Unlocking Recycling's Potential: Prototype, Test, Launch, Assess

February 22, 2024

The Recycling Partnership
Solving for Circularity

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CENTER FOR BEHAVIOR & THE ENVIRONMENT

Agenda

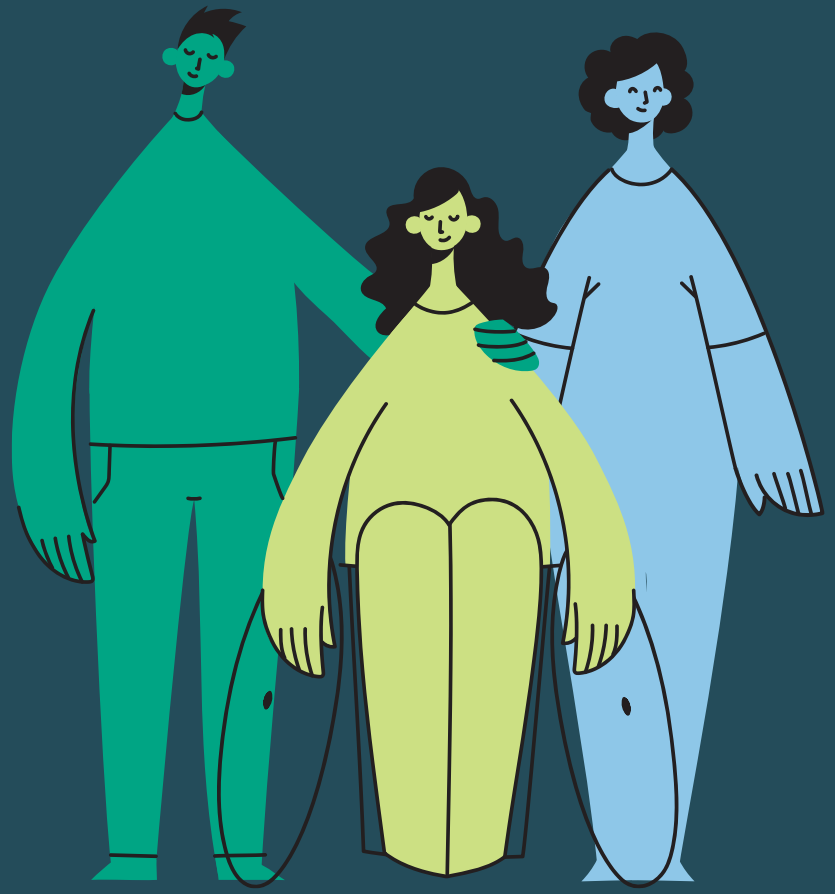
DAY 1

- Welcome
- Why Behavior Change Matters in this Moment?
- Behavior Change & Behavior-Centered Design
- Equity & Recycling
- Interactive Adventures with Behavioral Insights
- Framing, Empathizing, Mapping

DAY 2

- Opening, Reflections, and Warm-Up
- About Connected Recyclability
- Levers of Behavior Change
- Ideate, Prioritize & Refine Solutions
- **Prototype, Test, Launch, Assess**
- Equity - What's next?

Prototype, Test, Launch & Assess



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The Behavior-Centered Design Journey

Prototype

How? Make a small-scale version of your solution and prepare to share your idea.

Key Principle:

- Aim for a good draft, complete enough to be testable but still in a work in progress

DEI Considerations:

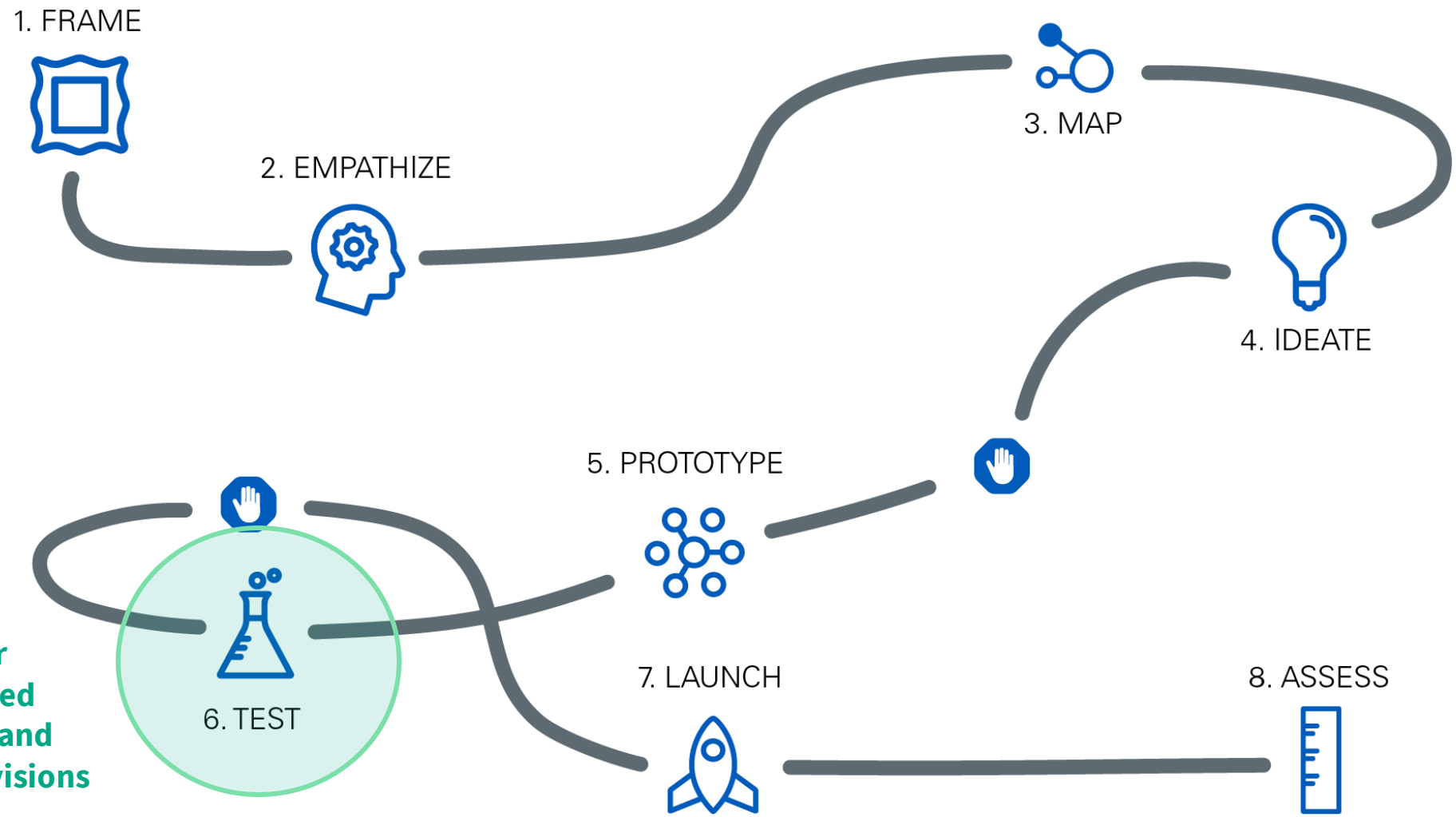
- Does the prototype incorporate the broader context?
- Does the prototype work for the many, not just the few?

