Visualizing Journeys Through the Homelessness and Housing System of Care

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Land Acknowledgement

I would like to take this opportunity to acknowledge the traditional territories of the people of the Treaty 7 region in Southern Alberta, which includes the Blackfoot Confederacy (comprising the Siksika, Piikani, and Kainai First Nations), as well as the Tsuut'ina First Nation, and the Stoney Nakoda (including the Chiniki, Bearspaw, and Goodstoney First Nations). The City of Calgary is also home to Métis Nation of Alberta, Region 3.

Supporters and Partners

Calgary Homeless FOUNDATION

CALGARY DROP-IN CENTRE

MAKING THE SHIFT INC

Calgary Health Foundation™

This study is based in part on data provided by Alberta Seniors, Community and Social Services. The interpretations and conclusions contained herein are those of the researchers and do not necessarily represent the views of the Government of Alberta. Neither the Government of Alberta nor Alberta Seniors, Community and Social Services express any opinion in relation to this study.

Engineering?!

- Engineers build things for people to use.
- **Research Question:** What software tool design allows housing and homelessness staff make the best possible use of their data?
- Research Scope:
  - Interpretable machine learning.
  - Cooperative/user experience design methodology.
  - **Data visualization and dashboard design.**

Making it Easier to Use Data

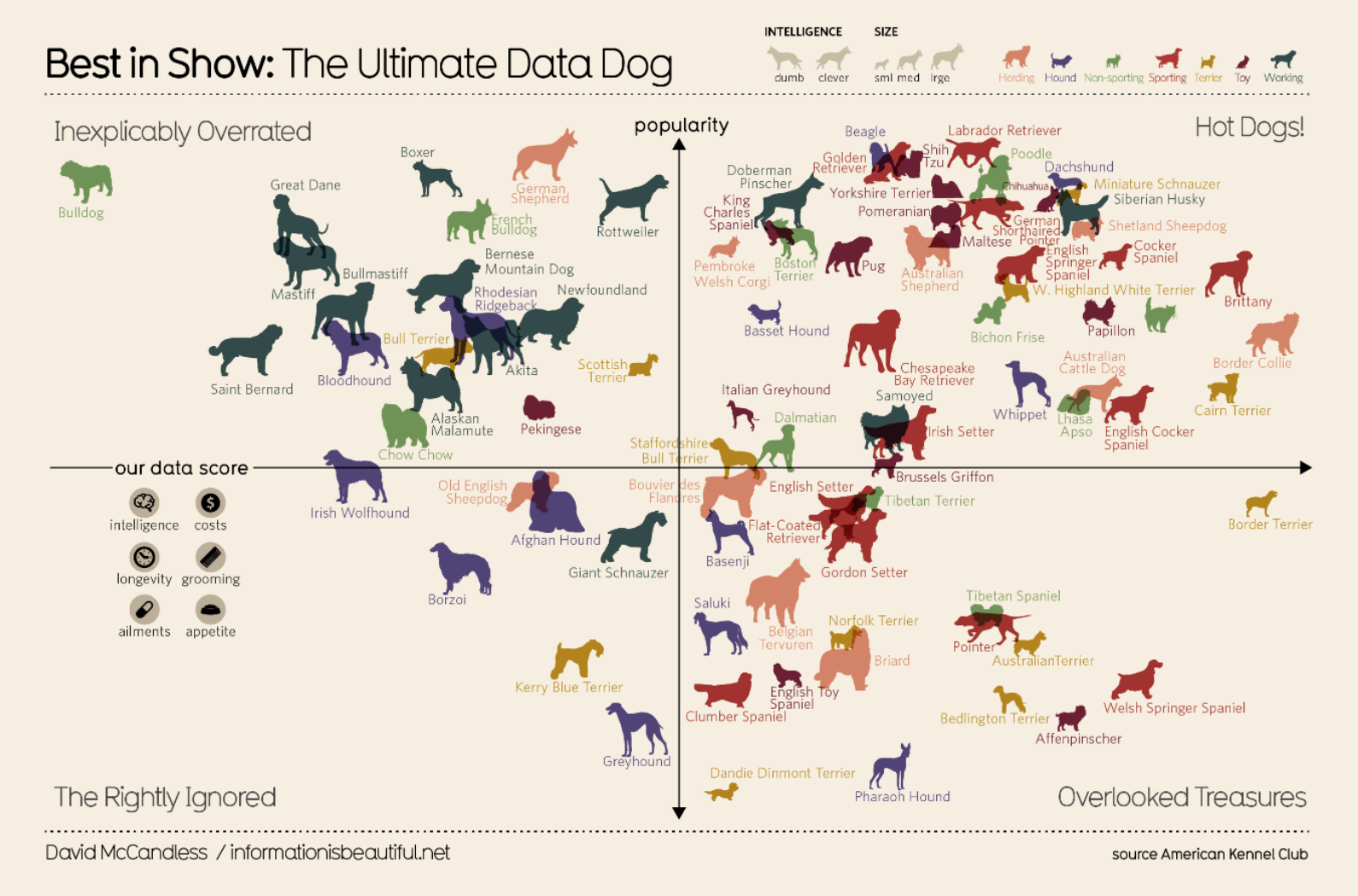
- The most important component of a system of care are the **people** who work in that system.
- Staff at all levels use data for decision making.
  - Front line staff frequently consult with a person's record.
  - Leadership look at aggregated data.
- The cognitive load of accessing and understanding data can be considerable.
- How can we make this easier?

