

Respondent-Centered Establishment Survey Design Principles: An Overview

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Annual Conference of the Federal Committee on Statistical Methodology (FCSM)

College Park, MD



U.S. Department of Commerce
Economics and Statistics Administration
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What is respondent-centered design?

- Wilson and Dickinson (2022): put the respondent in the driver's seat
- Smyth (2016): cognition, usability, and a holistic design model
- Willimack and Snijkers (2013: 39): “Businesses are different!”

Why do we want to be respondent-centered?

- Minimize measurement error
- Reduce non-response bias
- Reduce response burden
- Inform policy decisions

Interagency Collaboration

- Energy Information Administration, Department of Energy

Sarah Grady, Heather Ridolfo, and Benjamin Messer



- National Agricultural Statistics Service, Department of Agriculture

Kenny Herrell



- Census Bureau, Department of Commerce

Temika Holland, Kristin Stettler, and Melissa Cidade



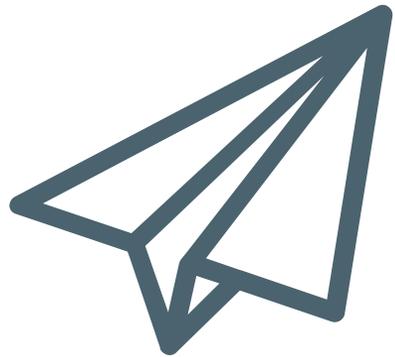
- National Center for Education Statistics, Department of Education

Maura Spiegelman



Four Guiding Principles:

Contact knowledgably



Gain as much information as possible about the response unit and the respondent prior to fielding the survey, and use that information to inform contact strategies;

Question carefully



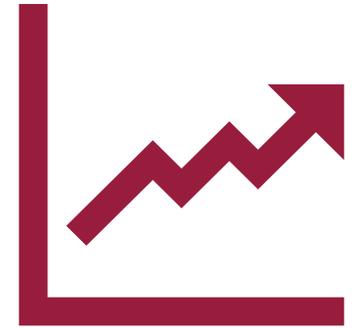
Consider the unique response processes in place for establishment surveys, particularly respondents' authority, capacity, and motivations to respond;

Design intuitively

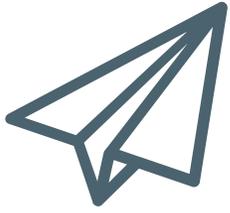


Layout instruments to be intuitive with minimal support to minimize response errors; and

Collect adaptively



Tailor data collection to respondents' needs, including questionnaire delegation/sharing, response mode selection, edit and content checks, and the use of previously reported data, administrative records, and third party data.



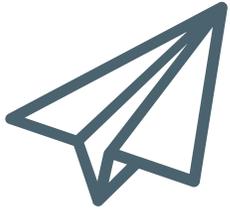
Principle 1: Contact knowledgably

What it means:

- Gain as much information as possible about the response unit and respondent prior to fielding the survey, and use that information to inform survey design

Why it matters:

- Davis and Pihama (2009): staff turnover predicts response status
- Gravem et al. (2011): mismatches between survey questions and data availability were a leading cause of perceived response burden
- Snijkers et al. (2023): respondent communications predicts response status



Principle 1: Contact knowledgably

Best Practices:

- Consider the design implications of your response unit
- Tailor your communication strategies and messages to respondents

Research Methodologies:

- **Record Keeping Studies:** how companies keep their data
- **Contact Tracing Studies:** Identifying best contact



Principle 2: Question carefully

What it means:

- *Hybrid Response Model*: Different cognitive response process for establishment surveys (Willimack and Nichols 2010)
- *Business Survey Response Model*: Different social response process for establishment surveys (Willimack and Snijkers 2013)

Why it matters:

- Janik and Kohaut (2011): establishment response process is predictive of response status
- Tuttle, Morrison, and Willimack (2010): iterative, respondent-centered design produces a better survey



Principle 2: Question carefully

Best Practices:

- Keep instructions brief and use sparingly
- Tailor wording where appropriate
- Address privacy concerns

Research Methodologies:

- **Cognitive Testing:** identifies question issues
- **Early-Stage Scoping:** combines cognitive testing and exploratory interviewing
- **Pilot Testing:** uses qualitative and quantitative methods to test questions



Principle 3: Design intuitively

What it means:

- Usability Performance Metrics (Geisen and Romano Bergstrom 2017; ISO/IEC TR 9126-4: 2004):
 - Effectiveness (Accuracy)
 - Efficiency
 - Satisfaction

Why it matters:

- Romano Bergstrom, Erdman, and Lakhe (2016): placement of buttons impacts instrument performance
- Nichols, Olmsted-Hawala, Holland, and Anderson Riemer (2020): usability testing encompasses many methodologies



Principle 3: Design intuitively

Best Practices:

- Instrument flexibility and adaptability is a must
- Use design features to cue response

Research Methodologies:

- Paradata analyses – data generated by the instrument
- Usability testing – task-oriented interviews
- Debriefing interviews – retrospective reporting



Principle 4: Collect adaptively

What it means:

- All of the activities included in the actual collection of survey data, including (but not limited to):
 - Contact and collection mode(s)
 - Contact and collection materials
 - New and emerging collection techniques

Why it matters:

- Rodhouse and Ott (2022): Previously reported data lowered perceived burden
- Snijkers et al. (2023): respondent communications predict response status



Principle 4: Collect adaptively

Best Practices:

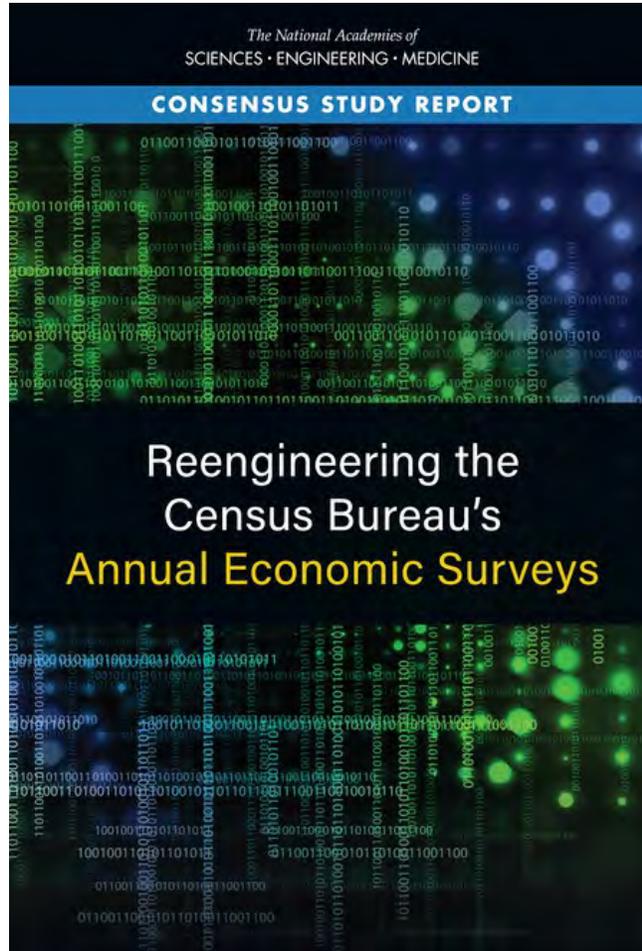
- Incentives are more complicated for establishment surveys
- Consider multiple methods of response within modes – spreadsheets, system-to-system data reporting, third party data

Research Methodologies:

- **Classic experimental design** – changing one factor of a research plan to track its impact on performance
- **Response Analysis Survey** – a survey sent after completion to estimate burden
- **Small-scale technology pilot** – working closely with technical staff to integrate new technologies

Annual Integrated Economic Survey (AIES)

NAS Panel of Experts and the ABSS



- Panel of Experts
- Factors:
 - Budget pressures
 - Declining response rates
 - Increasing timeliness and granularity
 - Increasing competition
- ABSS to include:
 - Integrated and harmonized content
 - Revamped sampling strategy
 - Coordinated collection strategy
 - Inclusion of alternate response methods
 - Single dissemination platform
 - Multi-sector and subnational estimates

ANNUAL INTEGRATED ECONOMIC SURVEY (AIES)

