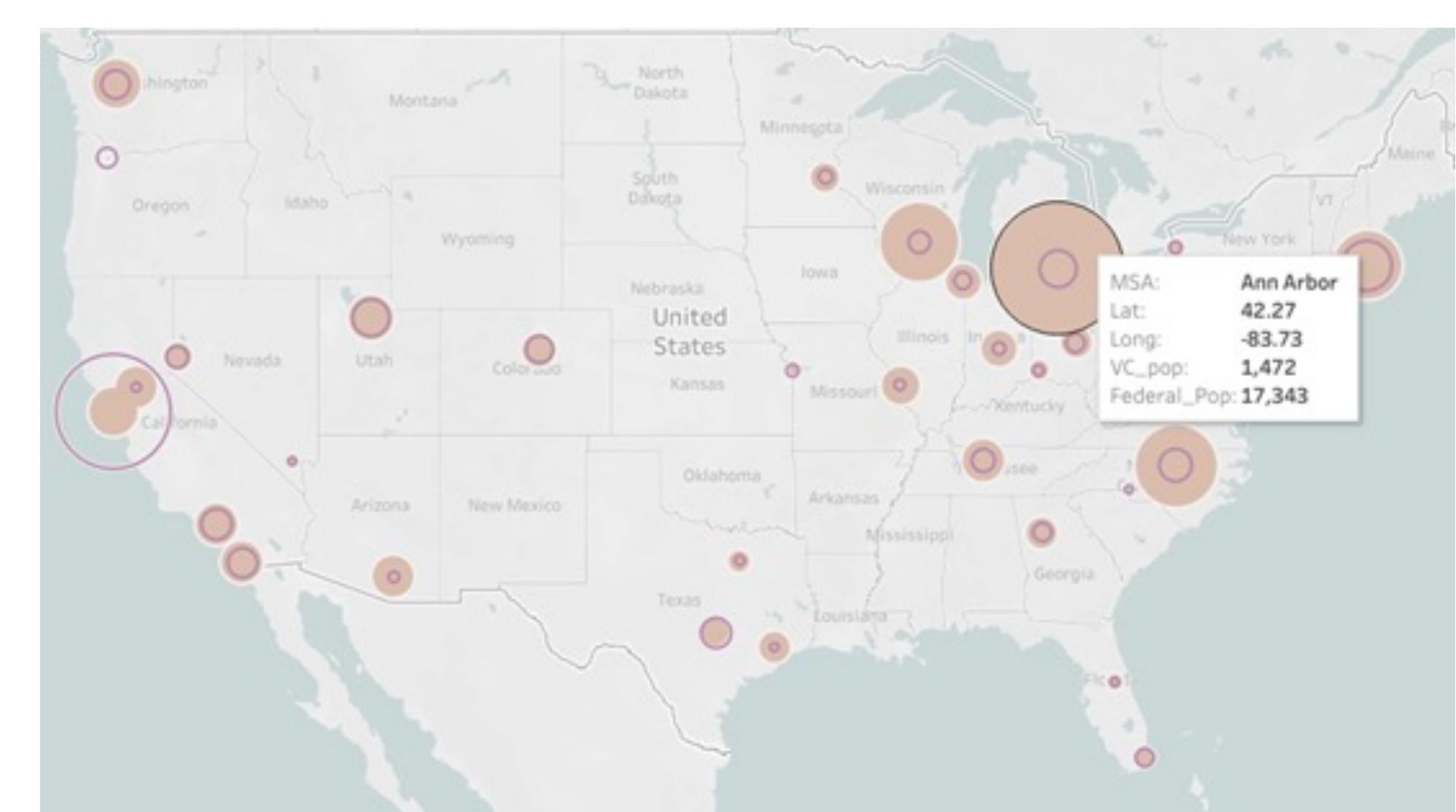
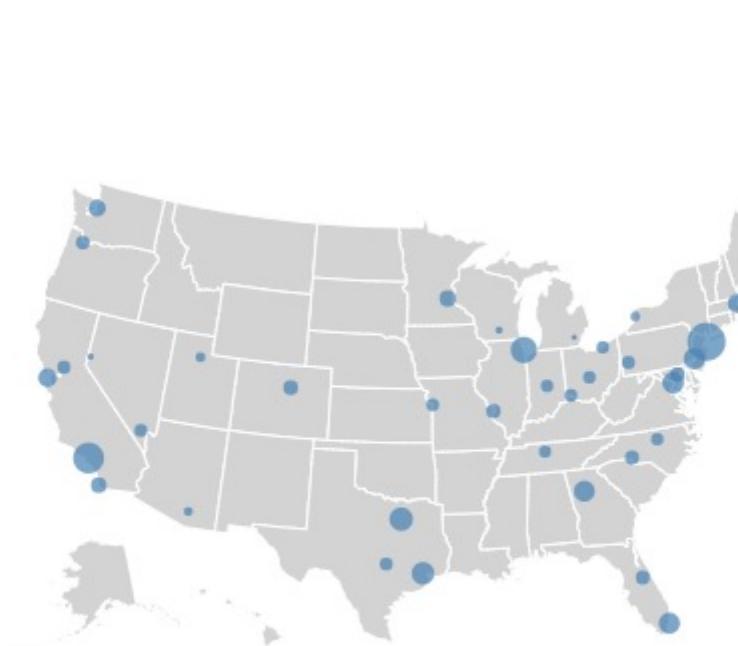
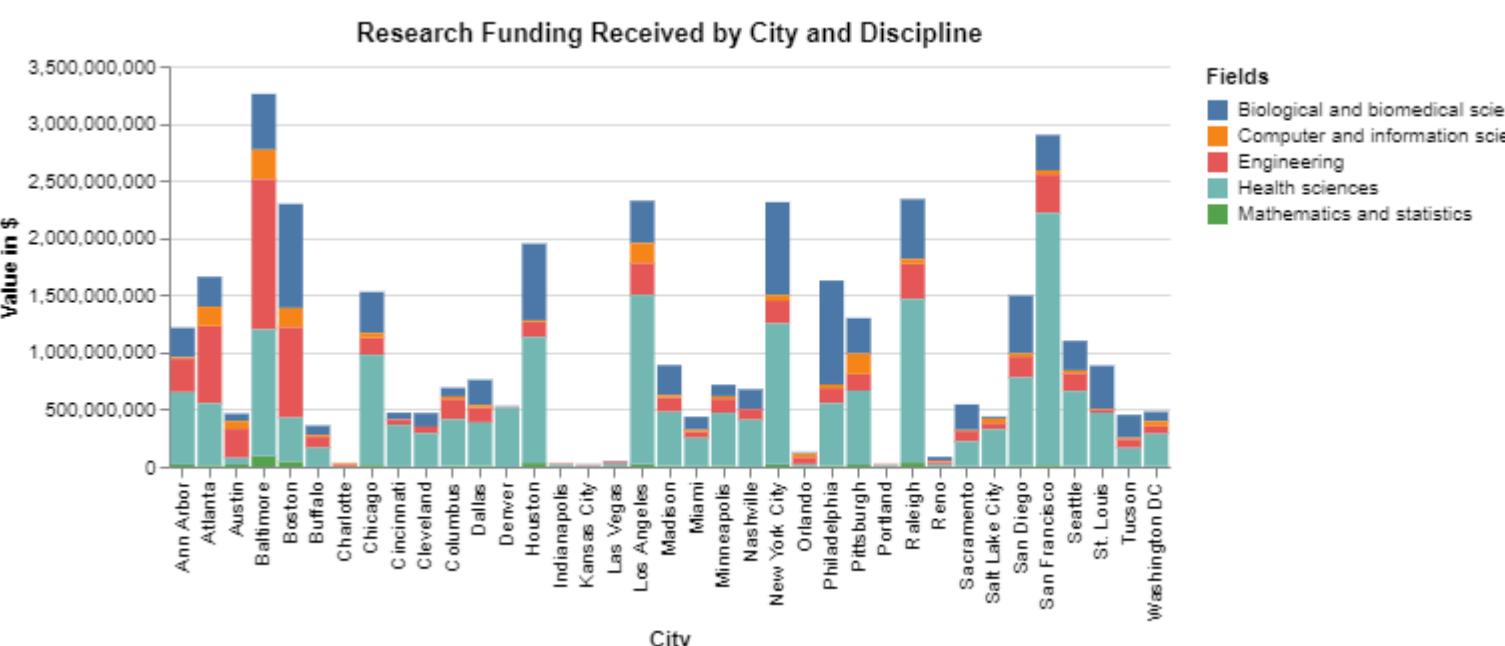
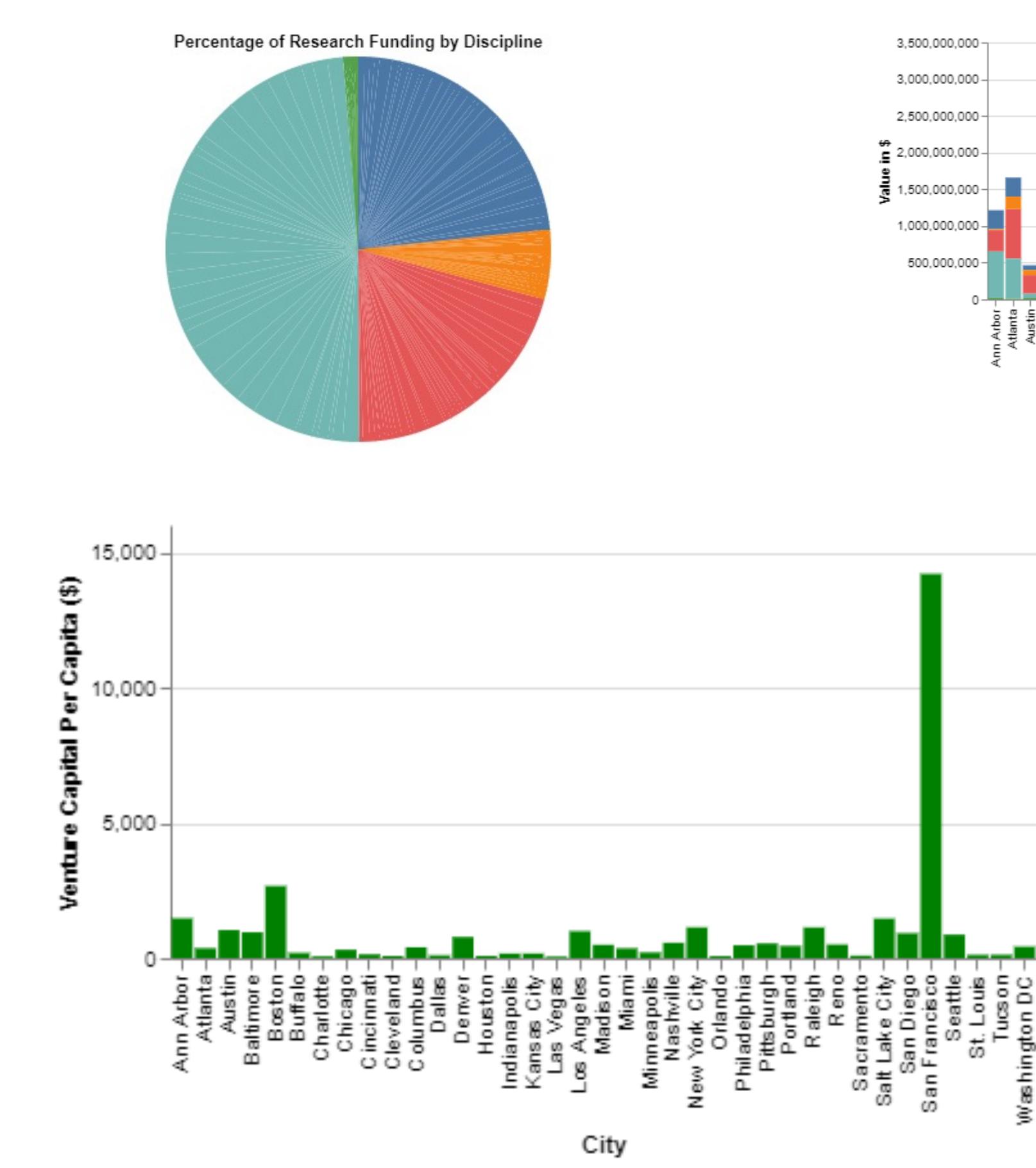
