A Practical Visualization Approach for Paradata Monitoring in Adaptive Total Design

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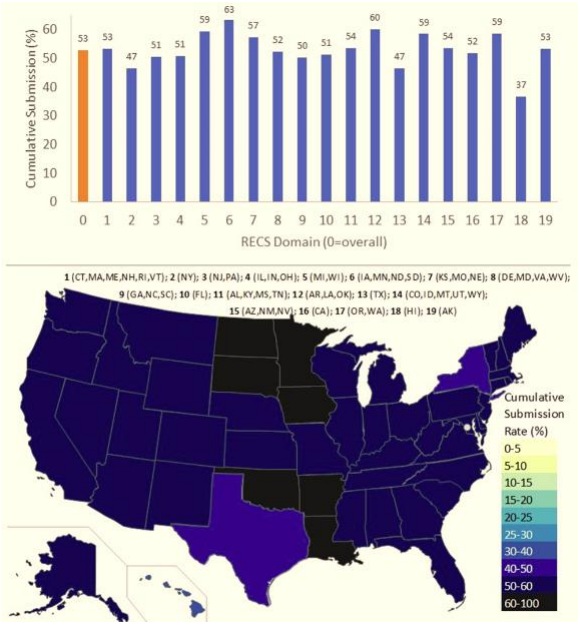

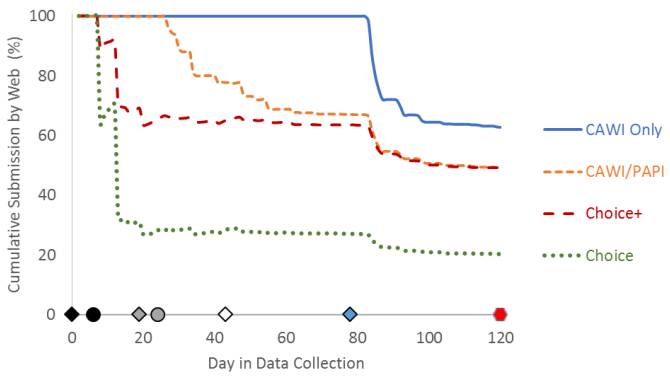

FedCASIC
Annual Conference
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Overview

- Using adaptive total design (ATD) in a web/mail experiment
- Real time monitoring of costs and quality
  - Visualizing the survey process as it unfolds
  - Identifying metrics critical to quality (CTQ)
  - Displaying data for effective decision making
- Case study: Residential Energy Consumption Survey (RECS) National Pilot
- Lessons learned and recommendations

What is Adaptive Total Design? (ATD)

- Process to identify and monitor key features of a survey design that are **c**ritical **t**o data **q**uality (CTQ)

- Similar to *responsive design* and *adaptive design*
  - real-time monitoring of data
  - ATD goal to minimize total survey error and costs

- CTQ monitoring vital
  - to determine if/when interventions will be applied
  - aids in projecting outcomes of experiments

Mode (and protocol) matters

- Range of decisions that can be made is dependent on the data available and options for intervention
- Some features that can be manipulated or carry importance depending on mode/mix of modes:

Example Features	Field	Phone	Mail	Web
Interviewer effects	X	X		
Time of day	X	X		
Reasons for refusal	X	X		
Physical characteristics of HH	X		X	
Advance materials			X	X
Survey appearance			X	X
Incentives / other costs	X	X	X	X

Key steps to CTQs and ATD

- Begin with a flow diagram of the process
- Identify the CTQs
  - need to be monitored and the metrics or indicators that work best for addressing
  - highly correlated with costs or errors or some other component
- Organize the data and visualize the variation in CTQs in “real-time” (e.g. daily)
- 3 Ds: **D**istribute, **D**iscuss, **D**ecide whether/how to react

Illustration using RECS

- Periodic survey of households collecting energy characteristics, usage patterns, and demographics.
- Traditionally an in-person survey using computer-assisted personal interviewing (CAPI) for data collection
- 3 pilots to determine feasibility, cost-effectiveness, time efficiency, and response validity of RECS using mixture of web and paper questionnaires delivered by mail
- Pilot 2: Cities Pilots (May to July 2015)
  - ATD monitoring across experimental conditions
- Pilot 3: National Pilot (October 2015 to February 2016)
  - designed while Cities Pilot still in progress

RECS National Pilot Design

- 8 treatment combinations of equal sample size
  - 4 contact strategies; 2 incentives levels (all get $5 prepaid)

Contact Strategy	Promised Incentive	
Web (CAWI) Only	**$10**	**$20**
Web (CAWI), then Paper (PAPI)	**$10**	**$20**
Choice	**$10**	**$20**
Choice Plus	**$10 for paper, $20 for web**	**$20 for paper, $30 for web**

- Extended nonresponse followup (xNRFU)
  - single UPS high-priority mailing
  - abbreviated, one-page questionnaire
  - random half offered additional $10

Phase:	1. Main Study Data Collection						2. xNRFU	
Stage:	1	2	3	4	5	6	7	8
Days Between:	3	5	15	5	20	35	42	
Protocol	Contact Materials/Strategy							
CAWI Only	Prenotice postcard	Letter + URL + $10/20 promised*	Reminder postcard	Letter + URL + $10/20 promised	Reminder postcard	UPS letter + URL + $10/20 promised	UPS letter + URL + 1-sheet quex + $10/20/30 promised**	Stop data collection
CAWI/PAPI	"	"	"	" + PAPI	"	" + replacement PAPI	"	"
Choice	"	" + PAPI	"	" + replacement PAPI	"	" + replacement PAPI	"	"
Choice+	"	" + PAPI + $10 bonus offer for web response	"	" + replacement PAPI + $10 bonus offer for web response	"	" + replacement PAPI + $10 bonus offer for web response	"	"

