Memiro (ID+NEC America)

Centering Self-Tracking in Designed Experiences

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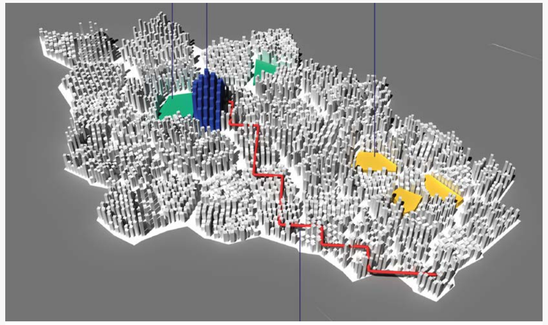
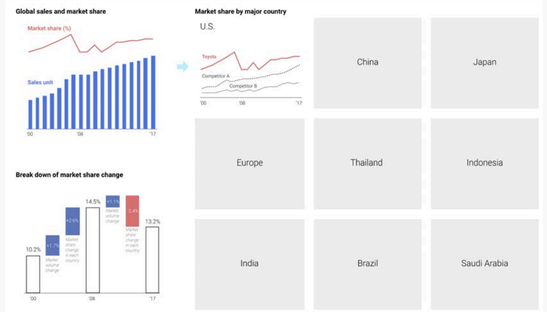
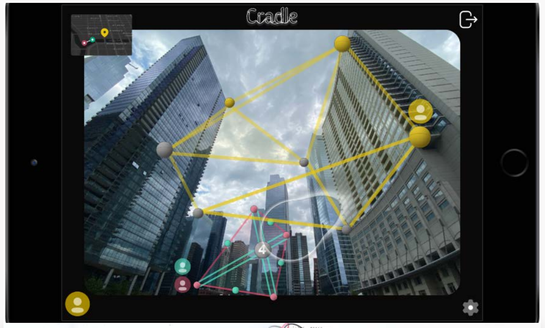
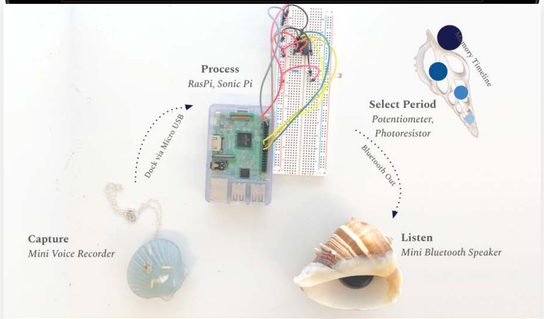


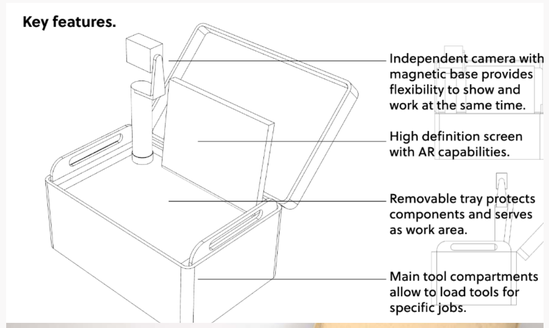


Shin

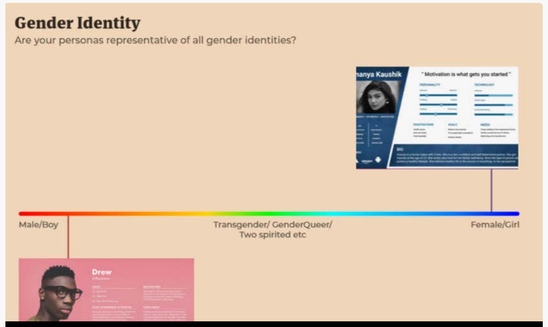


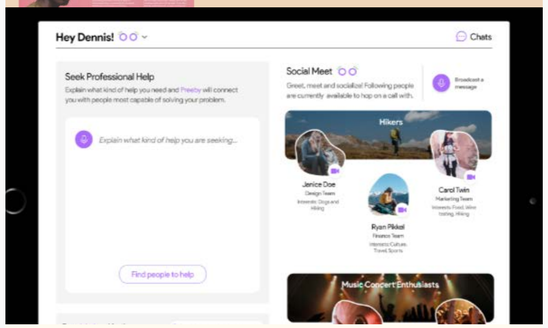


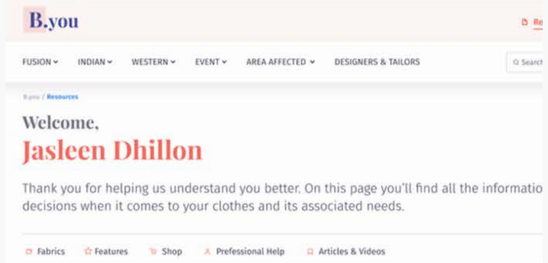
Roxanne



Jorge







Sandhini

What is *self-tracking*?

Self-knowledge through numbers

Finding personal meaning in your personal data

Includes:

> lifelogging

> personal informatics

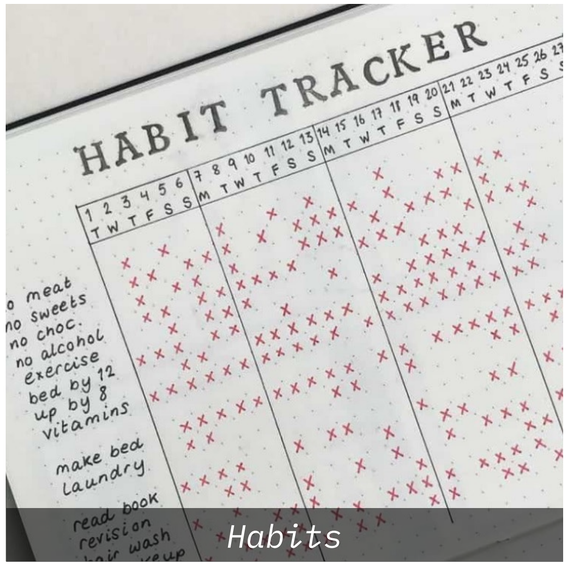
> personal analytics

> the quantified self

Nutrition

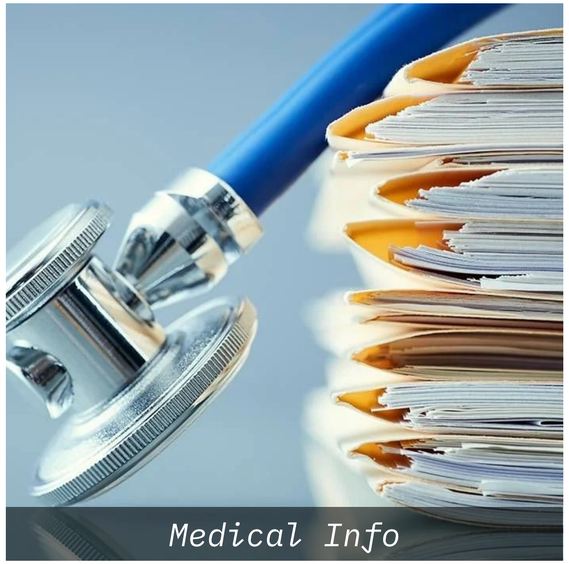
Fitness

Mood & Emotion



Habits

Finances



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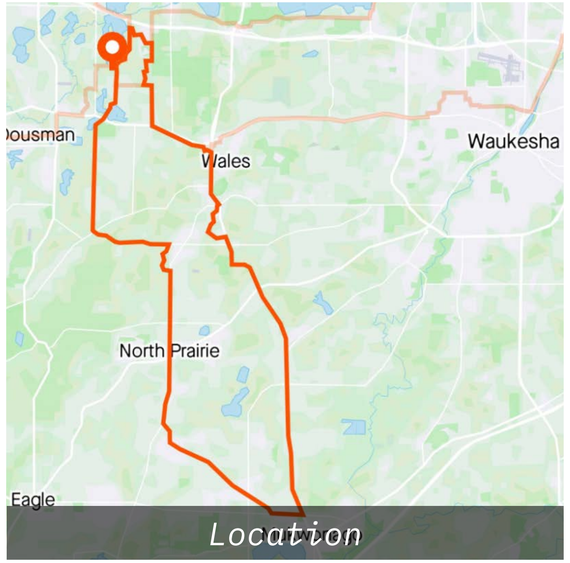

Location

Sleep & Dreams

When poll is active, respond at **pollev.com/roxannehoffm081**

Text **ROXANNEHOFFM081** to **22333** once to join

What do you track?








None Other

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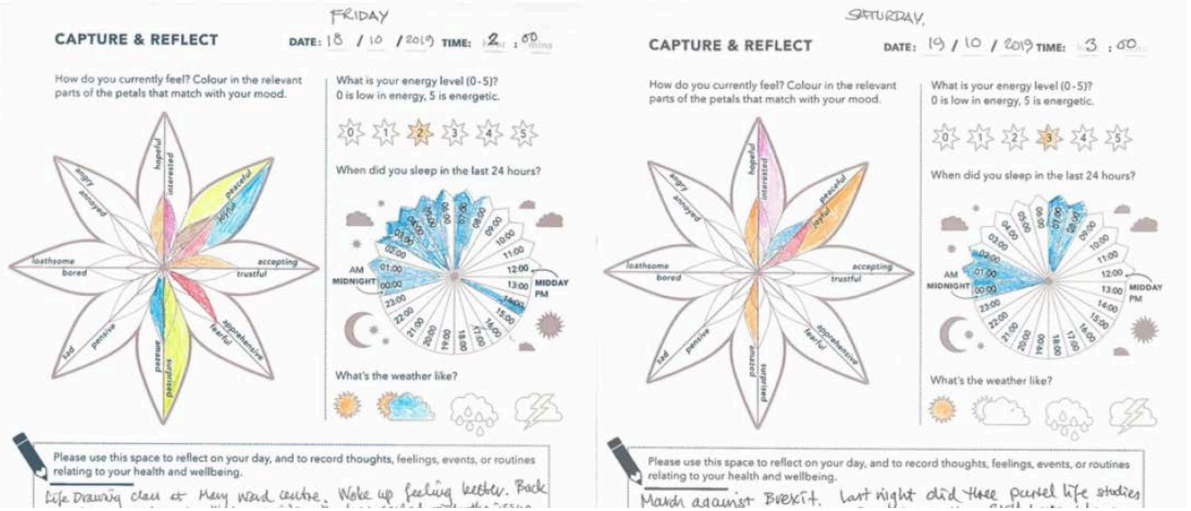
What makes self-tracked data *different*?