Pictures!

- **Human Computer Interaction (HCI):** "…how groups and individuals interact with visual information.."[1]
- HCI is a rich source of tools and ideas for data visualization.
- Data dashboard tools (Qlik, PowerBI, Tableau) allow agencies to implement these visualizations using **real-time** data.
- Dashboard platforms are easy to use but a lot still goes in to designing an effective visualization.

1. https://science.ucalgary.ca/computer-science/future-students/undergraduate/programs/human-computer-interactions

A Useful Visualization?



https://www.informationisbeautiful.net/visualizations/best-in-show-whats-the-top-data-dog/

Critique

- Too many dogs!
  - Most people handle 7±2 cognitive features.
  - Data could be consolidated (ie. “spaniels”, “terriers”, etc.)
- How could someone rate a dog?
  - Data pre-processing and limitations can seriously alter a visualization.
  - Ranking with a single numerical score is risky.
- Geoff’s dog is a Welsh springer spaniel.. 🤔
  - All data has bias.
  - Data analysis techniques (and visualizations) can further exacerbate this bias.

The Data

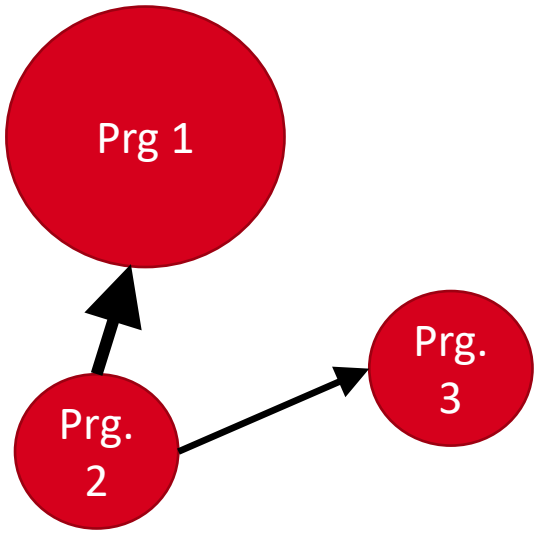
- Visualizations are created using participant journey data from the Calgary Homeless Foundation.
  - July, 2018 – January 1, 2023
  - 144 different services.
- People accessed these 144 services in over 3,000 different combinations.
- Mapping all these possibilities to a single picture is part of the design process.

Design #1: System Level Visualization

- Example Users:
  - Agency and Program Managers/Leadership
  - Government Policy Staff and Researchers
  - System Planners
- Example Questions:
  - What are all the services that make up the system of care?
  - How do these services work together?
  - What are the common paths through the system?
  - How does my agency fit into the larger system of care?

