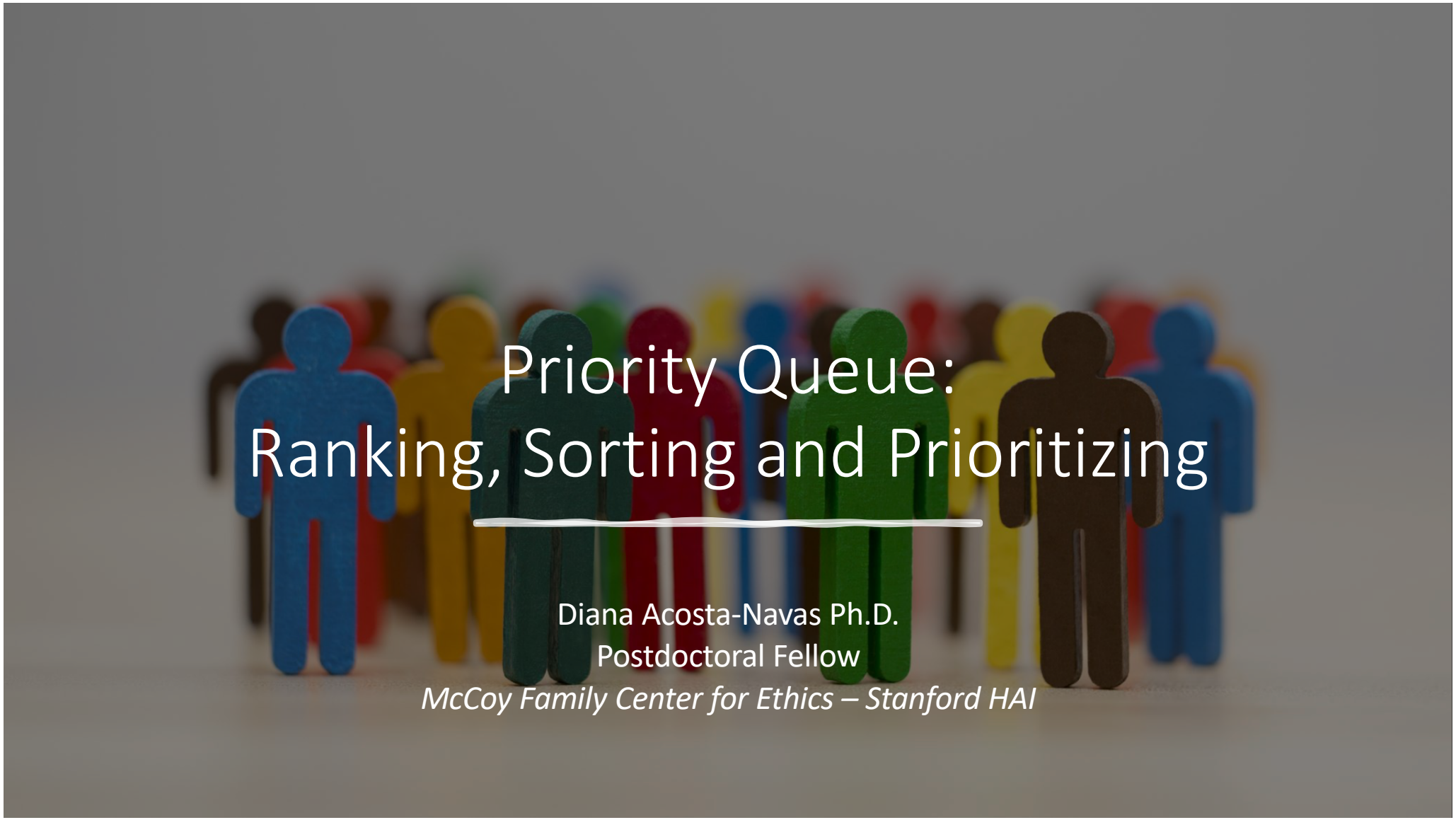

Priority Queue: Ranking, Sorting and Prioritizing

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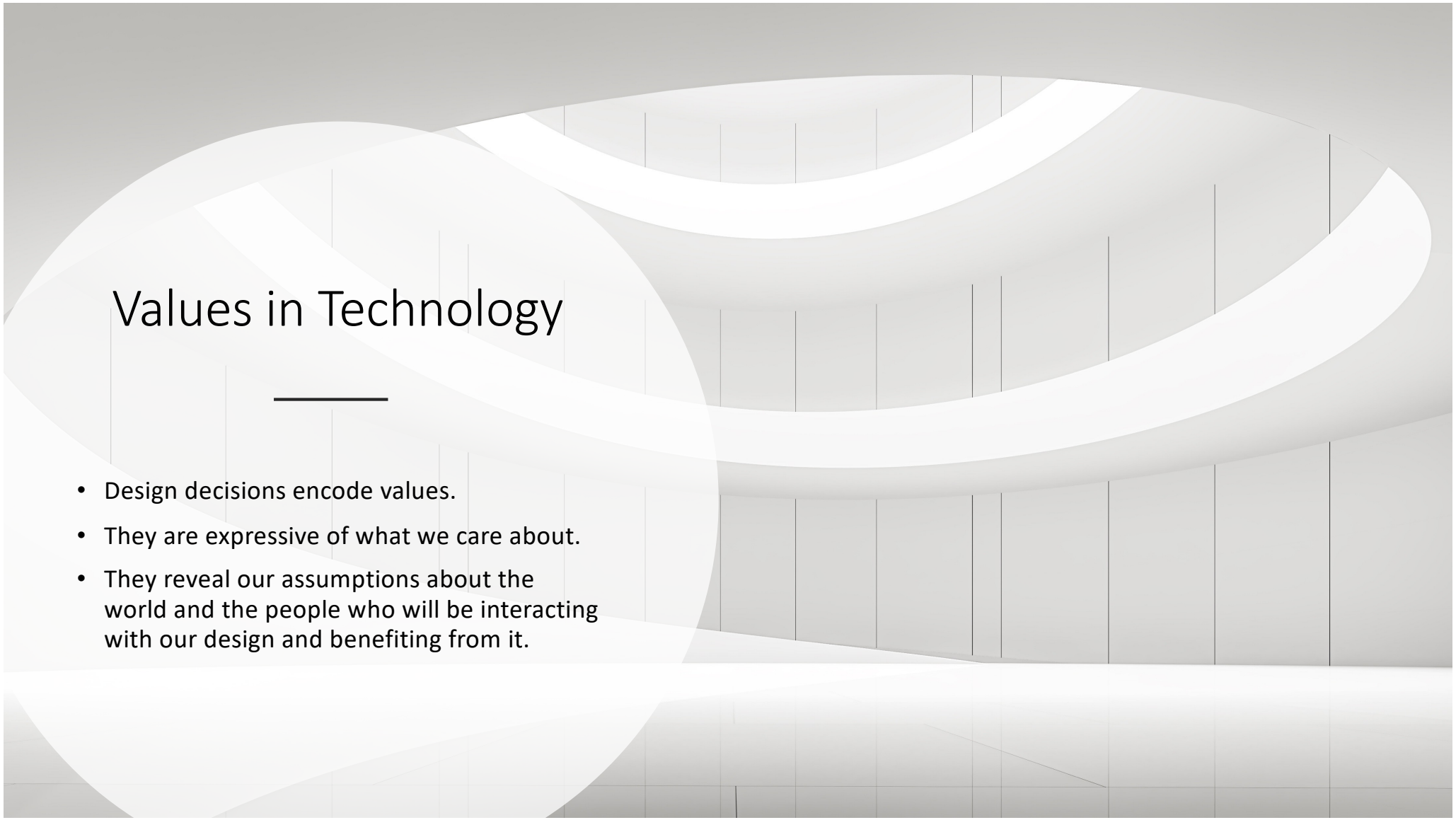
Goals for today

- Values in design
- Coordinated Entry System
- Values embedded
- Value conflicts



Values in Technology

- Design decisions encode values.
- They are expressive of what we care about.
- They reveal our assumptions about the world and 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 embody
- **Collateral values**: Values that crop up as side effects of design decisions and the way users interact with them

➢ There may be conflict among these values when the system operates in the world.

Priority Queue

- 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**. And, elements are served on the basis of their priority. That is, higher priority elements are served first.

What do we use Priority Queue for?

- Triage
- Vaccines
- Organ donation
- College admissions
- 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 C.E.S.

- 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

- Two Philosophies
  - Housing First
    - Research by Psychologist Sam Tsemberis (2004)
    - Rejection of “house-readiness” approach
    - Anti-paternalistic
    - Better results
    - Less public spending
  - Prioritization according to need

Coordinated Entry System

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

      ➢ Scarce resources and growing needs

  - Prioritization according to need

Coordinated Entry System

- Two Philosophies
  - Housing First
  - 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

- Two Philosophies
  - Housing First
  - Prioritization according to need
    - ➢ Need for a system that enabled agencies to:
      - Identify individuals' and households' needs
      - Sort them
      - Allocate resources

How it works

Entering the system

Meeting the definition of “literal homelessness”

