

## **APPENDIX H**

### **2017 NSCG Adaptive Design Experiment Goals, Interventions, and Monitoring Metrics**

## 2017 NSCG Adaptive Design Experiment Goals, Interventions, and Monitoring Metrics

The 2017 NSCG Adaptive Design Experiment (“2017 Experiment”) will be structured largely the same as the 2015 NSCG Adaptive Design Experiment. Just as in 2015, we will have experimental samples for the new sample cases (8,000) and the returning sample cases (10,000) with control groups identified for comparative purposes. Improvements will come from two directions for the 2017 Experiment:

- 1) We will expand the data monitoring metrics that we implement during data collection to include evaluating the stability of survey estimates.
- 2) We will automate much of the data analytic and business rule execution that was *ad hoc* in nature in the 2013 and 2015 Experiments.

In 2015, NCSES and the Census Bureau worked to develop flow processing capabilities for the entire survey, with editing, weighting, and imputation occurring at time points during the data collection period as opposed to waiting until after data collection was over to perform the data processing. For the 2017 Experiment, we will be implementing simplified versions of flow processing to allow us to examine differences between the treatment and control not only with respect to representativeness and response rate, but stability of estimates and the effect of our nonresponse adjustment. These types of metrics will be considered as contributing factors in our decisions to make interventions.

The second improvement will arise from automation of the data analytic and business rule execution that was *ad hoc* in nature in the adaptive design experiments from previous cycles. While some monitoring metrics, including R-indicators, were run on an automated basis, specific decisions about when and where interventions should actually occur were the result of extended conversations and incremental data analysis. While these steps were important in the early stages of adaptive design, and for understanding how large interventions would be, adaptive design cannot be implemented in a standardized, repeatable production setting while maintaining such an extremely hands-on approach. Instead, for the 2017 Experiment, we will review the analytical questions that arose during past adaptive design decision meetings, and attempt to automate these types of analyses in conjunction with the data monitoring metrics.

In a general sense, the goal of the 2017 Experiment is to replicate the successful results we had in the 2015 Experiment, expand usage of and access to data monitoring metrics, and develop a baseline level of comfort with automated interventions for adaptive design in a production setting.

The remainder of this appendix discusses adaptive design goals that NSCG will pursue as part of the 2017 Experiment, what interventions would allow the NSCG to achieve those goals, and what monitoring metrics would inform those interventions. As noted earlier, the 2017 Experiment will be structured largely the same as the 2015 Experiment. As a result, the following goals are similar to the goals pursued as part of the 2015 Experiment. A major difference for the 2017 Experiment is that these goals will be pursued through the use of increased automated interventions.

### **Goal 1: Balance Sample / Reduce Nonresponse Bias**

Sampling balancing and/or reducing nonresponse bias relate to maintaining data quality in the face of shrinking budgets and falling response rates. Nonresponse bias arises when the outcomes of interest (the survey estimates) for respondents are different from those of nonrespondents. This difference results in a bias because the resulting estimates only represent a portion of the total target population. Surveys often try to correct for this *after* data collection using weighting, post-stratification, or other adjustments. Adaptive design interventions during data collection attempt to correct for nonresponse bias *during* data collection by actually changing the respondent population to be more balanced on frame characteristics related to response and outcome measures.

While discussing R-indicators, Schouten et al., provides reasons why balancing on variables related to response status and outcome variables is desirable. “In fact, we view the R-indicator as a lack-of-association measure. The weaker the association the better, as this implies that there is no evidence that non-response has affected the composition of the observed data.” [3] This suggests that “selective forces...are absent in the selection of respondents” out of the sample population [2], and so nonresponse approaches missing at random, reducing the risk of non-response bias.