Visualizing System Flow

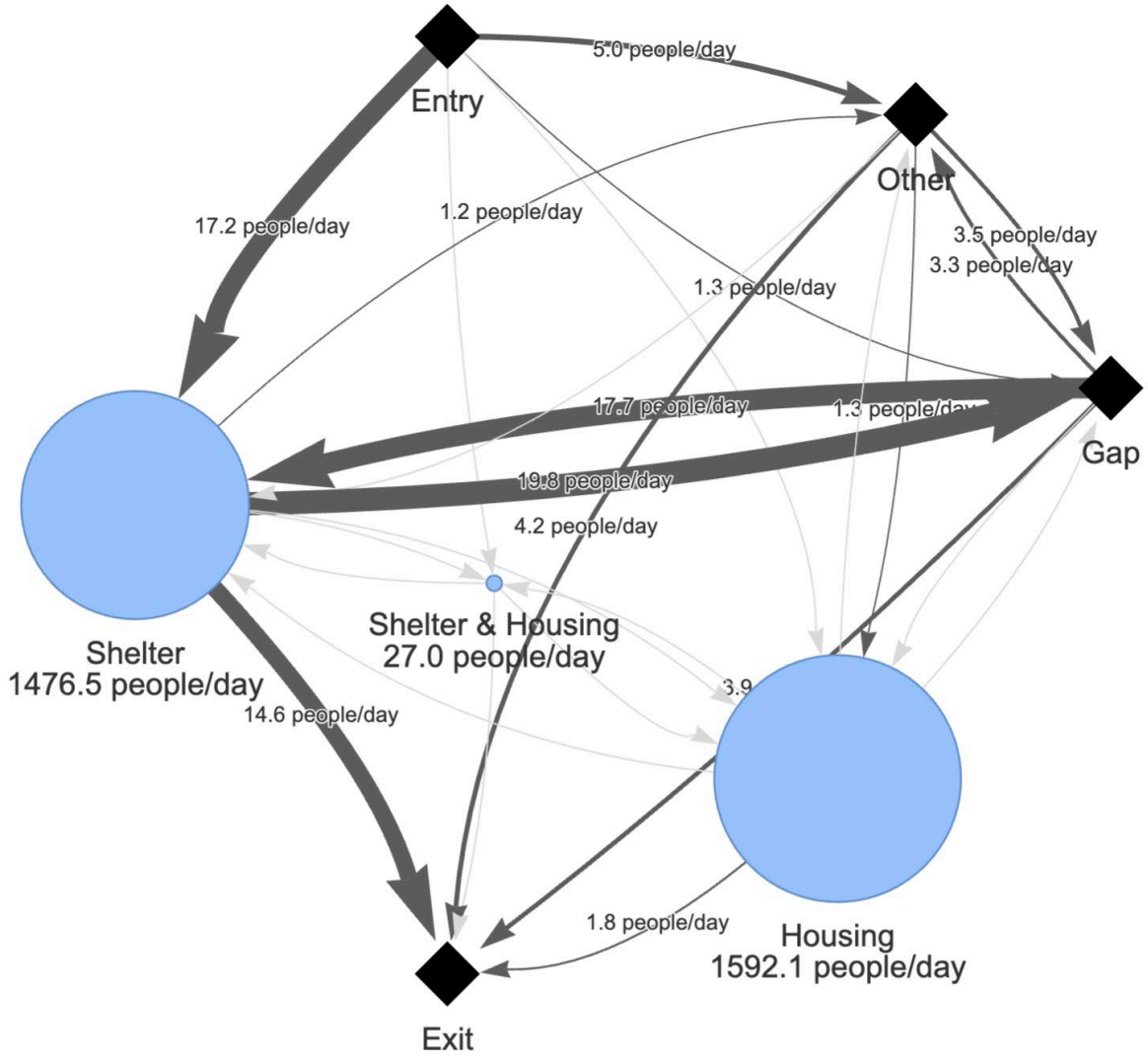
- People move (flow) between services.
- **Network diagrams** are a popular way to visualize flow.