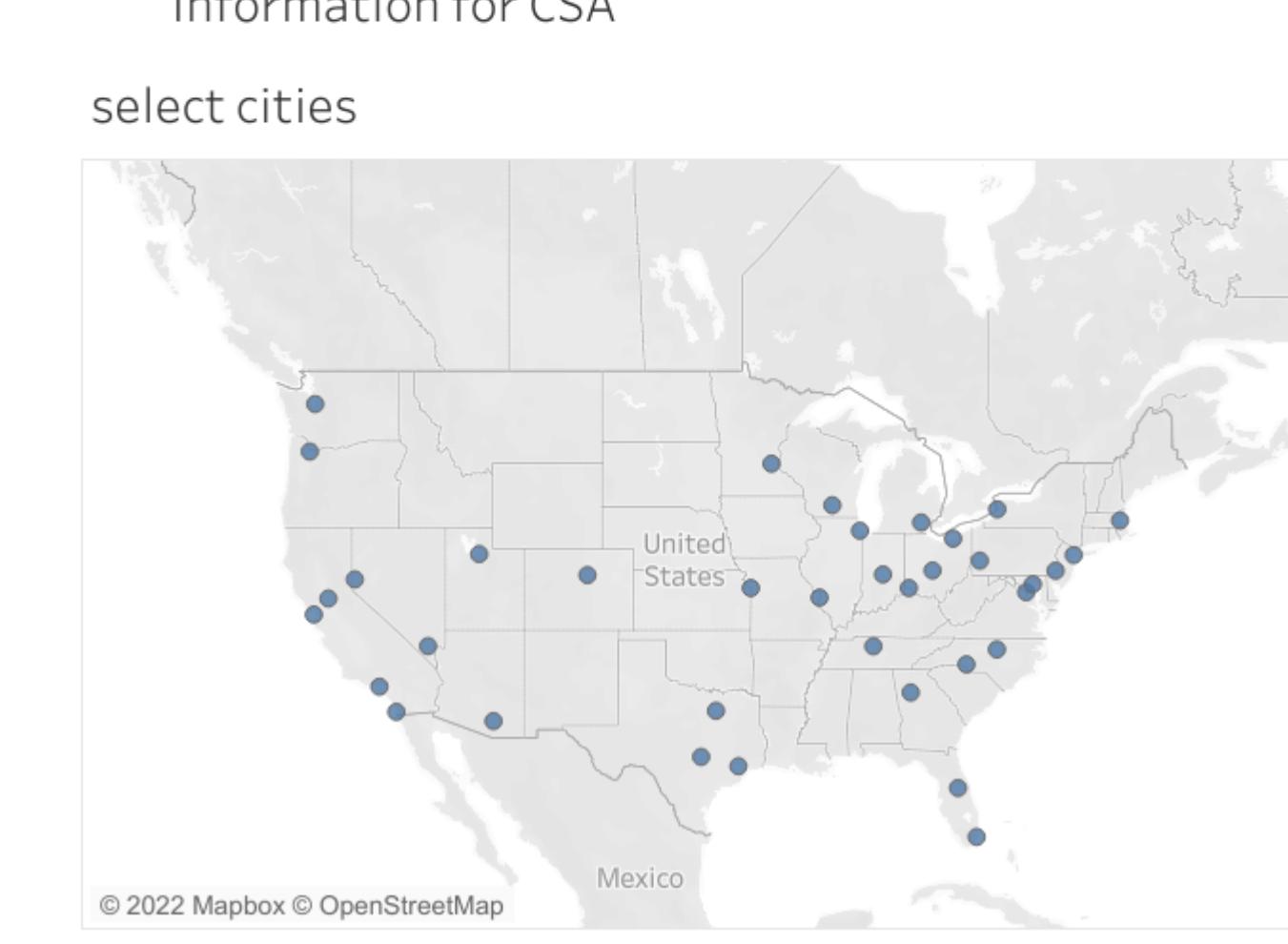
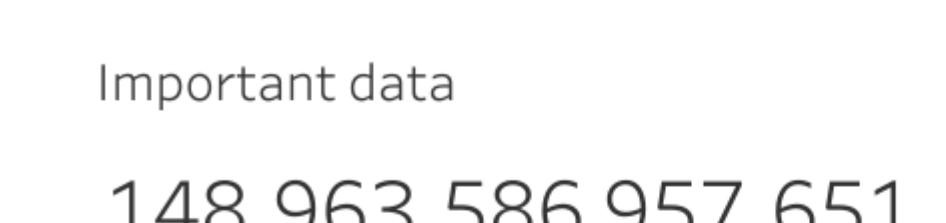
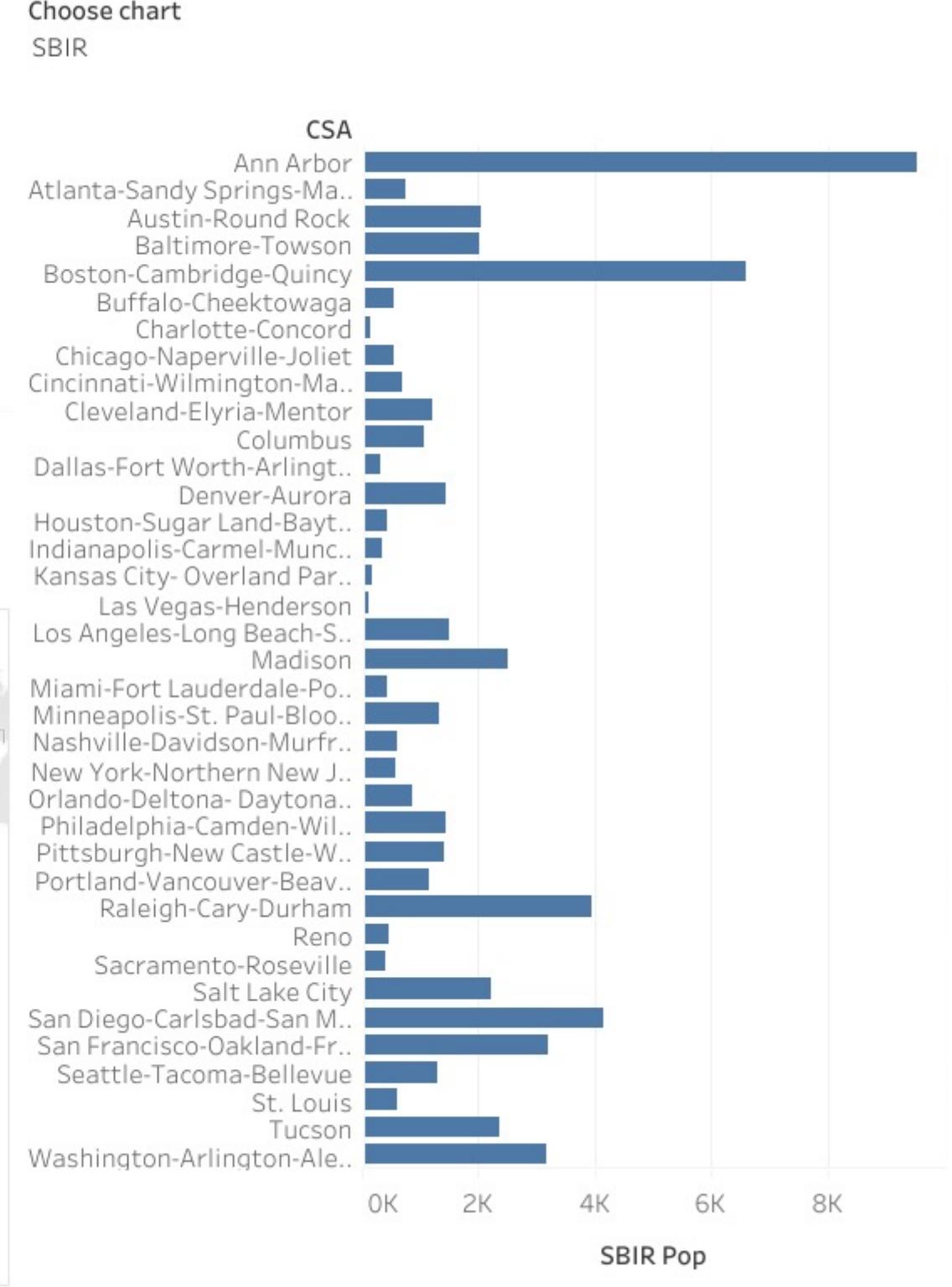