* 50% randomly assigned for $10 or $20 at sample draw

** 50% randomly assigned to be offered additional $10 upon nonresponse followup sample draw

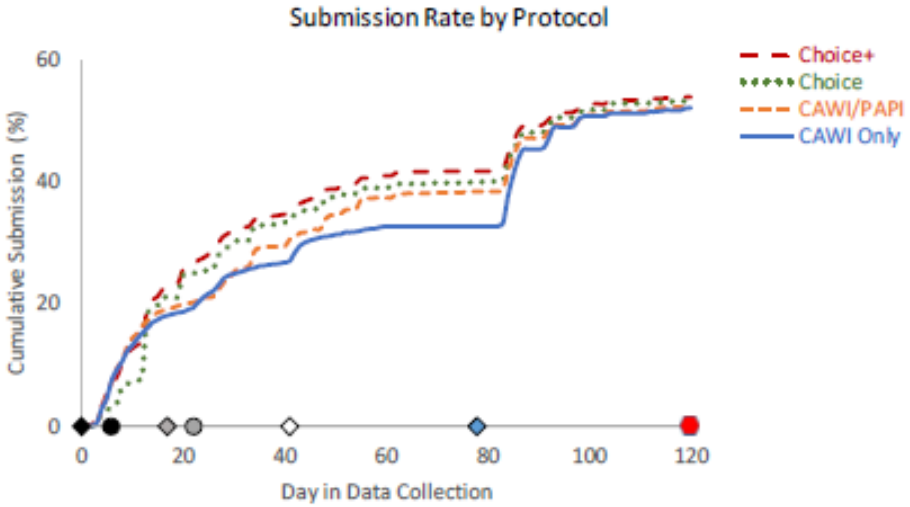
" Same as CAWI Only

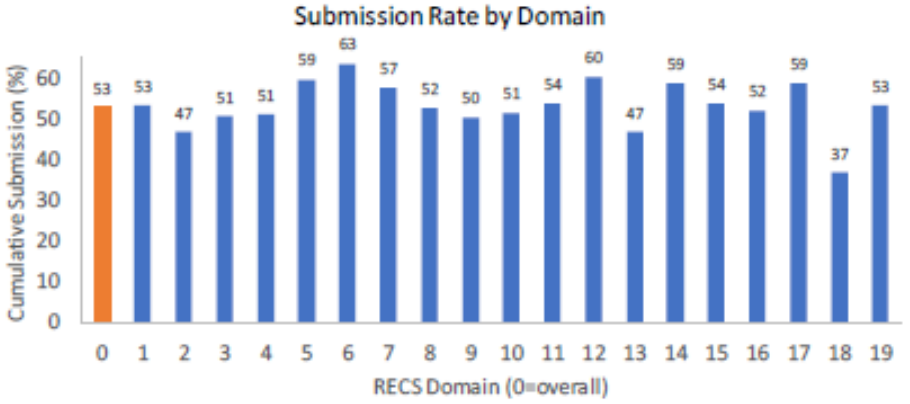
RECS National Pilot CTQs

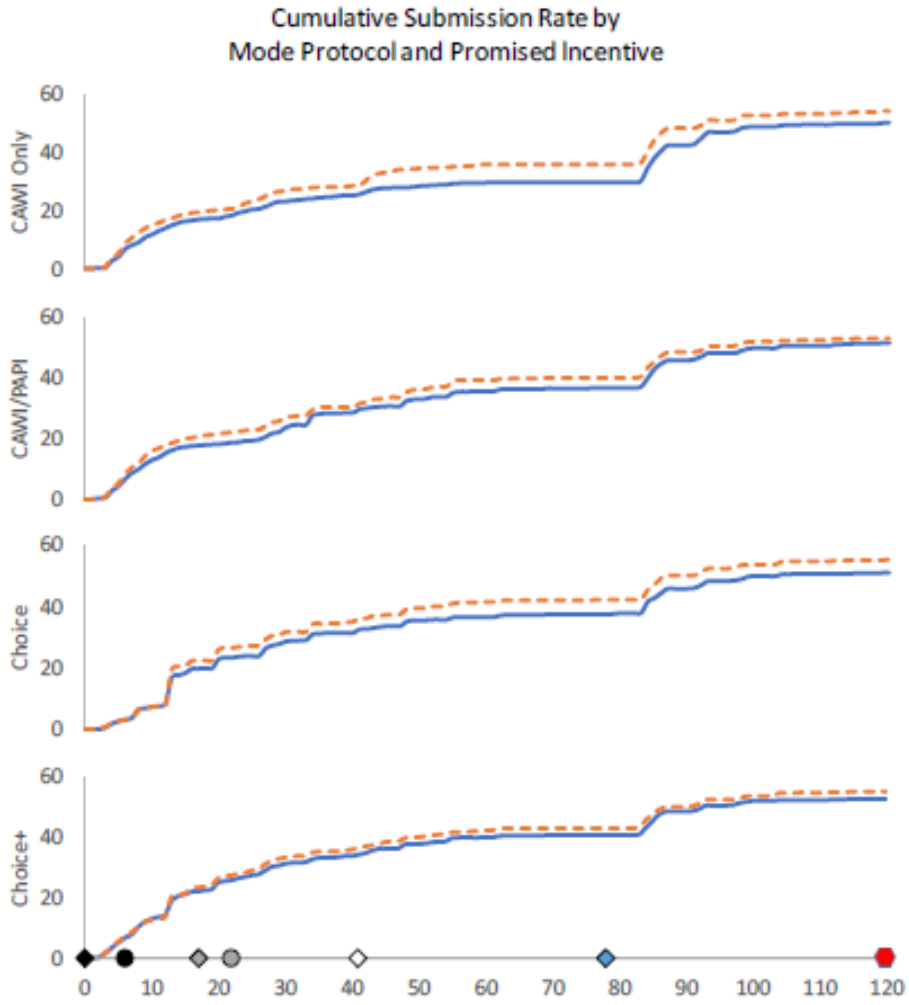
- **Submission rate**: cases submitted via web or paper form divided by the total number of sampled cases
- **Ineligible**, **Incompletion**, **breakoff**, **undeliverable** rates
- Web survey **timing** overall and by section
- **Comparison of estimates to benchmarks**
  - American Community Survey (ACS) benchmarks
  - comparisons to sampling frame