Examples of Prototypes

An experiential prototype could look like...

- A **storyboard** of key moments in time
- A **drawing** or set of drawings
- A short **play or scene** that shows what happens
- A small-scale **interactive space**

The Behavior-Centered Design Journey



Test your prototyped solution and make revisions

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Test

How? Present your solution idea to a focus group, run a simulation, do a mini-scale pilot, conduct interviews or surveys

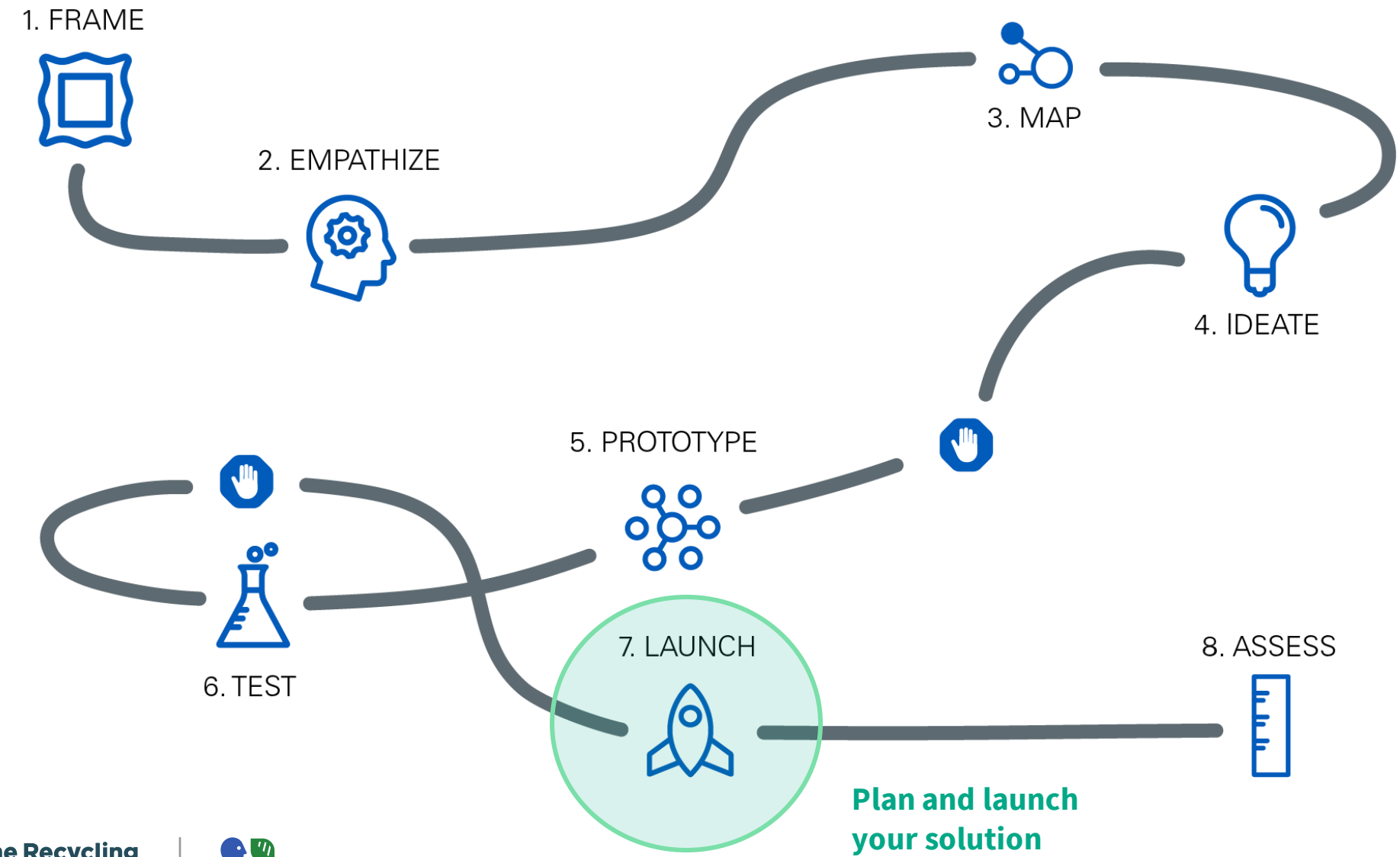
Key Principles:

- Get feedback on your idea in a real-world setting

DEI Considerations:

- Think about representation in your test group
- Consider the impact or any potential harms of your test/pilot
- Consult local stakeholders on what's appropriate

The Behavior-Centered Design Journey



Launch

How? Completing an assessment plan, completing a launch plan and budget, planning interventions at scale

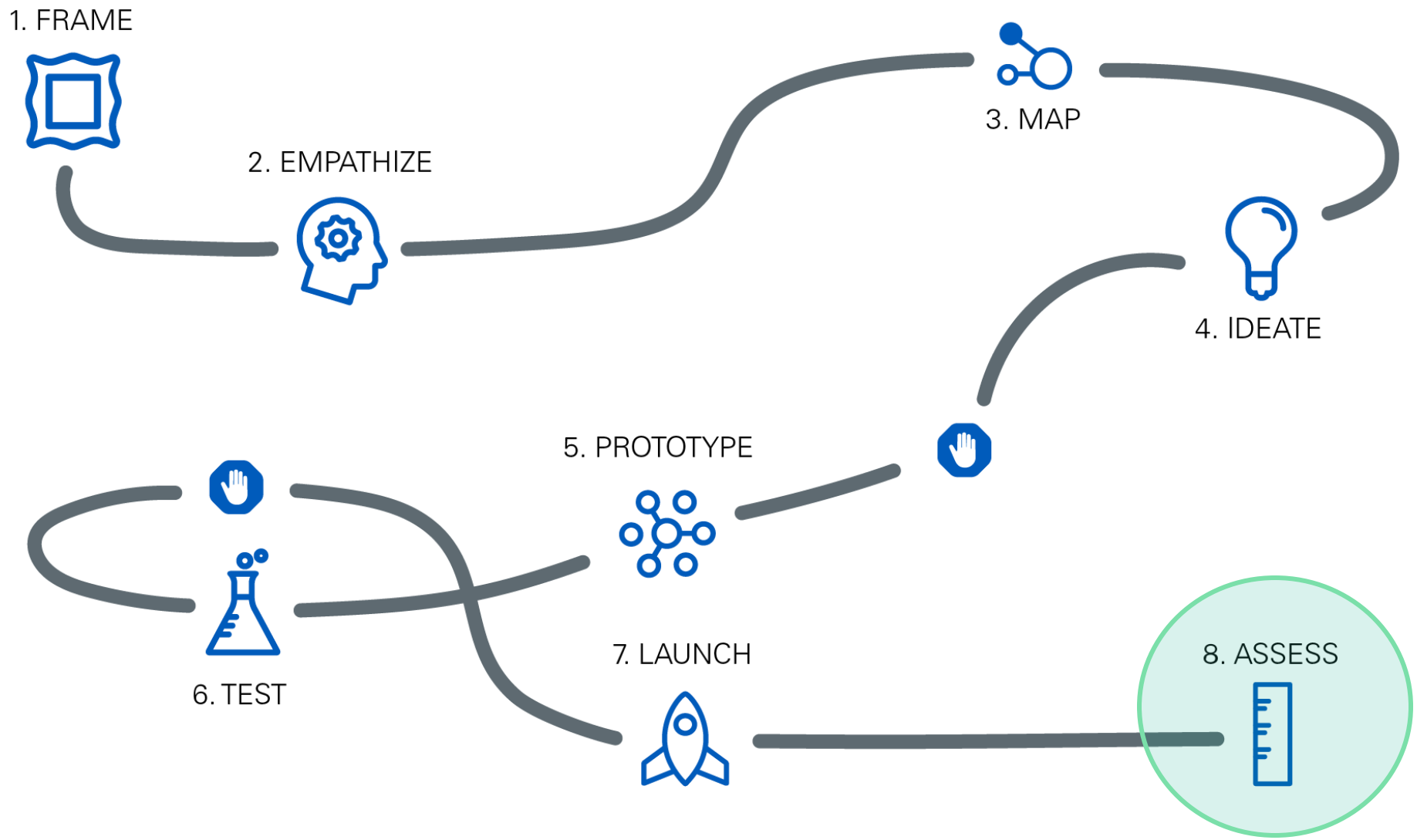
Key Principles:

- Think of Assess while you plan for Launch
- Include lots of detail (what, where, when, who, etc.)!

DEI Considerations:

- Have local experts be involved in implementation
- If you are running an experiment, consider fair treatments

The Behavior-Centered Design Journey



Assess the impact of your solution and monitor change over time

Assess

What? Measure the impact of your solution and monitor change over time.

