Priority Queue:

Ranking, Sorting and Prioritizing

Diana Acosta-Navas Ph.D.
Postdoctoral Fellow
McCoy Family Center for Ethics – Stanford HAI

Contents

- Values in technology
- Coordinated Entry System
- Values Encoded
- Value Conflicts

Values in Technology

- Design decisions encode values.
- They are expressive of what we care about.
- They reveal our assumptions about the world, the people who will be interacting with our design and benefiting from it.

Values in Technology

Explicit values: Values that designers intend their products to encode.

Collateral values: Values that are not explicitly encoded but crop up as side effects of design decisions and the way users interact with them.

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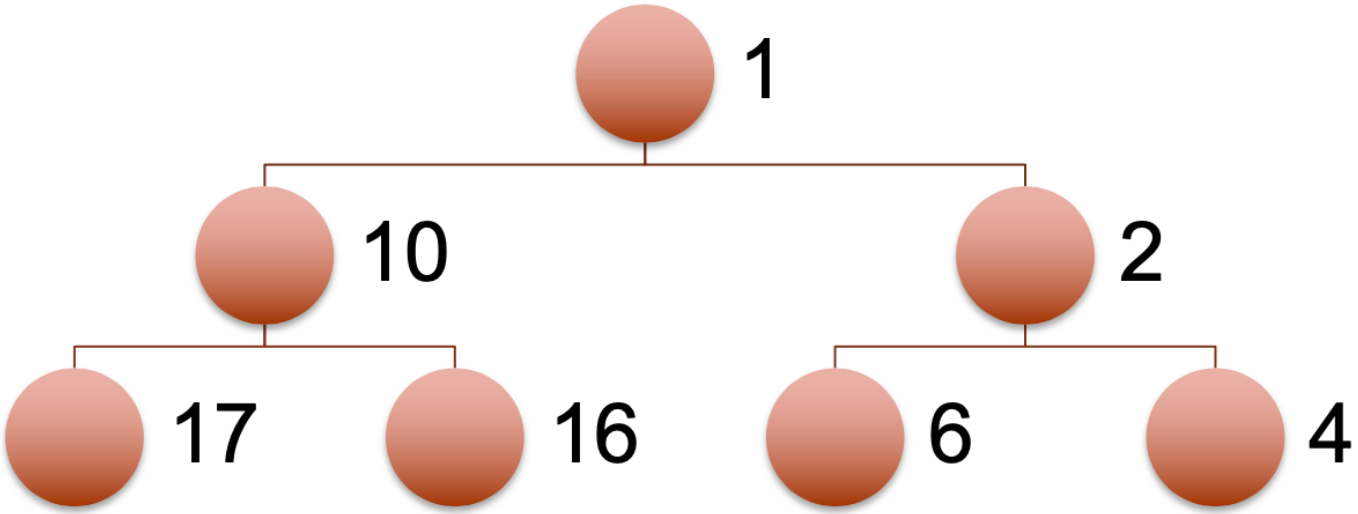
Values in Technology

- Value tensions and conflicts may arise when the system operates in the world.

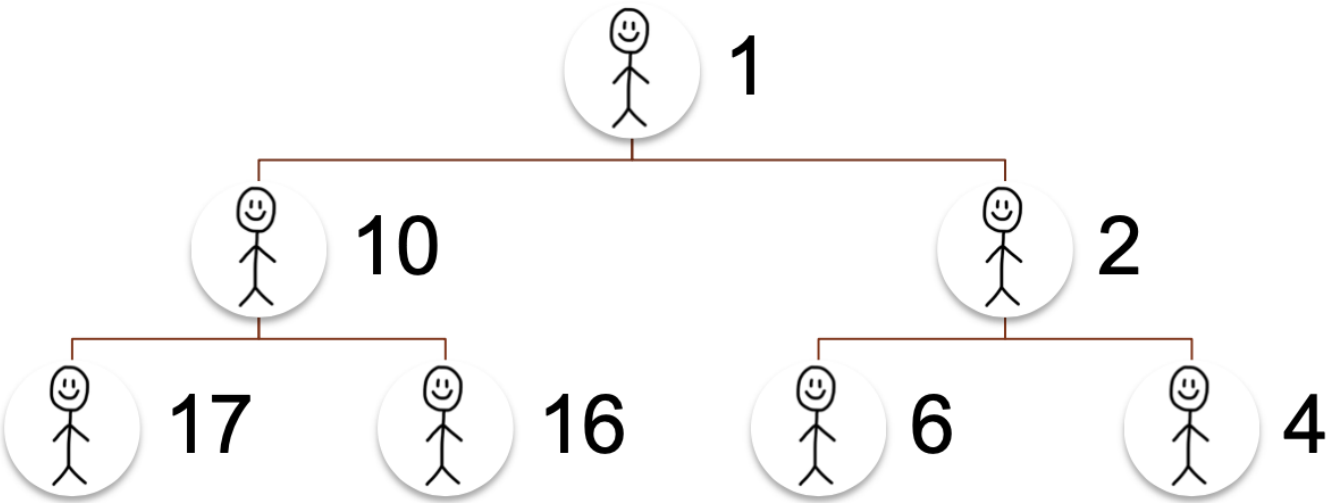
Priority Queue: a refresher

- In a queue, the **first-in-first-out rule** is implemented.
- A priority queue is a **special type of queue** in which each element is associated with a **priority value**. Elements are served on the basis of their priority. That is, higher priority elements are served first.

Priority Queue Implemented as Heap



Priority Queue of People's Housing Needs



What do we use Priority Queue for?

- Triage
- Vaccines
- Organ donation
- Social assistance programs

Coordinated Entry System

- Centralized system for the allocation and provision of services to the unhoused.
- Provides standardized intake process to reduce waste, redundancy, and double dipping across agencies.

Before the Coordinated Entry System

- Unhoused people navigated a complex system of waitlists and social service programs
- Competition for rooms and funding among service providers.
- Corruption

Coordinated Entry System

Two Philosophies

- Housing First
- Prioritization according to need

Coordinated Entry System

Housing First

- Research by Psychologist Sam Tsemberis (2004)
- Rejection of “house-readiness” approach
- Anti-paternalistic
- Better results
- Less public spending

Coordinated Entry System

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➢ Scarce resources and growing needs

Coordinated Entry System

Prioritization according to need

- Crisis homelessness
  - Requires a small, time-limited investment
- Chronic homelessness
  - Associated with other problems
  - Requires more complex social support

Coordinated Entry System

Prioritization according to need

- Need for a system that enabled agencies to:
  - Identify individuals' and households' needs
  - Sort them
  - Allocate resources

Coordinated Entry System

Entering the system

Meeting the definition of “literal homelessness”

Data gathering

Unhoused person provides personal information including name, DOB, SSN, immigration status, disability, current & past mental health, sexual activity, substance use.