RECS 2015 National Pilot Adaptive Total Design (ATD) Report

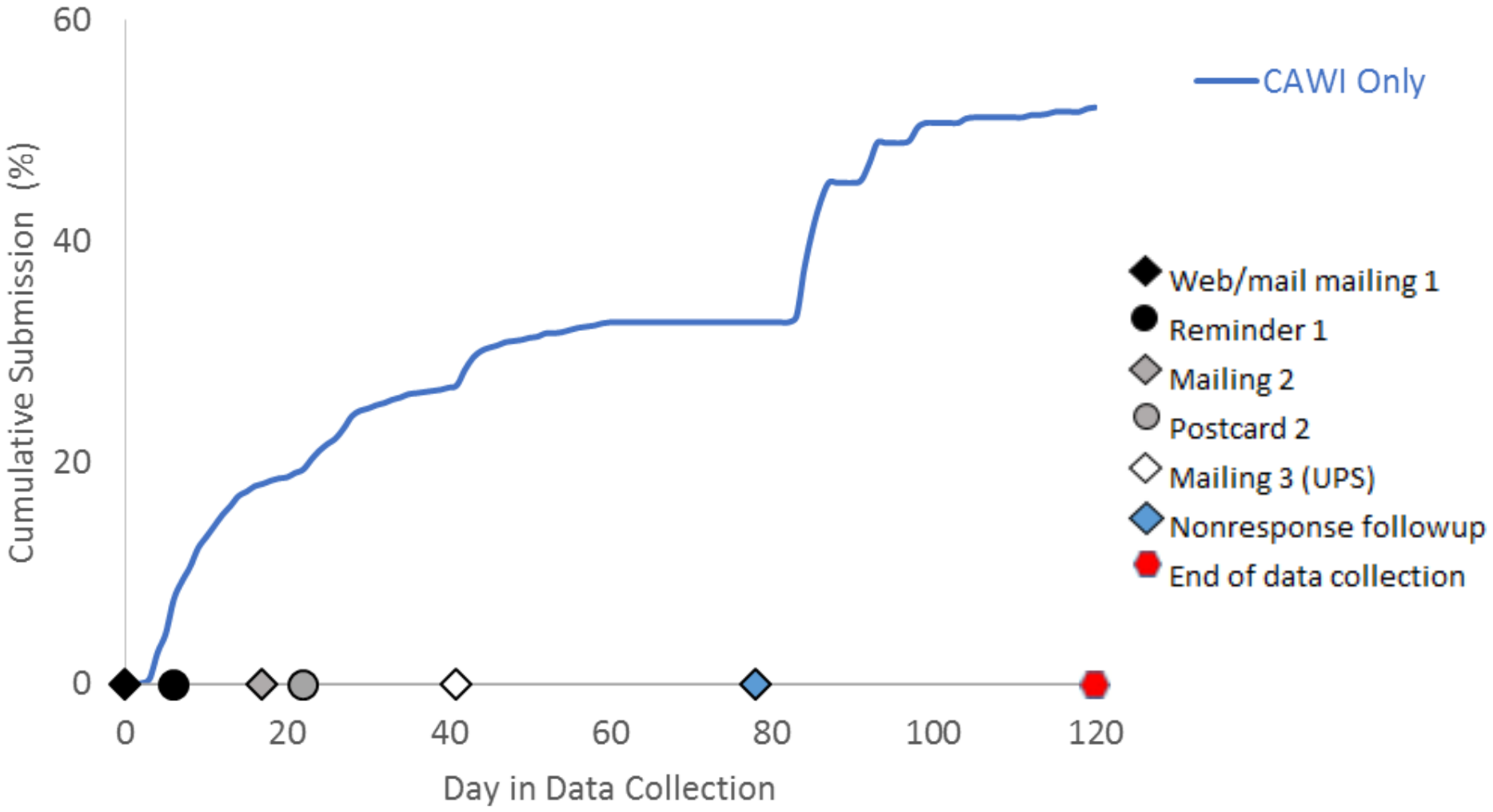
Thursday, February 18, 2016



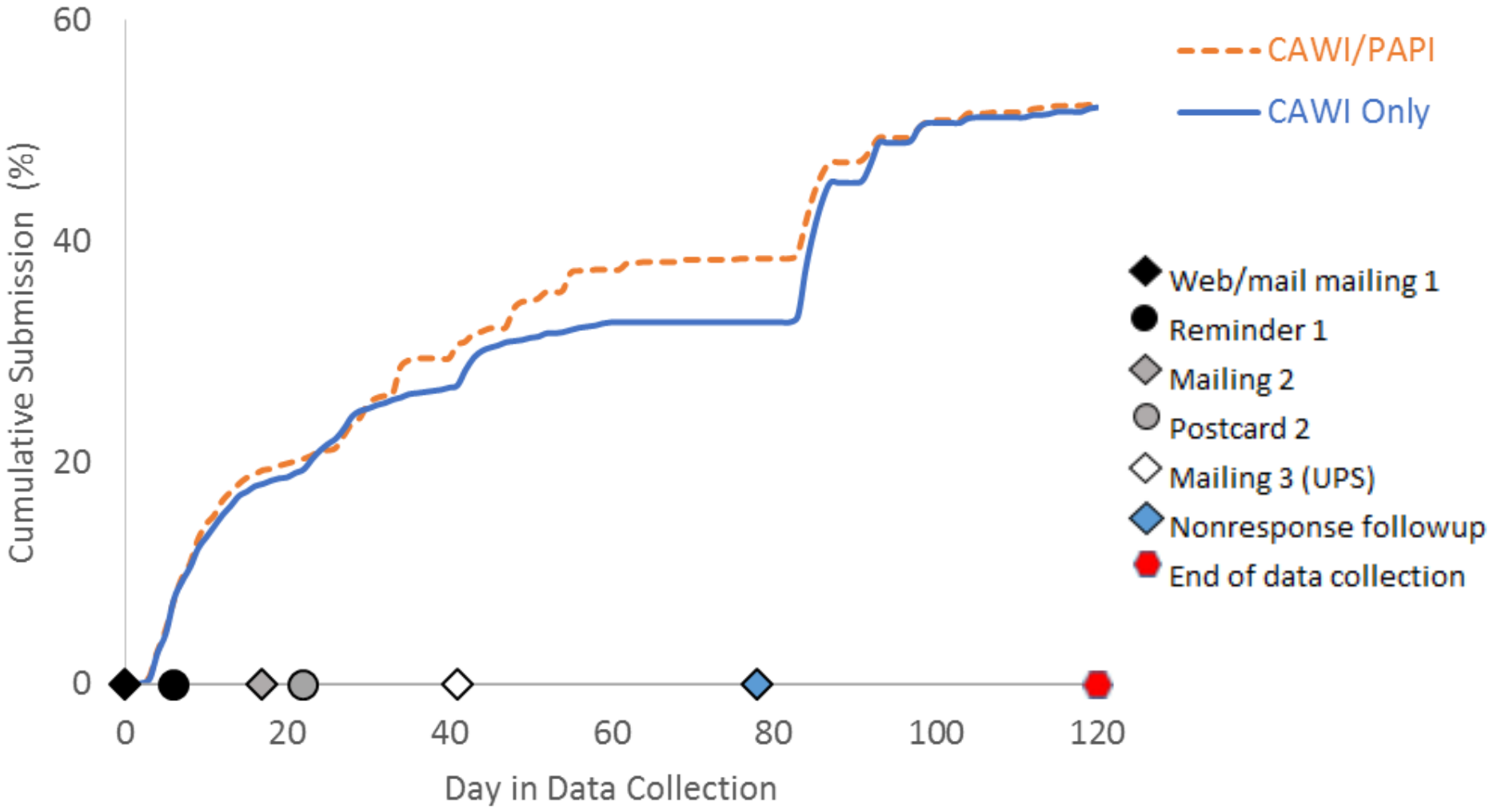




Submission rates by mode protocol



Submission rates by mode protocol



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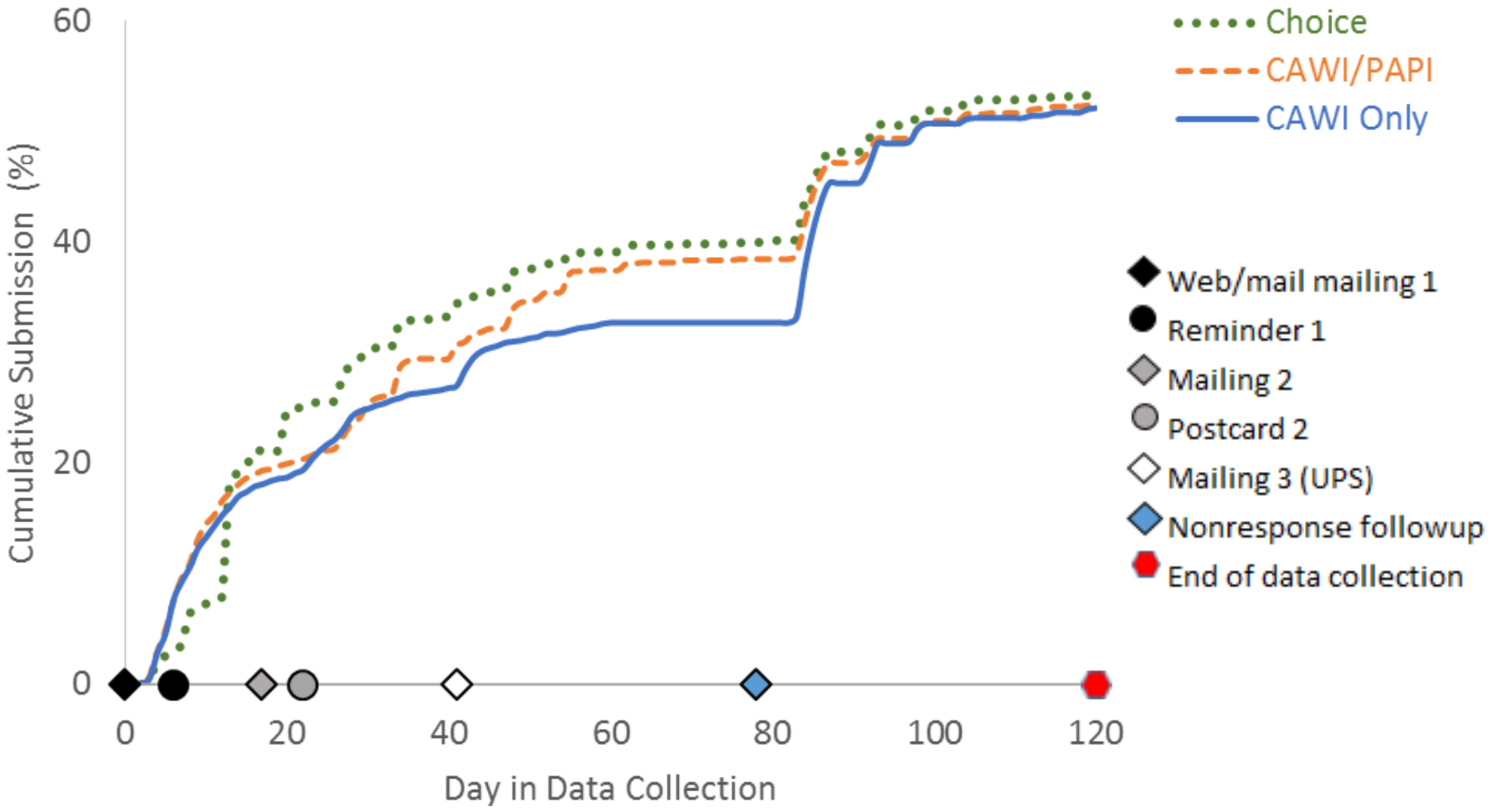