**Interventions:** Interventions are used to change the type or quantity of contacts targeted at specific subgroups or individuals. Interventions that will be considered for inclusion in the 2017 Experiment include:

- Sending an unscheduled mailing to sample persons;
- Sending cases to CATI prior to the start of production CATI non-response follow up (NRFU), to target cases with an interviewer-assisted mode rather than limiting contacts to self-response modes;
- Putting CATI cases on hold, to reduce contacts in interviewer-assisted modes, while still requesting response in self-response modes;
- Withholding paper questionnaires while continuing to encourage response in the web mode to reduce the operational and processing costs associated with certain groups of cases;
- Withholding web invites to discourage response in certain groups of cases, while still allowing these cases to respond using previous invitations;
- Sending paper questionnaires to web nonrespondents earlier than the scheduled mail date to provide two modes of self-response rather than one; and
- Changing the CATI call time prioritization to increase or decrease the probability a case is called during a specific time.

## **Monitoring Methods:**

- R-indicators [2], [3], [4];
- Mahalanobis Distance or other distance measure [5];
- Response influence [6]; and
- Uncertainty/influence of imputed y-values [7].

We used R-indicators in the 2013 and 2015 Experiments, and plan to continue using them in the 2017 effort. As a metric, R-indicators were useful for measuring response balance, and served their purpose as a proof of concept for data monitoring. However, employing more metrics during data collection allows us to assess the usefulness of each monitoring metric and provides more confidence that data collection interventions were targeted in the most efficient way possible. That is, if R-indicators identify *subgroups* that should be targeted to increase response balance, and another metric (e.g., response influence, Mahalanobis distance, etc.) identifies *specific cases* in those subgroups that also are likely to have an effect on nonresponse bias, then we have more confidence that those identified cases are the optimal cases for intervention, both from a response balance and non-response bias perspective.

## **Goal 2: Increase Timeliness of Data Collection**

Analysts and other data users that need relevant, up-to-date information to build models, investigate trends, and write policy statements rely on timely survey data. NCSES specifically focused on timeliness as a goal for the 2013 NSCG [4], and reduced the length of time from the beginning of data collection to the time of data release from 28 months to 12 months. This required a reduction in the data collection from ten months to six months. In the future, NCSES is interested in further reducing data collection, specifically, from six months to five months.

**Interventions:** Interventions will attempt to either encourage response to the NSCG earlier than the standard data collection pathway or will be used to stop data collection if new respondents are not changing key estimates. This could be achieved by introducing modes earlier than the standard data collection pathway, sending reminders that elicit response more quickly, or stopping data collection for all or a portion of cases and reallocating resources. Possible interventions include:

- Sending cases to CATI prior to the start of production CATI non-response follow up (NRFU), to target cases with an interviewer-assisted mode rather than limiting contacts to self-response modes;
- Sending paper questionnaires to web nonrespondents earlier than the scheduled mail date to provide two modes of self-response rather than one;
- Sending email reminders earlier than the scheduled dates in data collection; and
- Stopping data collection for the sample or for subgroups given a sufficient level of data quality. For example, we could stop data collection if:
  - key estimates have stabilized and standard errors fall within acceptable ranges, or
  - the coverage ratio for a subgroup of interest reaches a pre-determined threshold.

### **Monitoring Methods:**

- Propensity to Respond by Modes [8];
- Change Point Analysis [9];
- Stability of Estimates [10]; and
- Coverage Ratios.

Ongoing NSCG research conducted by Chandra Erdman and Stephanie Coffey [8] could inform appropriate times to introduce new modes to cases ahead of the standard data collection schedule. Another possibility involves exploring change point analysis. If respondents per day as a metric changes over time, showing fewer responses in a given mode, there may be cause to introduce a new mode ahead of schedule. In addition, we will be able to calculate key estimates on a weekly or semi-weekly basis. As a result, we will be able to track stability of estimates during data collection to identify times when the data collection strategy has peaked, resulting in fewer responses or similar information that was already collected.

### **Goal 3: Reduce Cost**

Controlling costs are always a survey management goal. More recently however, “the growing reluctance of the household population to survey requests has increased the effort that is required to obtain interviews and, thereby, the costs of data collection...[which] has threatened survey field budgets with increased risk of cost overruns” [10]. As a result, controlling cost is an important part of adaptive design. By allowing survey practitioners to reallocate resources during the data collection period, surveys can make tradeoffs to prioritize cost savings over other goals.