Ranking

Algorithm uses personal data to assign a number from 1-17, least vulnerable to most vulnerable.

Matching

Risk score is used to assign housing and housing related services.

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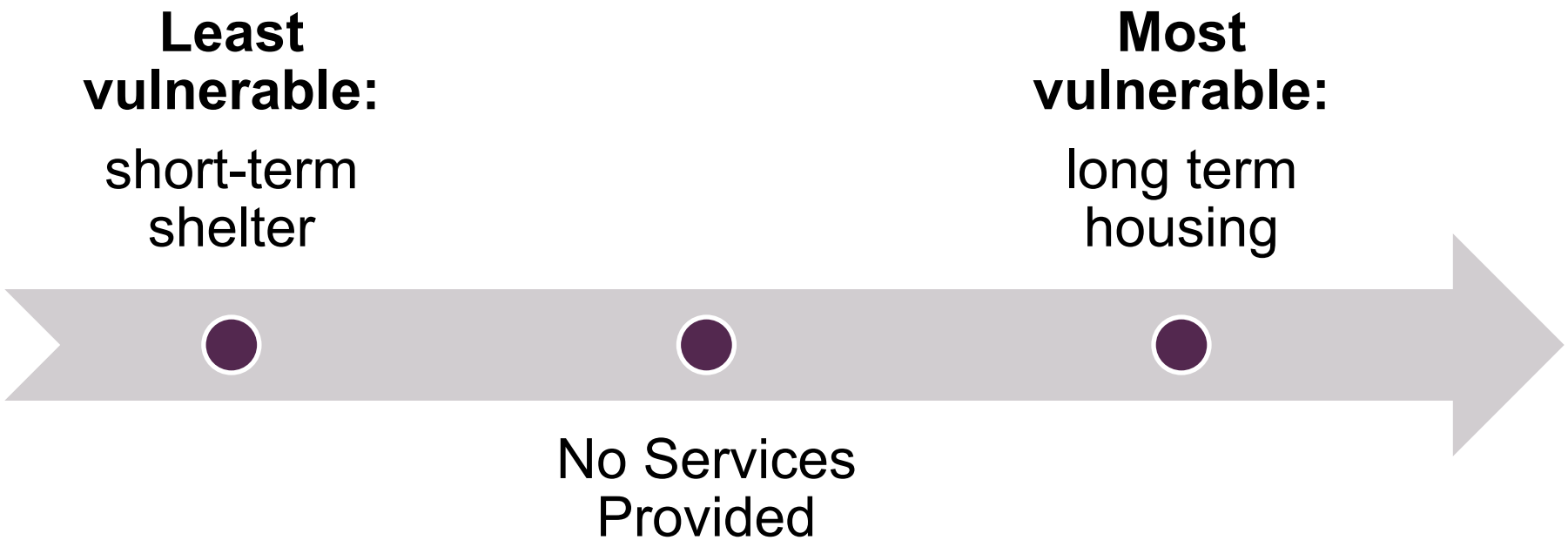
Priority Queue!


Least vulnerable:
short-term shelter
Most vulnerable:
long term housing
No Services Provided

Design decisions?

- Sort individuals based on certain characteristics
  - Which characteristics?
  - How are they weighted?
  - What data is needed?
  - How do we gather information?
  - Categories?
- Once they are classified and ordered, how do we treat individuals in each category?
- How do you treat the data?

Concept Check:

Unlike collateral values, explicit values are those that…

Answer at
https://pollev.com/cs106bwin23

Encoded Values?

Think-Pair-Share:

What are some explicit values encoded in the C.E.S.?

Encoded Values?

Efficient use of resources

Neutrality

Promoting autonomy

Priority of the worst-off

Encoded Values?

Efficient use of resources

Efficiency?

- C.E.S. was intended to reduce public spending by streamlining the process of housing allocation.
- It sought to optimize the use of existing housing resources by allocating them to the people who would benefit most from them.

Efficiency?

- Total cost to L.A. County:
  $11 million
  - The C.E.S. did improve matching between people and services but didn't increase the number of people housed.

- Cost per housed person:
  $1140
  - Would the $11 million have been better spent on giving each person $1,140 to put towards a security deposit for an apartment?

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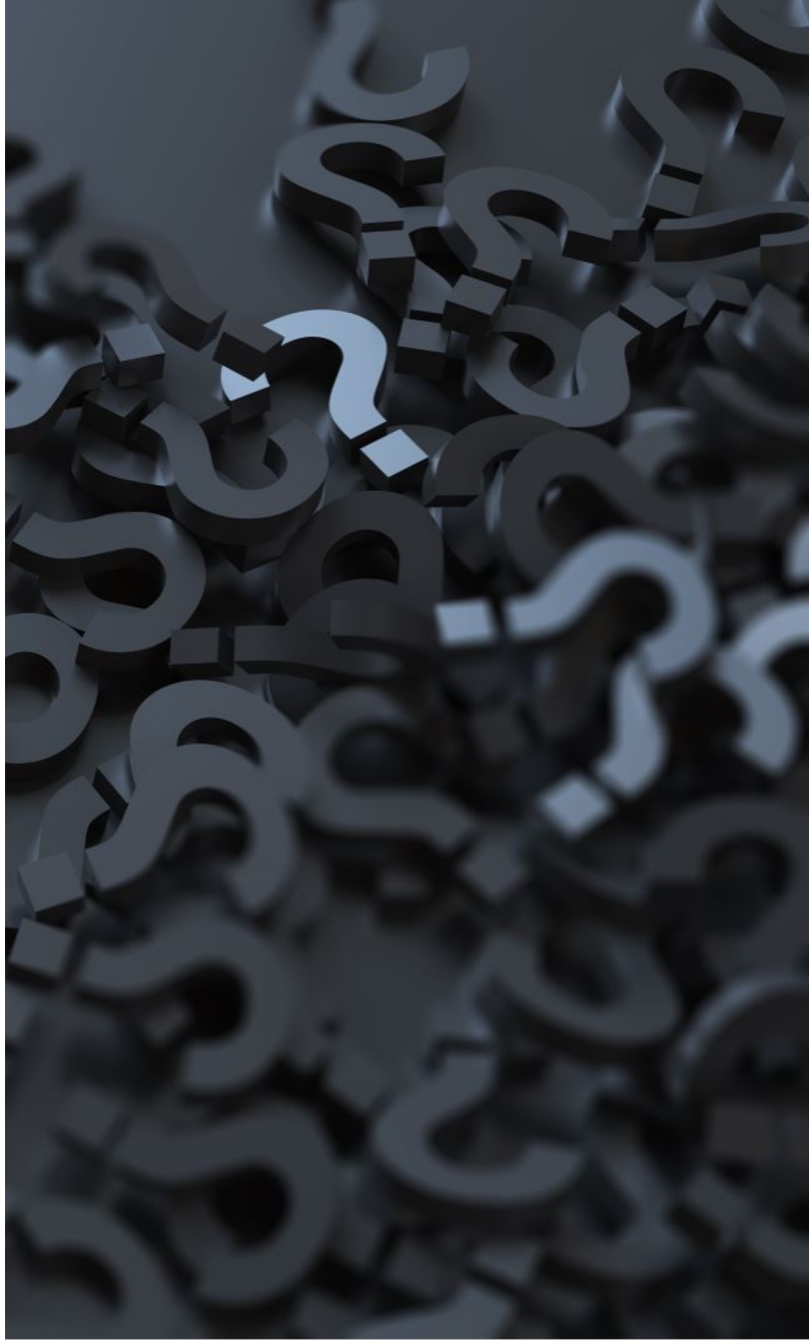
Encoded Values?