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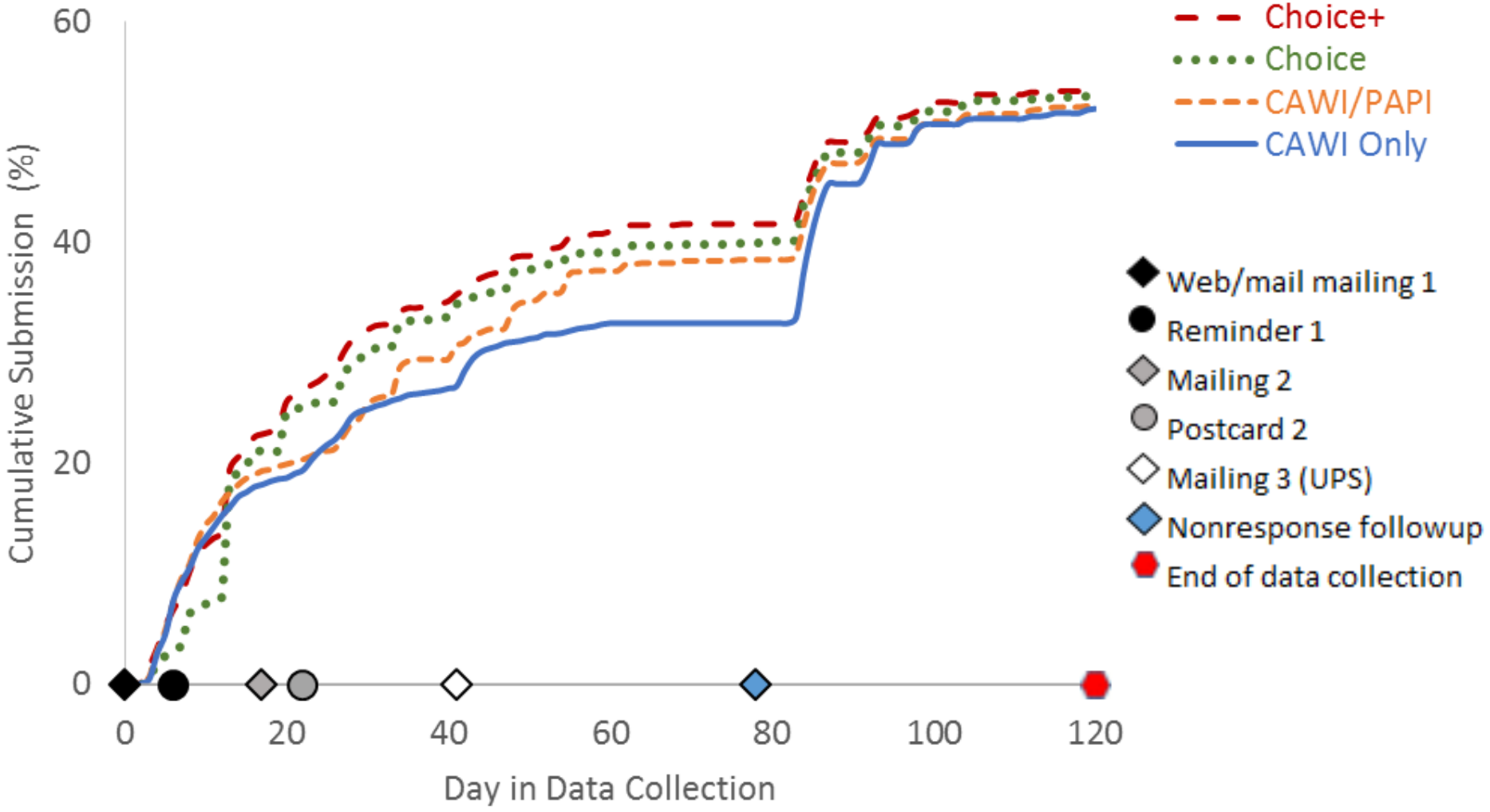

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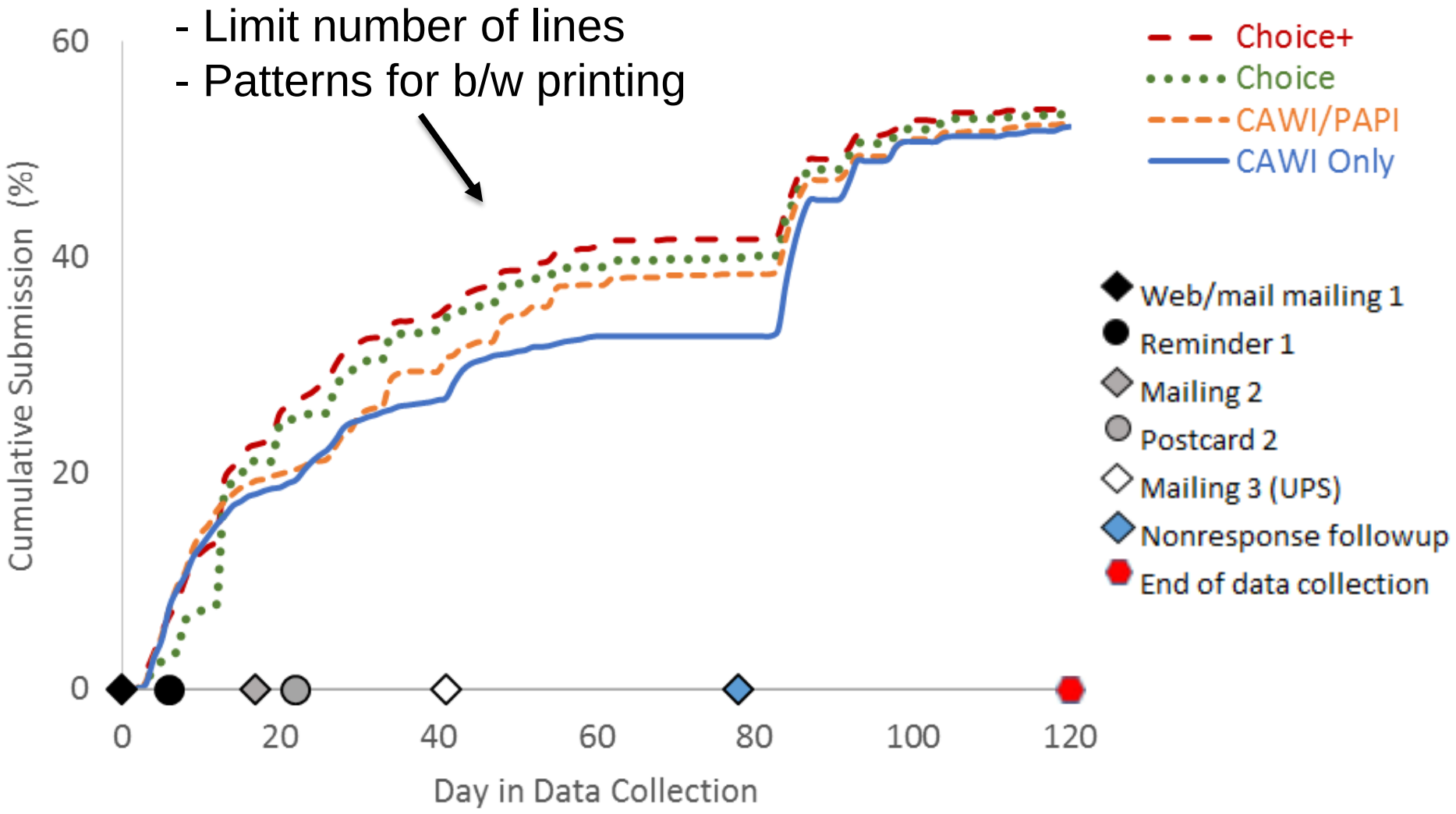