> Self-tracked data is ***Elective & Reflexive***

> Self-tracked data is ***Unfiltered & Unique***

> Self-tracked data is ***Dynamic & Evolving***

Elective & Reflexive

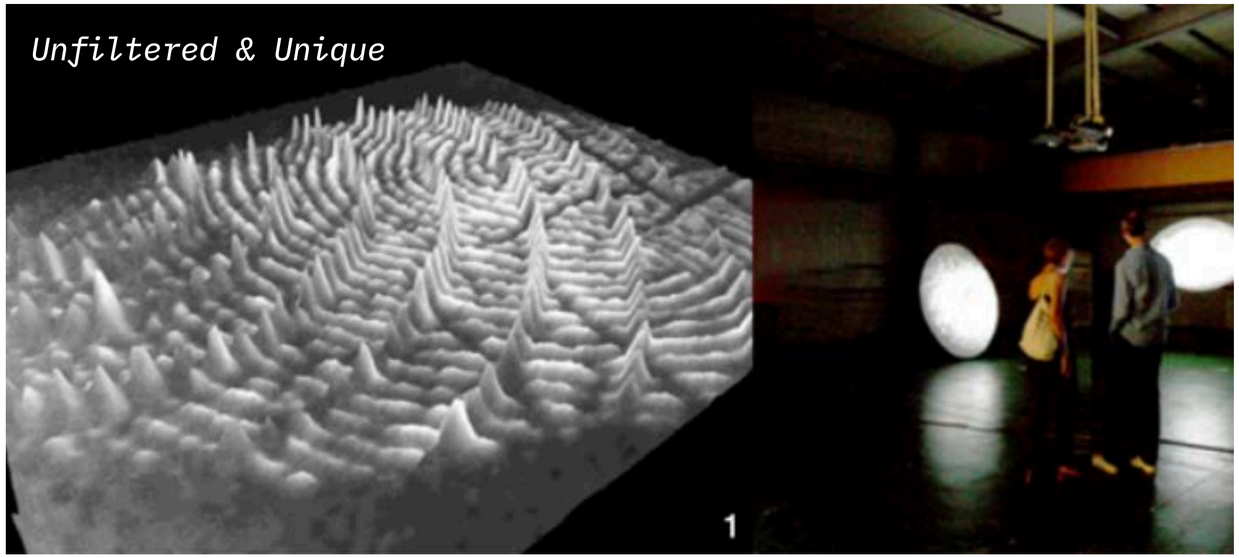


A Different Type of Data

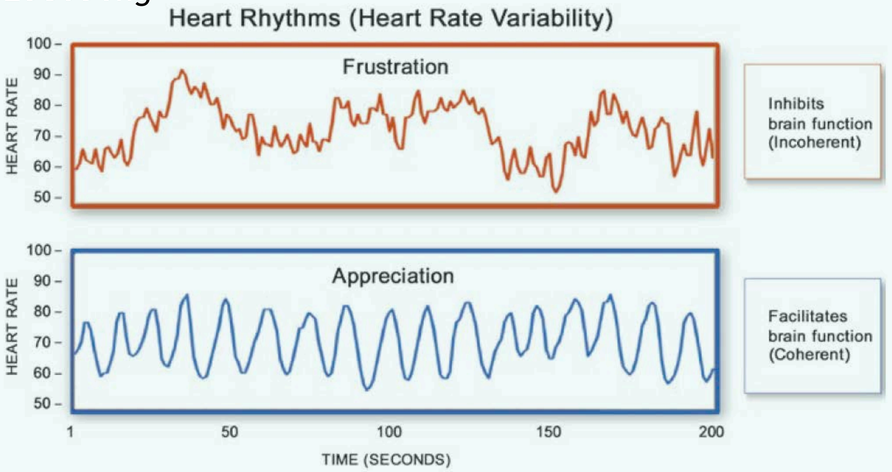
Truth in the trails

- **Elective & Reflexive:** People are more likely to share information when it benefits their lives. Because of the personal nature of self-tracking, people embed interconnections between various aspects of their experience.
- **Unfiltered & Unique:** While engineers are often concerned with reducing the noise to find the signal, the value of self-tracked data is the richness of the noise. Observed data picks up biased perspectives from the observer, and data hand-offs can modify meaning. Data collected by other agents are reflective, but self-tracked data comes from the data source.
- **Dynamic & Evolving:** Self-tracked data is typically time-based, it can reveal change and transition. Continuous data sources provide greater accuracy over sampled sources. Analytical capabilities are strengthened with dynamic information.

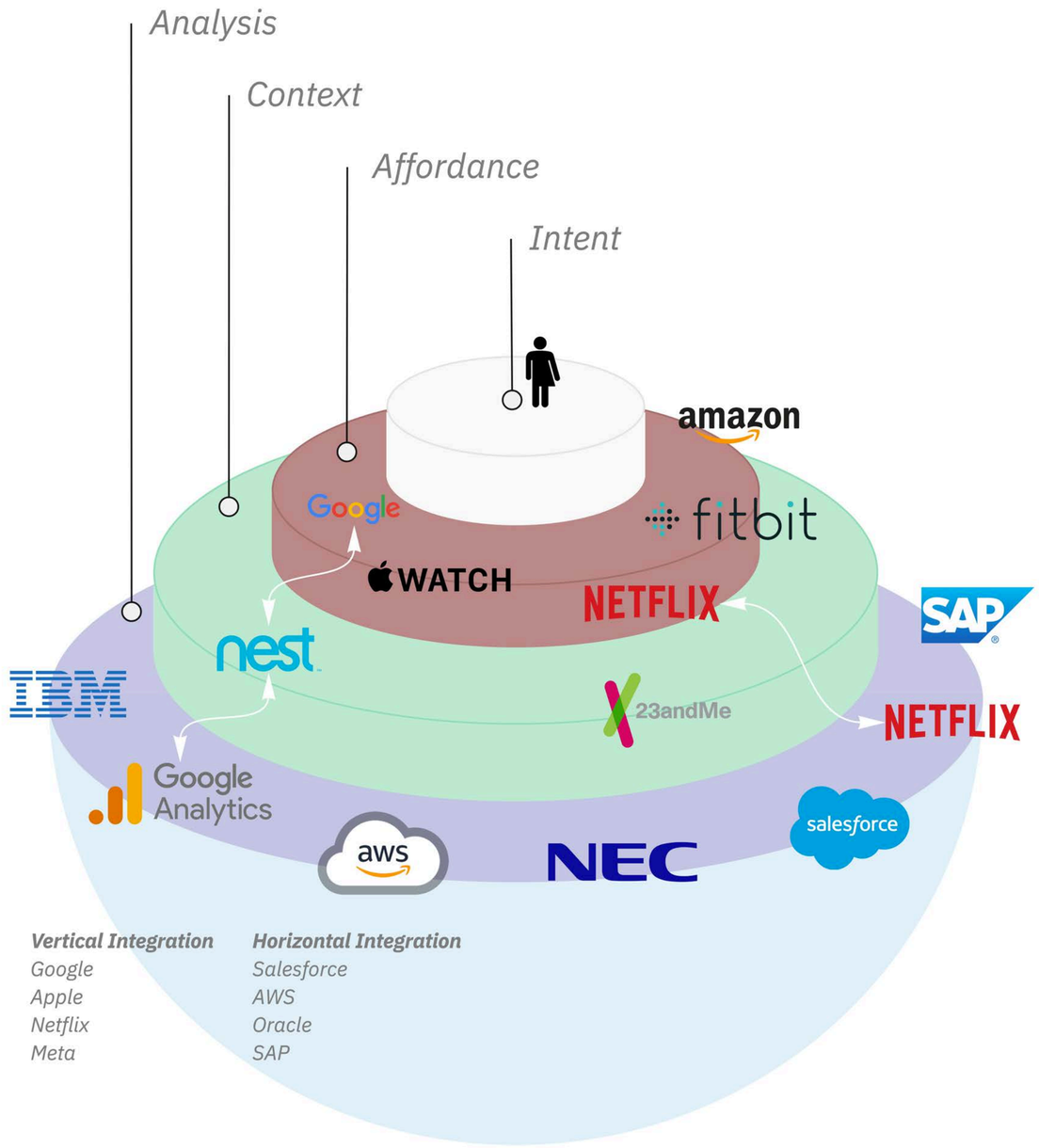
Unfiltered & Unique



Dynamic & Evolving



Upper Left: Claisse, C. et. al. (2022). Bottom Left: Han, Y. C. (2016). Bottom Right: Wac, K., & Wulfovich, S. (2022)



Locating Data in Experience

A Human-Centered Competitive Landscape

> Technology companies may not all be designed for user experiences but they can all be informed by them. Whether or not the product, service, or solution reaches an end-user or an intermediary, it is important to understand the layers in which these data-oriented services are located.

> The competitive landscape for data products ranges from wearable devices, entertainment algorithms, DNA heritage, and analytical cloud services. Despite the diversity of these applications, they can be filtered through four areas of user experience: Intent, Affordance, Context, and Analysis.

> **Filters of Experience**

  > Intent: Self data, originating from user directed activities

  > Affordance: Data which arrives based on possible actions or behaviors from the user

  > Context: Data produced adjacent to user activities and environments or afforded technology

  > Analysis: Data resulting from gathered data sources relating to the user indirectly

Why is data *controversial*?