How? Conducting post-intervention surveys and interviews, running experiments, identifying indicators, reflecting on and sharing what you learned

Key Principles:
- Reflect on what worked and didn't work
- Look for observable change in behavior due to your solution

DEI Considerations:
- Report all outcomes with diverse actors
- Monitor for long term and unintended effects

Case study: Evaluating heavy-item pickup communications

Anna Keleher, Behavioral Insights Team

With thanks to Keep Indianapolis Beautiful

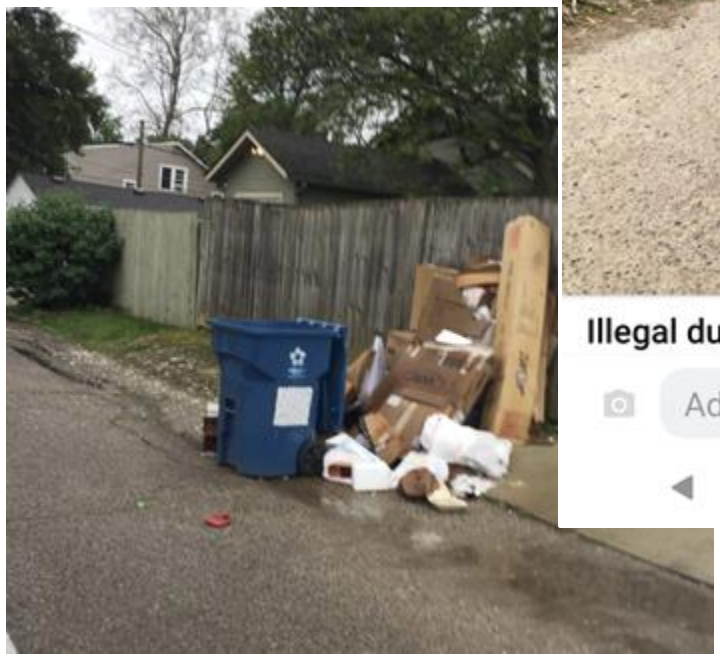
THE BEHAVIORAL INSIGHTS TEAM

Outline

- **Context & research question**
- **Evaluation design**
  - Selecting a methodology
  - Finding & making data
  - Analysis
- **Results & follow-up**
- **Takeaways**

Context

- BIT worked with Keep Indianapolis Beautiful (KIB) and the Department of Public Works in Indianapolis to address dumping behaviors in Indianapolis– **specifically by increasing uptake of the free heavy item pick up service.**



Context

- BIT worked with Keep Indianapolis Beautiful (KIB) and the Department of Public Works in Indianapolis to address dumping behaviors in Indianapolis– **specifically by increasing uptake of the free heavy item pick up service.**
- We conducted on-the-ground qualitative research with residents and **applied our knowledge of behavioral science to design a solution.**

11:42

Potential Barriers

Potential Barrier: Present Bias

Present bias describes the tendency for people to overweight the immediate costs and benefits of an action compared to future consequences. If costs are in the present and benefits are in the future, people will be less likely to act.[1] The present "cost" of holding trash or arranging a large-item pick-up may outweigh the longer-term benefits of keeping the environment clean.

Indianapolis Context: Present bias can help explain the presence of litter along Indianapolis roadways, at bus stops, and in parking lots. The long-term consequences of littering in Indianapolis, such as the monetary costs of cleaning, the environmental impacts (despite the city's distance from the ocean, the White River can carry trash downstream), and decreased quality of life, are significant.[2] However, the present costs can seem high as well -- holding on to garbage is unpleasant and the "friction costs" section below discusses how proper waste disposal can require outsized effort in Indianapolis.

Promising strategies:

- **Reduce the immediate discomfort** (i.e., "costs") of holding on to trash. One way to accomplish this is through encouraging the use of redesigned packaging or carrying

Solution: A mailer to inform residents about their free heavy trash pick-up service

A salient headline invokes a **deadline**

FRONT - OUTSIDE

Images aid **comprehension**

Simple & direct **call-to-action**

Magnet as a **reminder** of upcoming pick-up days

Selecting an evaluation methodology

Our question: Does sending an informational postcard to remind and inform recipients increase usage of the heavy item pickup service?

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- **Do I need to measure impact?** → **Impact evaluation** (e.g., field trial or online RCT, quasi-experimental methods, diff-in-diff, pre/post designs)
- **Do I want to understand effectiveness or feasibility?** → **Formative evaluation** (e.g., user feedback, interviews, prototyping, observation)
- **Do I want to know if my program was implemented as intended?**→ **Process evaluation** (e.g., surveys, observations, data collection and monitoring of key outputs)

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We ran a RCT to evaluate the impact of the mailers

In May 2021, KIB mailed the postcards to the selected addresses. Volunteers counted the presence of heavy trash at each selected address at two points after sending (June 16 & July 21).

Randomized 6,676 addresses to...

...receive one of two treatments...