Neutrality?

"I'm doing the matching and it's very unbiased as far as our work because the computer tells me, based on a scoring system, which families are higher need than other families"

Worker Interviewed

According to Need Podcast



Neutrality?

Vulnerability assessment:

- If no one intervenes
  - Death
  - Chronic homelessness
  - Use of costly social services

- Some criteria
  - Physical or mental illness
  - Disability
  - Addiction
  - Length of time unhoused

Neutrality?

Unintended consequence:

- Because of economic disparities, it is easier for people of color to become unhoused.
- A higher proportion of white unhoused people meet the criteria of high vulnerability.
- White unhoused individuals score higher on the ranking and are more likely to receive benefits.

Neutrality?

- Individual vulnerability does not take structural factors into consideration.
- But these factors affect some people disproportionately.
- Which could make the system work less effectively for people of color.

Neutrality?

Concept Check:

The designers of the C.E.S attempted to encode the value of neutrality by….

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Encoded Values?

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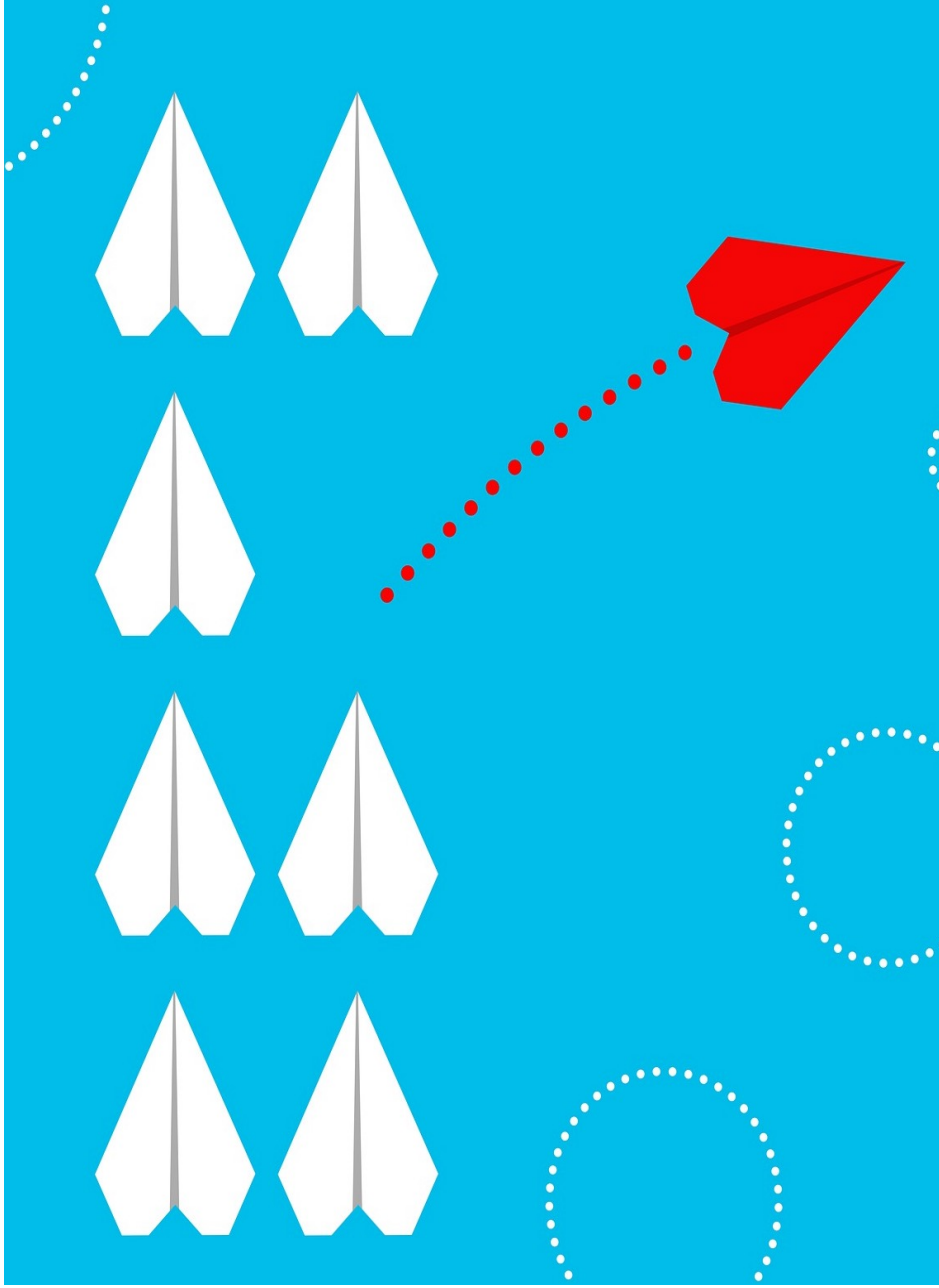
Autonomy?