Distrust, lack of data privacy, ambiguous processes

> data breaches

> nefarious usage

> unclear collection practices

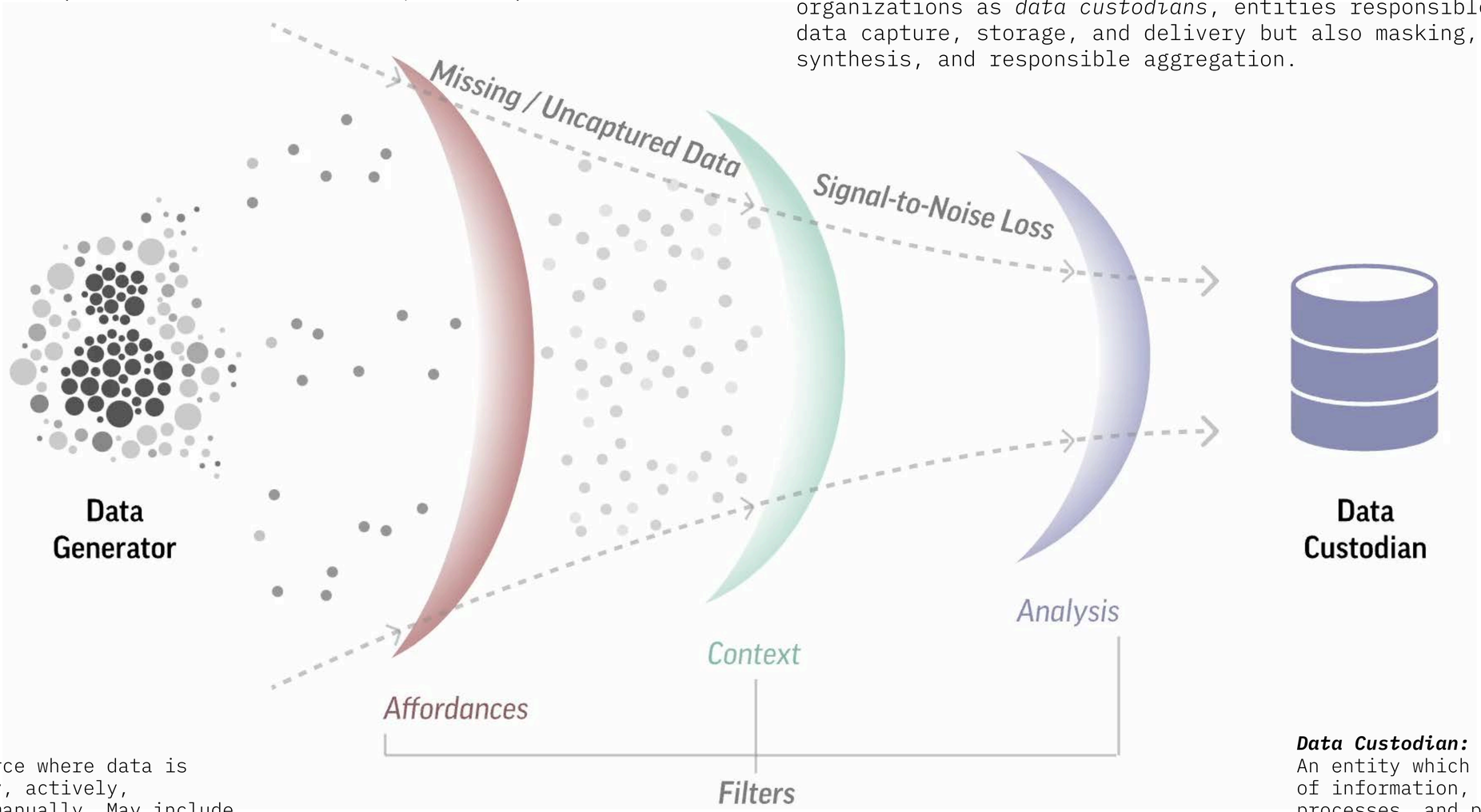
> sold in digital data economy

> surveillance

Data Generators and Custodians

Rich data capture now, for a more inclusive and equitable future

> Memiro repositions intermediate self-tracking, data-collecting organizations as *data custodians*, entities responsible not only for data capture, storage, and delivery but also masking, compression, synthesis, and responsible aggregation.



Data Generator:
An information source where data is generated passively, actively, automatically, or manually. May include the human body, the environment, and other measurable process outputs.

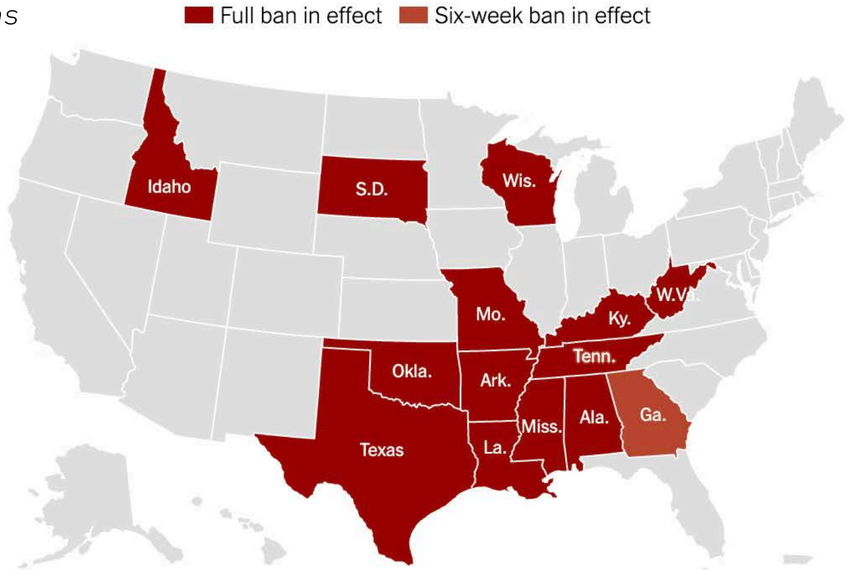
Data Custodian:
An entity which governs the flow of information, manages data processes, and protects the privacy of data generators

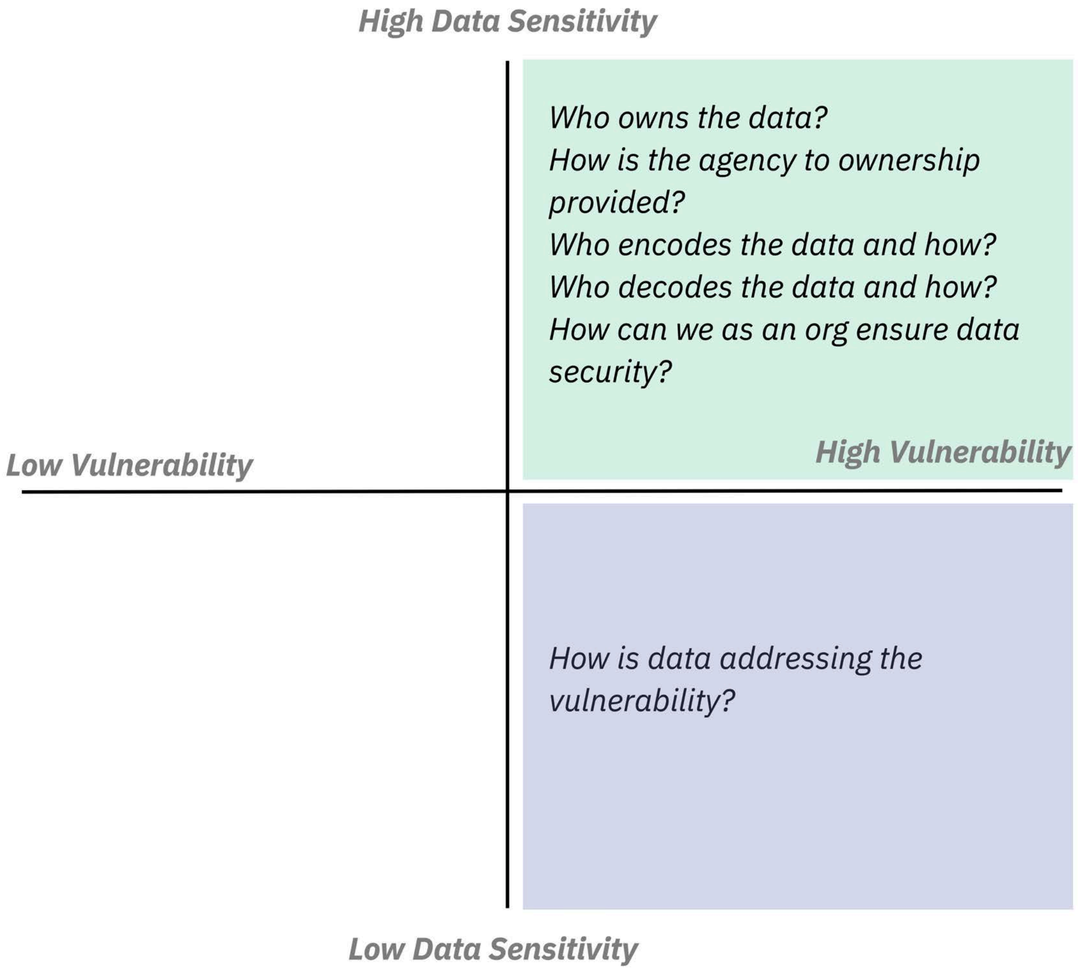
Vulnerability

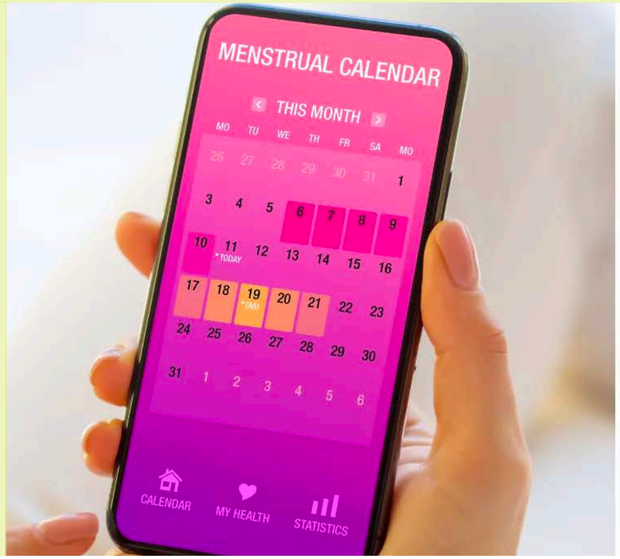
Rich data capture now, for a more inclusive and equitable future