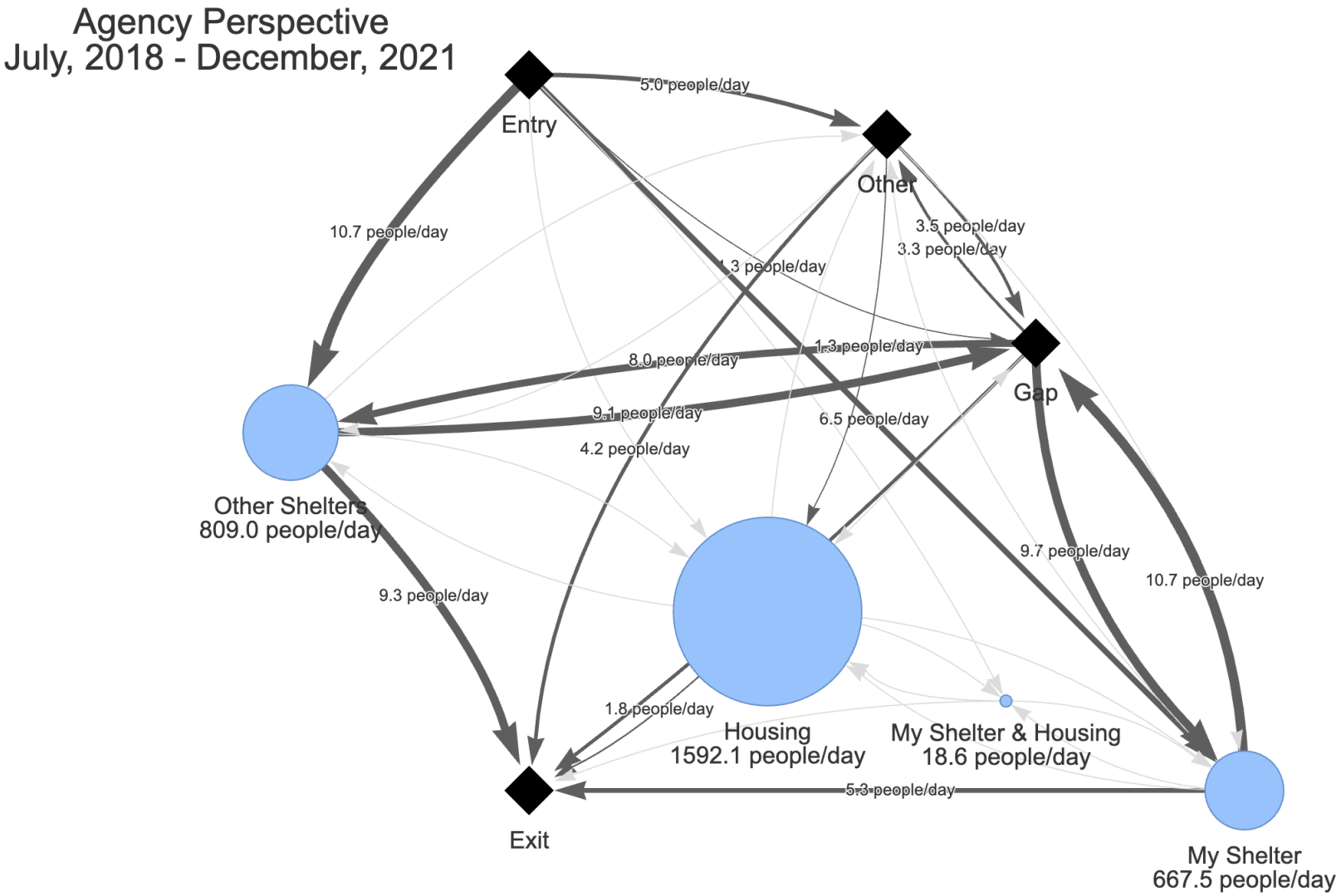
- **Nodes**: Represent services. Size reflects activity
- **Edges/Arrows**: Flow between services. Thickness reflects frequency.

Overall System

July, 2018 - December, 2021



System and a Single Agency



Design #2: Visualizing a Person's Experience

- Example Users:
  - Social workers.
  - Front-line agency staff.
  - Housing case managers.
- Example Questions:
  - What has the person I'm helping experienced?
  - Are there others in the system with similar experiences that I can learn from?
  - Are there signs that my person needs extra support?