Housing First:

- Rejection of paternalism
- Creating conditions for individuals to make their own choices

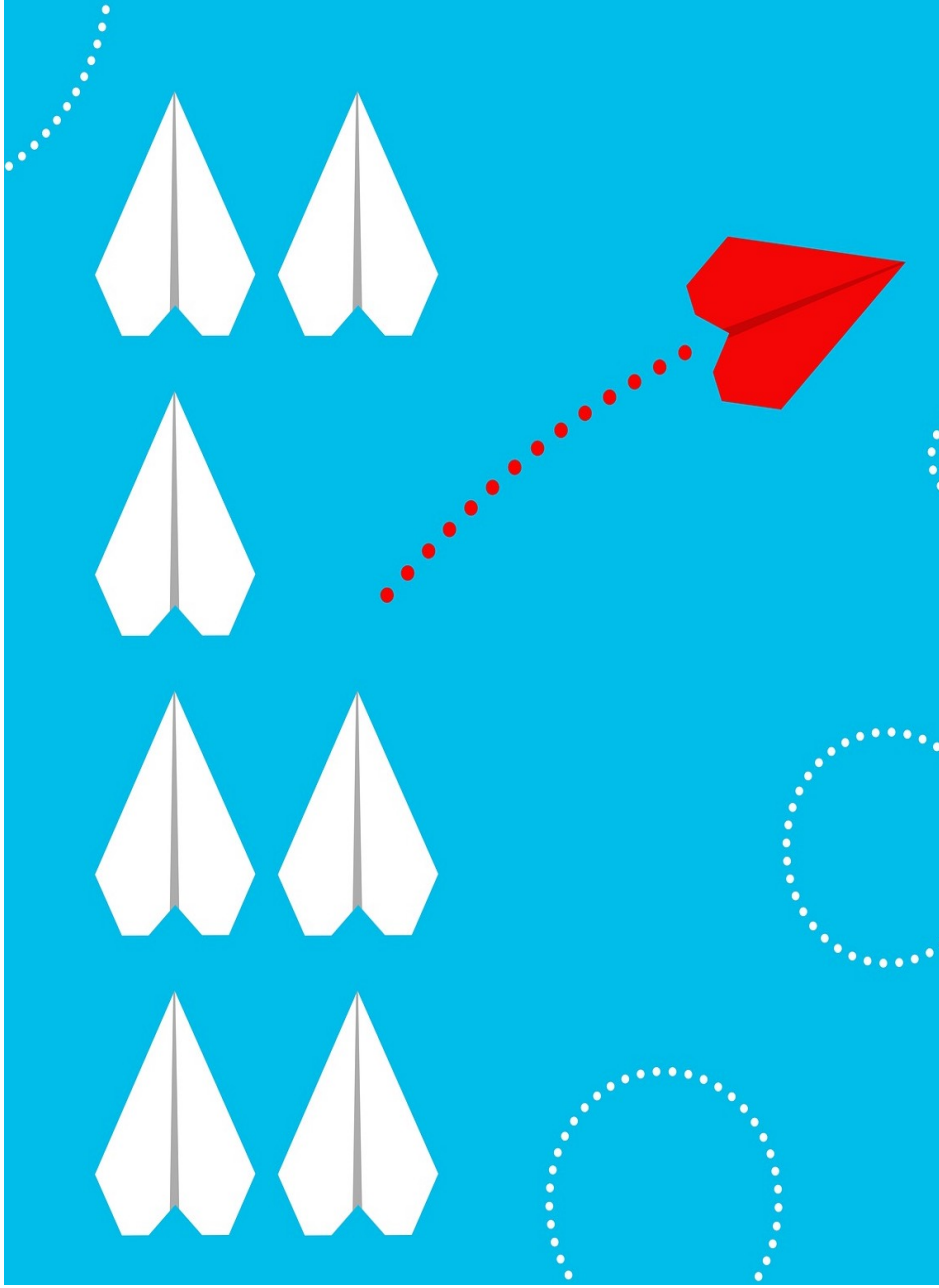


Autonomy?

No other path to services

Sensitive data

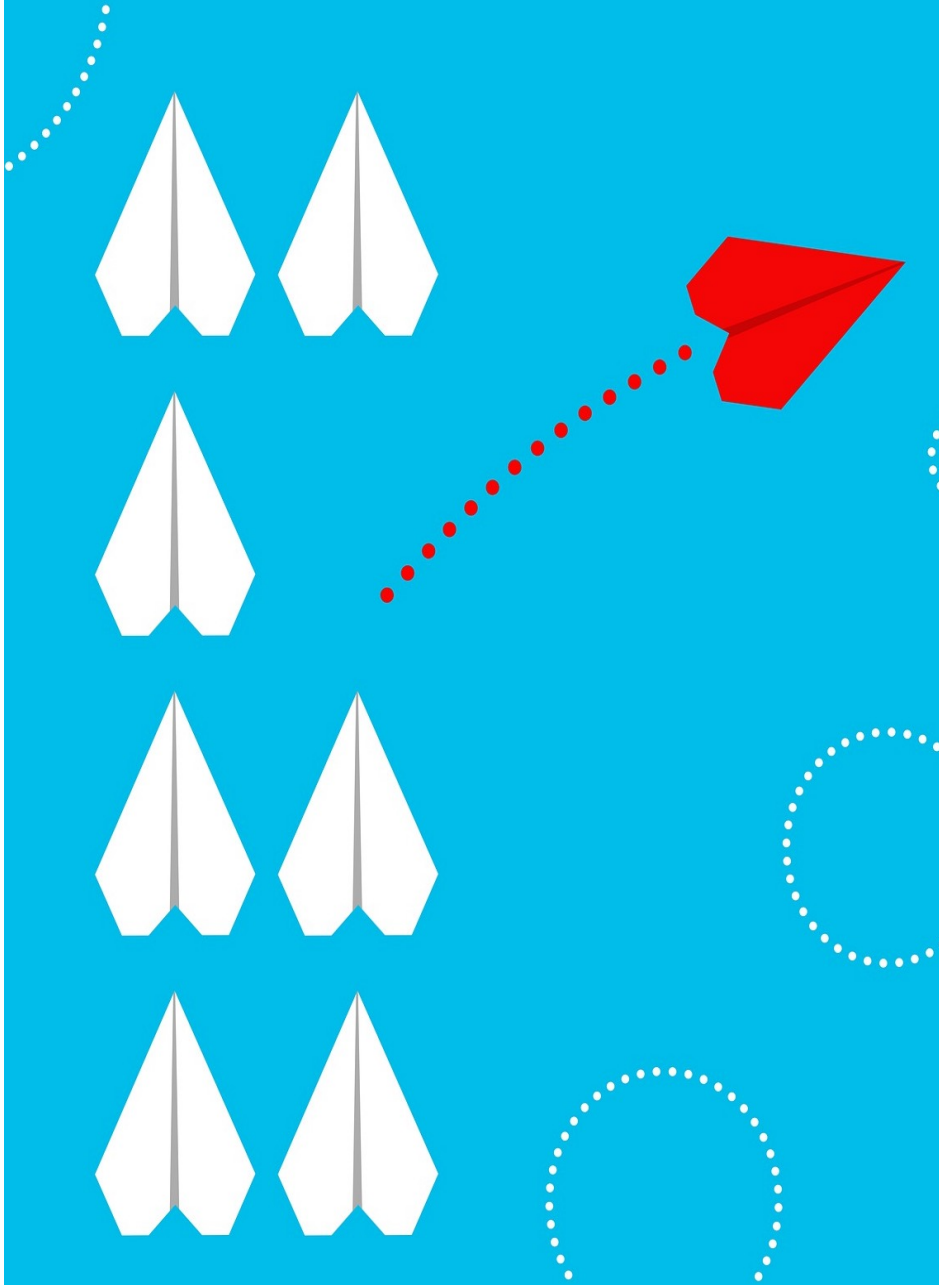
- Demographic
- SSN
- Immigration status
- Mental health
- Disability
- History of domestic violence
- Sexual activity
- Substance use



Autonomy?