1. Mailer
2. No mailer (control)

...and measured:

- Heavy trash set outs
- QR code usage
- Heavy trash violations

An RCT provided actionable results

Scale the postcard to all Indianapolis households

Not expand investment in postcards with this type of messaging

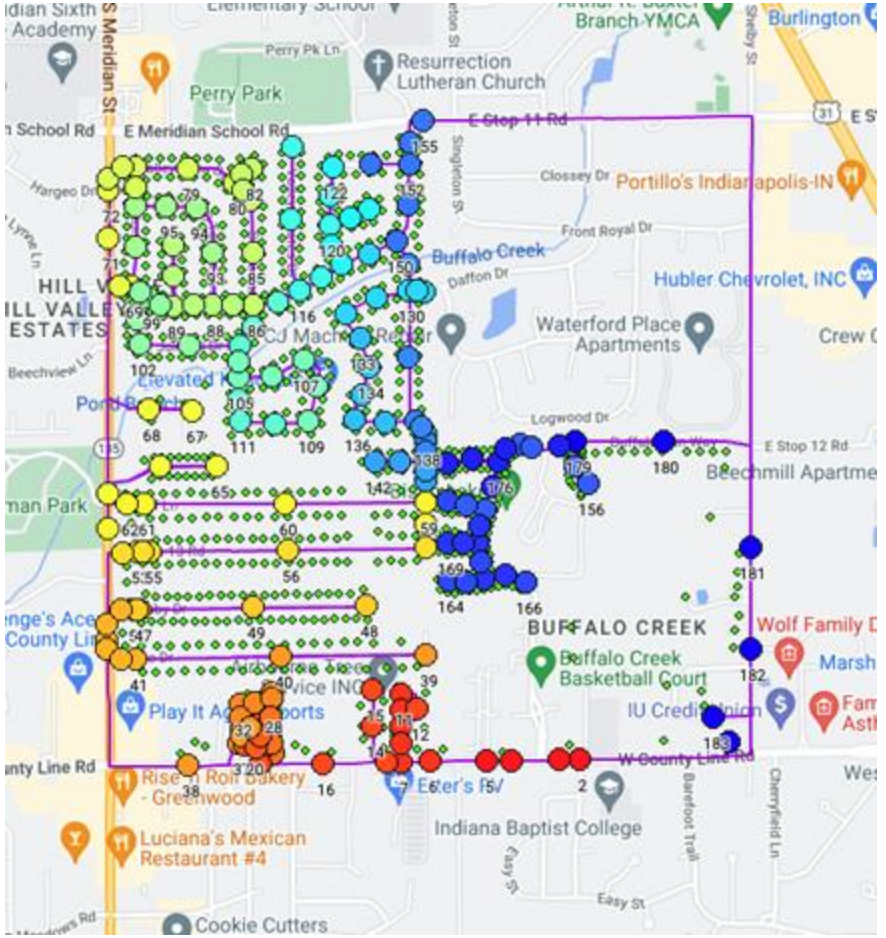
Do not use postcards with this type of messaging

Data: Finding it & making it

J18

	A	B	C	D	E	F
1	First Name	Last Name	Street Address	City	State	Zip Code
2	James	Butt	6649 N Blue Gum St	New Orleans	LA	70116
3	Josephine	Darakjy	4 B Blue Ridge Blvd	Brighton	MI	48116
4	Art	Venere	8 W Cerritos Ave #5	Bridgeport	NJ	8014
5	Lenna	Paprocki	639 Main St	Anchorage	AK	99501
6	Donette	Foller	34 Center St	Hamilton	OH	45011
7	Simona	Morasca	3 Mcauley Dr	Ashland	OH	44805
8	Mitsue	Tollner	7 Eads St	Chicago	IL	60632
9	Leota	Dilliard	7 W Jackson Blvd	San Jose	CA	95111
10	Sage	Wieser	5 Boston Ave #88	Sioux Falls	SD	57105
11	Kris	Marrier	228 Runamuck Pl #2	Baltimore	MD	21224
12	Minna	Amigon	2371 Jerrold Ave	Kulpsville	PA	19443
13	Abel	Maclead	37275 St Rt 17m M	Middle Island	NY	11953
14	Kiley	Caldarera	25 E 75th St #69	Los Angeles	CA	90034
15	Graciela	Ruta	98 Connecticut Ave	Chagrin Falls	OH	44023
16	Cammy	Albares	56 E Morehead St	Laredo	TX	78045
17	Mattie	Poquette	73 State Road 434 E	Phoenix	AZ	85013
18	Meaghan	Garufi	69734 E Carrillo St	Mc Minnville	TN	37110
19	Gladys	Rim	322 New Horizon Bl	Milwaukee	WI	53207
20	Yuki	Whobrey	1 State Route 27	Taylor	MI	48180
21	Fletcher	Flosi	394 Manchester Blv	Rockford	IL	61109

Data: Finding it & making it



Data: Finding it & making it

Awesome volunteers!

- Willing to wake up early
- Willing to drive behind garbage trucks
- Blinded

Data: Finding it & making it

ht_june16	ht_july21	violatio	violatio	violatio	route	[primary_n	[street_pre	[street_name]	[street_	[street_post	Apt	Notes
					3W-1	8546		Bison Woods	Ct			
					3W-1	8548		Bison Woods	Ct			
					3W-1	50		Brookacre	Ln			
1					3W-1	110		Brookacre	Ln			
					3W-1	130		Brookacre	Ln			
1					3W-1	131		Brookacre	Ln			
					3W-1	504		Buffalo Ridge	Cir			
					3W-1	505		Buffalo Ridge	Ct			
					3W-1	506		Buffalo Ridge	Ct			
					3W-1	512		Buffalo Ridge	Cir			
					3W-1	513		Buffalo Ridge	Cir			
					3W-1	514		Buffalo Ridge	Ct			
					3W-1	519		Buffalo Ridge	Cir			
					3W-1	520		Buffalo Ridge	Cir			
					3W-1	522		Buffalo Ridge	Ct			
					3W-1	523		Buffalo Ridge	Ct			unbundled trash (pic)
					3W-1	527		Buffalo Ridge	Cir			
					3W-1	528		Buffalo Ridge	Cir			
					3W-1	530		Buffalo Ridge	Ct			
1					3W-1	531		Buffalo Ridge	Ct			BBQ
					3W-1	535		Buffalo Ridge	Cir			