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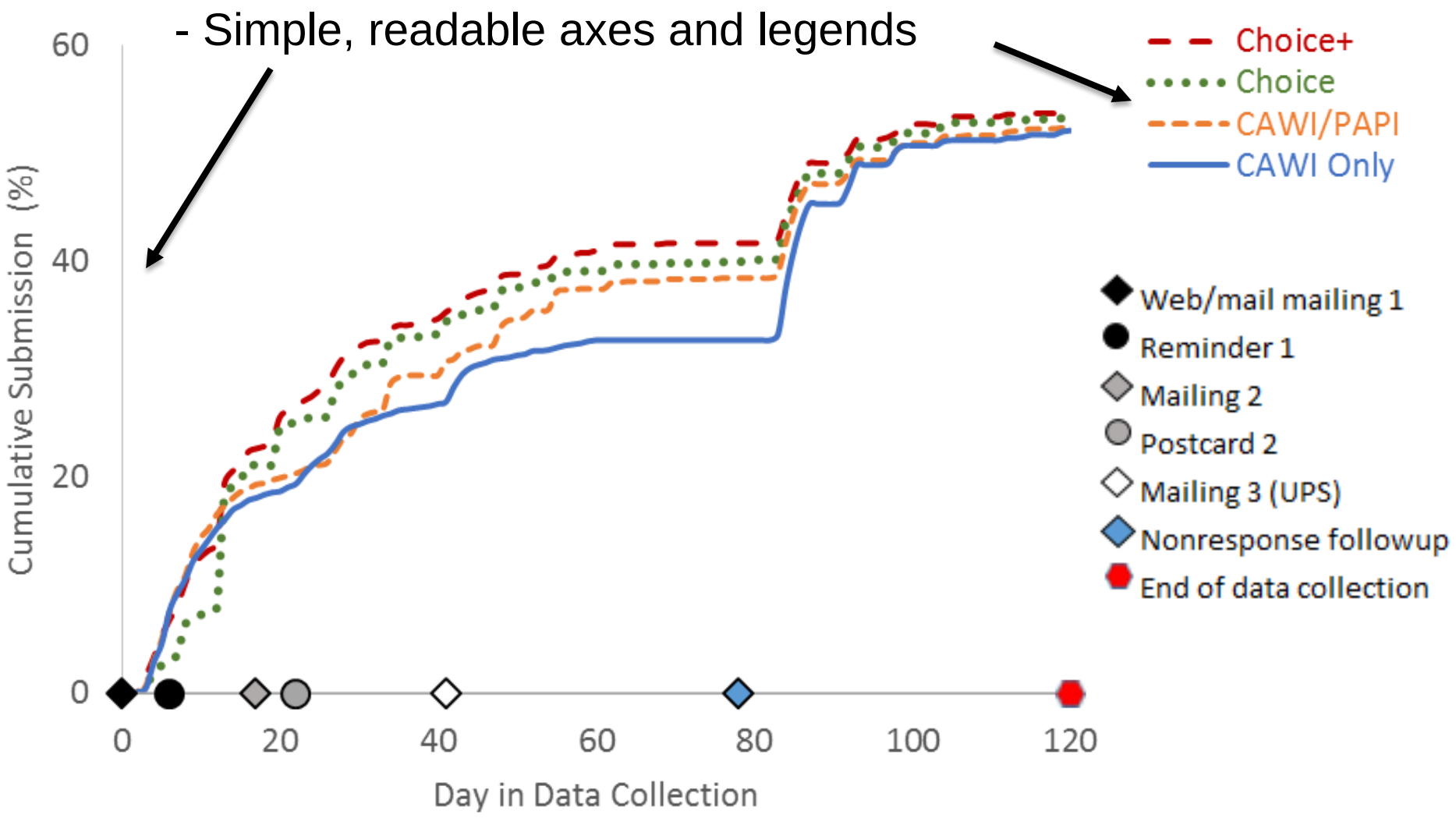
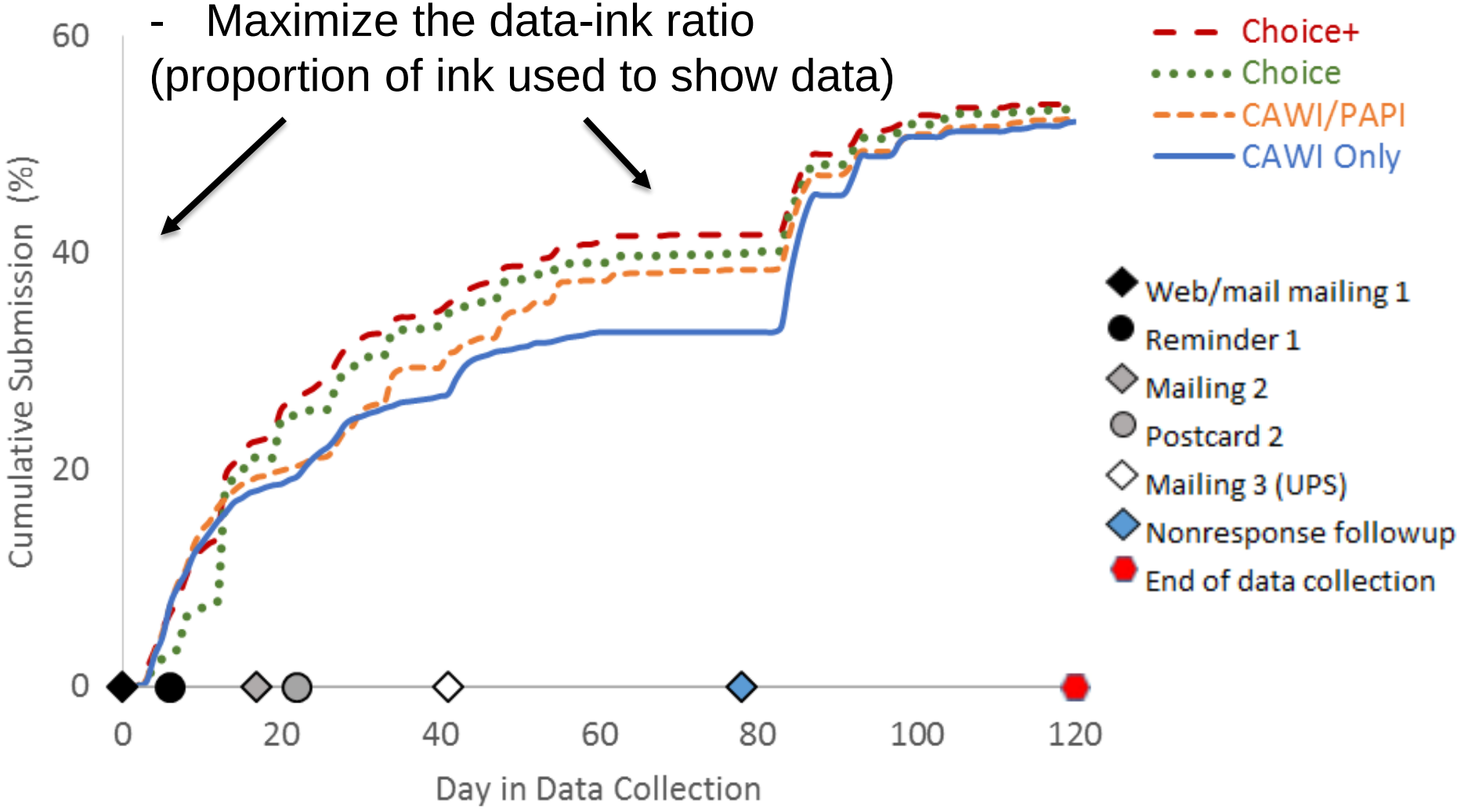
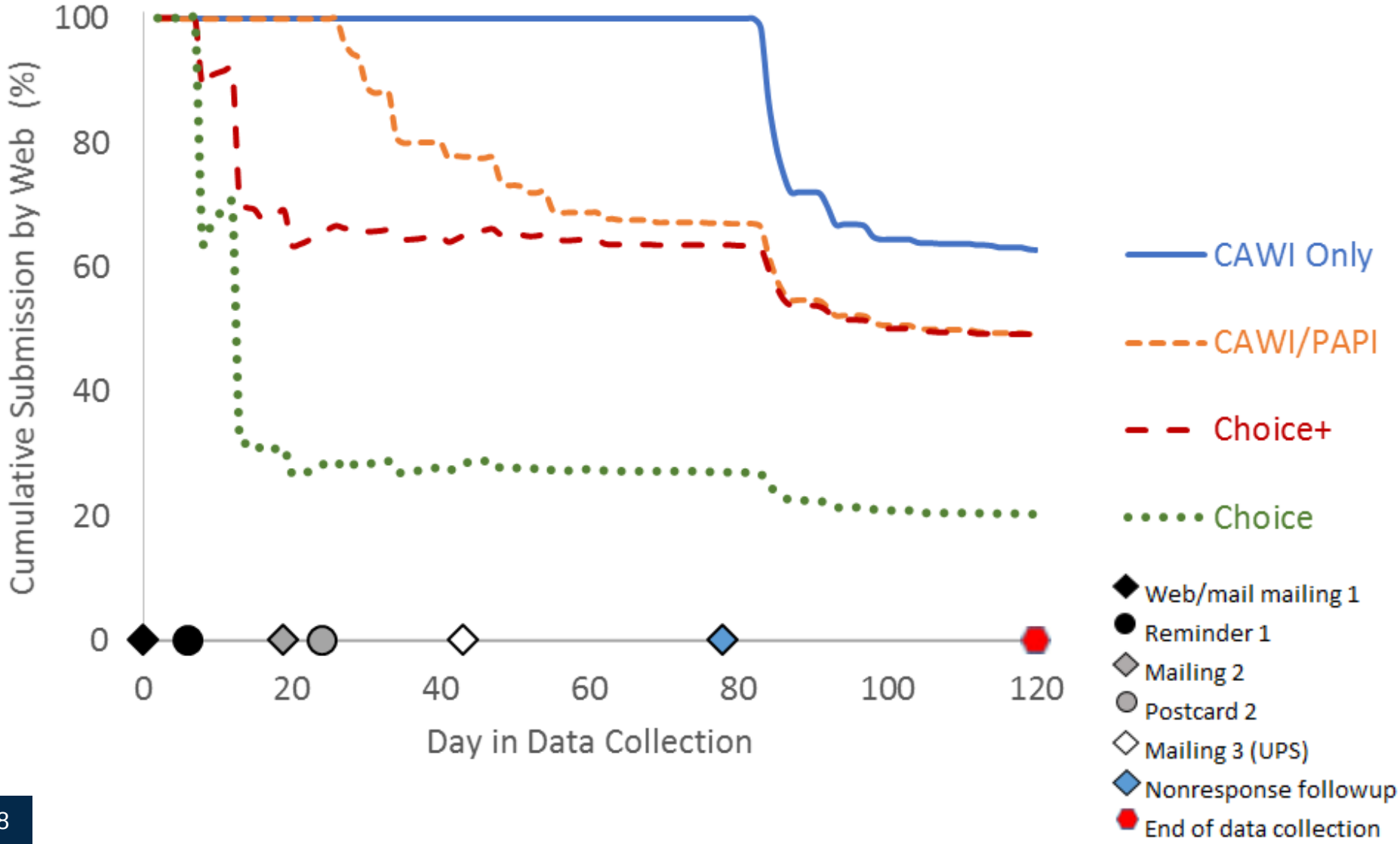