- It is critical to add a sixth "v" – *vulnerability* – to the other "v"s of today's Big Data definition (volume, value, variety, velocity, and veracity).
- Vulnerable populations are disenfranchised twice by data-driven systems – not only are they unserved by contemporary digital systems, but their existence is invisible to data-honed systems honing future data-driven interventions
- Design, identity, and context scenarios were chosen for their sensitivity to, and risk of, existing or potential data exploitation

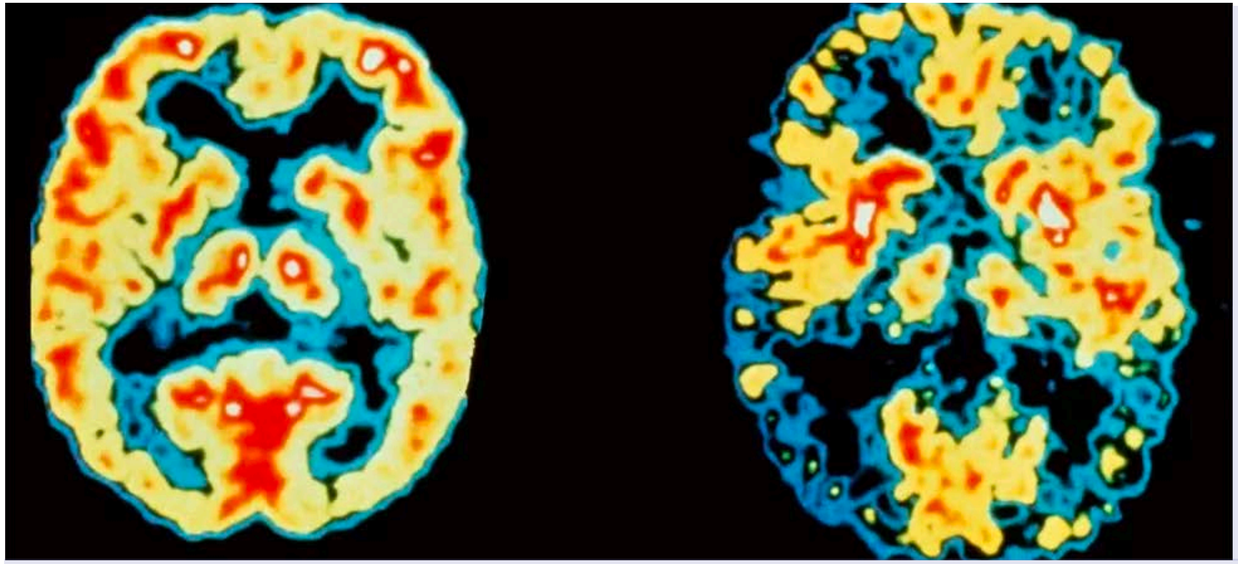
Abortion Bans






MENSTRUAL CALENDAR
THIS MONTH
CALENDAR
MY HEALTH
STATISTICS


BLACK TRANS LIVES MATTER
BLACK LIVES MATTER
BLACK TRANS QUEER CHILDREN PEOPLES
LIVES MATTER



Personal Encoding

Empowering individuals to track their lives in a language unique to them

> Instruction manual, guided experiences, and a kit of parts for teaching individuals to log, transform, and embed sensitive data in everyday objects

> Digital-aided rituals that bring predictive algorithms to the physical world

> Varying degrees of encryption possible, from simple 1:1 mappings to complex data transformations

Data | Components | Algorithms

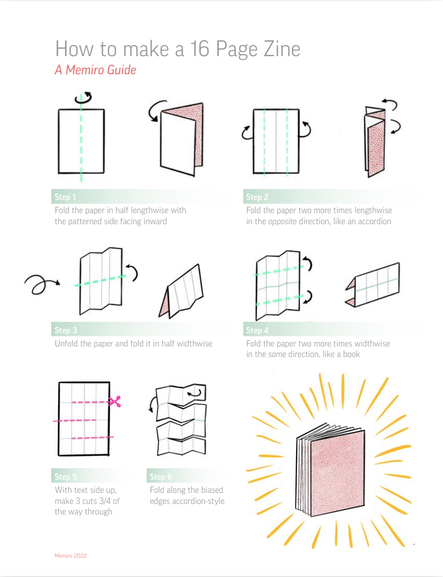
> Computer vision

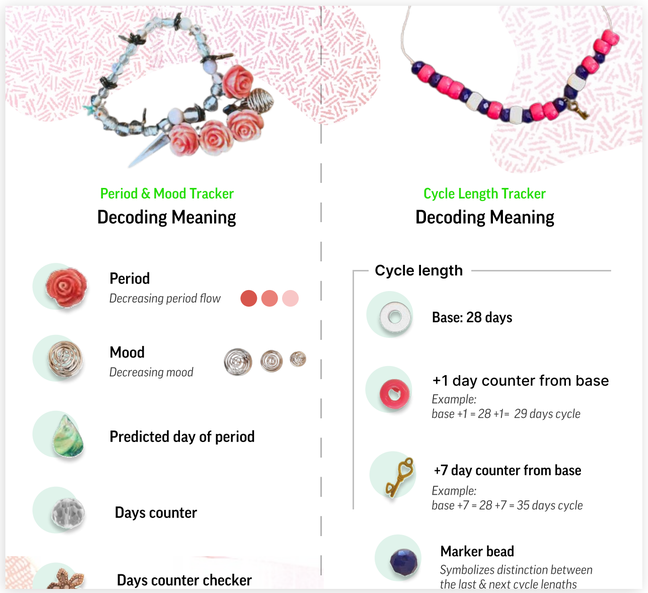
> Data literacy & interpretability best practices

> Privacy-preserving data transformations

> Regressive, predictive modeling

> 3D-Printing



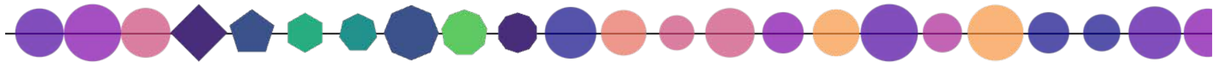


DIY Encoding

A Zine that anyone can make to encode almost anything

- A tool that enables individuals to track sensitive data in physical objects that are *hidden in plain sight*
- Accessible & Intangible
- Personal & Anonymous
- Habitual & Destructible
- 100% Open-source

Oct



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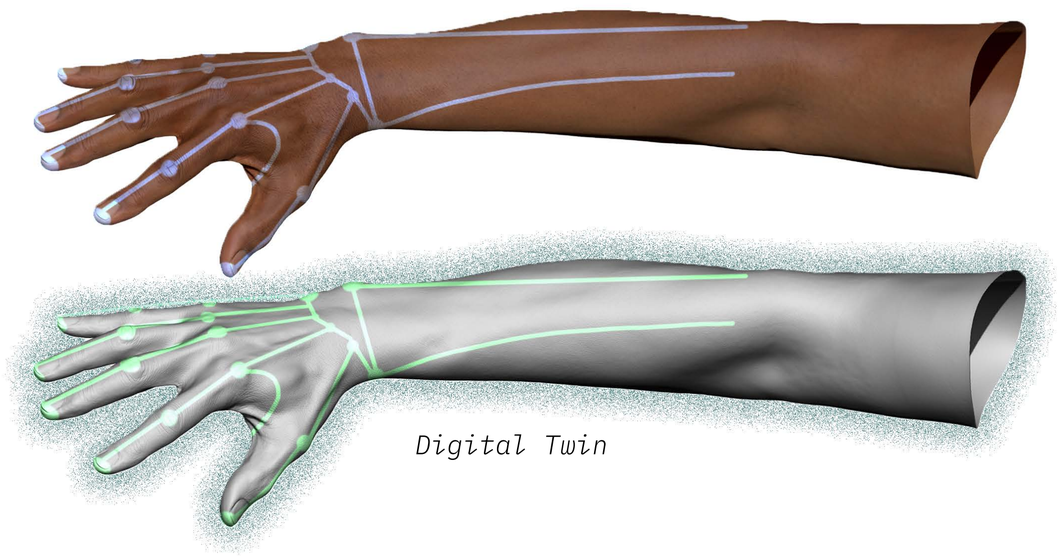


Digital Twin

Moving Alignment

Capturing scale, motion, extents, and physical capabilities of bodies in transition

> Wearable movement sensors for capturing body measurements, forces, and biomechanical dynamism

> Affordably printable and flexible circuits for democratized assembly and open source editing

> De-anatomized digital twin experience for sensitive feedback

> Meditative and contemplative motion exercises to minimize body-mind discontinuity trauma

Circuit on Body

Data | Components | Algorithms

> Conductive ink and insulated, adhesive, body-friendly substrate

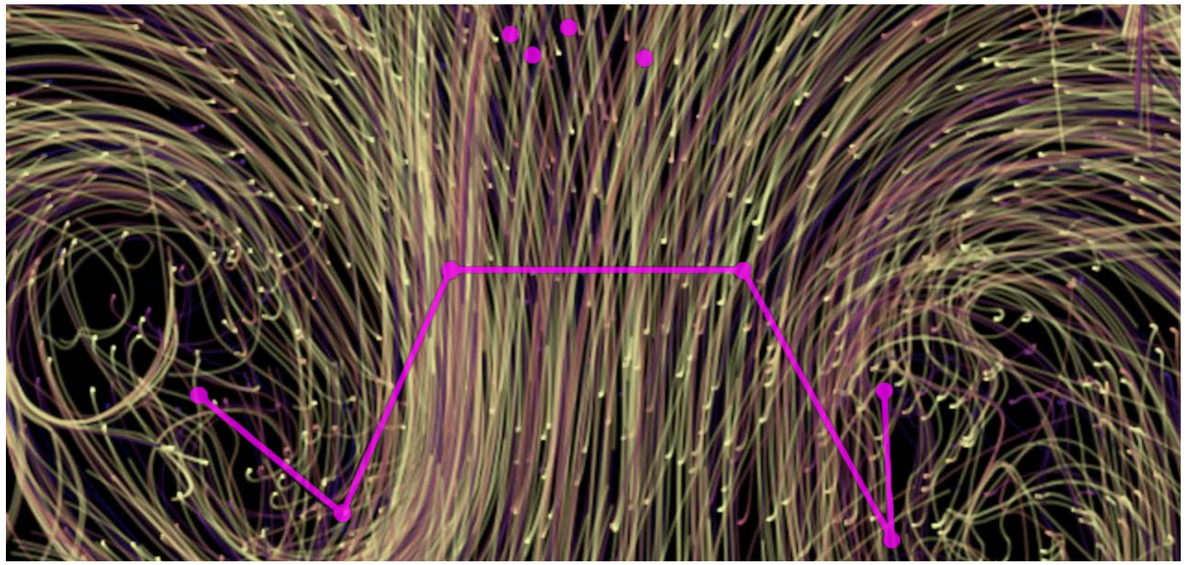
> Microcontroller with ADC and signal amplifiers