Analysis

We will use a logistic regression:

$$outcome_i \sim bernoulli(p_i)\,;\; logit(p_i) = \alpha + \beta_1 Treatment\, i + \beta_2 MultiUnit + \beta_3 Route$$

where the function logit is defined as the log-odds ratio: $logit(p) = log(\frac{p}{1-p})$

and where i represents the individual, p represents the binary outcome of interest (heavy trash set out or not), $Treatment$ represents an indicator variable equal to 1 if the individual was randomly assigned to receive the mailer and 0 if they were assigned to control, $MultiUnit$ represents whether or not the address reflects one or multiple (2-4) units, and *Route* represents the 1 of 8 trash routes being followed for data collection. We will conduct an Intent-To-Treat (ITT) analysis with heteroskedasticity-robust standard errors.

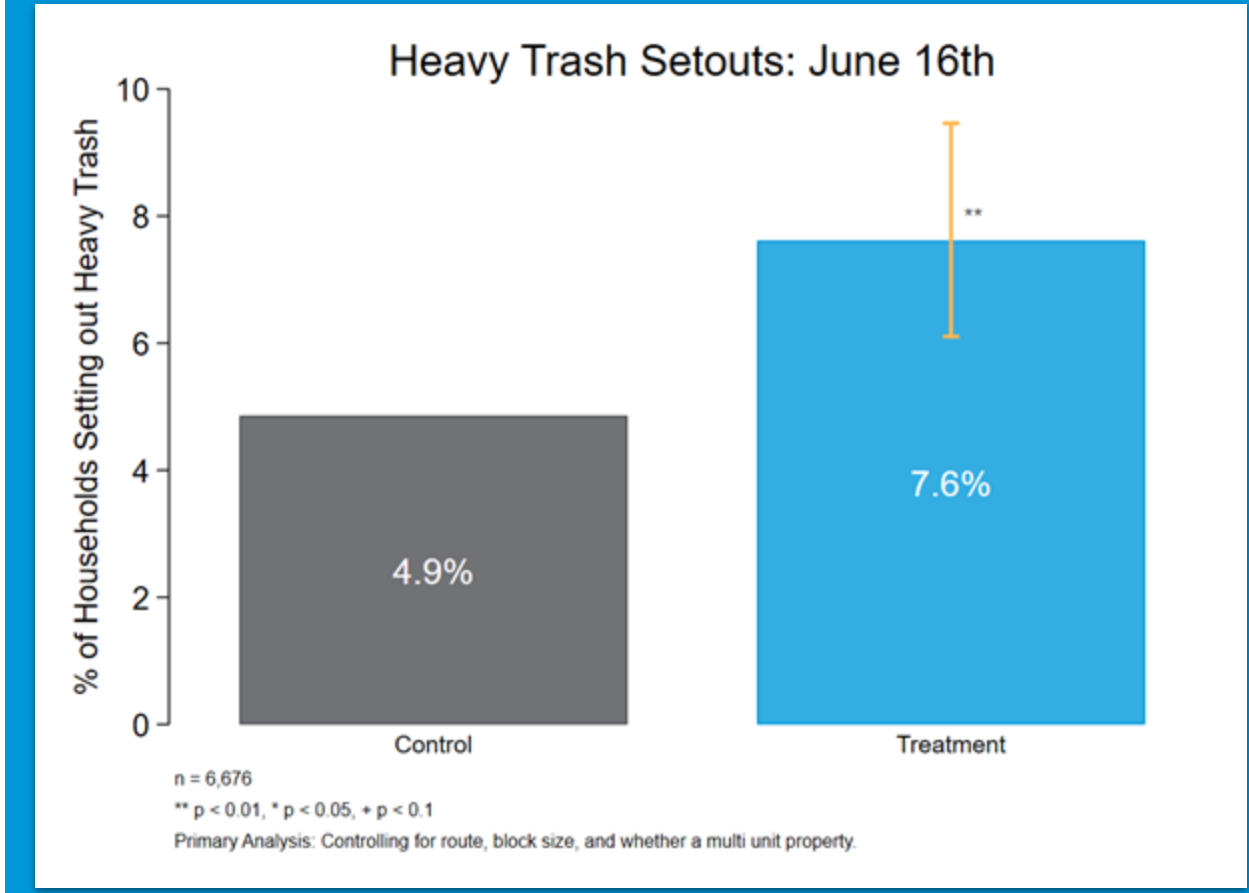
Our primary coefficients of interest is $\beta 1$ which represents the average causal effect of being assigned to our treatments. We are testing the hypothesis that the average difference between the treatment and control group is statistically significantly different than zero.

Analysis

The mailers had an immediate, large, impact on proper disposal

On the first heavy trash collection day after the mailing, households who received the mailer were **55.1% more likely to properly set out trash for collection**.

- This equals ~180 more set outs from households that received the mailer. These results were statistically significant.
- If we sent mailers to all eligible households on DPW heavy trash routes (~120,000), we would expect to have seen **3,240 additional trash items set out** in the first month.