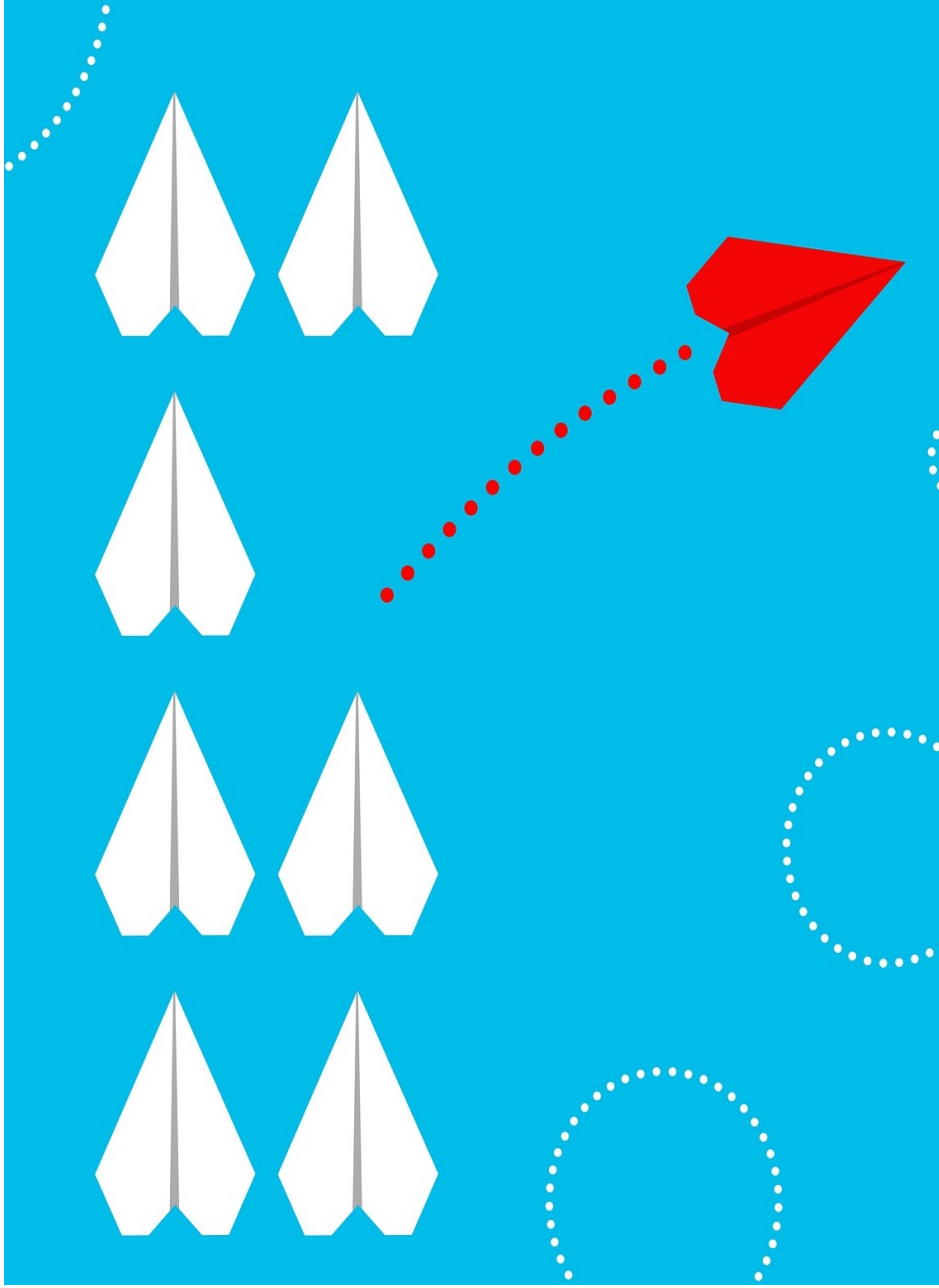
"It was like I was talking to my therapist [...] I was honest. I would prefer to do [the survey] with somebody that I trust […] But I would have done it with a stranger if I had to do that to get housed.… If it was to get me a roof over my head, I will talk to you, and tell you the truth, and tell you what you want to hear.""

Eubanks (2018), p. 96



Autonomy?