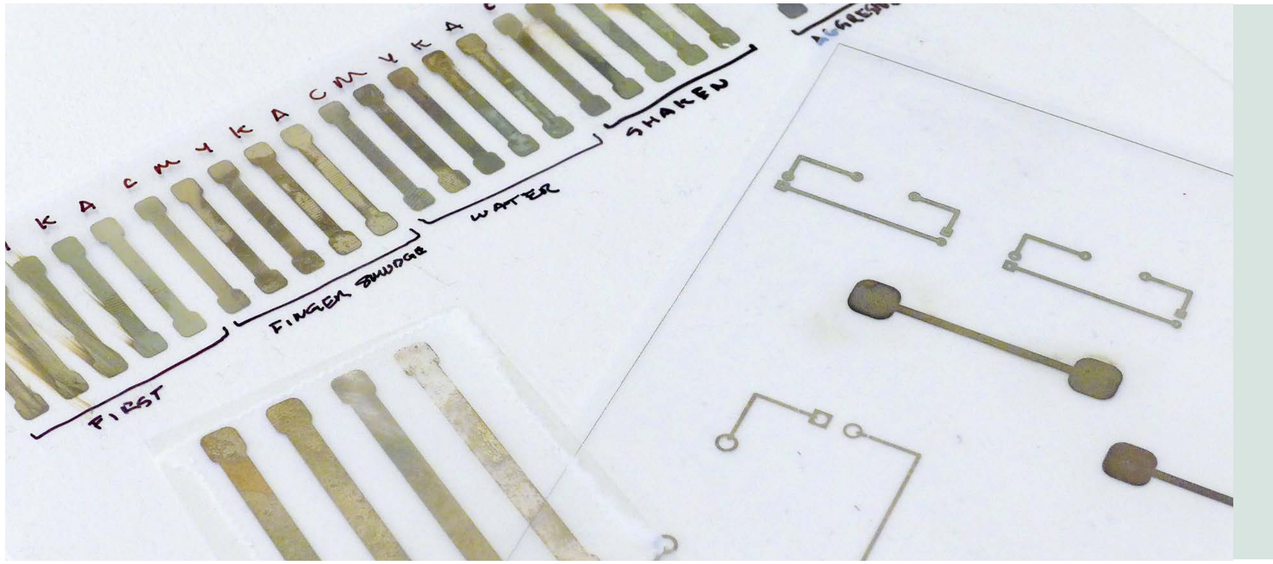
> Inverse kinematics simulation

> Computer vision

> PoseNet / OpenPose and ML5 machine learning libraries

> Open motion capture “MoCap” datasets





Live Motion Capture

Interact with your digital twin

> By making the body the data generator, data shown to the user gives them a way to understand the current state of their body, and how it changes through time.

> Matching body-mind perception between physical and digital

> PoseNet / OpenPose

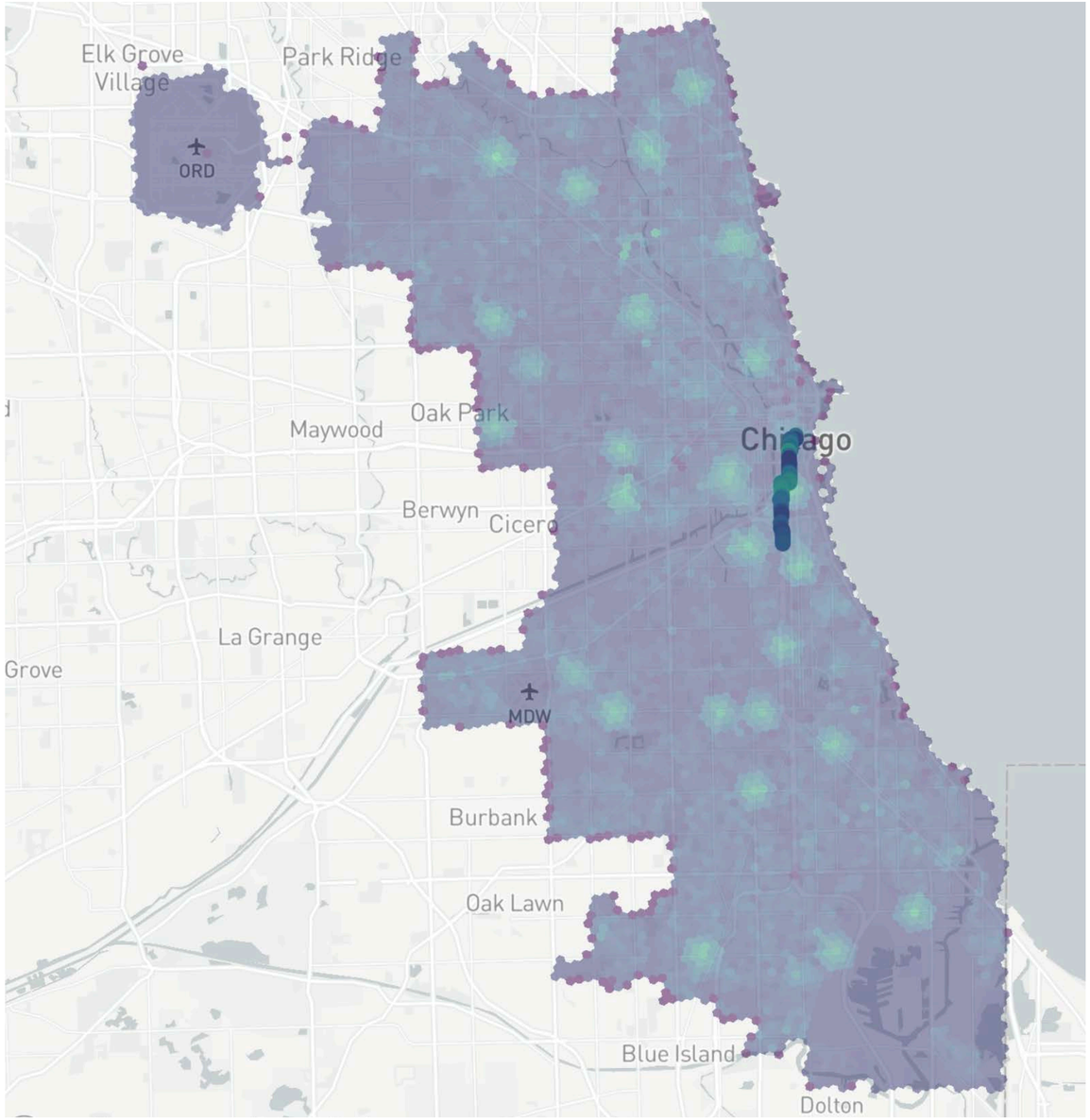
Community-Driven Cartography

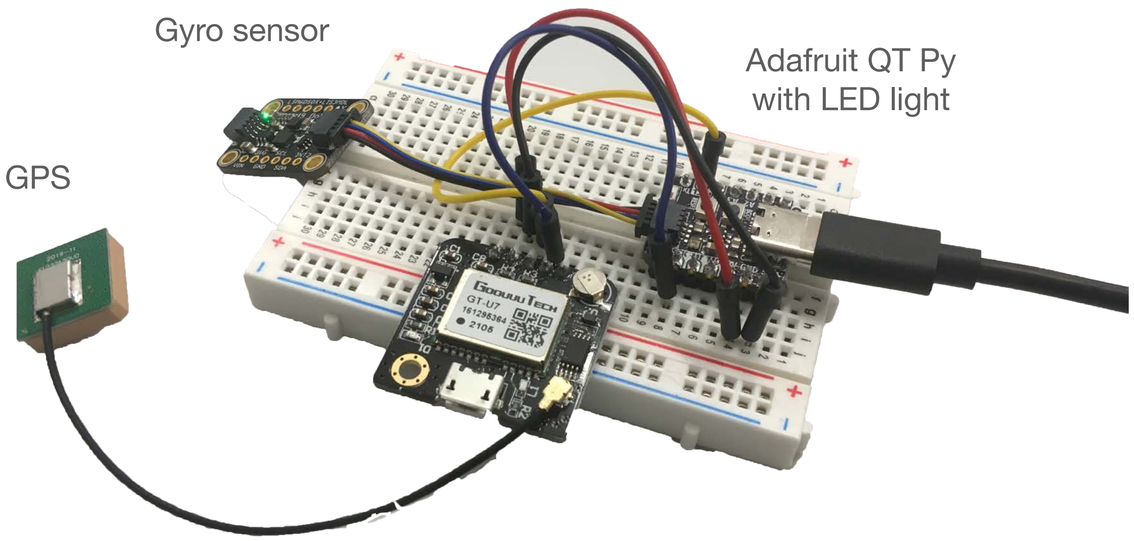
Collaborative and active data experiences for vulnerable populations

> Adjustable index for collaborative definitions of “safety” and routing logic
> Data inputs from municipal, open-source, and advocacy organizations
> Community-driven data input with gestural, disposable, and wearable tech
> Alternative safe paths and regions identified and presented to system users
> Community awareness and support for traversing uncertain spaces

Data | Components | Algorithms

> City interpersonal crime, domestic violence, and gender-based assault datasets
> Public safety facilities and streetlights locations
> A* and Minkowksi routing algorithms
> *Hexbin* spatial quantiles and Open Street Maps geographic tiles
> Gesture sensors, GPS modules, and microcontrollers