Submission rates by mode protocol

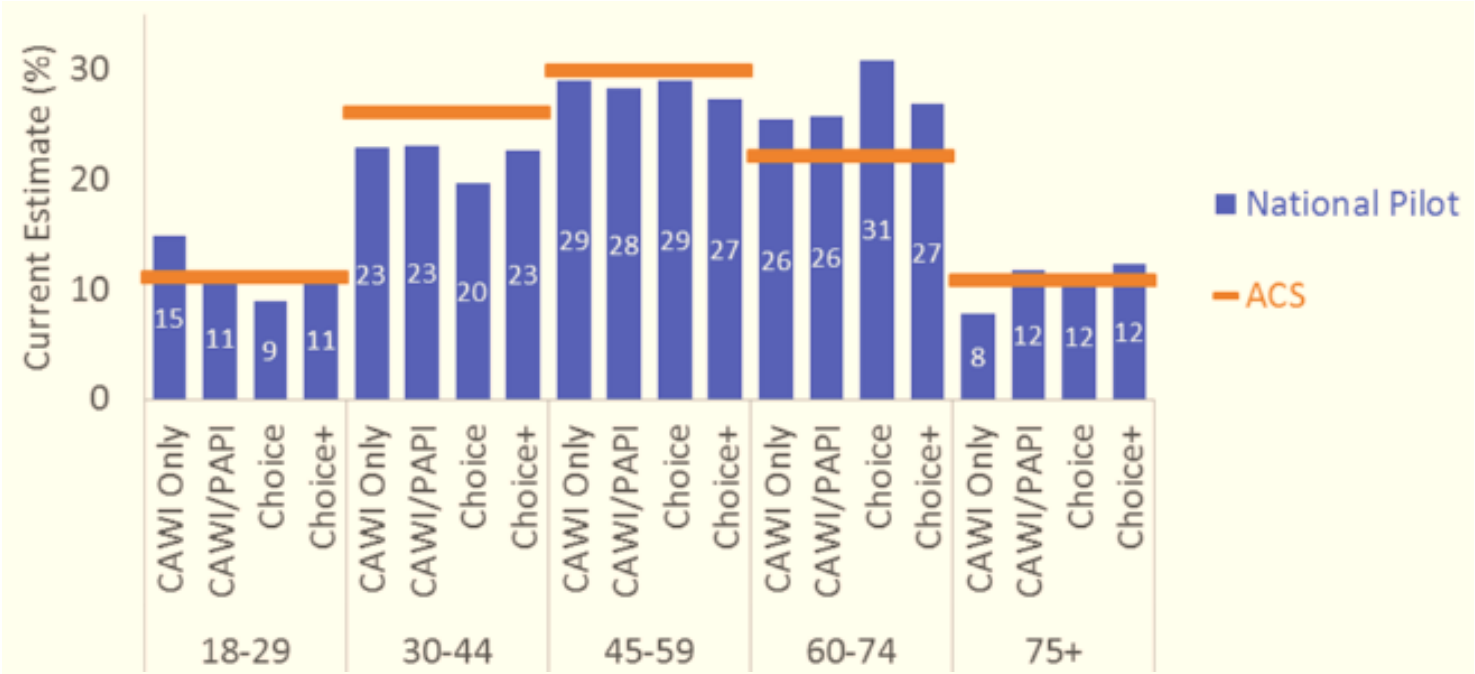
- Maximize the data-ink ratio (proportion of ink used to show data)