Data gathering

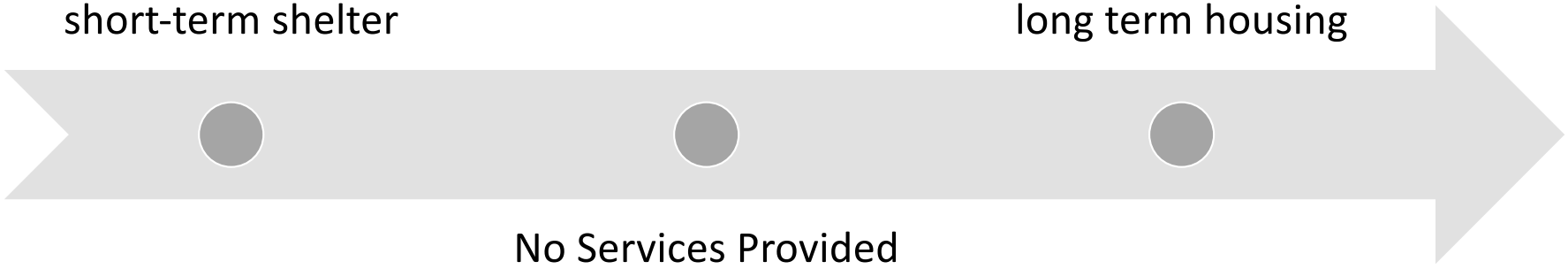
Unhoused person provides personal information including name, DOB, SSN, immigration status, disability, current & past mental health, sexual activity, substance use.

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.


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?

Expressed values?