Collective Safety Map

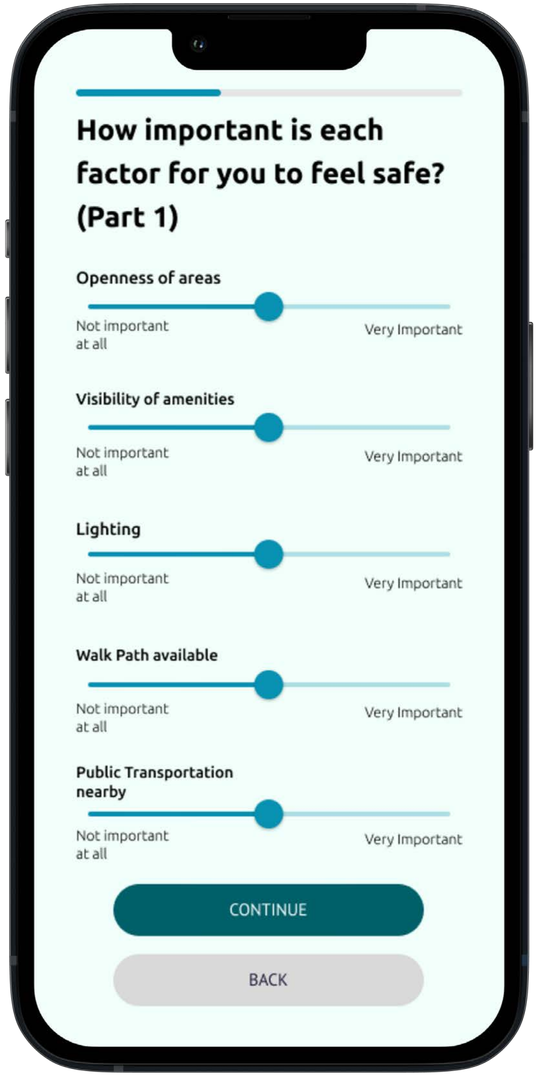
Share the areas where you feel safe with your community

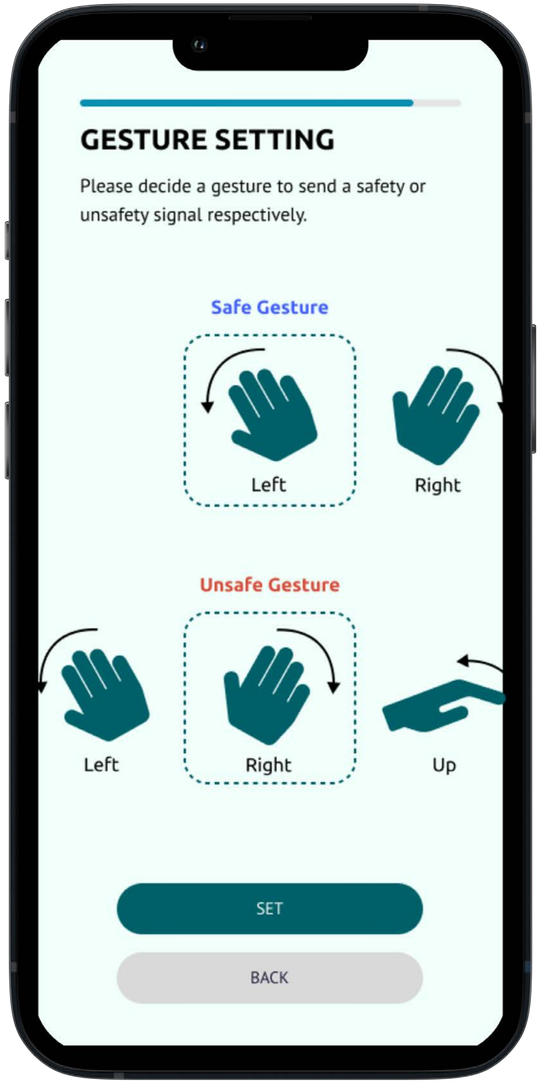
> Each user has different data privacy, different accessibility, and differing capabilities of their data

> Where the most valuable datapoints are the outliers, looking to the individual brings healthy diversity to the collective layers

> Observable / OpenStreetMaps

> Adafruit QT Py with GPS and Gyro sensor





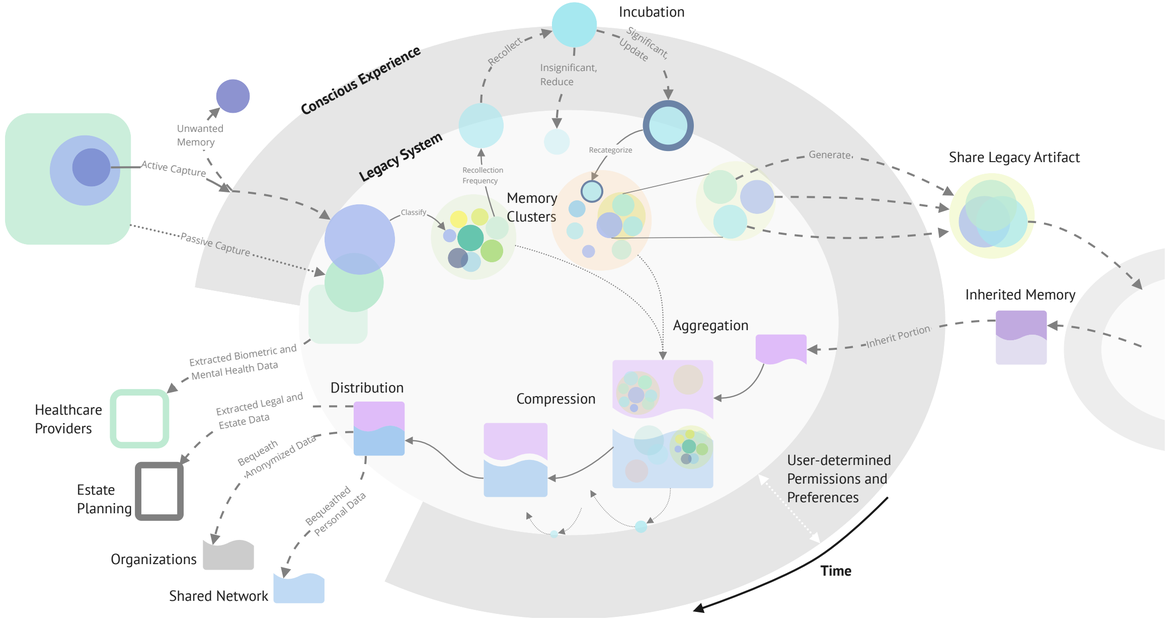
Legacy Infrastructure

Passively collecting, synthesizing, and reinforcing memory through self-tracking

> Weave biosignals from wearable devices together with photographs, audio and video streams, and environmental sensors for comprehensive experience fingerprinting

> Blockchain-based memory "versioning" facilitates revisiting, sharing, and branching memories while maintaining provenance, anonymity, and security

> Platform supports individuals experiencing memory loss, as well as interfacing with digital legacy and estate processes



Data | Components | Algorithms

> IoT cameras and microphones

> Wearable and environmental sensors

> Dall·E media generation model

> Projection mapping and spatial interaction

> Semantic compression, hashing, and synthesis algorithms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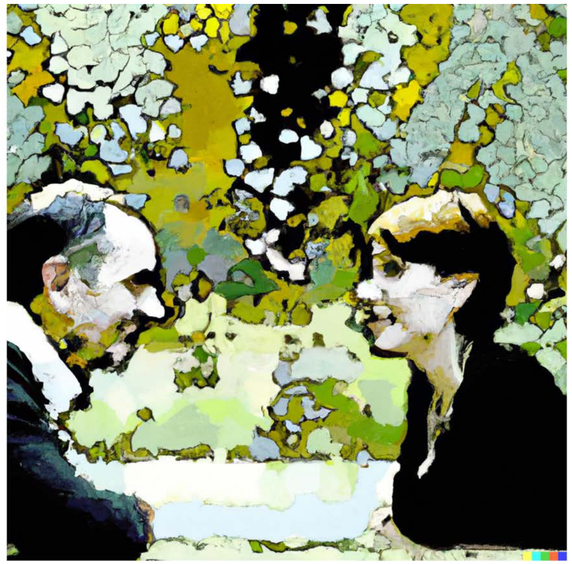


Interactive DALL·E 2

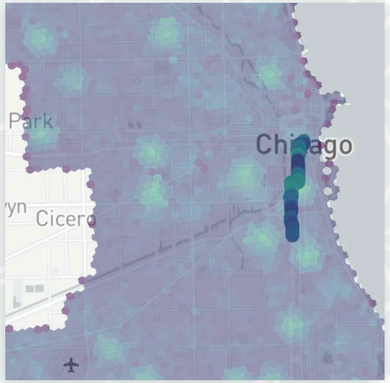
Synthesize a Memory

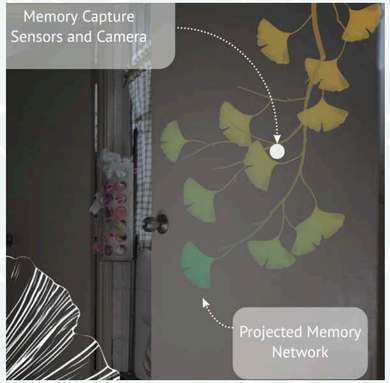
> Blend the ephemeral nature of physical heirlooms with the capabilities of creative AI-generated art

> MadLibs-style prompts

> Dall·E synthesis

“[Noun] at a [Adjective] [Event] near a [Setting] in [Locale] with [Nouns], [Style]”





Check out
our blog!

Thanks so much for listening!
Any questions?

Appendix

Research & Design Activities

Tracking progress in self-tracking research

> **Literature Review** of approximately 100 publications regarding self-tracking, quantified self, behavior change, data privacy, etc.