**Interventions:** Interventions will be used to encourage survey response via the web while discouraging response in more expensive modes (mail, CATI), or to eliminate contacts that may be ineffective. Possible interventions include:

- Putting CATI cases on hold, to reduce contacts in interviewer-assisted modes, while still requesting response in self-response modes;
- Withholding paper questionnaires while continuing to encourage response by web to reduce the operational and processing costs associated with certain groups of cases;
- Withholding web invites to discourage response from certain groups of cases, while still allowing these cases to respond using previous invitations;
- Prioritizing or deprioritizing cases in CATI during certain call times to increase or decrease the probability a case is called during a specific time frame without having to stop calling the case entirely; and
- Stopping data collection for the sample or for subgroups if key estimates and their standard errors have stabilized.

### **Monitoring Methods:**

- R-indicators;
- Mahalanobis Distance or other distance measure;
- Response influence;
- Uncertainty/influence of imputed y-values;
- Stability of estimates; and
- Numbers of trips to locating.

The same indicators that are valuable for monitoring data quality also could measure survey cost reduction. If cases are in over-represented subgroups, or have low response influence, we may want to reduce or eliminate contacts on those cases.

In addition, the key estimates valuable to increasing timeliness, are also valuable for controlling cost. When estimates stabilize and their standard errors fall within acceptable limits for subgroups or the entire survey, new respondents are providing similar information to that which we have already collected. If continuing data collection would have little effect on estimates and their standard errors, stopping data collection to all or subgroups of cases would be an efficient way to control costs.

Another potential cost-saving intervention would be to limit the number of times a case could be sent to locating. If we have no contact information for a case, or previously attempted contact information has not been useful for obtaining contact, a case is sent to locating where researchers attempt to identify new, more up-to-date contact information. This operation can be time intensive, especially for cases repeatedly sent to locating. We could track the number of times a case is sent to interactive locating, or the length of time it spends in locating. Cases repeatedly sent to locating and cases that spend a large amount of time being researched may not be ultimately productive cases. Reallocating effort spent on these cases to those in locating for a fewer number of times may be a sensible cost-saving measure that allows us to attempt contact on more cases, rather than spending large amounts of time (money) on the same cases.