Evidence-driven policy design

Efficient use of resources

Neutrality

Priority of the worst-off

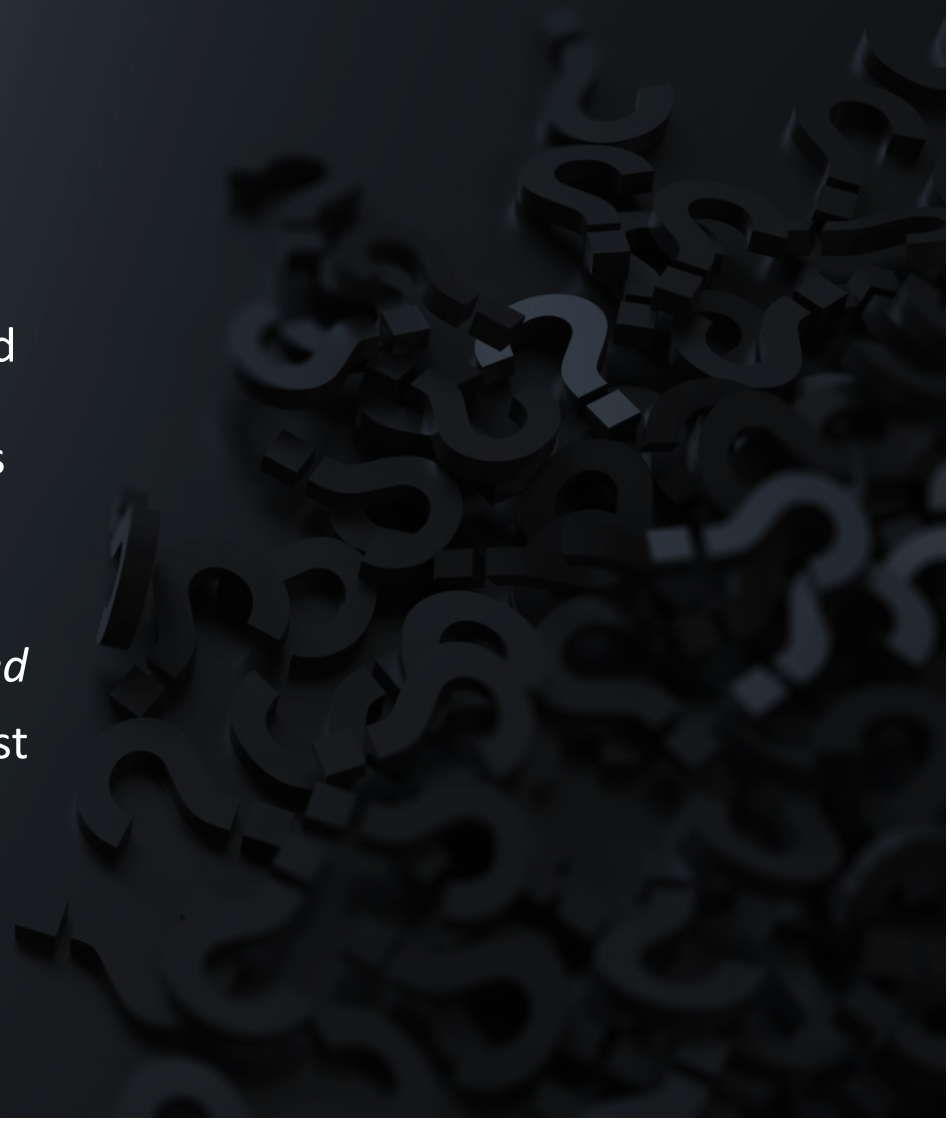
Promoting autonomy

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

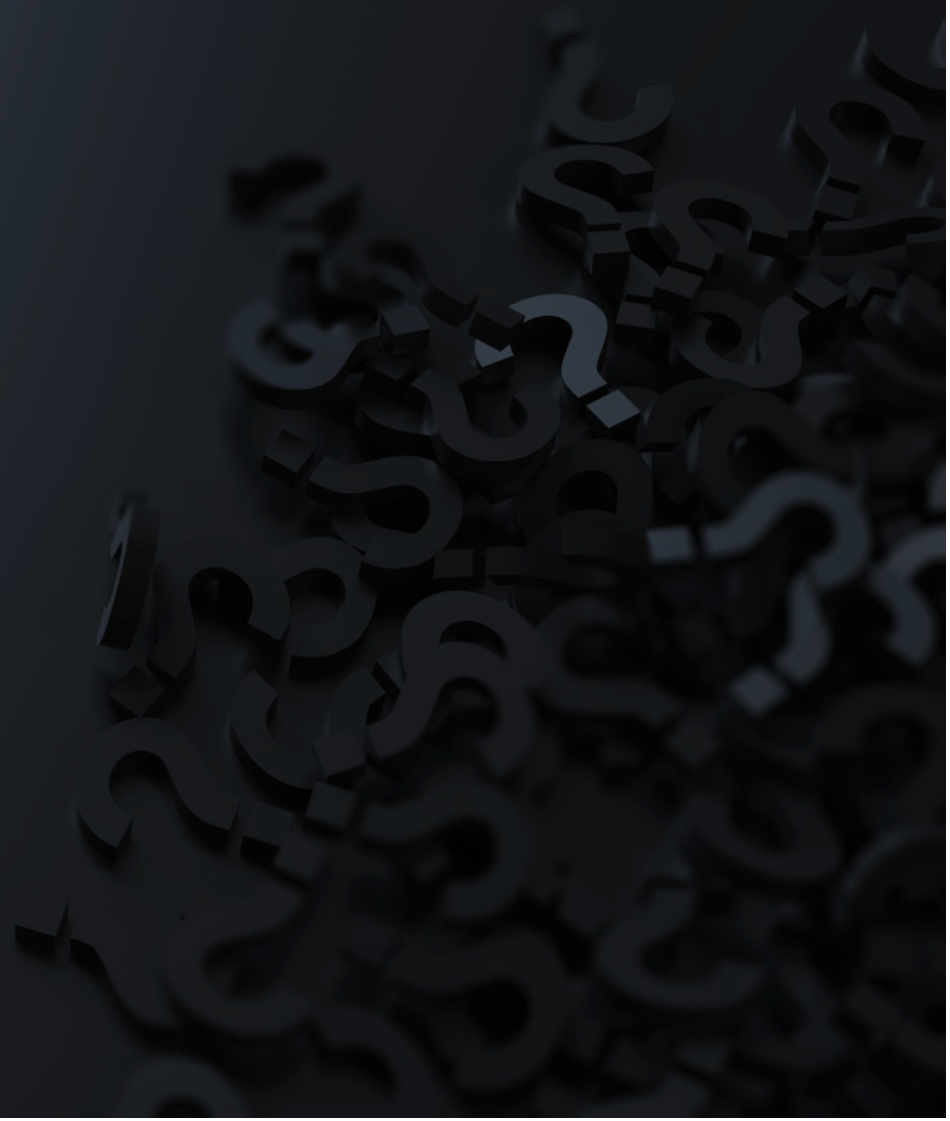
According to Need Podcast



Neutrality?

Vulnerability assessment:

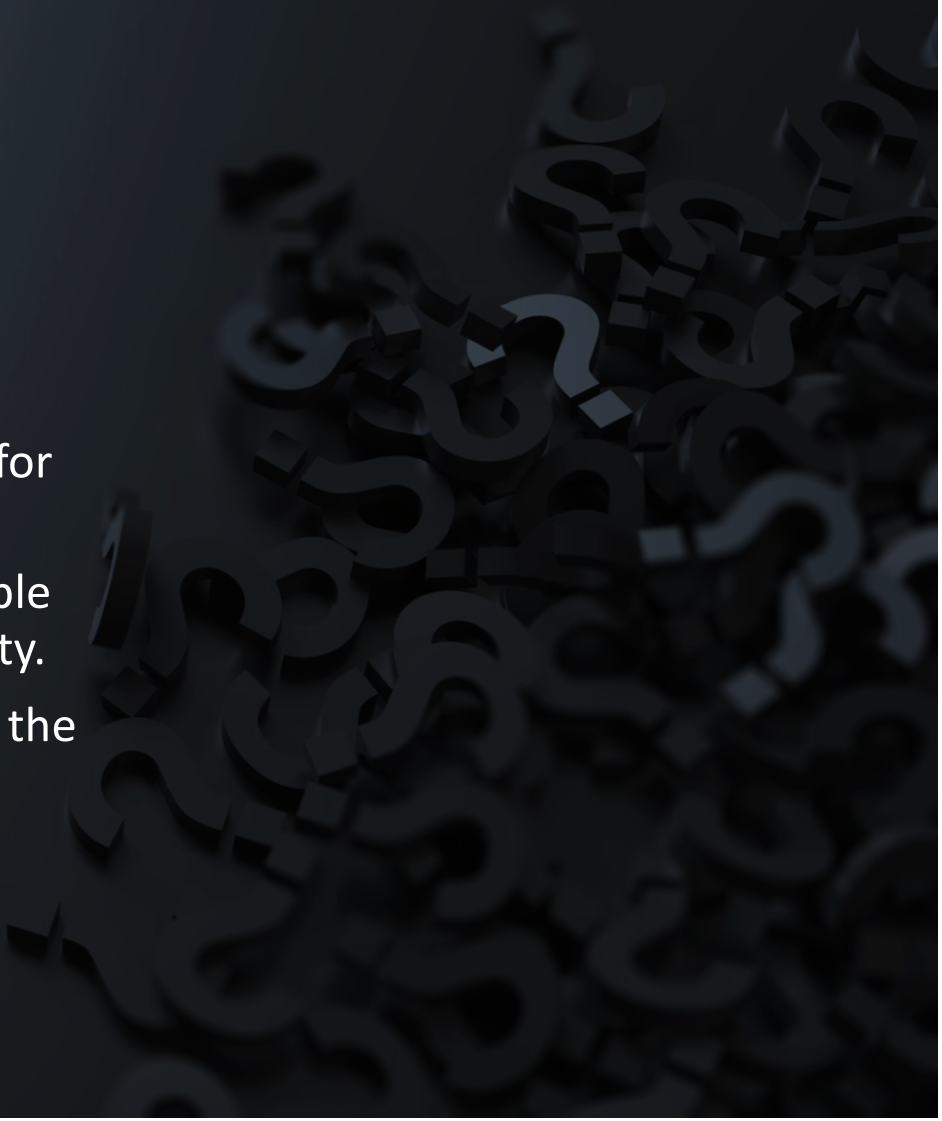
- If no one intervenes
  - Death
  - Chronic homelessness
  - Use of costly social services
- Some criteria
  - Physical or mental illness
  - Disability
  - Addiction
  - Length of time unhoused



Neutrality?

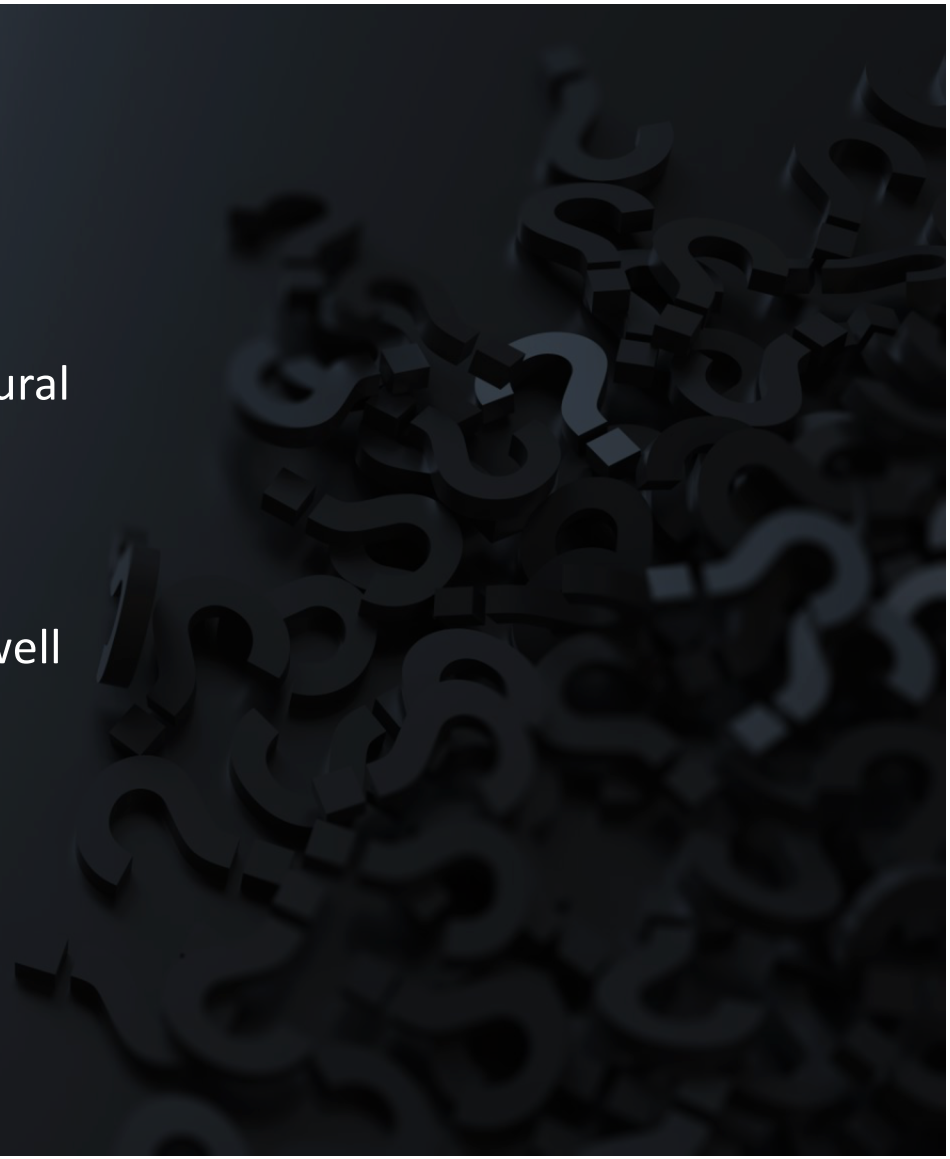
Unintended consequence:

- Because of economic disparities, it is easier for people of color to become unhoused.
- A higher proportion of white unhoused people meet some of the criteria of high vulnerability.
- White unhoused individuals score higher on the ranking.
- 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 not work as well for people of color.



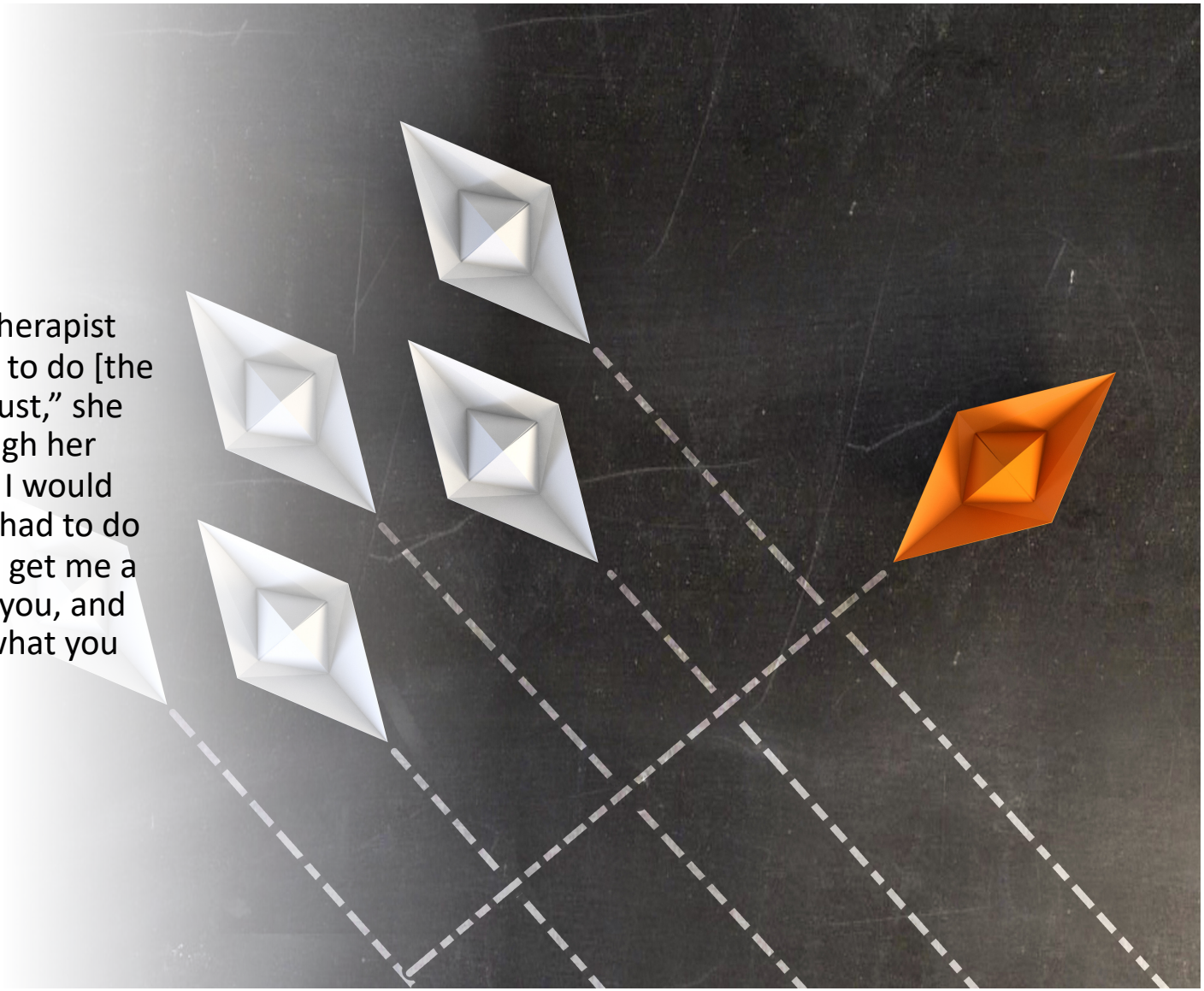
Autonomy?