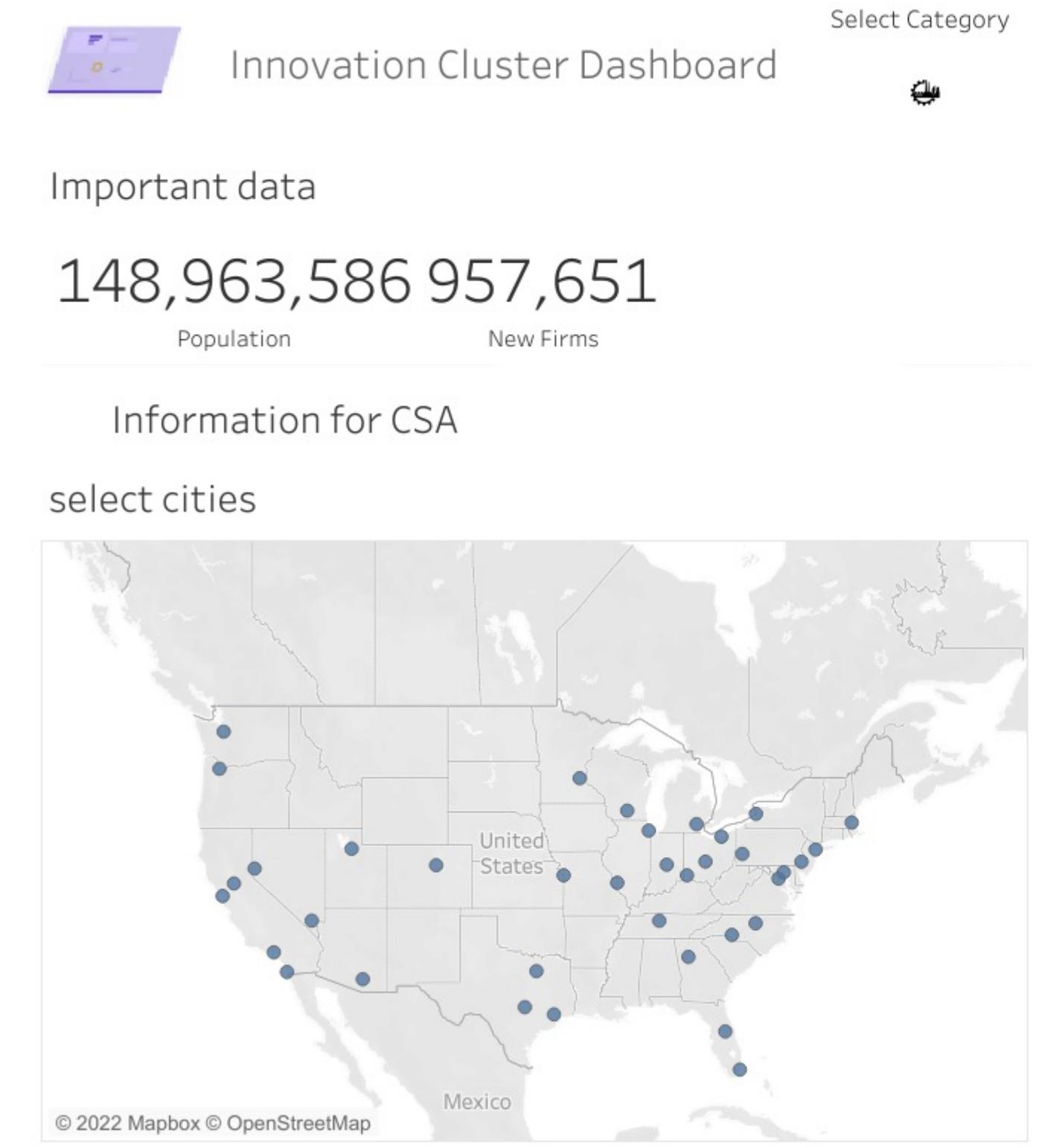
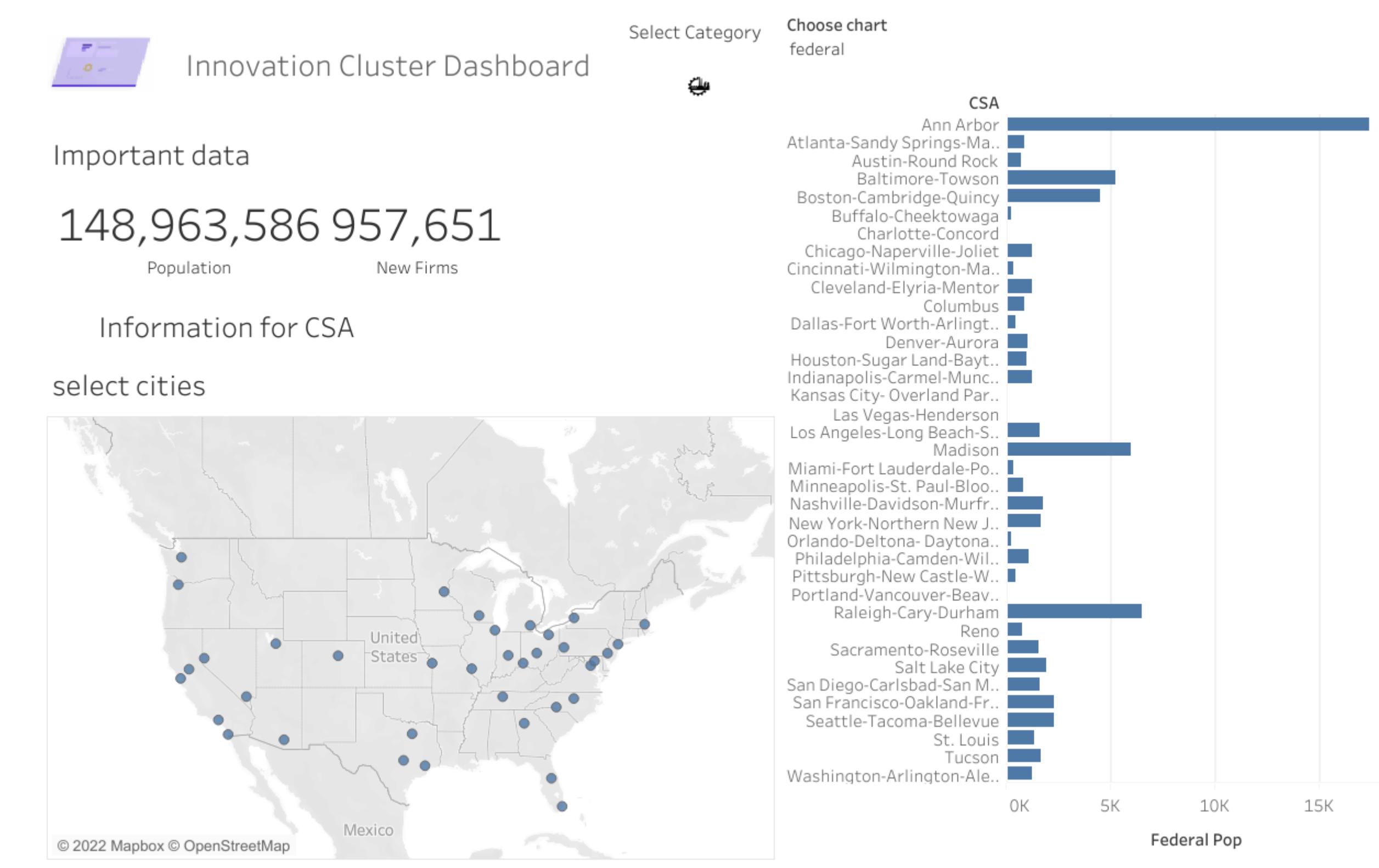
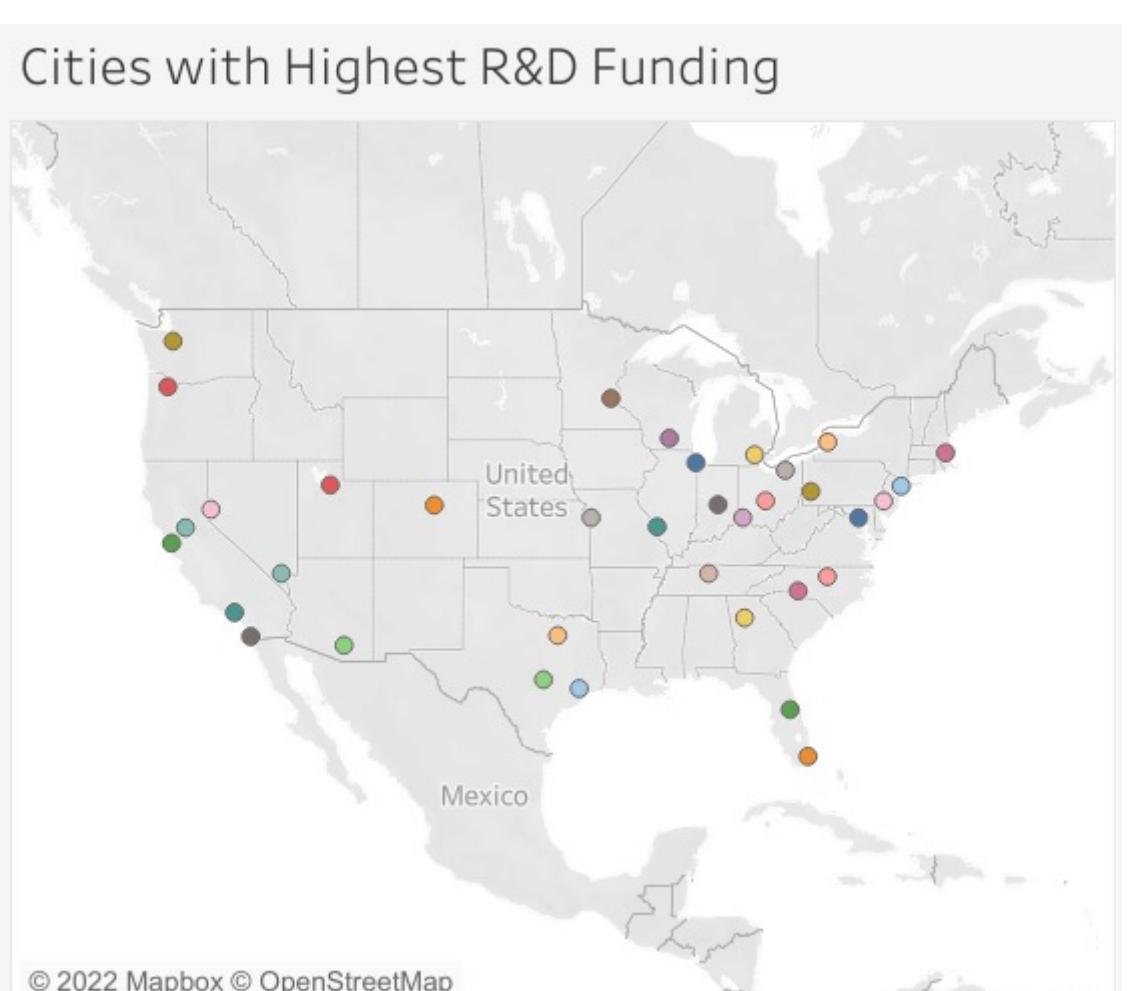
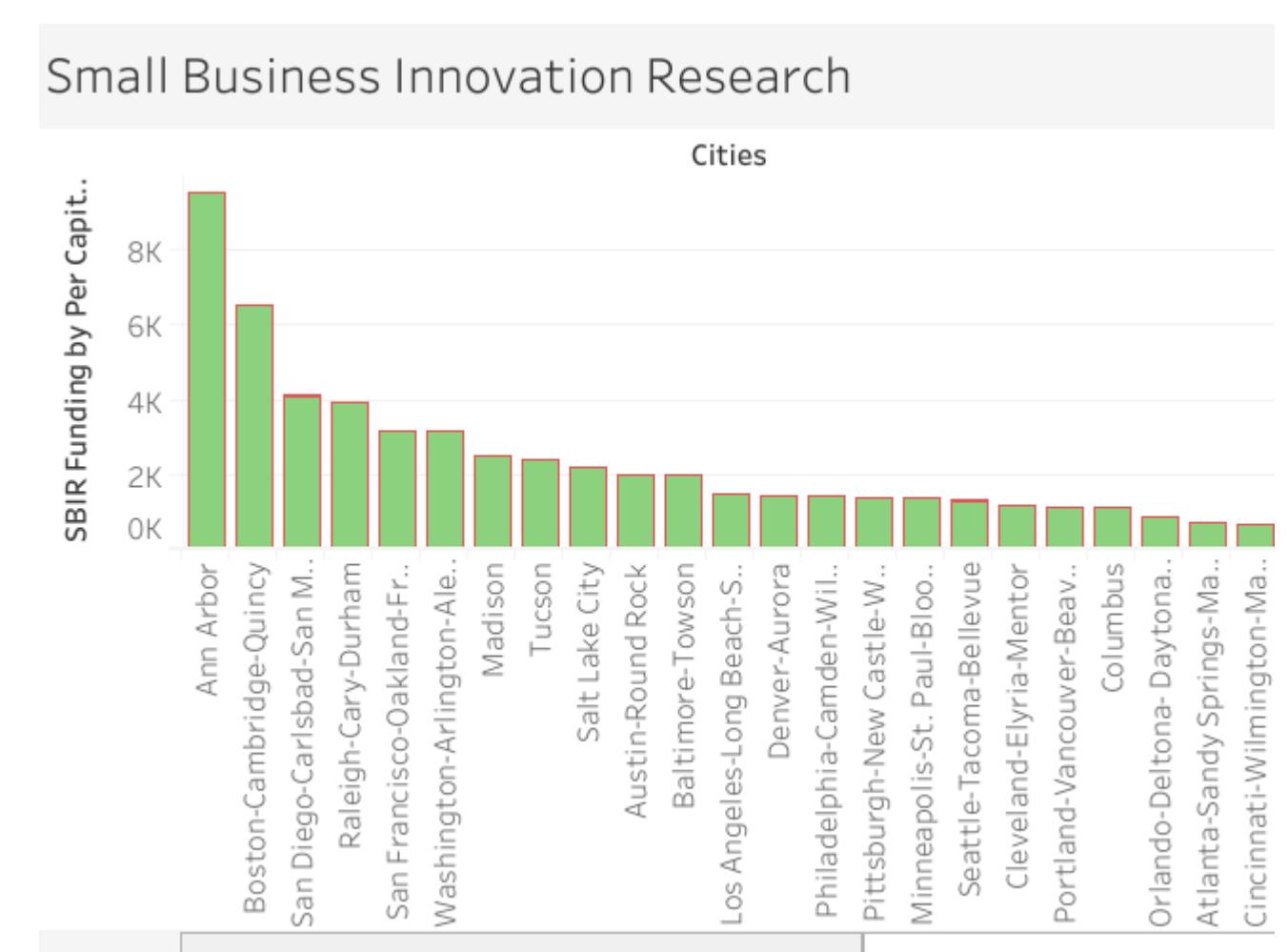