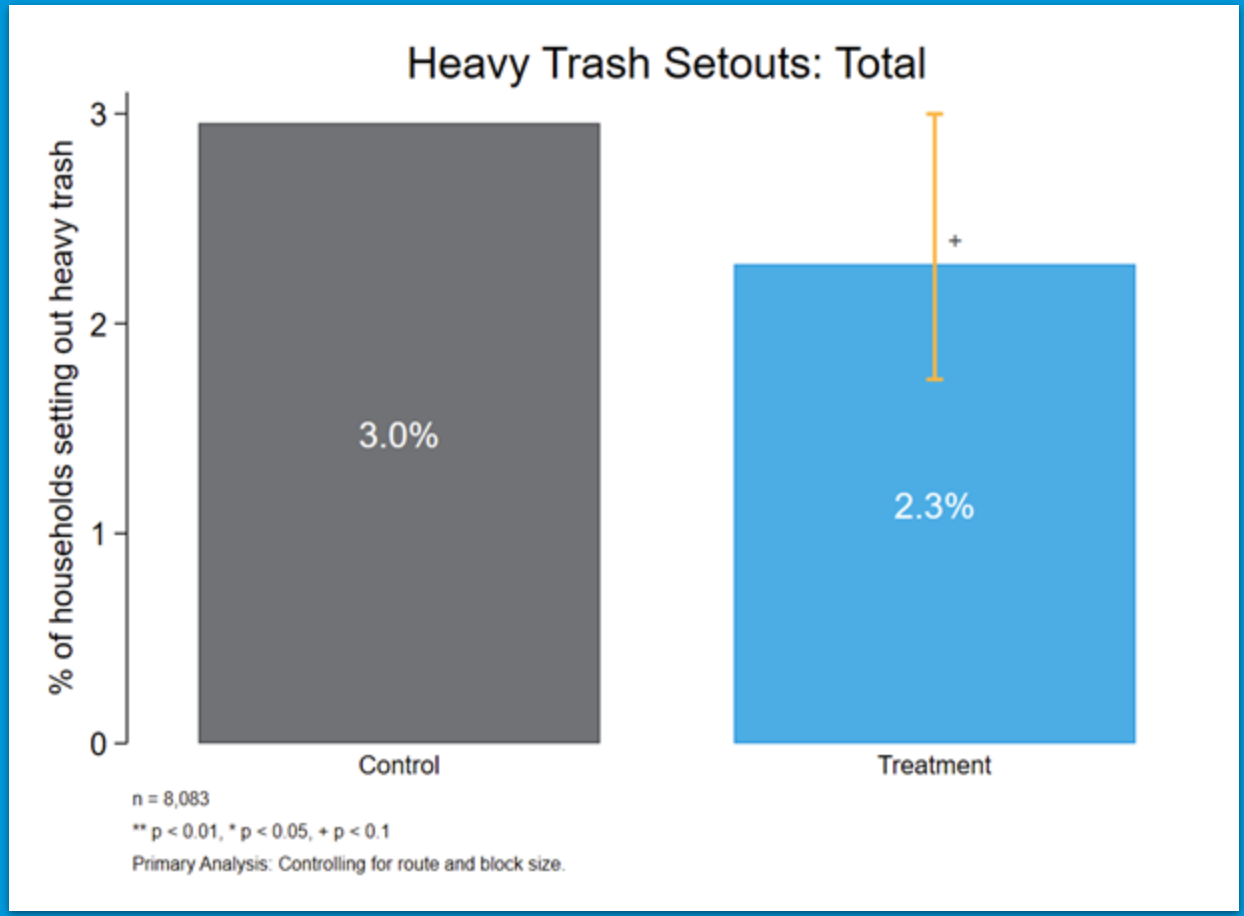
Testing a more “scalable” mailer

We tested the impact of a cheaper and low-effort design. The goal was to **understand whether the more tailored and expensive design was worth the cost to scale.**

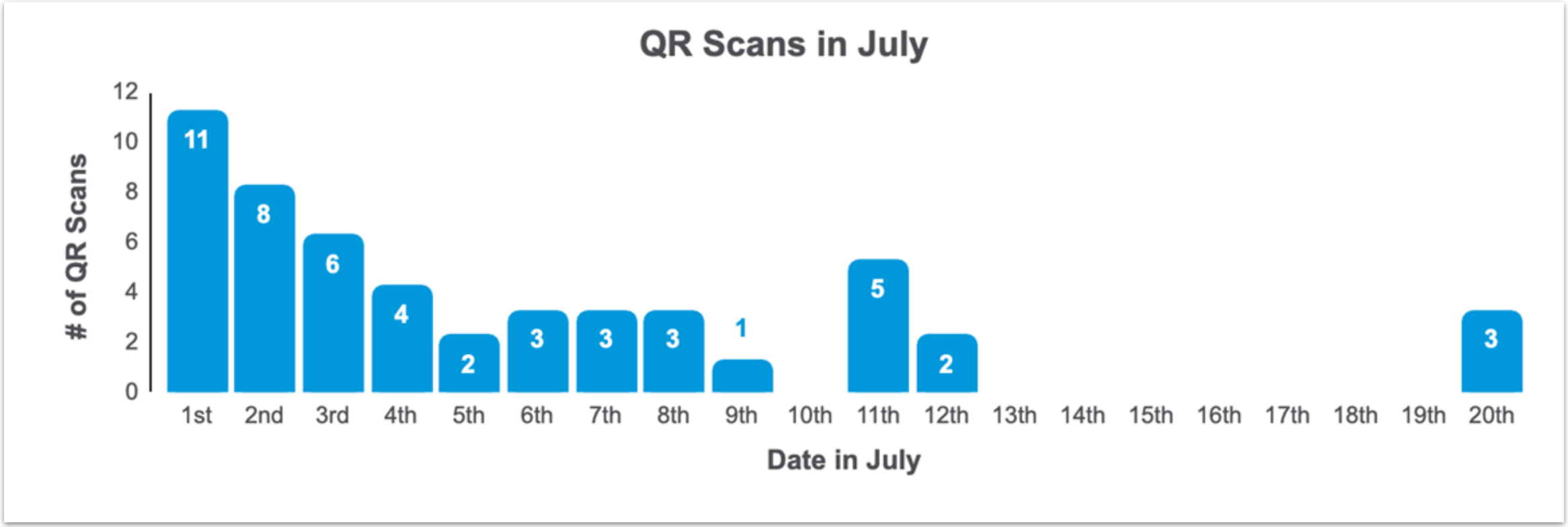
- Smaller mailer
- No magnet
- Asked households to use the QR code/link to look up their own heavy trash service information online.

The “scalable” mailer failed to generate the same effect.

- Overall, there were 26 *fewer* set outs from households that received the mailer across our data collection dates on July 13 and 20th.



QR code engagement suggested that postcard personalization was important



Takeaways for evaluating waste programs

- **Let your research question guide the evaluation approach**
- **Evaluation is a continuous process**
- **You can do it!**
  - Even if your data is limited
  - Even if you aren't an expert (ask me about off-the-shelf resources!)

Assessing Engagement

Asami Tanimoto
Senior Business Systems & Analytics Manager

February 21, 2024

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We mobilize people, data, and solutions across the value chain to reduce waste and our impact on the environment while also unlocking economic benefits.

Where do I start?

There are many ways to measure

- Tons Collected
- Capture Rate
- Set Out Rate
- Subscription Rate
- Participation Rate
- Recycling Rate
- Recovery Rate
- Contamination Rate
- Composition
- Thoughts, Attitudes, Beliefs

What is your goal?
What question do you want to answer?

Increase Recycling Tonnage	Increase Recycling Participation	Increase Recycling Capture	Improve Confidence
• Collected weight • Households served to normalize data (pound/household/year) • Recycling vs. waste Example: Reynoldsburg, OH	• Set out data for each address over 4 weeks • Manual audit (FOTS) or cart tip data (RFID) Example: Cincinnati, OH	• Composition of recycling & waste streams applied to collected tonnage per households served • Generation, composition, capture, contamination Example: Folsom, CA	• Recycling Confidence Index • Survey of 10 factors to gauge people's confidence in their recycling habits & in their recycling program Example: Folsom, CA

Who? What? When? How?

1. Prototype
2. Test
3. Launch

Large Southern City Example

- **Goal:** Improve quality of recyclables collected in 48 routes of the city (~10%)
- **Intervention:** Yes/No info via mailer, customizable cart tag (warning, rejection), social media
- **Measurement:** Set out rate, participation rate, tagging rate from FOTS and generation rate, composition, contamination, and capture rate from capture study

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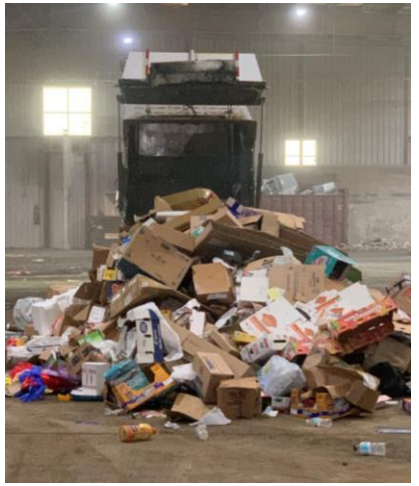
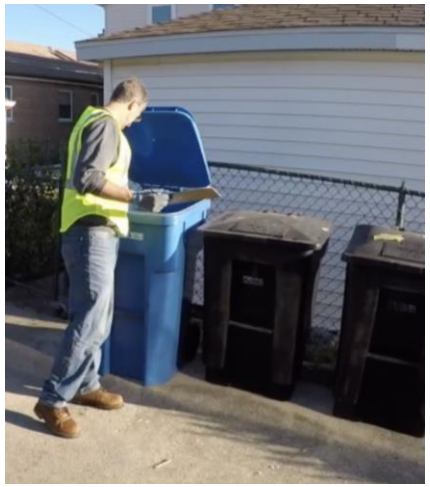
Large Southern City Example - Results

- Data from Feet on the Street Tracking
  - Weekly set out rate hovered between 34% and 42%
  - 31% of households never set out over 4 weeks (69% participating)
  - Tagging rate decreased 28% over 4 weeks
- Capture study collected paired garbage and recycling cart contents from 144 households chosen from 12 routes before and after intervention
  - Average contamination rate decreased 41%
    - Sampled households with bagged recyclables in their recycling cart decreased 2% and weight of bagged recyclables decreased 23%
    - Sampled households with bagged garbage in their recycling cart decreased 27% and weight of bagged garbage in recycling decreased 50%
    - Number of households with less than 10% contamination almost doubled
  - Average participating household capture rate increased 12%
    - 22% more households captured more than half of their recyclables in the recycling cart
    - Almost every material type's capture increased but most metal, glass, and plastic containers are still behind average participant capture rates and can be improved

Assessing Engagement

1. What question do you want to answer? What metrics are relevant?
2. Determine details of measurement: Who? What? When? How?
3. Conduct measurement before and after intervention
4. Adjust intervention based on results





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Get in Touch:

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