- No other path to homeless 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,” she says, laughing and sorting through her monkey-shaped backpack. “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?

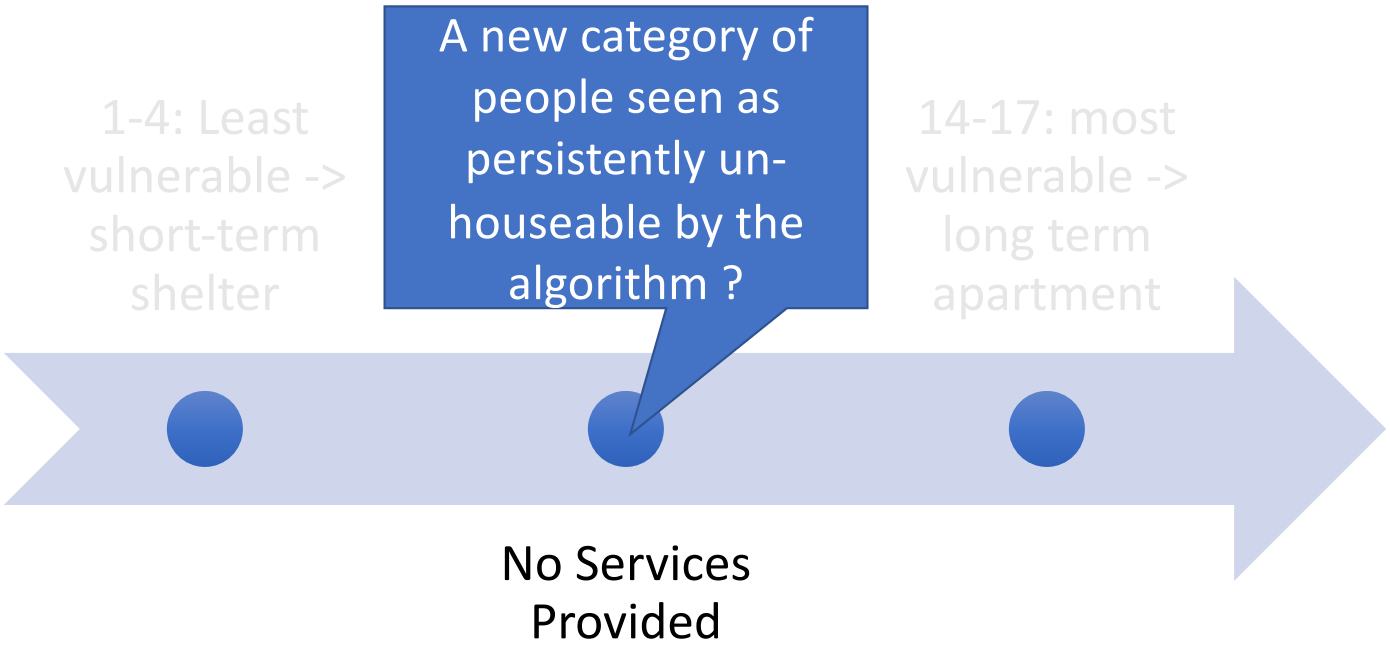
- The behavior of the unhoused is therefore more visible, trackable, and predictable.
- The values of individual autonomy and self-determination are in tension with a state of surveillance.

The worst off?