> **Design Sprint**: Creating new self-tracking experiences that withhold judgement

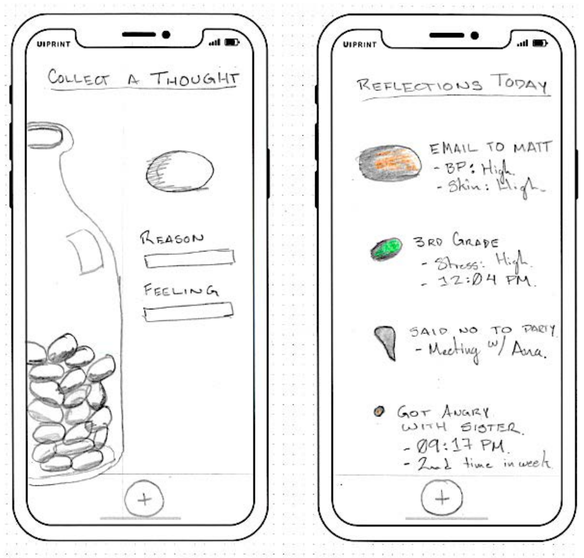
> **Fitbit Redesign**: Deconstruction, Preconstruction, and Reconstruction of Fitbit both for the physical device and digital experience

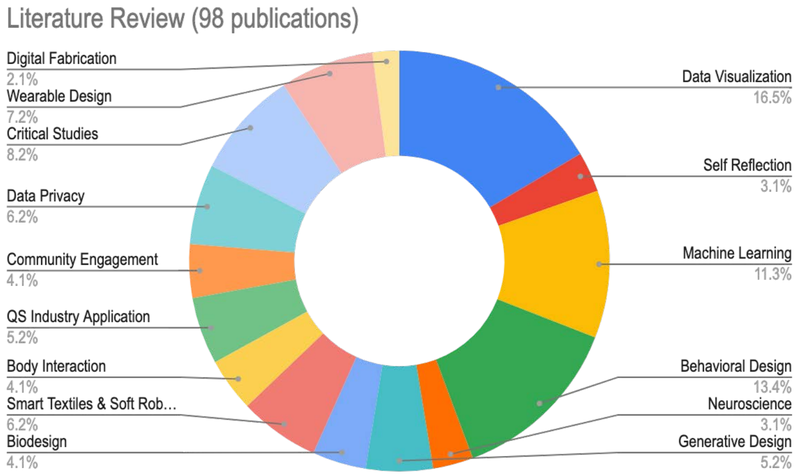
> **Survey** and **Interview** for insight validation and learning about individual experience

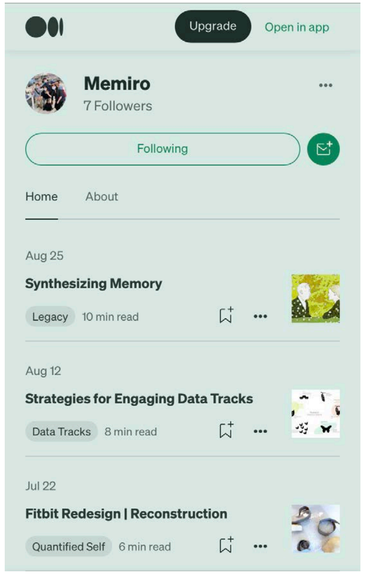
> **Blog** documenting our progress, sprints, and insights

> **Inspiration Trips** to local art, academic, and community institutions that served to inspire and provoke discussion about personal experiences with data

> **Wearing Wearables** in order to gain firsthand experiences with self-tracking tools







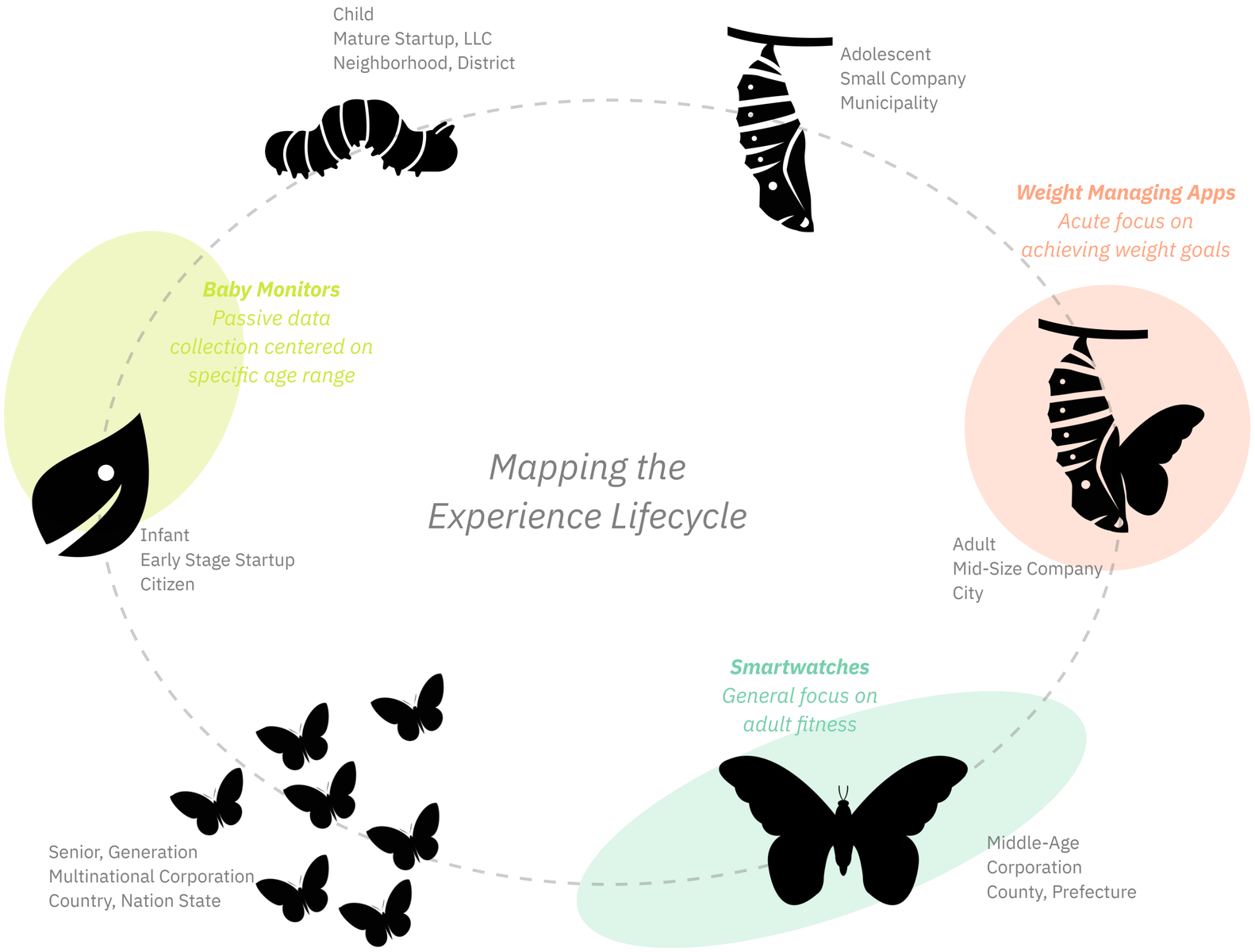
Designing With Time

Extending the Data Lifecycle

> Needs change throughout the life of users, businesses, and communities. Most existing forms of self tracking focus on a specific concern bounded by time. Others are generalized across multiple experiences, but are often disconnected from the user's identity.

> Systems that are cognizant of the passage of time are able to use data more effectively. These solutions bring focus to transition and can adapt to long term change.

> Strategies which design for change embed an awareness of the possibilities and limitations of data capture. As people and organizations age, considering how a user experience and its data change throughout a user lifecycle is critical to advancing innovation.



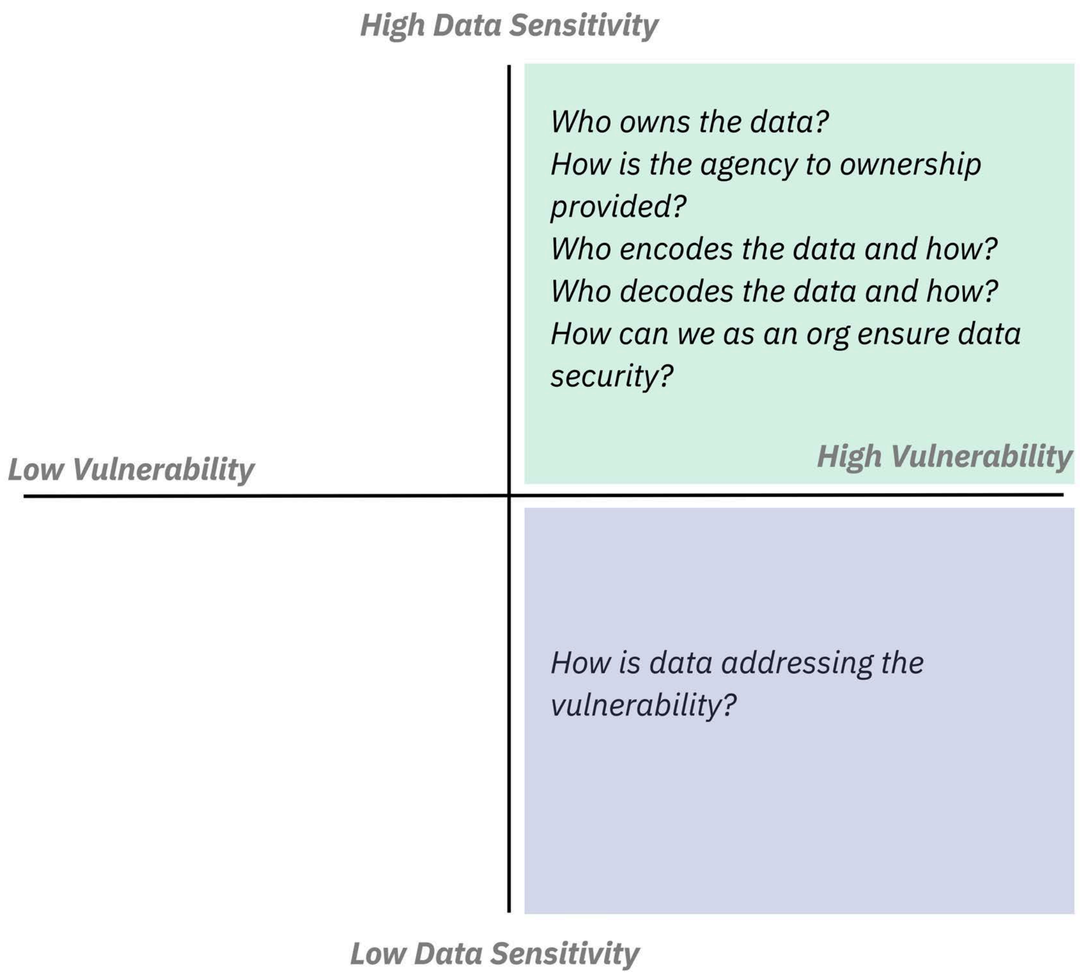
Involving the Self

Designing for Situational Self-Efficacy

> As the gap between digital and virtual diminishes, as a culture, we have seen an increasing need for unplugging and reconnecting with the self.