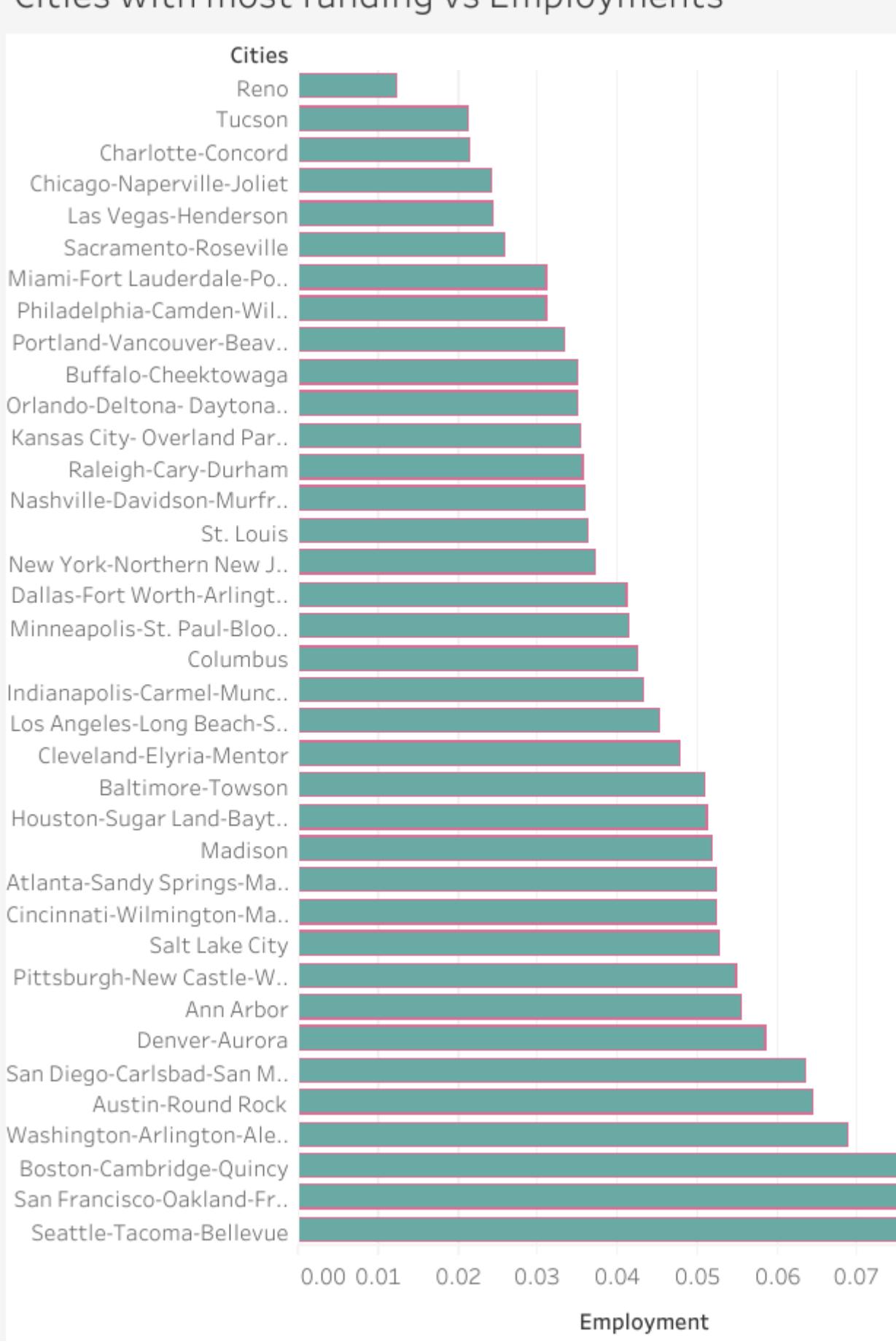
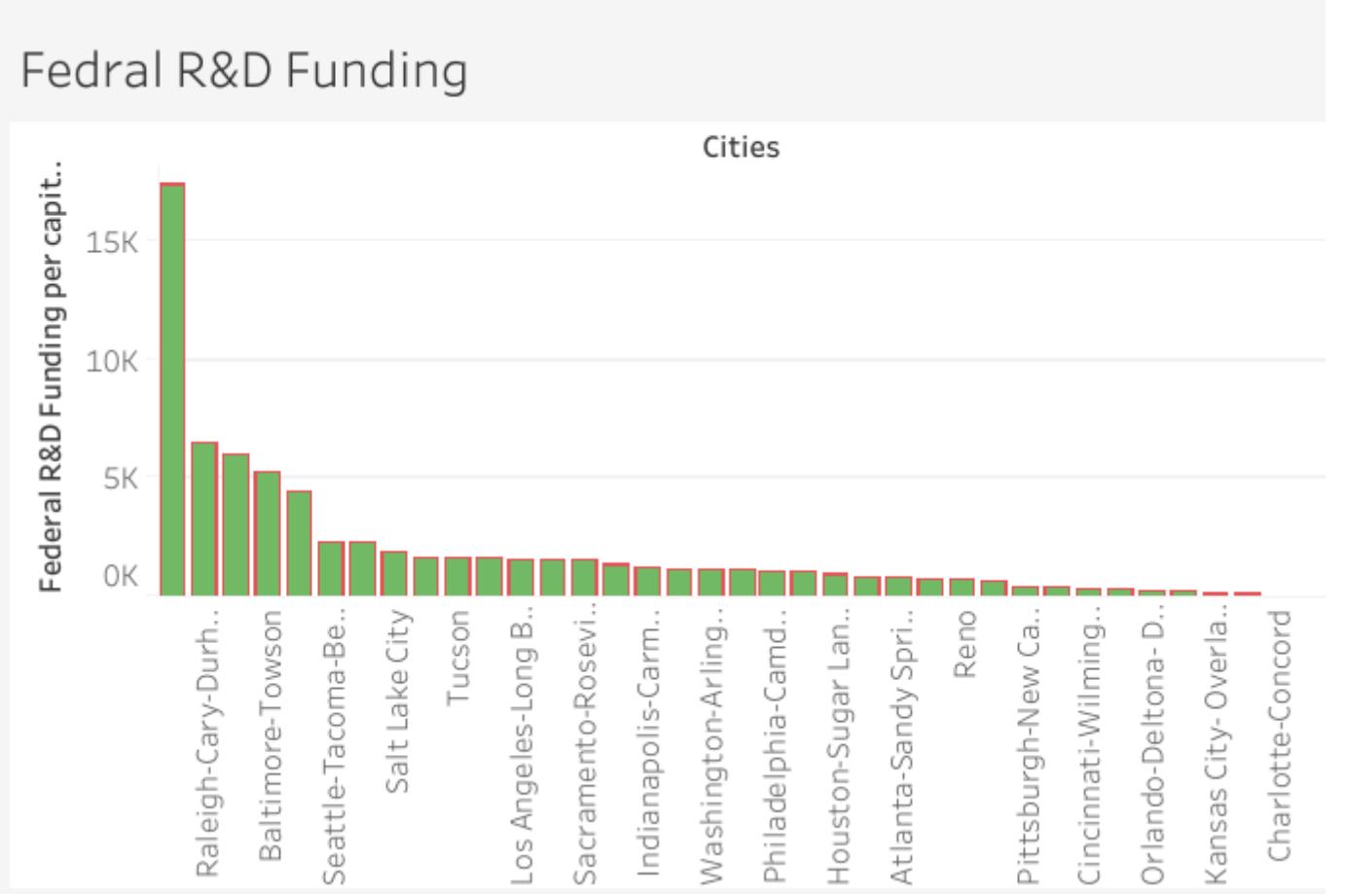
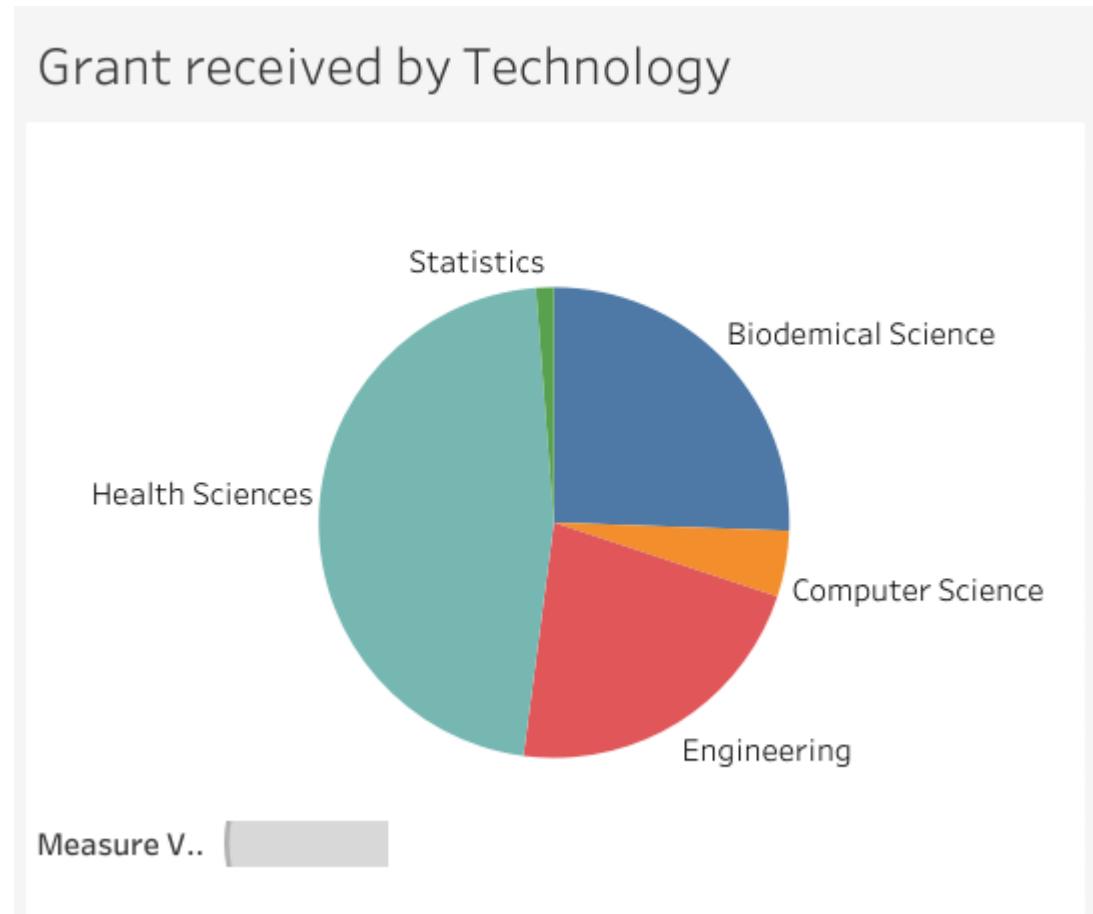