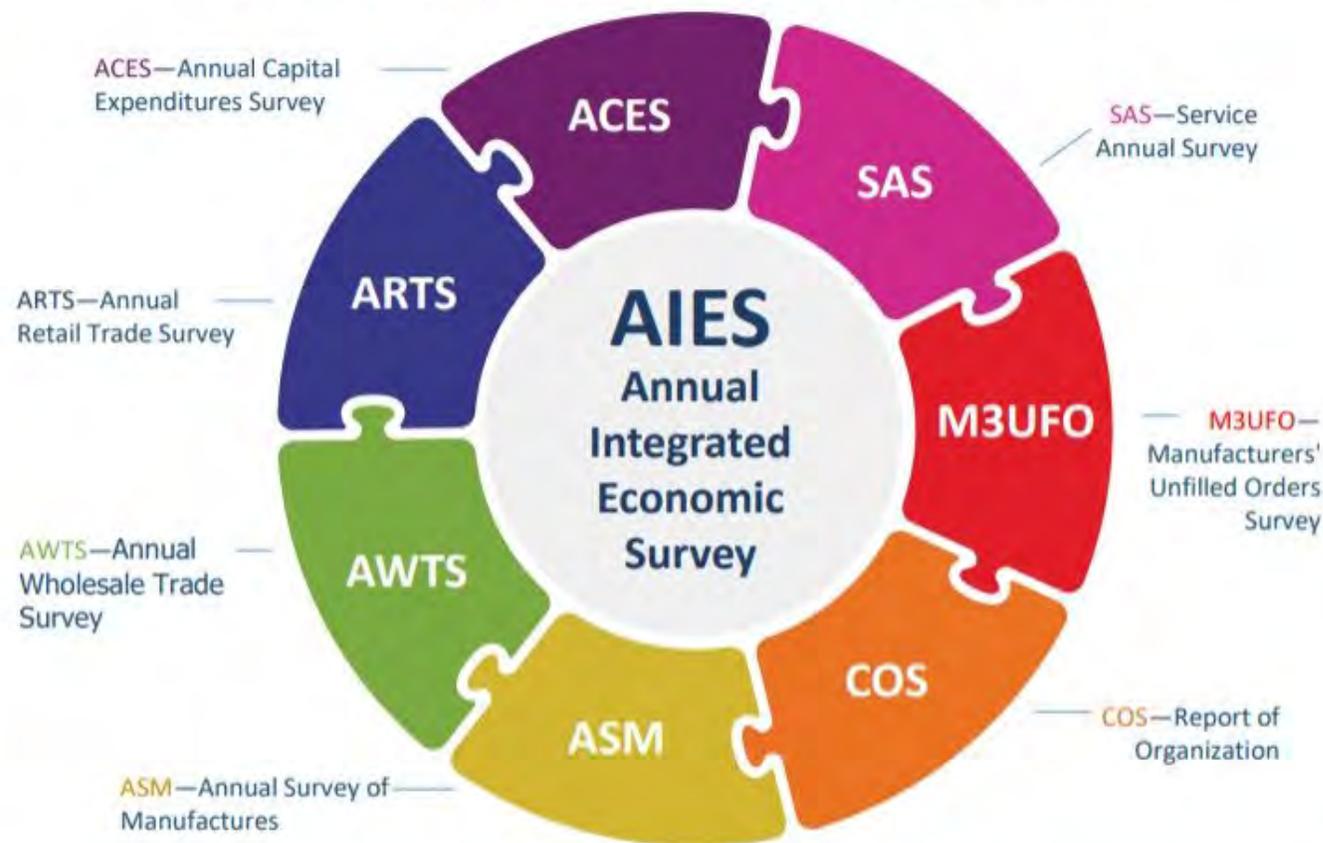
Integration of Seven Annual Economic Surveys

Current State

- Industry focused.
- Overlapping content.
- National estimates.
- Independent samples.
- Different reporting units by program.
- Inefficient processes and operations.
- Varying classification systems.

Future State

- Alignment to enterprise programs.
- Consolidated processing system.
- Integrated frame and sample.
- National and state geographic estimates.
- Standardized and rotating content.
- Respondent centric.
- Coordinated collection and instruments.
- Harmonized reporting units.
- Leveraging of alternative data.
- Holistic company analysis.
- Economy-wide data products.



2020

Test coordinated collection, evaluate existing content.

2021

Harmonize and test content, create frame prototype.

2022

Test sample selection, finalize content, and conduct pilot.

2023

Develop instrument & systems, conduct dress rehearsal, finalize frame.

2024

Load finalized sample, launch the AIES, collect data.

2025

Analyze and release the AIES data.

Application of the Principles

Combining Content: Considerations for Impactful Change

Heidi St.Onge



Iterative Instrument Usability Testing and the AIES

Rebecca Keegan



Respondent-centered Response Options and the AIES

Rebecca Hutchinson

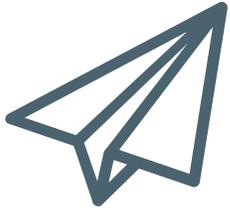
Combining Content: Considerations for Impactful Change

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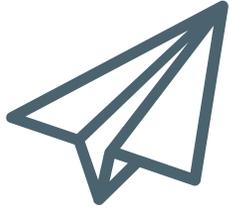
Contact Knowledgably

What it means:

- Design the survey and materials based on prior knowledge of the respondent and/or response unit.