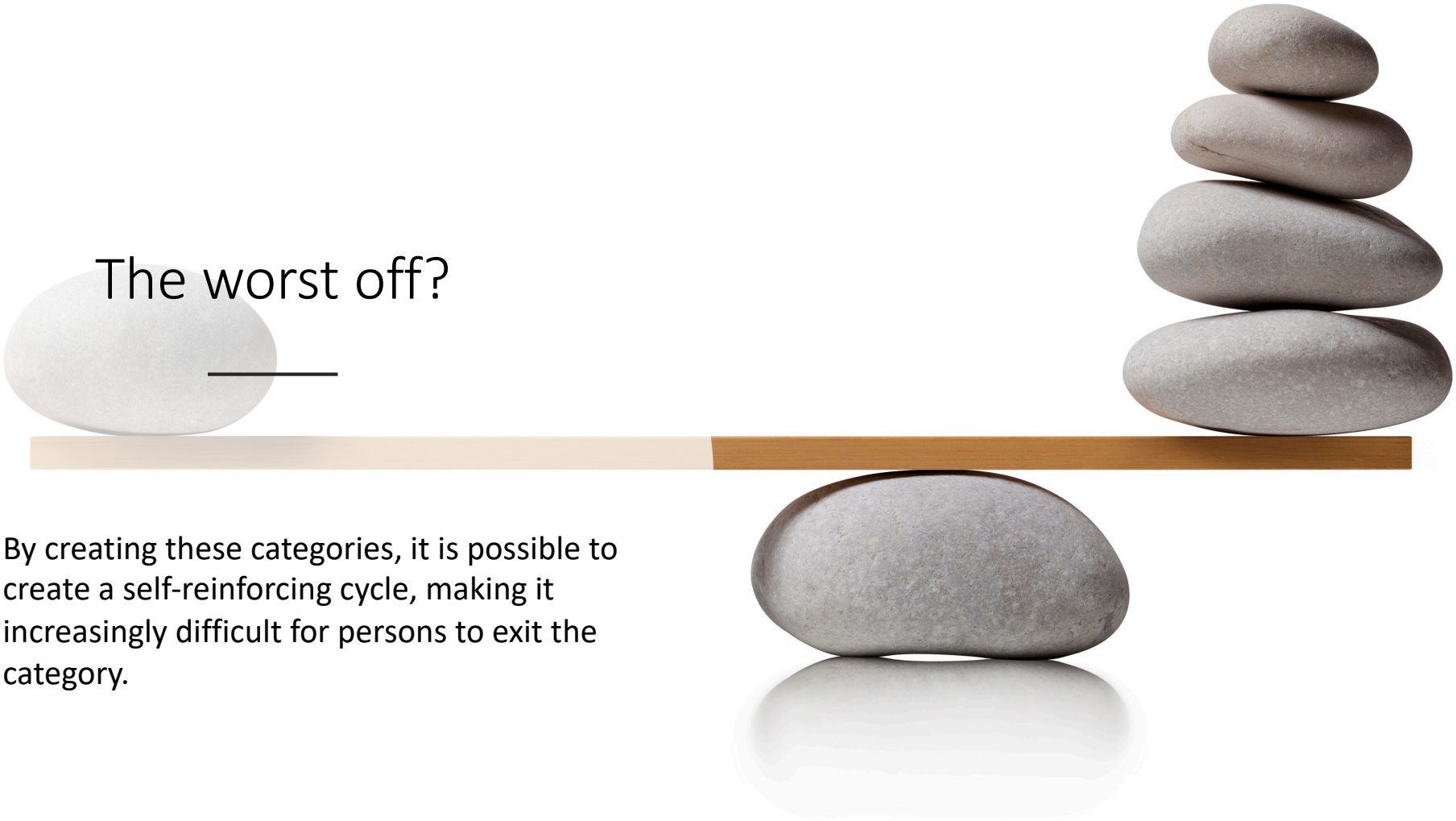
- Between 2014 and 2018, the C.E.S. in L.A. surveyed 31,124 individuals and connected 9,627 with housing (or housing-related resources).
- Some people aren't considered "literally homeless", and some make it to the system but receive no assistance.
- Sometimes housing is not available, or interviews 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 model counts prison as housing so may lower their scores in the future.


1-4: Least vulnerable -> short-term shelter
A new category of people seen as persistently un-houseable by the algorithm ?
14-17: most vulnerable -> long term apartment
No Services Provided

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.
- 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, or between values themselves.

Thank you!
Please reach out if you have any questions!
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References

- Dereck W. Paul Jr., Kelly R. Knight, Pamela Olsen, John Weeks, Irene H. Yen & Margot B. Kushel(2020) Racial discrimination in the life course of older adults experiencing homelessness: results from the HOPE HOME study, Journal of Social Distress and Homelessness, 29:2, 184-193, DOI: 10.1080/10530789.2019.1702248
- Eubanks, V. (2018). *Automating inequality: How high-tech tools profile, police, and punish the poor*.
- Flanagan, M., & Nissenbaum, H. F. (2014). *Values at play in digital games*.
- Katie Mingle (Host) 2021/03/17, "The List"(No. 5) [Audio podcast episode] In: According to Need. 99 Percent Invisible. https://99percentinvisible.org/need/
- Oakland-Berkeley-Alameda County Continuum of Care (2021) "Centering Racial Equity in Homeless System Design" Final Report. At: https://everyonehome.org/centering-racial-equity/
- Tsemberis, S. J. (2010). *Housing first: The Pathways model to end homelessness for people with mental illness and addiction*.