> Most self-tracking technologies which focus on improving self-efficacy rely on passively collecting, analyzing, and applying information collected from biomarkers. More so, the data collected is personal to an individual, yet minimal steps are taken to prevent data misuse. Considering user vulnerability, regardless of the distance of the user to the product, is paramount to creating value in a fearful culture.

> In such a situation, it becomes critical to focus on actively involving the self in generation, analysis, and interpretation of personal data, which could be done via the individual building their own data literacy. Since self-tracking deals with personal data, it’s imperative to take ethically responsible decisions to secure sensitive information. This could be done via providing ownership of data to the individual and decentralization of data sources, such as using technologies like edge computing or blockchain.



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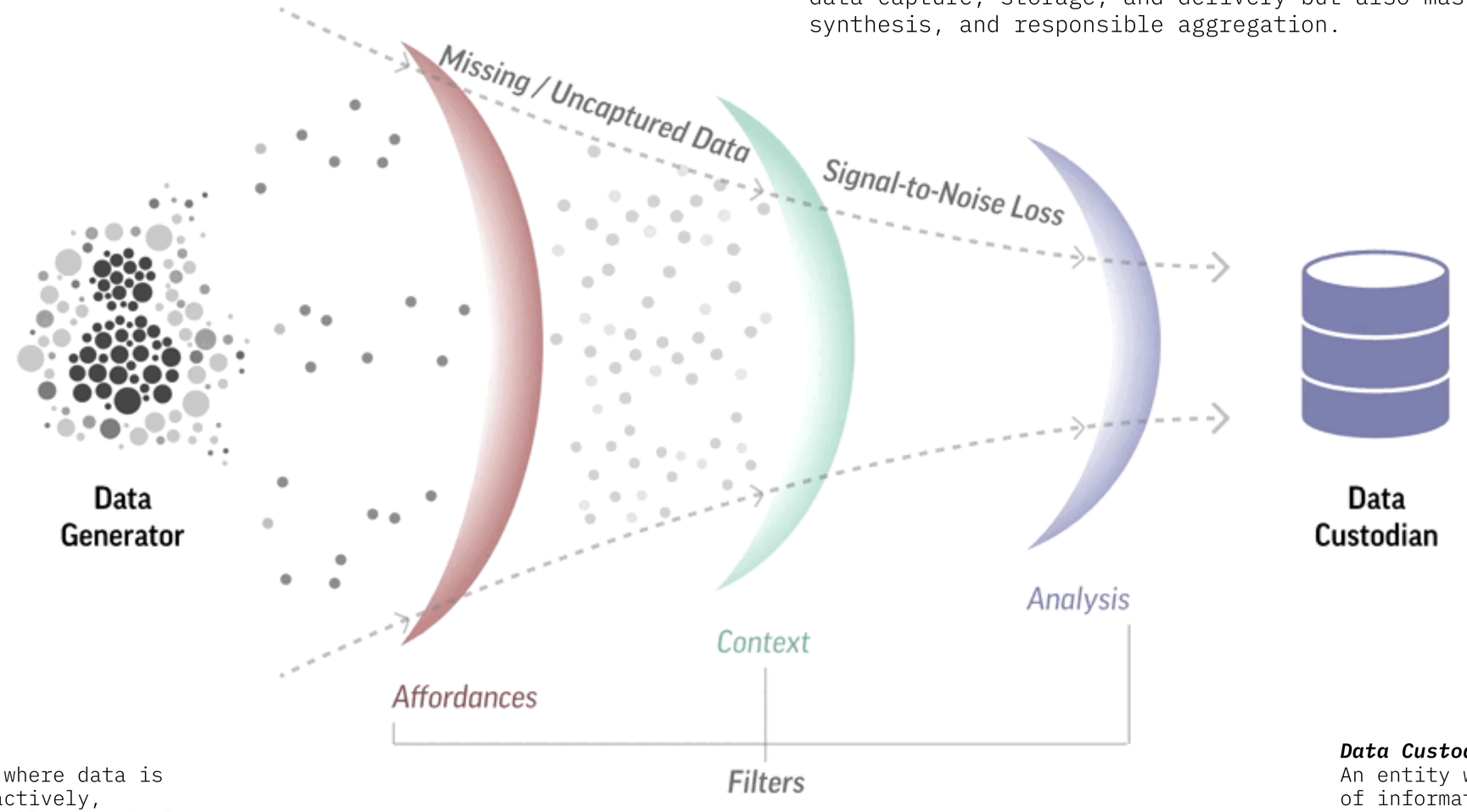
Rich data capture now, for a more inclusive and equitable future

> Memiro repositions intermediate self-tracking, data-collecting organizations as *data custodians*, entities responsible not only for data capture, storage, and delivery but also masking, compression, synthesis, and responsible aggregation.



Data Generator:
An information source where data is generated passively, actively, automatically, or manually. May include the human body, the environment, and other measurable process outputs.

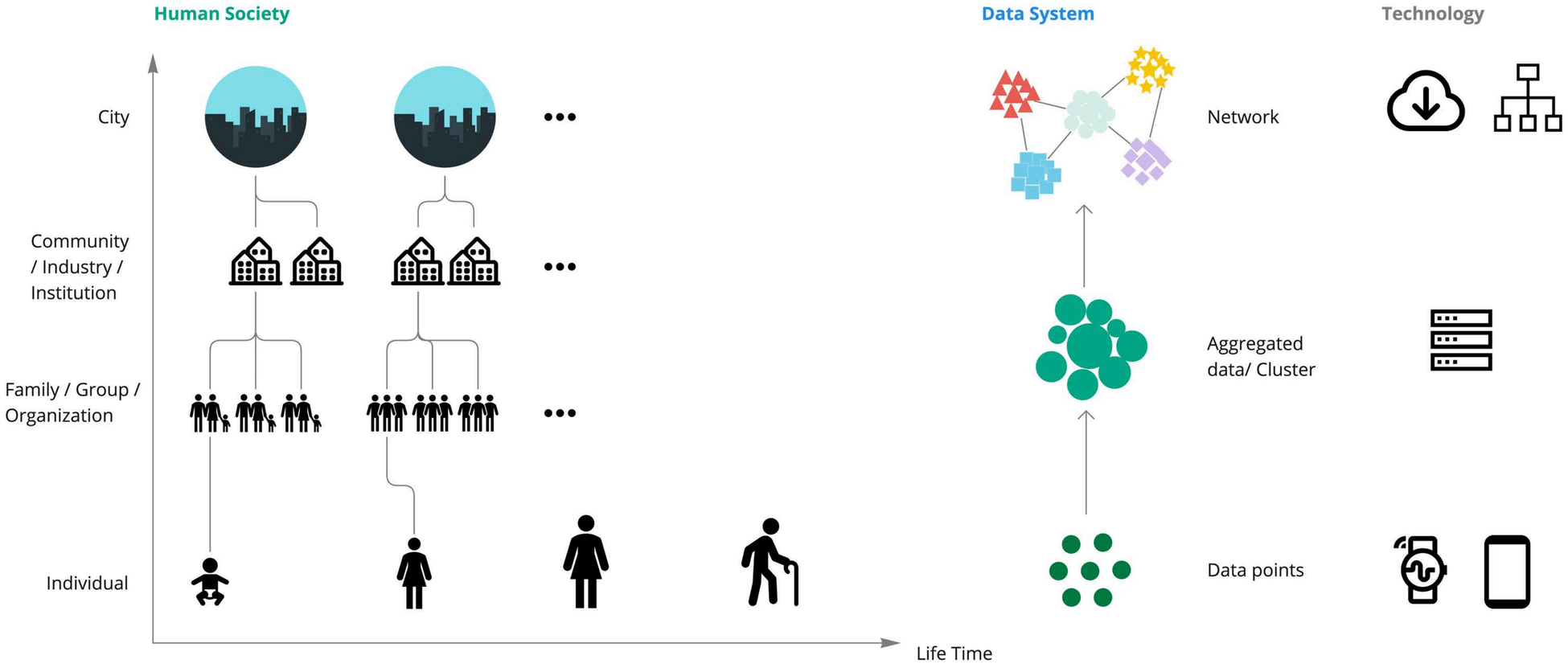
Data Custodian:
An entity which governs the flow of information, manages data processes, and protects the privacy of data generators

Ecologies of Scale

Supporting Self-Tracking Communities

> Collecting individual data from the bottom-up helps organizations improve **diversity** and **inclusivity** and broaden the population of products, services, and systems; while top-down approaches in the market mainly target normalized or mainstream people and may ignore marginalized voices.

> In encouraging users to share their data tracks, user agreement on data sharing is a key to scale up data-driven solutions. Designing persuasive, accessible, and user-friendly experiences is important to nudge people to share their data both for individual and collective benefit.



Ecologies of Scale

Supporting Self-Tracking Communities

> Organizations must set boundaries to improve data privacy, data accessibility, and data ownership in order to build trustworthy and well-balanced systems that can know the value as well as the risks of collective data. For example, a subset of users (individuals, families) might access private data while others are limited to filtered data to mitigate risks of data leakage.

> Regarding data ownership, a system could allow individuals to delete or revoke their data across the system. Similarly, community members could agree on a requirement to delete data valuable for the community. Avoiding polarized attitudes on those sensitive issues gives an opportunity to achieve system optimization without exploiting individual humans.

> Collective data has a potential to provide value where individual data cannot. In a smart city context, city governments may build customizable infrastructures in which service providers can offer consistent services on top of infrastructure for specific user groups throughout their lifetime. On the other hand, newly generated risks should be taken into consideration for different time frames, user groups, and data applications.