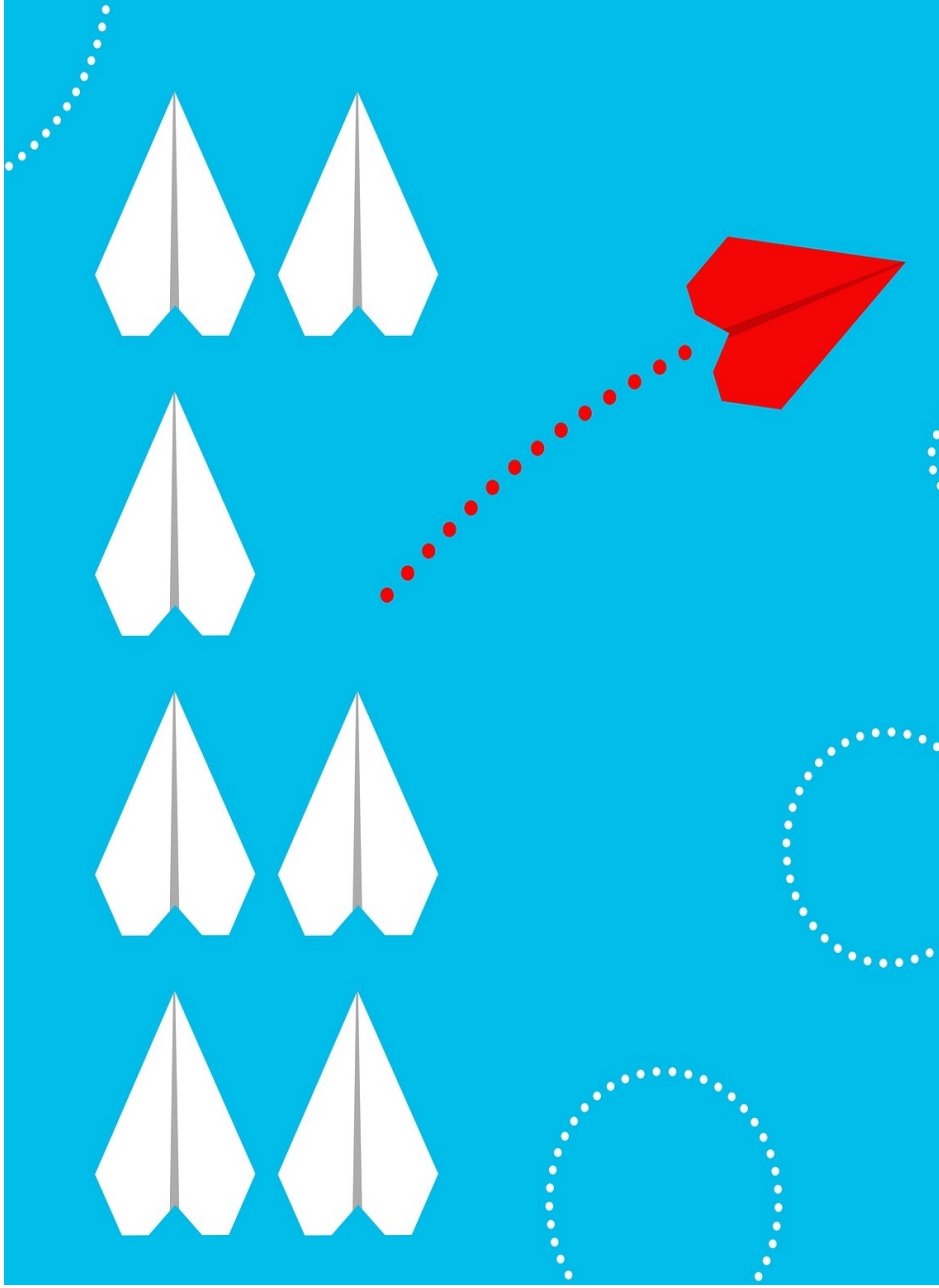
- Survey responses are shared with 168 agencies.
- Consent is valid for 7 years
- Initially there were rigorous procedures for data protection, but later, SSNs were introduced and linked to sensitive personal data.
- Absent strong data protection rules, C.E.S. enables a system of increased surveillance of the unhoused.



Autonomy?

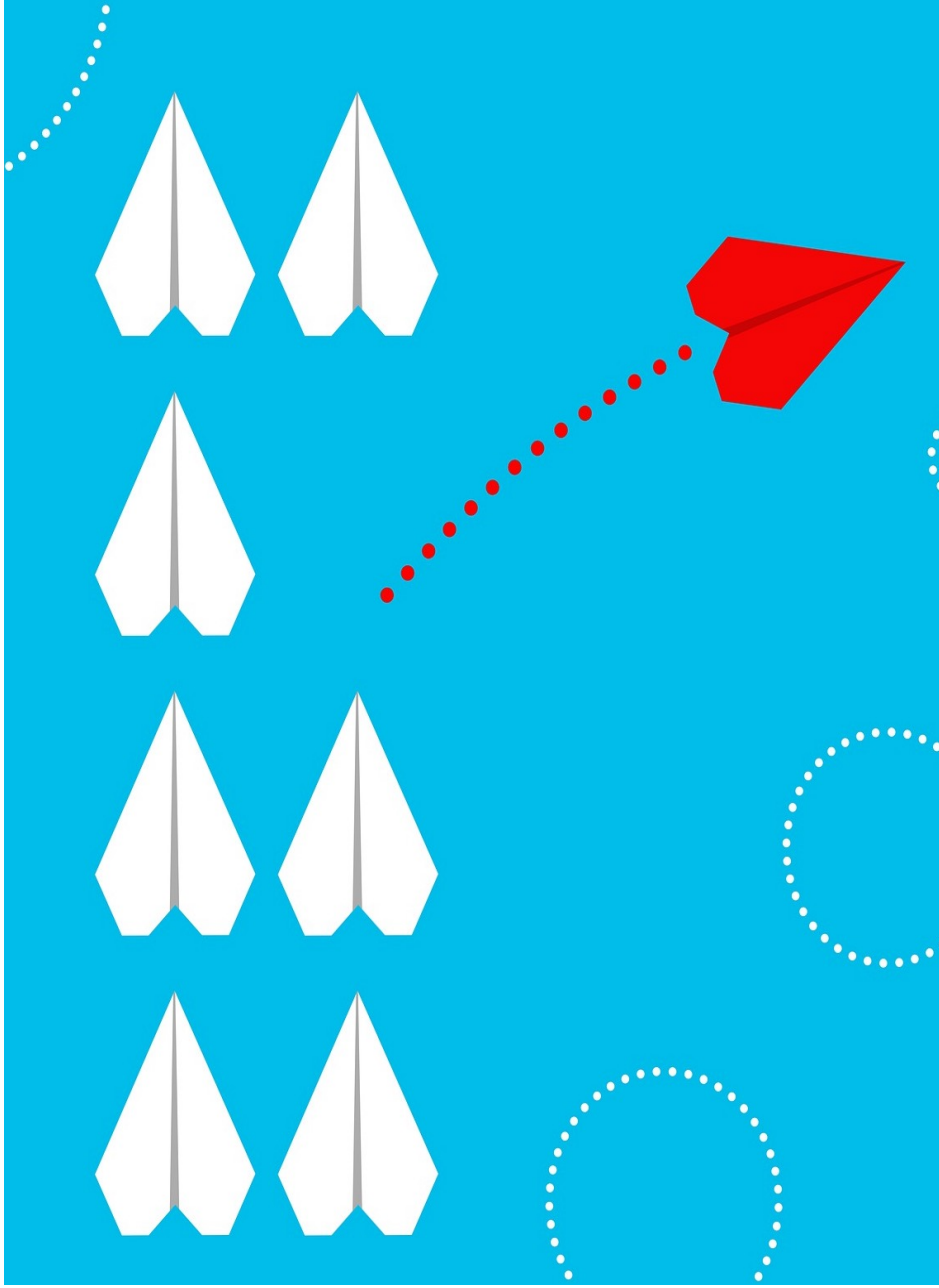
”The pattern of increased data collection, sharing and surveillance reinforces the criminalization of the unhoused, if only **because so many of the basic conditions of being homeless –having nowhere to sleep, nowhere to put your stuff, nowhere to go to the bathroom– are officially crimes** […] tickets turn into warrants and then law enforcement has further reason to search the databases to find “fugitives””

Eubanks (2018)



Autonomy?