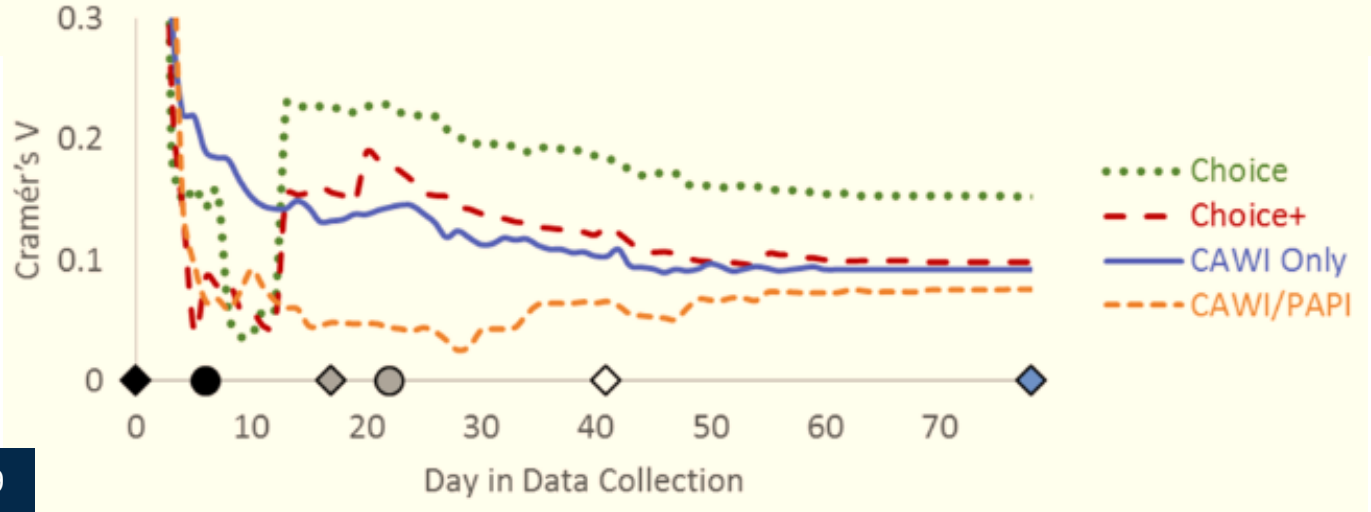


Proportion of submissions by web



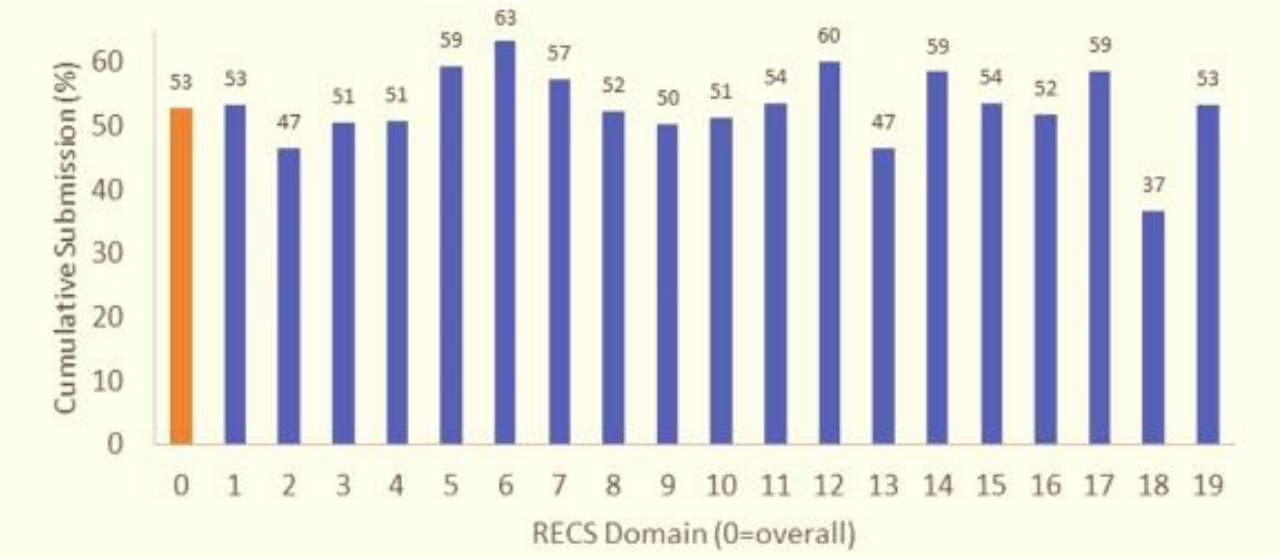
Respondent age vs. ACS benchmark

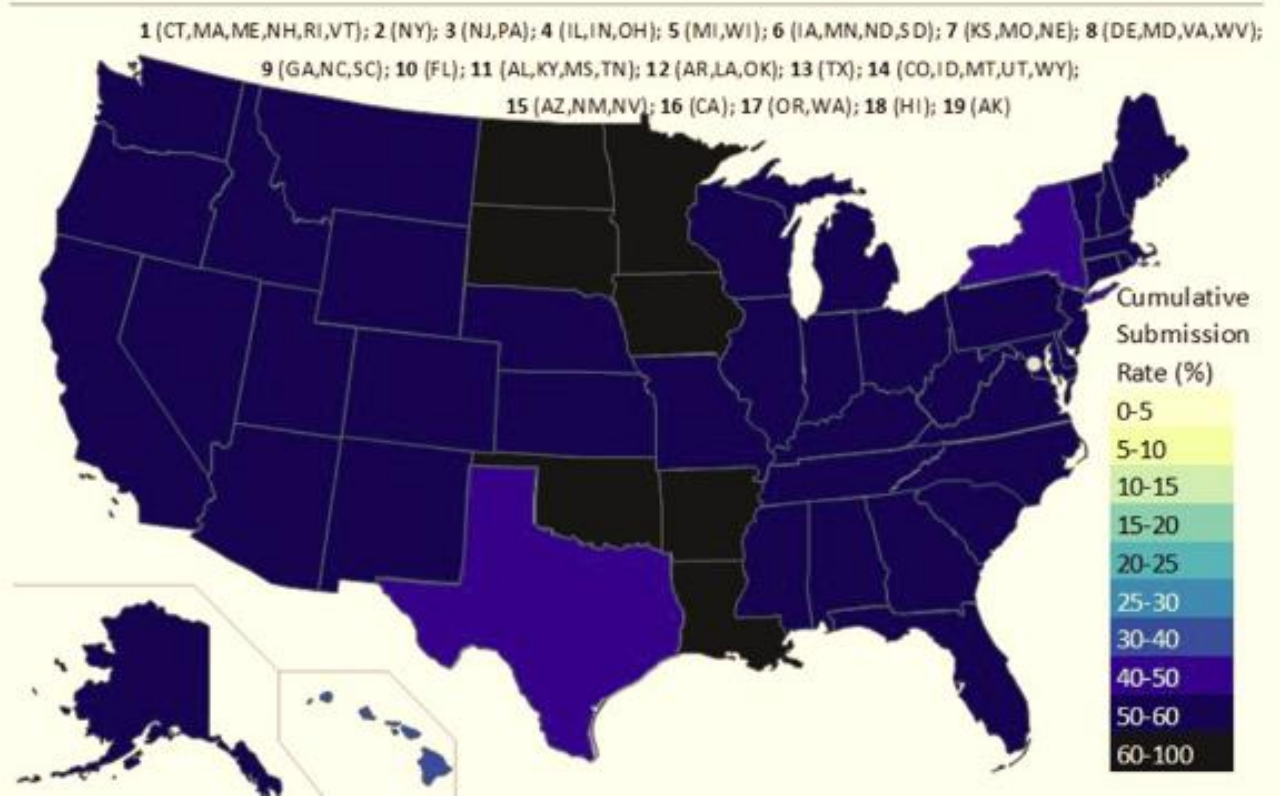




Web/mail mailing 1
Reminder 1
Mailing 2
Postcard 2
Mailing 3 (UPS)
Nonresponse followup
End of data collection