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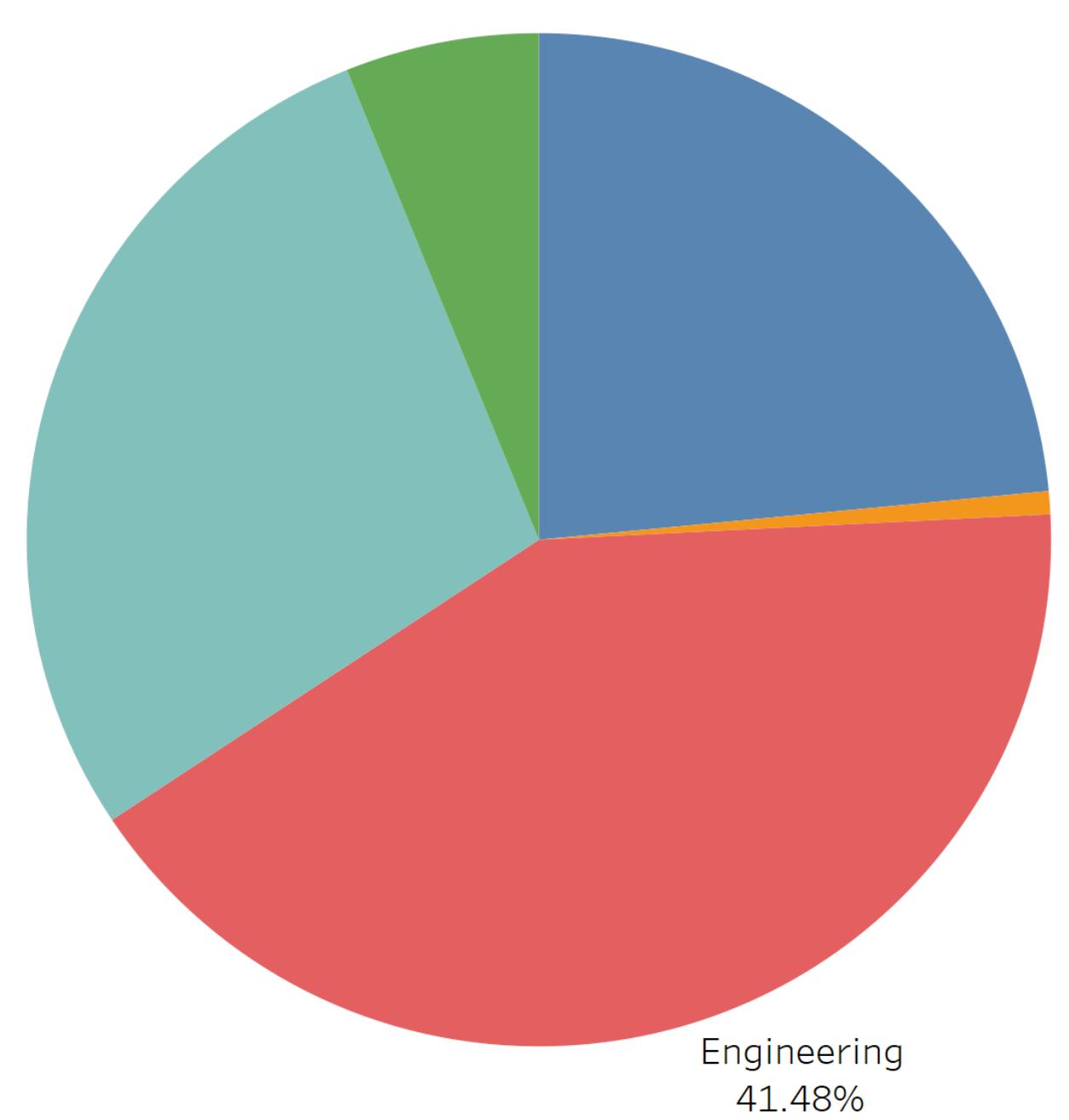
Which of the following settings do you work within?