The Importance of Time

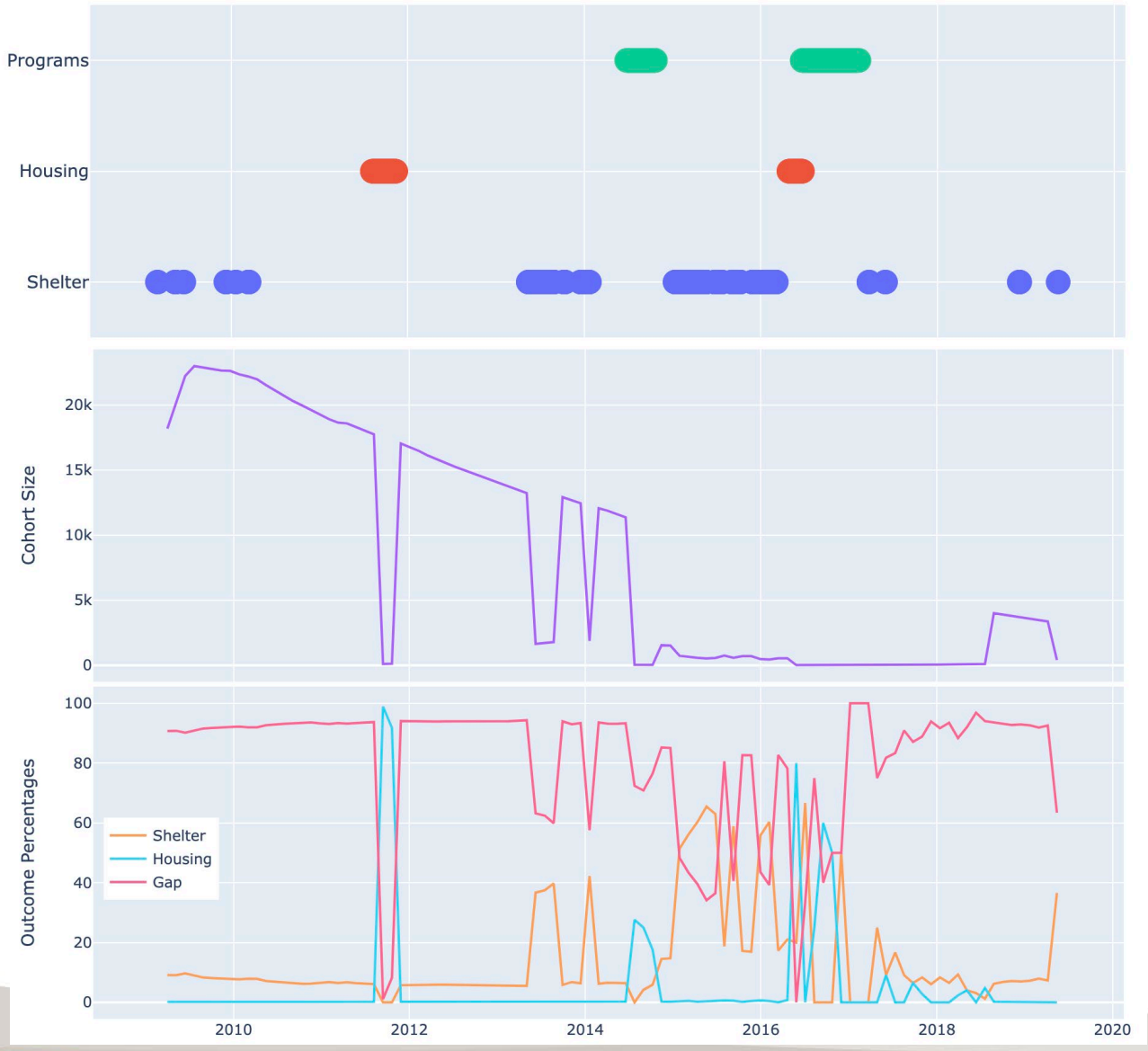
- What's important when understanding a person's experience?
  - The specific services accessed.
  - The order services are accessed.
  - How long each service is accessed.
- Network diagrams do not effectively represent time.

A Person's Timeline

Adding In Data Analysis

- A person's experience can be better understood if we can learn from other similar people.
  - How many other people are similar to my person?
  - What outcomes did this similar group experience?
- A "similarity cohort" can be created for a person:
  - Find everyone who is using the same services as our person after a particular time in the system (plus or minus a 30 day window).
  - Keep only those folks who have days that are 75% the same as our person over the last 2 years.
- Visualize the mix of outcomes the similarity cohort experienced 30 days into the future.

A Person and their Similarity Cohort



Conclusions

- Visualizations…
    1. make accessing data a **lot** easier.
    2. are accessible and affordable thanks to dashboard platforms.
    3. must be designed with care.

Very happy to connect with you!

- My contact info: