Designing Data Tools for Emergency Shelter Staff

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Data-Based Decision Making in Shelter

- The goal of this project is to develop tools that make data-based decision making easier for shelter staff.

- In some ways, data-based decision making is already well established in the homelessness sector:
  - Program Design
  - Program Evaluation
  - Policy Development and Research

- These activities tend to focus on populations:
  - What are the characteristics of a population?
  - How are these characteristics affected by a program or policy intervention?

Moving Data to the Front Line

- Once a program is defined, it is implemented by the many thousands of decisions made by front-line staff as they interact directly with clients.

- Questions:
  - What does this front-line decision making process look like today?
  - Where might data tools fit into this process in order to support and improve the decision making?
  - What sort of data is most useful for front-line staff?
  - What data format and user interface is easiest to use?

My Background

- Professor of Electrical and Computer Engineering
  - Over 20 years of industry and research experience in the IT and software development sectors.
  - Lifetime computer nerd :)
- Currently spending a year embedded at the Calgary Drop-In Centre (DI) doing data analytics and tool development.
- Have the good fortune to work directly with the staff providing care and support to DI clients.
- What have I learned about incorporating data science into shelter services?

Data Science in Shelter

- Data science is a broad field:
  - Data storage and access/database design.
  - Data mining.
  - Data visualization.
  - Machine Learning/Artificial Intelligence (AI):
    - Recommendation systems.
    - 'Expert' decision making systems.
- In theory, it is possible to develop algorithms that make autonomous decisions for placing clients in programs.
- Good idea?

NO!

- Dr. Andrew Ng is a pioneer in AI:
  - Professor of Computer Science at Stanford.
  - Co-Founder of the Google Brain project.
  - Chief Scientist and Vice President of Baidu.

- Andrew's 1 Second Doctrine for Artificial Intelligence:

  "If a typical person can do a mental task with less than one second of thought, we can probably automate it using AI either now or in the near future."

The Role of Data Science on the Front-Line

- Fully autonomous machine-based decision making has no place in shelter **BUT…**

  The humans making client support decisions can still benefit from having the right information at their fingertips.

- The Real Questions:
  - What data tools do shelter staff really need to <u>support</u> their client interactions?
  - How do we make these tools as intuitive and easy to use as possible for staff with non-technical backgrounds?

User Centric Design

- The best way to design a good data tool for a user is to start by **understanding the user's experience**.

- This is known as "user-centric design" or "contextual design", a technique first developed in 1998 by Beyer and Holtzblatt.

- The design process starts first by understanding the "day-in-the-life" experience of the data tool user.

- The design process then evolves to determine where and how a data tool could fit into the user's life.

- The emphasis is on *improving user experience*.

Our Design Toolbox Includes…

❖ The opportunity to interact with DI staff during the design and testing of the tools.

- Access to the DI database for testing:
  - Approx. 40,000 different clients over the past 20 years.
  - Over 5.6 million entries.

- PowerBI for data tool development:
  - A data visualization development platform for non-programmers (similar to Tableau).
  - Chosen for compatibility with DI IT systems.
  - Functionality limited to the display and filtering of data.
  - Able to connect to a wide range of data sources.

The User Centric Design Process

1. Staff Interviews

2. Synthesize User Centric Design diagrams from interview data.

3. 'Wall-Walk' Brainstorming Exercise

4. Iterative Agile Tool Development and Testing

Interviews

- Staff Group: Housing Program Managers
  - Managers in charge of teams of case workers that implement different housing programs at the DI.
  - Responsible for managing staff, assigning clients to programs and working on complex client cases.
- Interview conducted on November 8:
  - 3 managers in attendance.
  - 60 minute discussion.
  - 95 notes collected.
- This interview data was then used to create the user centric design diagrams.

User Centric Design Diagrams

- Affinity Diagram:
    - Displays all interview notes as 'stickies' that are grouped by theme.

- 'Day-in-the-Life' Diagram:
    - Graphically represents how the activities of the user are spaced over place and time.

- Collaborators Diagram:
    - Illustrates who the user interacts with and how that interaction occurs.

Wall Walk Design Workshop

1. User centric design diagrams are posted on the walls around a meeting room.

2. All participants examine diagrams and add to them using stickies. **No talking allowed!**

3. Round table discussion where each participant asked to reflect on what jumped out at them about the user experience.

4. Free flowing 'brainstorming' discussion regarding how data tools could make life better for the user.

Affinity Diagram
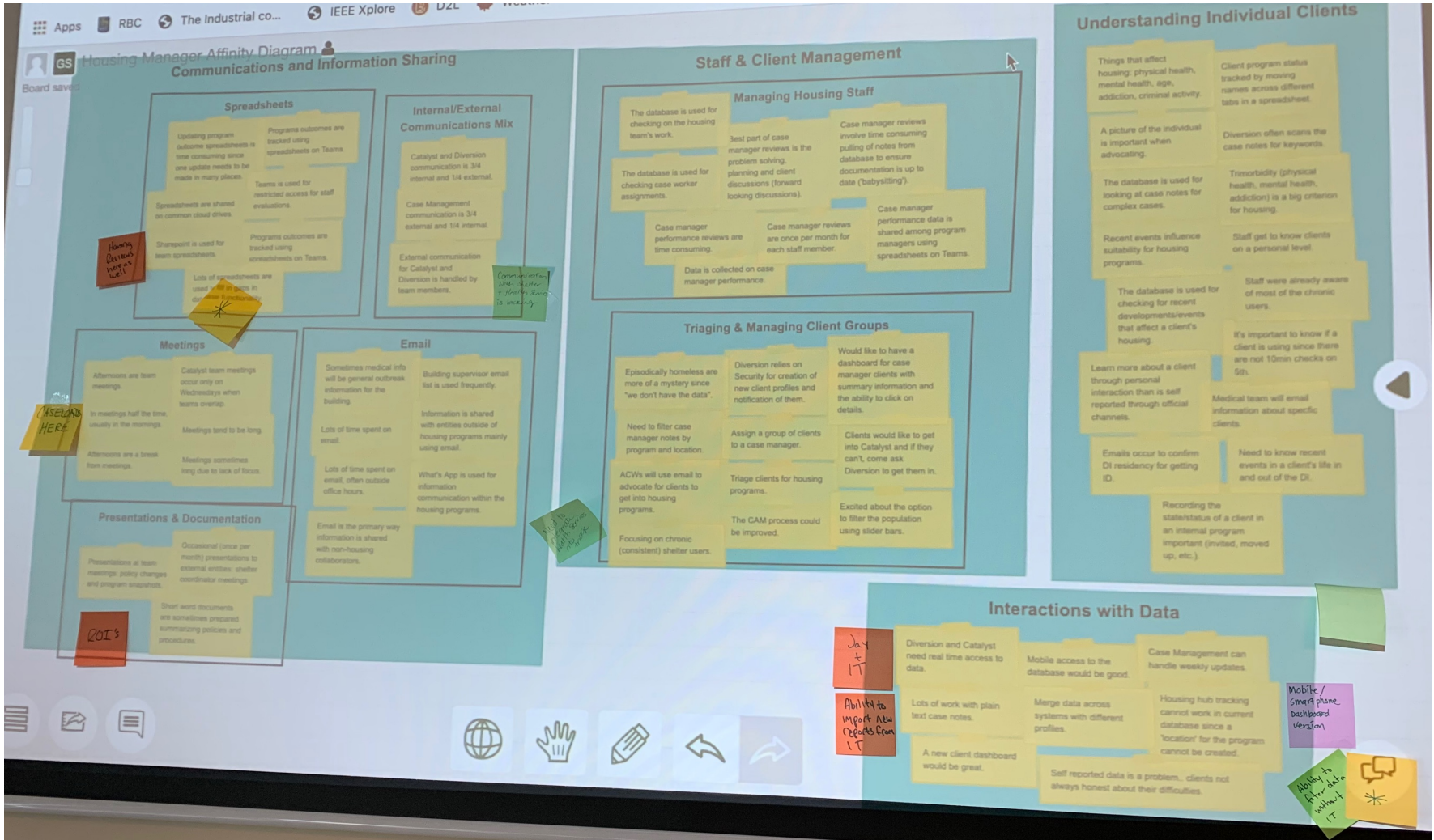
Affinity Diagram Themes

- Communications & Information Sharing
  - Spreadsheets
  - External/Internal Communications Mix
  - Meetings
  - Email
  - Presentation & Documentation
- Staff & Client Management
  - Managing Housing Case Worker Staff
  - Triaging and Managing Client Groups
- Understanding Individual Clients
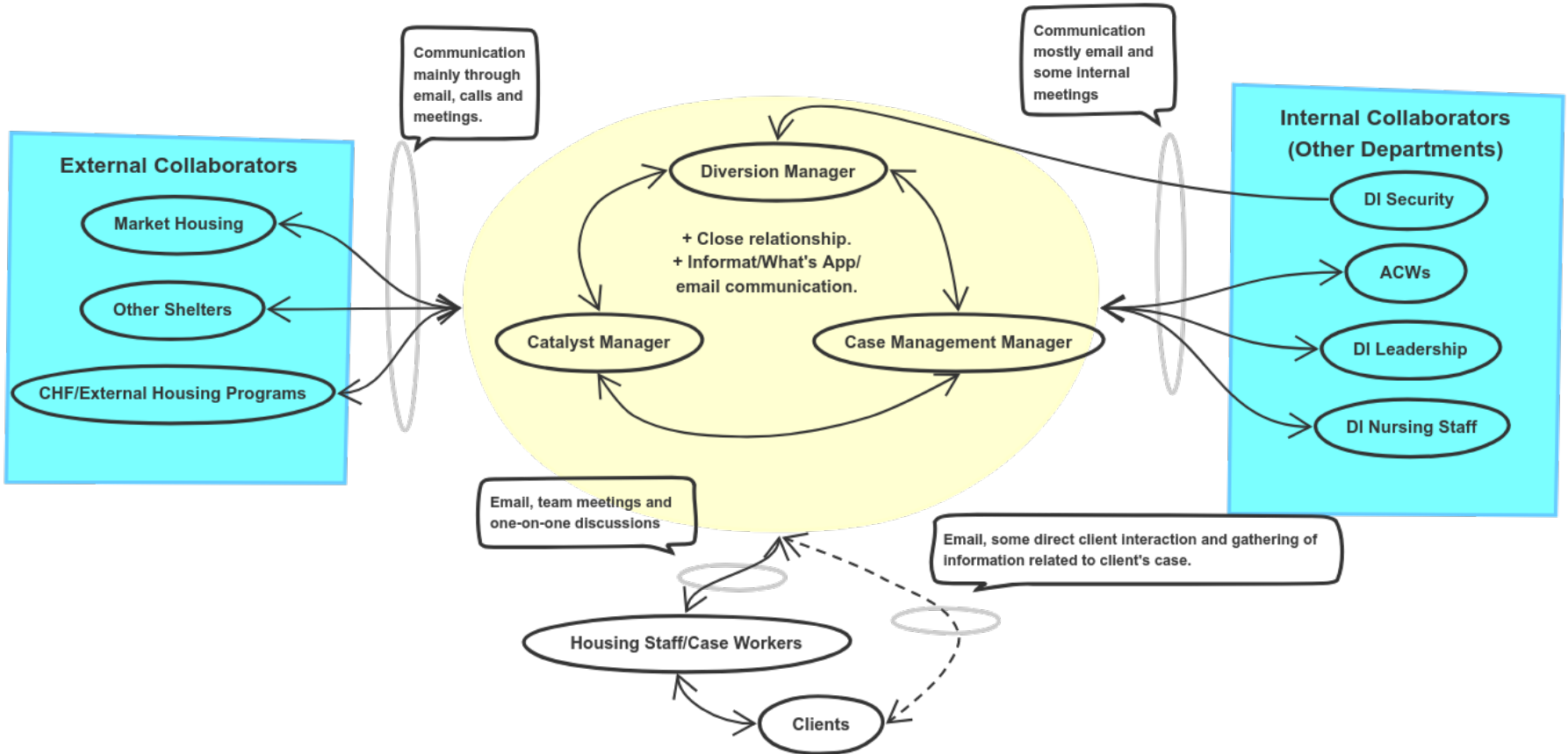- Interactions with Data

Day-in-the-Life Diagram
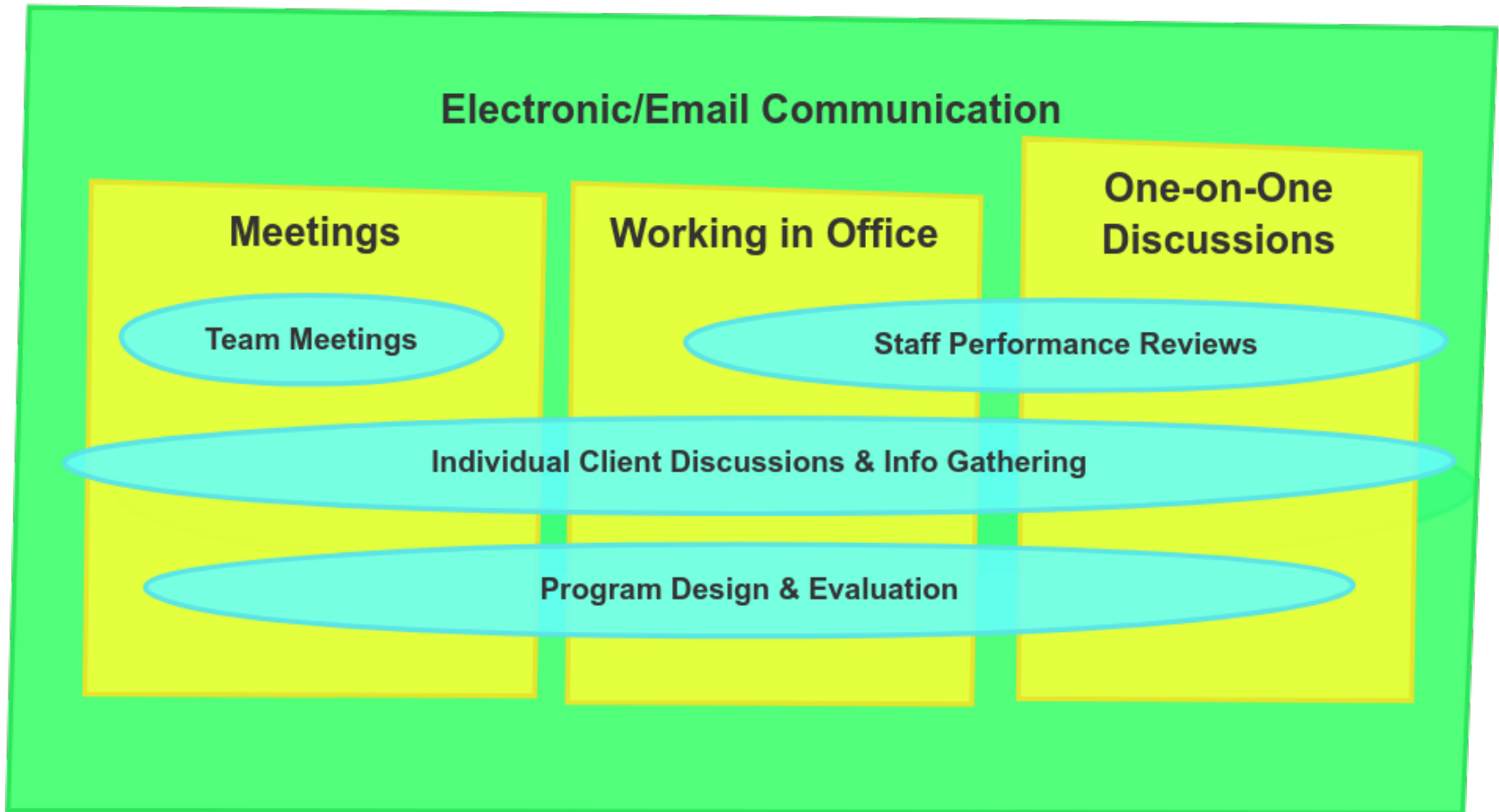
Collaborators Diagram

Wall-Walk Workshop Outcomes

- Managers' most important job is referring clients to the right program.

- Having a team conversation about the client is essential.

- Data-based decision making is already being used **but** the data is spread across several different spreadsheets and computer programs.

- What the data tool needs to deliver:
  - All information in one place.
  - Easy to use.
  - Mobile.

Reflections on the Design Process

- Staff was very happy to be engaged in the tool design.

- Having silence at the start of the wall walk and then going around the table allowed all voices to be heard.

- Things I learned:
  - Housing managers are very mobile and need access to data in many locations.
  - Collaboration and communication is key but there are already tools to support this.
  - Data based decision making is already going on so we don't have to "sell" the benefits of using data… it's just that accessing the data is hard.

Design Evolution – Iteration v0.1.1

- Tested by DI database administrator.

- Tool Features:
    - Individual client look-up only.
    - Timeline graphs for shelter access, counsellor interaction and bars.
    - Displays case notes and bar notes to provide more context.
    - Automatic data refresh every night.

Design Evolution – Iteration v0.1.2

- Tested by housing managers during housing program triage meeting on December 18.

- Tool Fixes:
    - Fixed problems with timeline zooming feature.
    - Adjusted fonts and aspect ratios for better projector viewing.
    - Added birth date to client lookup filter.
    - Fixed bug in database pull script that caused some counsellors notes to be omitted.

Design Evolution – Iteration v0.1.3

- Tested by housing managers during housing program triage meeting on January 15.

- Tool Fixes:
  - Adjusted date display when in zoom mode.
  - Implemented zoom reset button for new client searches.
  - Security issues addressed that will allow deployment of tool on DI mobile laptops.

Lessons Learned During Design Iterations

- It's all about understanding the **individual client**.

- Both long term and very recent shelter stays and program activity important: **being able to zoom in and out of timelines is key**.

- Access to the full case notes is still essential for context. **Graphs are not enough**.

- The tool must be accessible in different locations. **Secure laptop WiFi functionality is essential**.

- The first version of a tool will never be perfect. **The designer must work with the user to test and iterate the design**.

Tool Demo

Conclusions

- The successful implementation of most emergency shelter programs depend on front-line decision making.

- Data is just as important for front-line staff as it is for researchers and managers but…

  The way front-line staff need to access and interact with the data is unique.

- Having tools designed specifically for front-line use is important.

- User centric design is an effective process for developing these tools.