### **Adaptive Design Data Collection Flow, Intervention Schedule, and Intervention Criteria**

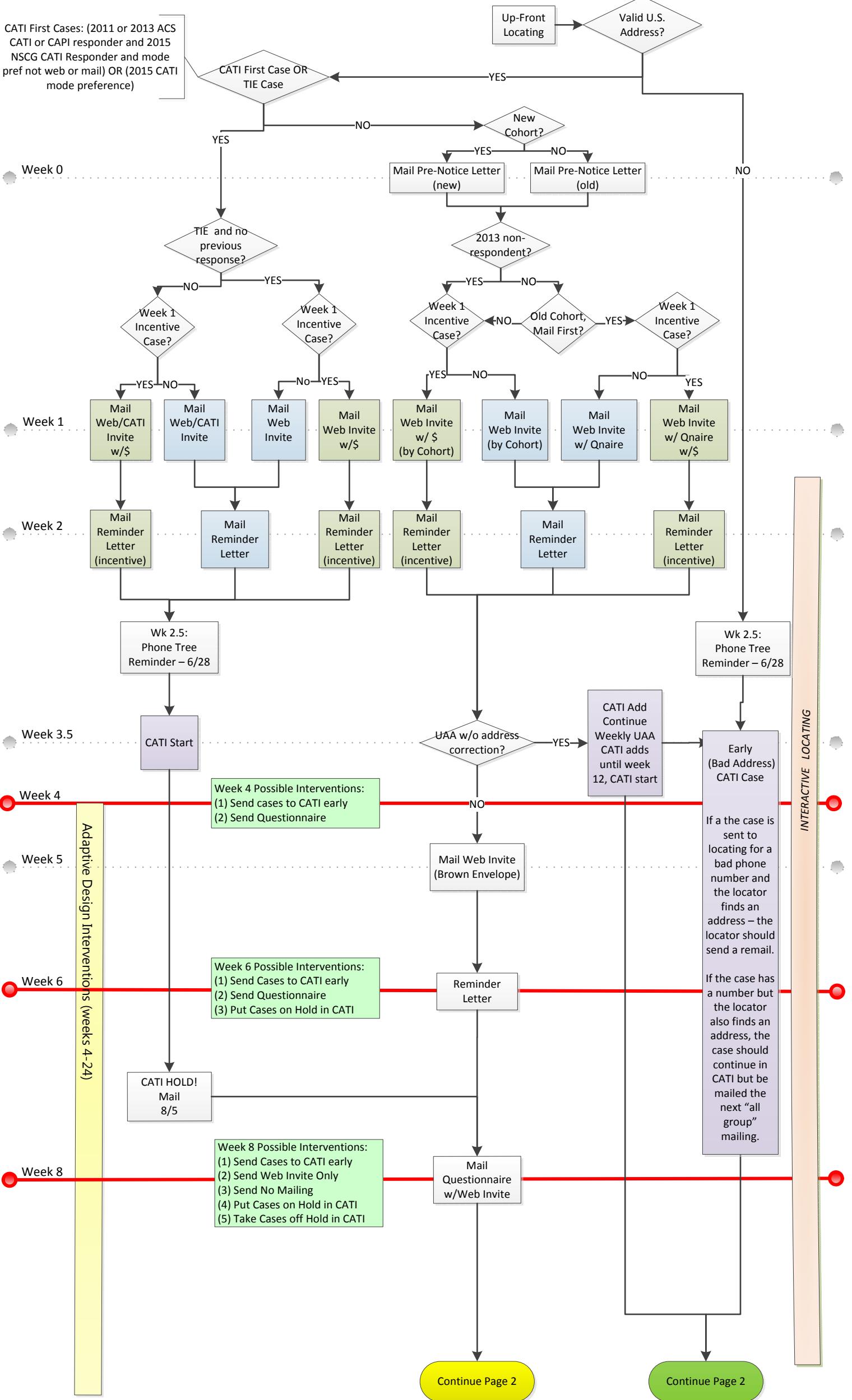
To provide insight on the way that adaptive design criteria will be applied in the determination of interventions for the 2017 NSCG adaptive design experiment, NCSES is submitting an adaptive design data collection flowchart (Figure H.1.) and a table documenting the adaptive design intervention schedule and criteria (Table H.1.).

All sample cases will be monitored beginning at week 0. Adaptive interventions will be reviewed and implemented as needed at weeks 4, 6, 8, 10, 12, 14, 16, 18, 20, 23, and 24 of the data collection period. As part of the adaptive design experiment, we have identified certain adaptive interventions that might be implemented depending upon the case monitoring results that could help the NSCG meet its data collection goals. The decision to implement an adaptive intervention will be based on the evaluation of specific criteria associated with the data collection

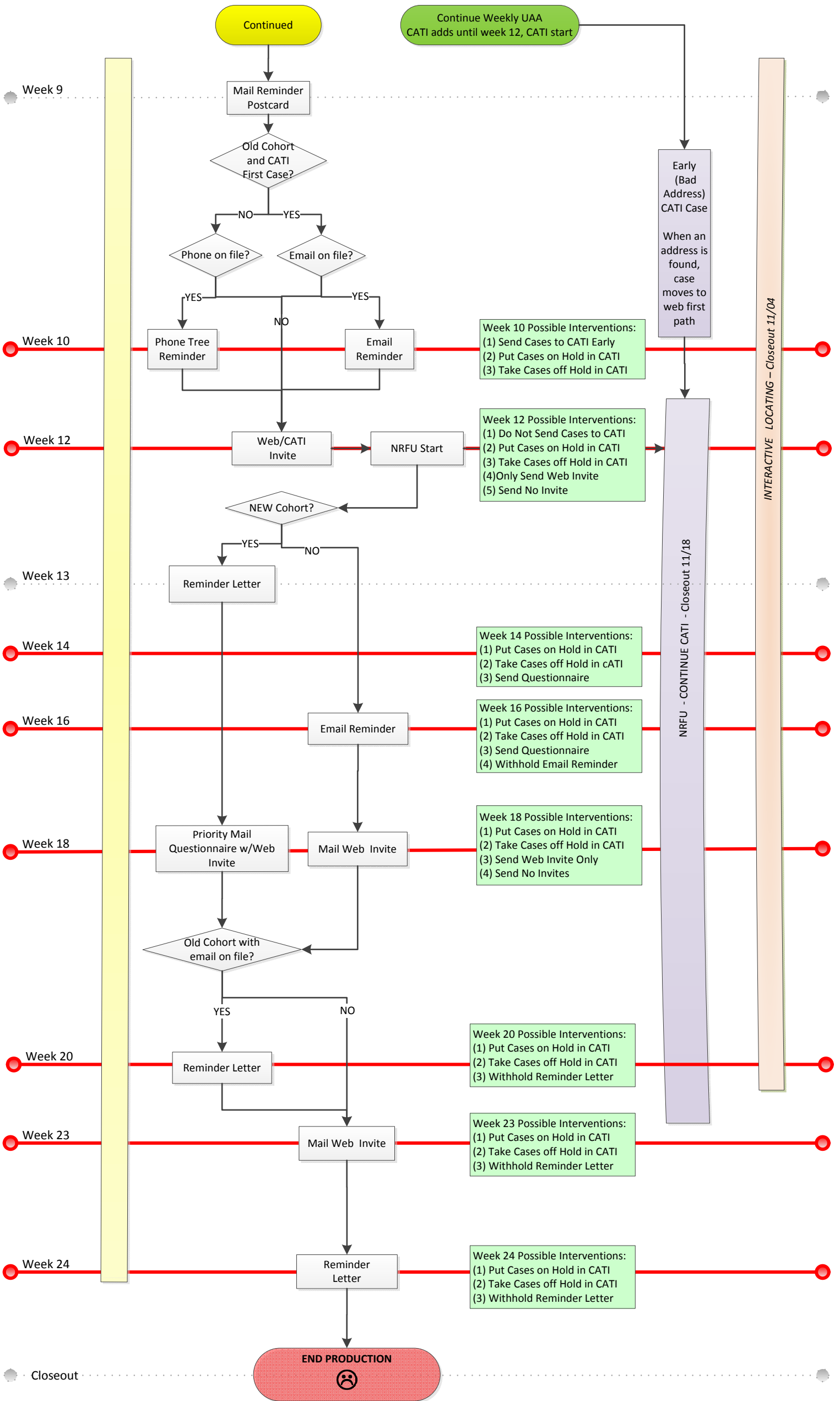
metrics. The specific criteria are described generally below and the specifics are provided in Table H.1.

The interventions that are considered at a given week are designed to address specific data collection goals. Early in the data collection, the adaptive interventions attempt to increase the representativeness of the responding sample by reducing under-representativeness in certain subgroups. During the middle of the data collection, some of the interventions attempt to address under-representation concerns, for example with extra questionnaire mailings to the specific groups, while others focus more on trying to increase representativeness by reducing over-representation through the reduction of contacts to certain subgroups. Finally, near the end of the data collection, using metrics such as the number of trips to locating, response propensities, and the number of call attempts, the interventions attempt to control data collection costs. The list of potential interventions for each week is shown in Table H.1. which includes information about metrics and criteria used and adaptive interventions by week.

**Figure H.1. Adaptive Design Experiment: Data Collection Flow**







**Table H.1. 2017 NSCG Adaptive Design Experiment: Intervention Schedule and Criteria**

<b>Intervention Week</b>	<b>Adaptive Interventions</b>	<b>Metric to Track</b>	<b>Eligibility for Intervention</b>	<b>Other Contributing Factors</b>
<b>4</b>	Send Cases to CATI early	R-Indicators Overall Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is less than -0.01.	- If these subgroups are low interest groups (e.g., non-S&E) we may not intervene. - If the subgroups are very large and we do not want to move all cases to CATI, use response propensity for these cases, and move over "higher" propensity cases.
	Send Questionnaire	Propensity to Respond by Mode	- If the probability to respond by mail > probability to respond by web, consider for intervention.	- If these cases are in over-represented groups or if they are in low interest groups (e.g., non-S&E), we may not intervene.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
<b>6</b>	Send Cases to CATI early	R-Indicators	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is less than -0.01.	- If these subgroups are low interest groups (e.g., non-S&E) we may not intervene. - If the subgroups are very large and we do not want to move all cases to CATI, use response propensity for these cases, and move over "higher" propensity cases.
	Send Questionnaire	Propensity to Respond by Mode	- If the probability to respond by mail > probability to respond by web, consider for intervention	- If these cases are in over-represented groups or if they are in low interest groups (e.g., non-S&E), we may not intervene.
	Put Cases on Hold in CATI	R-Indicators  Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
8	Send Cases to CATI early	R-Indicators	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is less than -0.01.	- If these subgroups are low interest groups (e.g., non-S&E) we may not intervene. - If the subgroups are very large and we do not want to move all cases to CATI, use response propensity for these cases, and move over "higher" propensity cases.
	Send Web Invite Only	R-Indicators Propensity to Respond by Mode Stability of Estimates	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01.	- If probability of responding by mail > probability of responding by web, we may apply this intervention to all cases in these subgroups. - If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Send No Mailing/Invite	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Put Cases on Hold in CATI	R-Indicators  Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
10	Send Cases to CATI early	R-Indicators	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is less than -0.01.	- If these subgroups are low interest groups (e.g., non-S&E) we may not intervene.
	Put Cases on Hold in CATI	R-Indicators Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
12	Do Not Send Cases to CATI	See Next Row	See Next Row	- This is effectively the same as putting cases on hold in CATI for nonrespondents in Week 12
	Put Cases on Hold in CATI	R-Indicators Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
12 (continued)	Send Web Invite Only	R-Indicators Propensity to Respond by Mode Stability of Estimates	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If probability of responding by mail > probability of responding by web, we may apply this intervention to all cases in these subgroups. - If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Send No Mailing/Invite	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
14	Put Cases on Hold in CATI	R-Indicators  Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Send Questionnaire	Propensity to Respond by Mode	If the probability to respond by mail > probability to respond by web, consider for intervention.	- If these cases are in over-represented groups or if they are in low interest groups (e.g., non-S&E), we may not intervene. - If overall response propensity is in lowest decile (or possibly quintile) we may not intervene.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
16	Put Cases on Hold in CATI	R-Indicators Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Send Questionnaire	R-Indicators	If the probability to respond by mail > probability to respond by web, consider for intervention.	- If these cases are in over-represented groups or if they are in low interest groups (e.g., non-S&E), we may not intervene. - If overall response propensity is in lowest decile (or possibly quintile) we may not intervene.
	Send No Email Reminder (Old Cohort Only)	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
18	Put Cases on Hold in CATI	R-Indicators Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
18 (continued)	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Send Web Invite Only	R-Indicators Propensity to Respond by Mode Stability of Estimates	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If probability of responding by web > probability of responding by mail, we may apply this intervention to all cases in these subgroups. - If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Send No Mailing/Invite	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
20	Put Cases on Hold in CATI	R-Indicators  Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.

Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
20 (continued)	Send No Reminder Letter	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	
23	Put Cases on Hold in CATI	R-Indicators  Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate Benchmarking to Frame Totals	- If previously over-represented cases are now under-represented or approaching being under-represented, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold. - If benchmarking to frame totals shows we may be inducing bias by not contacting individuals in a subgroup, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Send No Web Invite	R-Indicators Overall Response Propensity	- If a (higher than above) threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.20.	- If the most over-represented subgroups are not much different than other groups, we may not use this intervention. - If key estimates of interest have not stabilized in the experimental group, we may not use this intervention.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	



Intervention Week	Adaptive Interventions	Metric to Track	Eligibility for Intervention	Other Contributing Factors
24	Put Cases on Hold in CATI	R-Indicators Trips to Locating Response Propensity	- If a threshold of a metric of interest is met. For example, if the unconditional partial R-indicator is greater than +0.01. - If a case has been to locating 4+ times, put case on hold. - If response propensity is in the lowest decile of the subgroup, put case on hold.	- If key estimates of interest have not stabilized in the experimental group, we may not use this intervention. - If a case with many trips/calls or low propensity is in a high interest group, we may not use this intervention until late in data collection.
	Take Cases off Hold in CATI	R-Indicators Response Rate	- If previously over-represented cases are now under-represented or have an unconditional partial R-indicator less than +0.002, take cases off hold. - If response rate for subgroup is 10% less than control, take cases off hold.	- If estimates are not significantly different from the control group, we may not intervene. - If estimate have stabilized, we may not intervene. - If benchmarking to frame totals shows that we are accounting for nonresponse of both controlled for and uncontrolled for variables, we may not intervene.
	Send No Final Reminder Letter	Existing Restrictions Response Propensity	- Consider cases that were previously on hold in CATI or previously did not receive mailings for intervention.	- If we have any groups that we would like to have one last attempt at conversion, we may not intervene.
	Do Nothing		If criteria to intervene are not met or contributing factors outweigh interventions.	

## References:

- [1] Coffey, S. “Report for the 2013 National Survey of College Graduates Methodological Research Adaptive Design Experiment”. Census Bureau Memorandum for NCSES. April, 2014.
- [2] Schouten, B. Cobben, F. Bethlehem, J. “Indicators for representativeness of survey response.” *Survey Methodology*. 35.1 (June 2009): pp 101 – 113.
- [3] Schouten, B. Shlomo, N. Skinner, C. “Indicators for monitoring and improving representativeness of response.” *Journal of Official Statistics*. 27.2 (2011): pp 231 – 253.
- [4] Coffey, S. Reist, B. White, M. “Monitoring Methods for Adaptive Design in the National Survey of College Graduates (NSCG).” *2013 Joint Statistical Meeting Proceedings*, Survey Research Methods Section. Alexandria, VA: American Statistical Association.
- [5] de Leon A.R., Carriere K.C. “A generalized Mahalanobis distance for mixed data.” *Journal of Multivariate Analysis*. 92 (2005). 174-185.
- [6] Särndal, C., Lundström, S. (2008). Assessing auxiliary vectors for control of nonresponse bias in the calibration estimator. *Journal of Official Statistics*. 24, 167-191.
- [7] Wagner, J. (2014). “Limiting the Risk of Nonresponse Bias by Using Regression Diagnostics as a Guide to Data Collection.” Presentation at the 2014 Joint Statistical Meetings. August, 2014
- [8] Erdman C., Coffey S. (2014). “Predicting Response Mode During Data Collection in the NSCG.” Presentation at the 2014 Joint Statistical Meetings. August, 2014
- [9] Killick, R. Eckley, I. “Changepoint: An R Package for Changepoint Analysis”. Downloaded from <http://www.lancs.ac.uk/~killick/Pub/KillickEckley2011.pdf> on August 8, 2014.
- [10] Groves, Robert M., and Steven Heeringa. (2006). “Responsive design for household surveys: tools for actively controlling survey errors and costs.” *Journal of the Royal Statistical Society Series A: Statistics in Society*, 169, 439-457.