7 responses





CSA Disciplinary



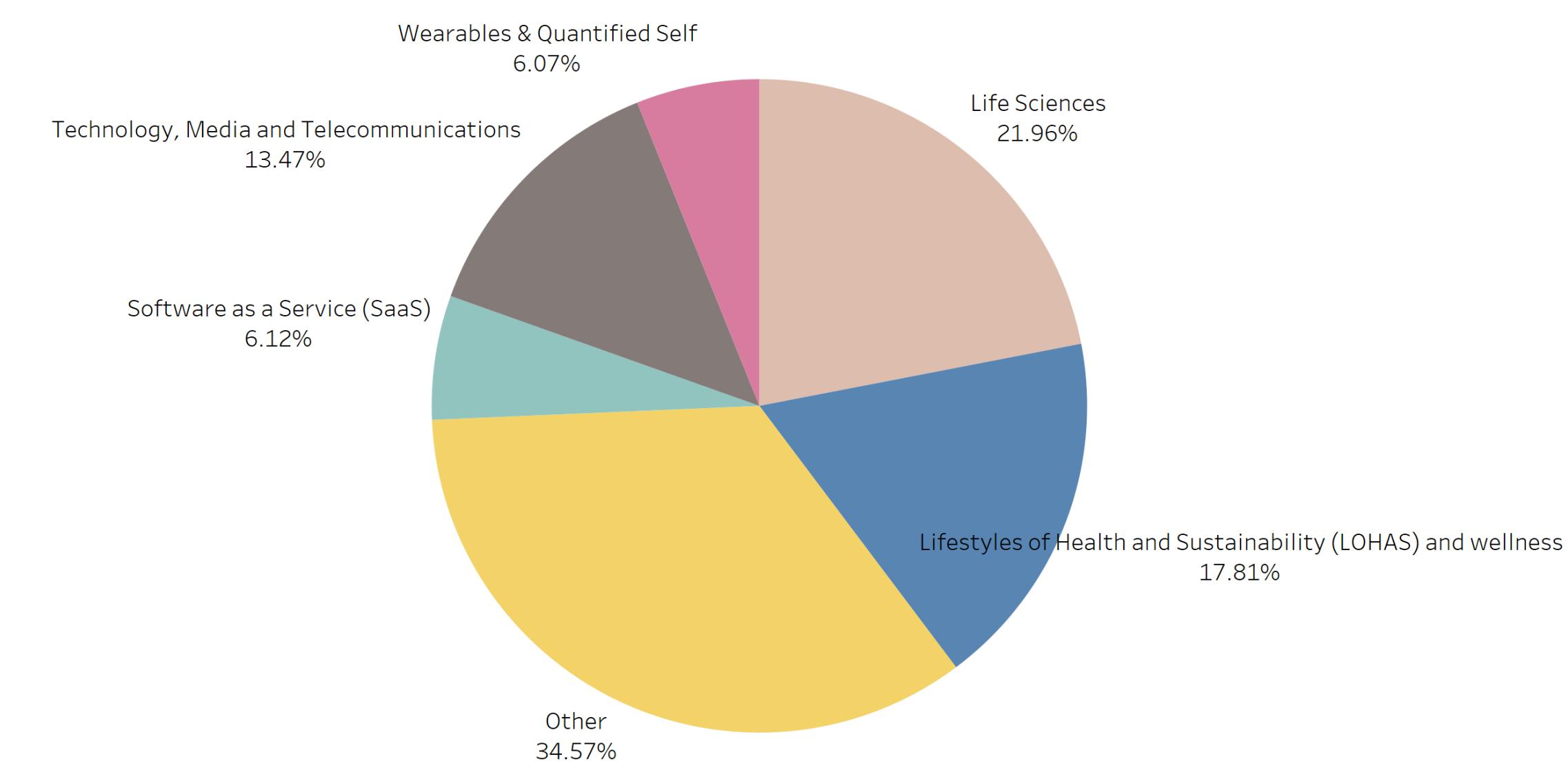
Institution

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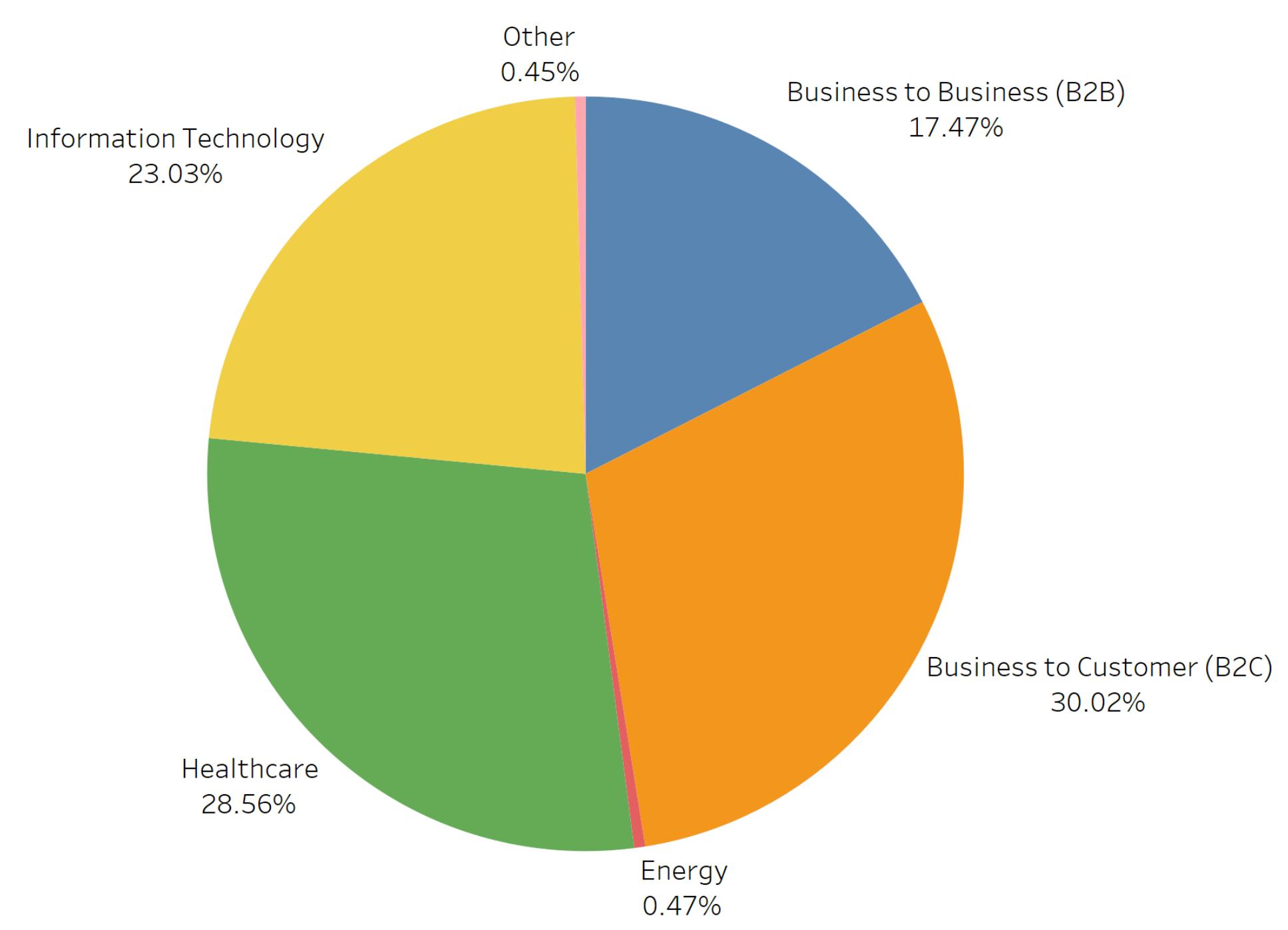
Discipline

- Biological And Biomed..
- Computer And Infor..
- Engineering
- Health Sciences
- Mathematics And St..