Submission by domain





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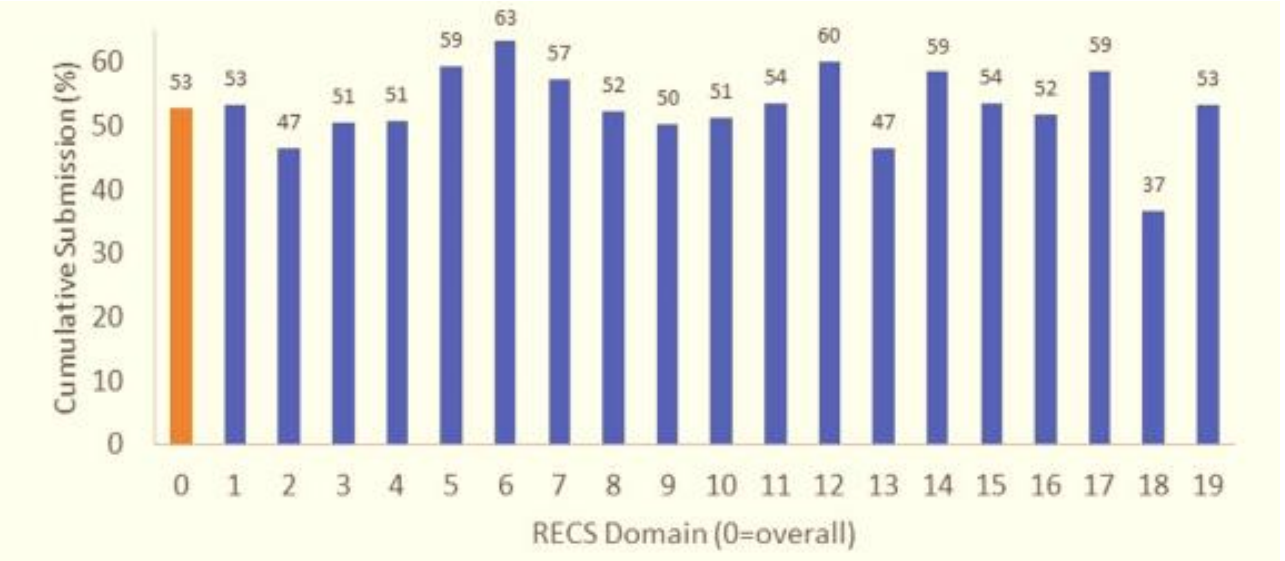
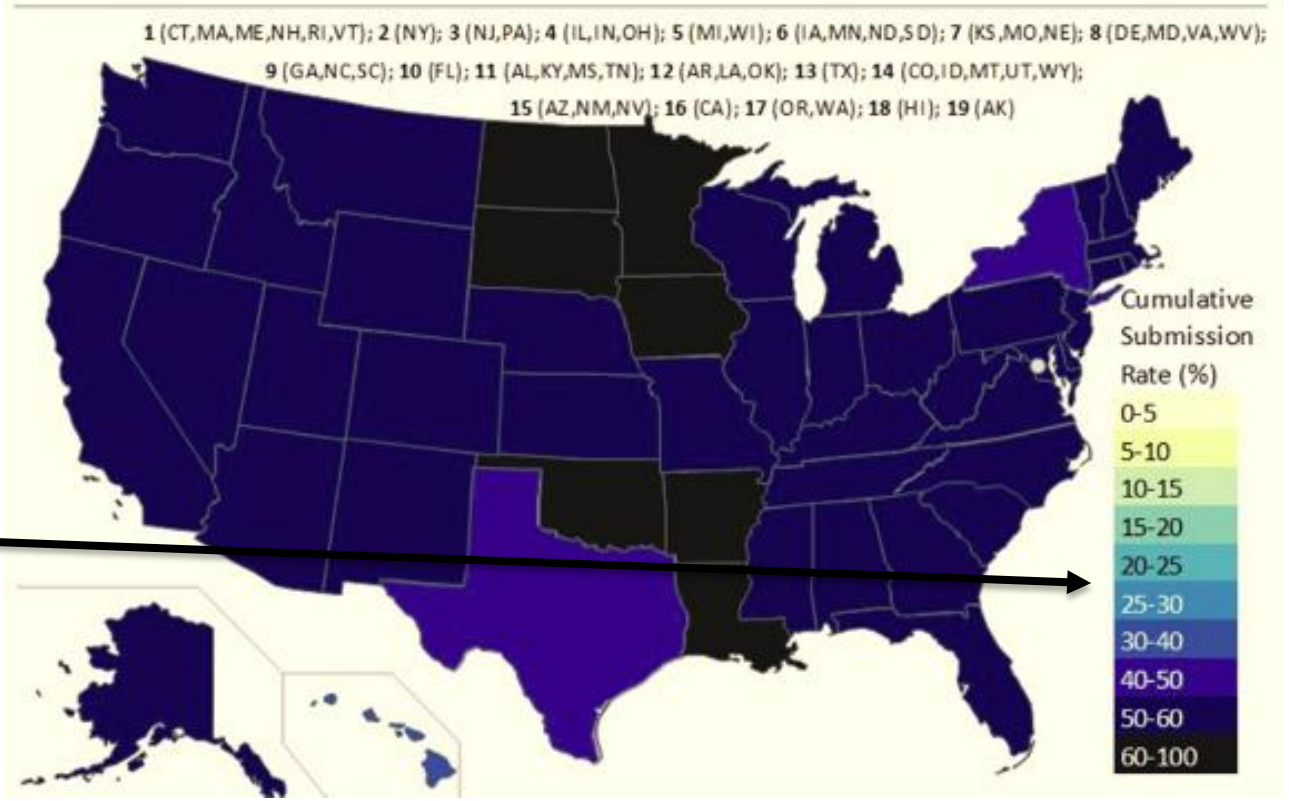


- Simple maps possible in most modern software packages (e.g. Excel)

- Tradeoffs in number/types of colors, visualizing relative differences



3 Ds: Distribute, Discuss, Decide

- Reports run nightly, automated SAS/Excel process published on project web portal for full team access
- Reports reviewed daily by data collection team, discussed in depth on weekly project calls
- Reports allowed for review and decision making during data collection
  - Cities Pilot ATDs led to design decisions for National Pilot
  - National Pilot ATDs led to decisions for 2015 RECS

Lessons learned and recommendations (1)

- ATD offers flexible approach to
  - managing data collection
  - monitoring data quality
  - predicting survey and experimental outcomes

- Interactive dashboards
  - great for public dissemination
  - But well-designed static graphs can help project team stay "on the same page."

Lessons learned and recommendations (2)

- Good visualization of the process and highly predictive metrics are key attributes
- Graphics should incorporate “gestalt principles of visual perception”
- A hallmark of the approach is the 3 Ds:
  - **D**istribute
  - **D**iscuss
  - **D**ecide

More Information

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