- The behavior of the unhoused is therefore more visible, trackable, and predictable.
- The values of individual autonomy and self-determination are in tension with a state of surveillance.



Autonomy?

Concept Check:

The C.E.S. erodes the value of autonomy by…

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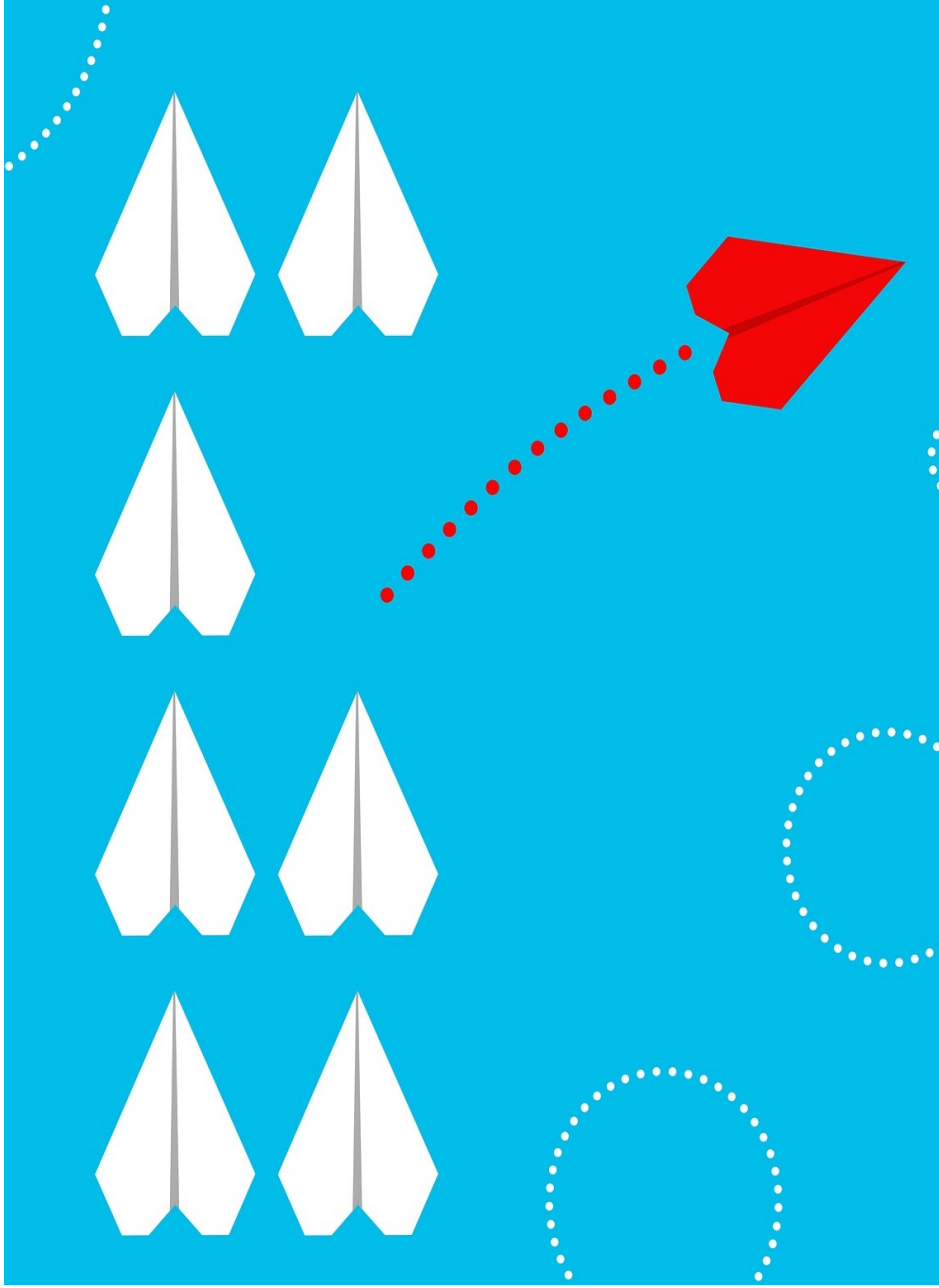

Encoded Values?

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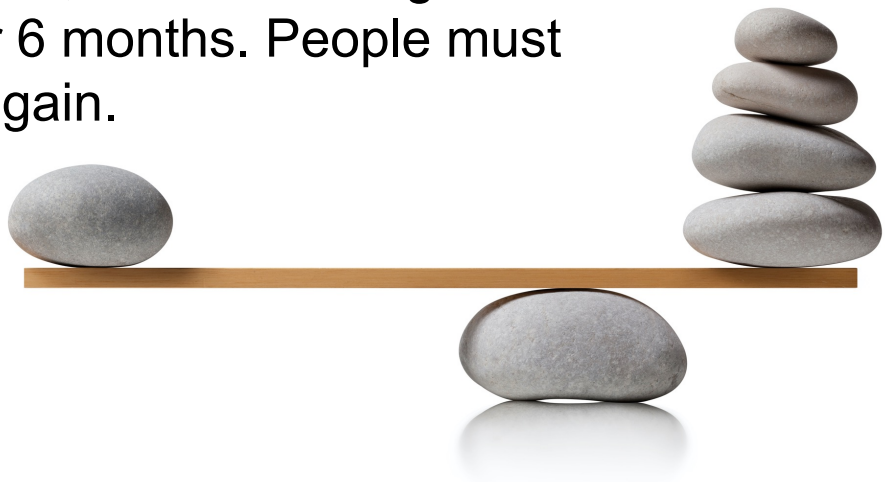
Encoded Values?

Priority of the worst-off

The worst off?