CSA VC



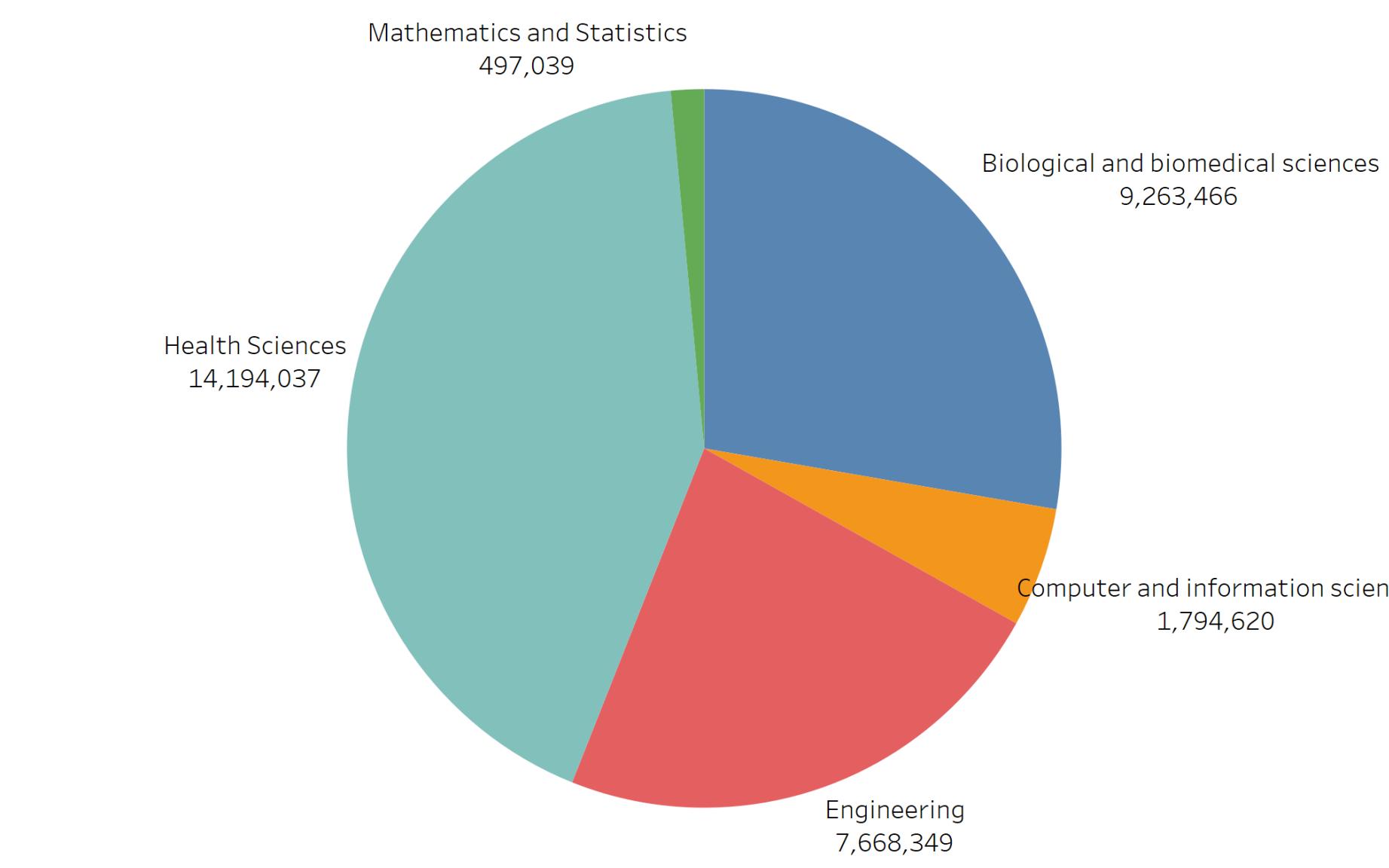
CSA Sectors



Sectors

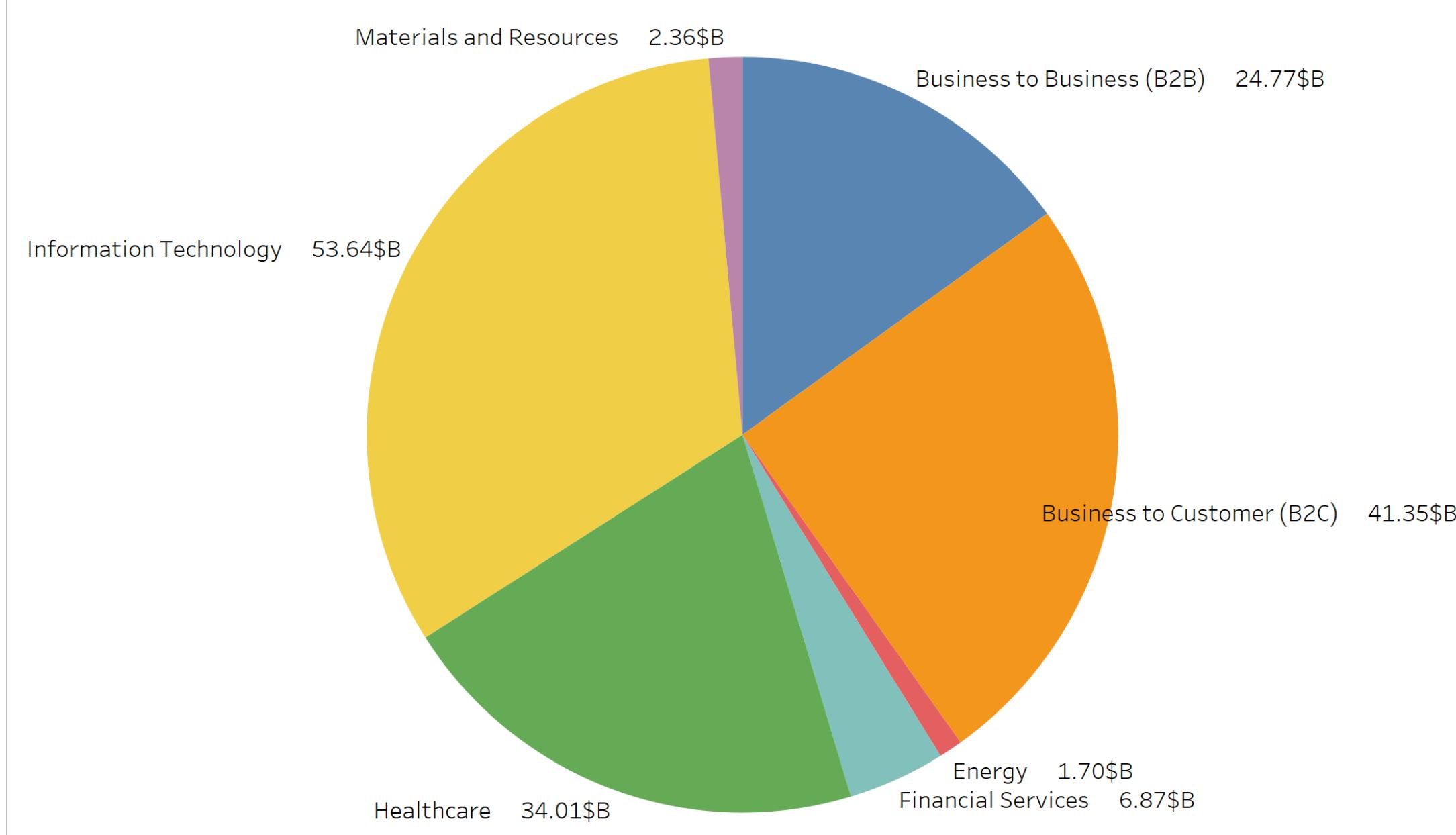
- Business to Business..
- Business to Custome..
- Energy
- Healthcare
- Information Technol..
- Other

Total US Discipline



- Select Funding Type
 - Industry Sectors
 - University Disciplin...
 - Venture Capitals
 - All
-
- Discipline1
 - Biological and biome..
 - Computer and infor..
 - Engineering
 - Health Sciences
 - Mathematics and St..

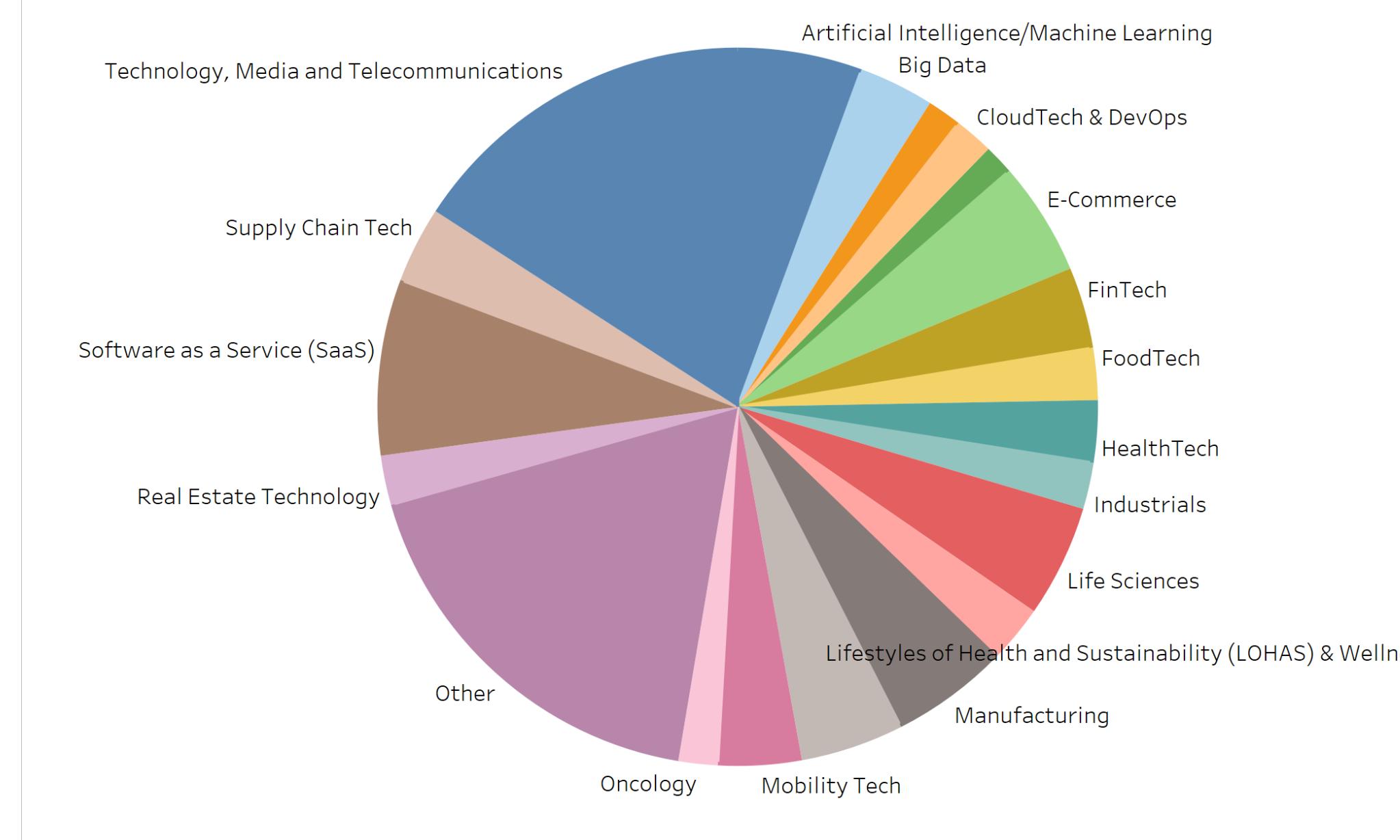
Total US Industrial Sectors



Select Funding Type

- Industry Sectors
- University Disciplin...
- Venture Capitals
- All

Total US Venture Capital

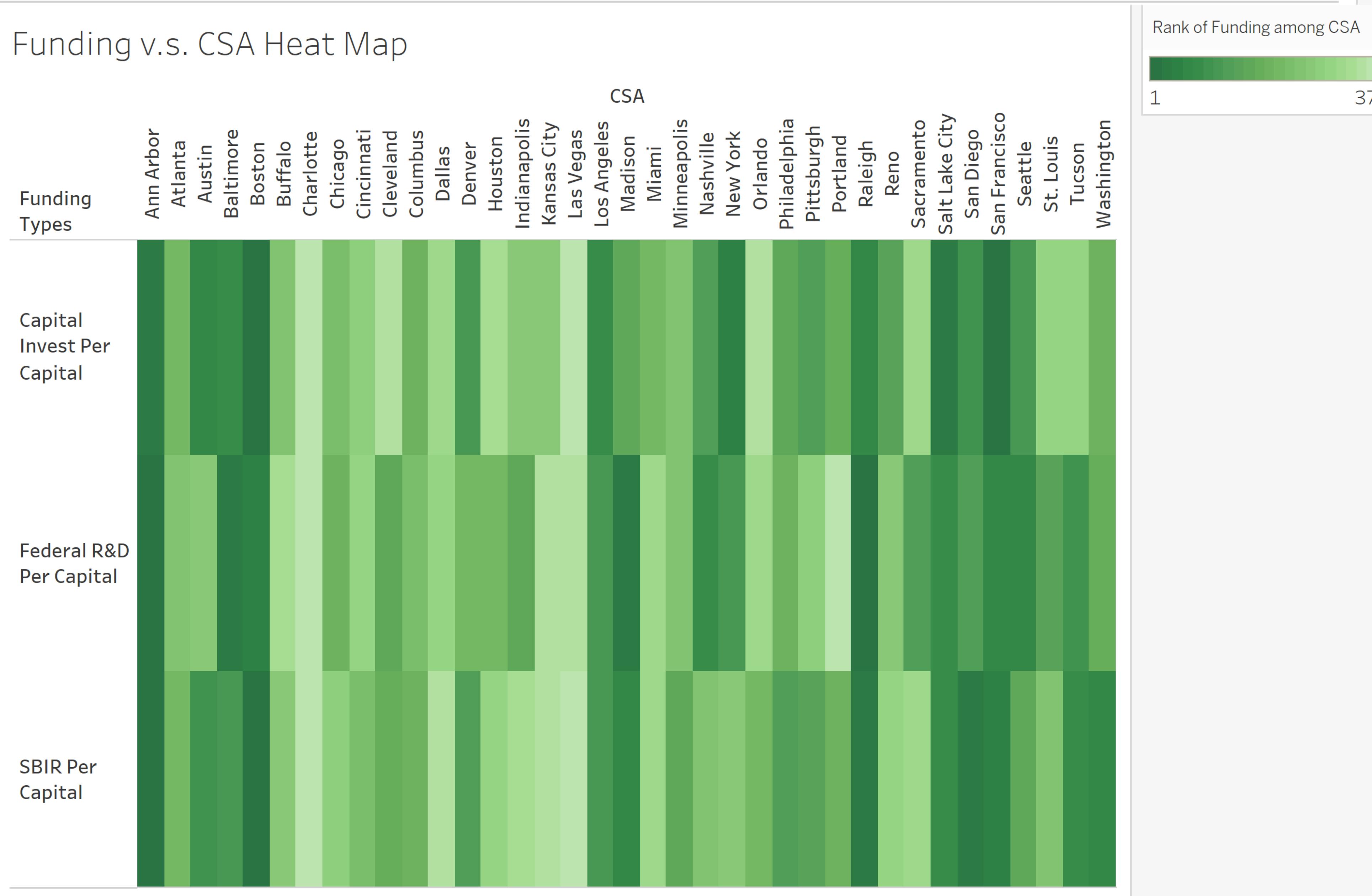


- Select Funding Type
- Industry Sectors
- University Disciplin...
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- All

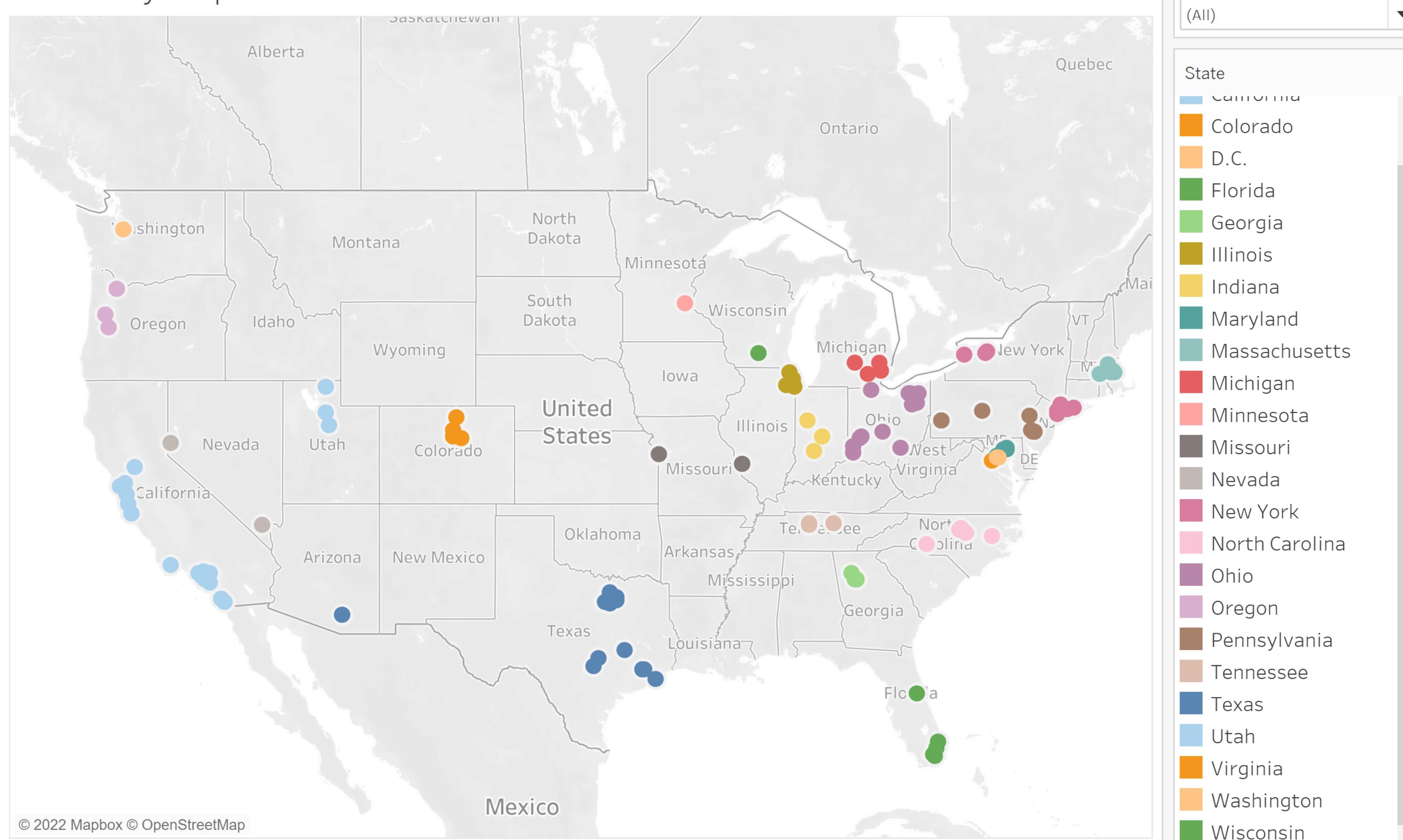
Data Ban



Funding v.s. CSA Heat Map



universiy map



Motivation: To developing a novel visualization application that can enable relevant stakeholders visualize and explore innovation activities in the U.S and analyze the role of university-industry collaborations in bolstering innovation.

Design Goals: This project is based on comparing innovation metrics around university research and development (R&D), industry structure and entrepreneurship across different cities in the U.S for 2019. The questions are:

- How did the expenditures of higher education R&D vary across different metro cities in 2019?
- How did industry structure differ in different metro cities in 2019?
- How did venture capital differ in different metro cities in 2019?

Evaluation & Feedback: To improve our prototype of the final project visualization, we created an anonymous survey to collect feedback and inquiries about the dashboard and accompanying charts that we had designed. We received a few responses, and the participants work in industries such as healthcare, artificial intelligence, and advanced manufacturing, indicating that the responses are from those whom we anticipate the project will assist and benefit in the future. We hope that the project will serve as a useful resource for academics, investors, and policymakers.

We created an anonymous survey with a snippet of our visualization to find out:

- 1) Who are our users?
- 2) Whether they find proposed dashboard useful?

We found that:

- 1) Our 7 seven users are employed in industries such as healthcare, artificial intelligence, and advanced manufacturing.
- 2) 57.1 percent of users will benefit directly or indirectly from our interactive dashboard.
- 3) More than half of the users work in university technology transfer, while 42 percent are academics and a few are startup employees.

- Approach:
 - We first gathered data for our final project from a variety of sources, including, but not limited to, Fred economic data and labor statistics, in order to identify the 36 cities with the highest levels of SBIR and Federal funding and capital investment. In addition, we compiled data on the top five industries in these cities and analyzed collected data to determine how different industries contribute to employment in these cities and if there is a correlation between the number of grants awarded and the employment industry.