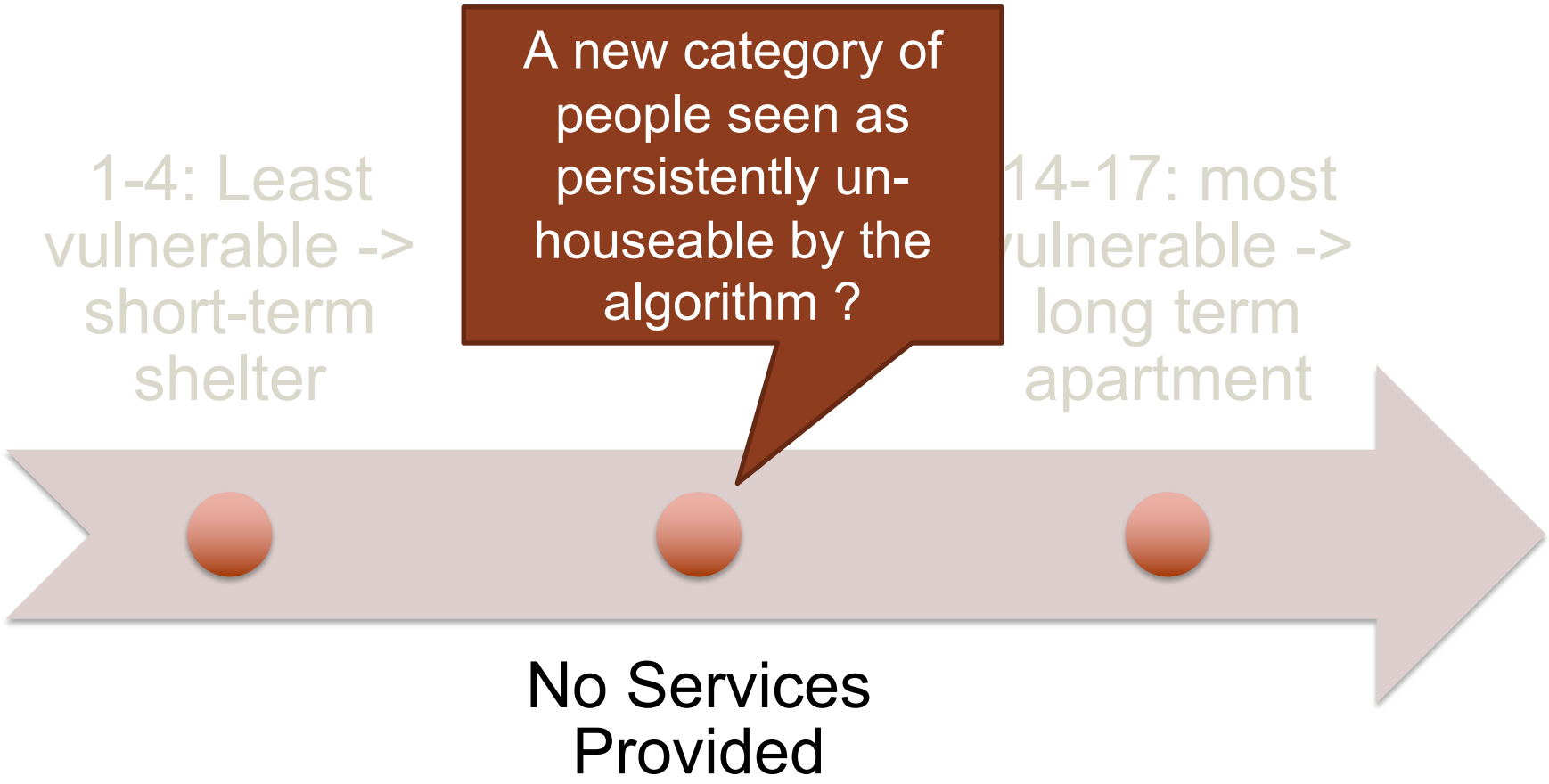
- Between 2014 and 2018, the C.E.S. in L.A. surveyed 31,124 individuals and connected 9,627 with housing (or housing-related resources).
- Some people aren't considered "literally homeless", and some make it to the system but receive no assistance.
- Sometimes housing is not available, or interviews go poorly, and vouchers expire after 6 months. People must go through the process all over again.



The worst off?

- What happens with those individuals in the middle that do not receive services?
  - Accumulated frustration and trauma may lead to decreasing mental health.
  - Enhanced surveillance may lead to diminished resources and sometimes incarceration.

The worst off?



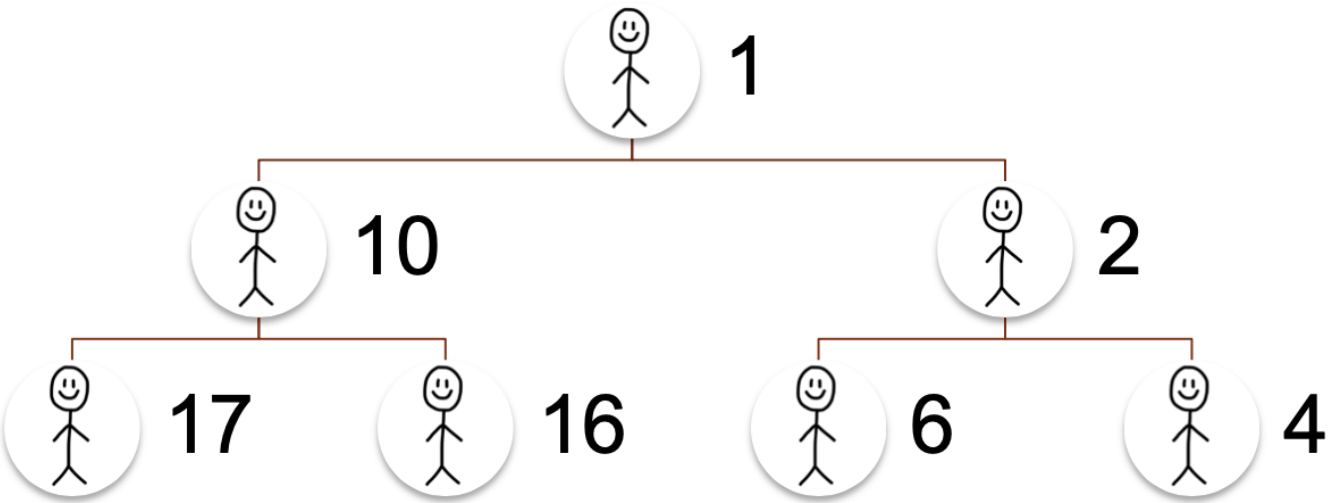
The worst off?

- By creating these categories, it is possible to create a self-reinforcing cycle, making it increasingly difficult for persons to exit the category.

Conclusions

- Priority queues may be used to address social problems in innovative ways.

Priority Queue of People's Housing Needs



Conclusions

- Priority queues may be used to address social problems in innovative ways.
- Design decisions that go into ranking algorithms embody values and principles.
- When they are used in complex social contexts, conflicts may emerge between the system's intended values and its impact.

Thank you!

PLEASE REACH OUT IF YOU HAVE ANY QUESTIONS!

DACOSTAN@STANFORD.EDU

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