Best practices:

- Consider the design implications of your response unit
- Tailor your communication strategies and messages to respondents



Contact Knowledgeably

N = 59

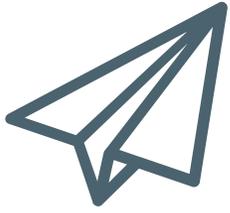
What did we consider?

- Structure
 - What do we know about business?
 - How can we leverage?
- Records
 - Types?
 - Storage?
 - Access?
 - Changes?

What we did:

Two-phased study on response units:

- Round 1: In-depth interviews focused on how kept records
- Round 2: Novel card-sort methodology on data accessibility



Contact Knowledgably

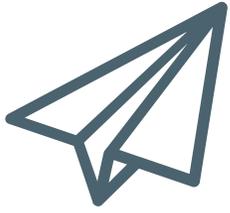
Findings:

- **Record Keeping Study:**

- Industry classification is challenging for respondents
- **Businesses varied in their operating units**
- Consolidated financial records act as an “anchor” for other data.

- **Accessibility Study:**

- Respondents struggled with their NAICS classification.
- Company-level data are the most accessible.
- State-level data were not accessible to respondents.



Contact Knowledgably

How did we implement?

- Company-level data is collected separately from other “levels”
- Do not collect data at State level
- Implemented means to collect at multiple levels based on company records.
- NAICS/Industry was given additional attention



Question Carefully

What it means:

- Establishment surveys are completed by humans, they are using some of the same cognitive response processes, **and records.**

Best Practices:

- Keep instructions brief and use sparingly
- Tailor wording where appropriate

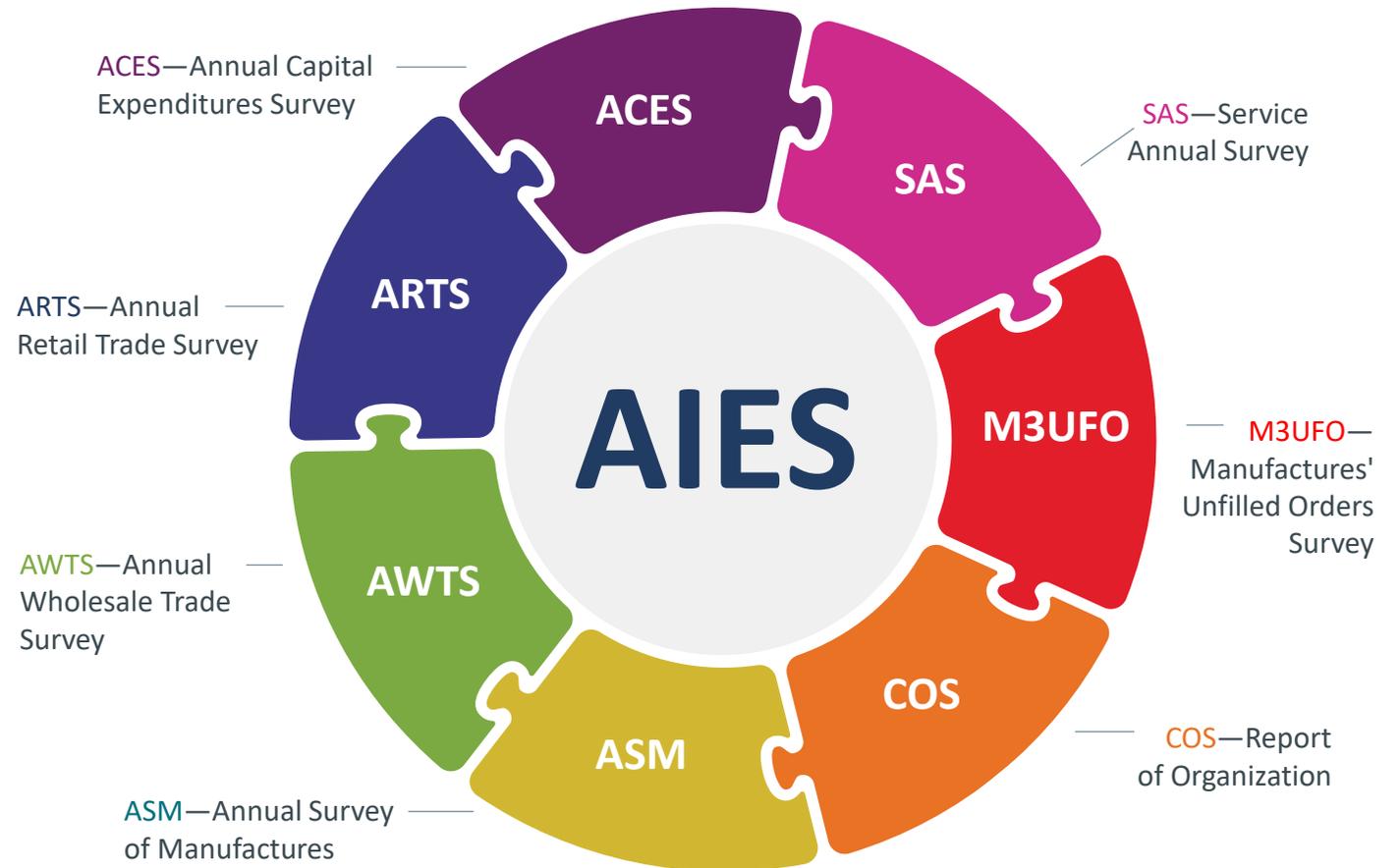


Question Carefully

What did we consider?

- Pulling together all the appropriate people
 - Stakeholders
 - SMEs
- Decision making in a large group
- 1000+ items

Integration of Seven Annual Economic Surveys





Question Carefully

REVENUE EXAMPLE

RETAIL



What were the total sales of merchandise and other operating receipts for this firm in 2021?

WHOLESALE



What were this firm's TOTAL sales and operating revenue in 2021?*

What were this firm's sales and other operating receipts in 2021?

SERVICES



What were the revenues for this firm in 2021?

MANUFACTURING



What was the total value of products shipped and other receipts for this establishment?

What were the sales, shipments, receipts, or revenue?***

AIES



What were the total sales, shipments, receipts, or revenue in 202X?



Question Carefully

What we did:

- Phase 1 of Pilot
 - Putting in one place to get reactions from Rs

Survey Modules:

The table below outlines the four modules within this survey. Use the links to access the different parts of the survey. You can consider your response complete once you submit data for every section.

	PDF Preview of Questions	Access the Survey (Begin/Resume)	Share the Survey Module
Module 1: Company Overview	Module 1 Company Overview Preview	Report Now	Share Module 1
Module 2: Establishment-based Questions	Module 2 Manufacturing Establishments Preview	Report Now for Manufacturing Establishments	Share Module 2 - Manufacturing
	Module 2 Non-Manufacturing Establishments Preview	Report Now for Non-Manufacturing Establishments	Share Module 2 - Non-Manufacturing
Module 3: Industry-based Questions	Module 3 Manufacturing Preview	Report Now for Manufacturing Industries	Share Module 3 - Manufacturing
	Module 3 Non-Manufacturing Preview	Report Now for Non-Manufacturing Industries	Share Module 3 - Non-Manufacturing
Module 4: Additional Establishments	List of Establishments Module 4 Preview	Add Missing Establishment(s)	Share Module 4 - Additional Establishments



Question Carefully

Findings:

- Complexity of certain constructs inhibited harmonization
 - Content sometimes was ambiguous
- Duplicative content – higher burden
- Duplication of pre-listed information

Design Implications:

- Certain instructions/questions were kept separate.
 - Updating language for multiple-industries
- Auto-sum functionality
- Included a step to “verify locations” in instrument

Iterative Instrument Usability Testing and the AIES

Rebecca Keegan

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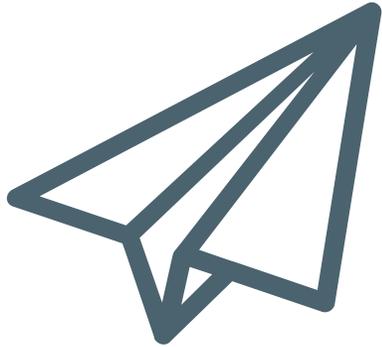


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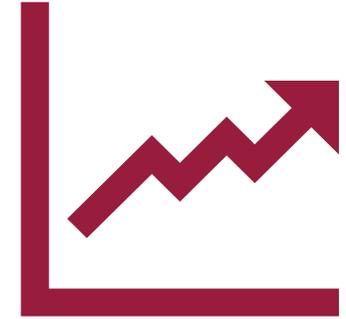
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Design intuitively



Layout instruments to be intuitive with minimal support to minimize response errors; and

Collect adaptively



Tailor data collection to respondents' needs, including questionnaire delegation/sharing, response mode selection, edit and content checks, and the use of previously reported data, administrative records, and third party data.



Principle 3: Design intuitively

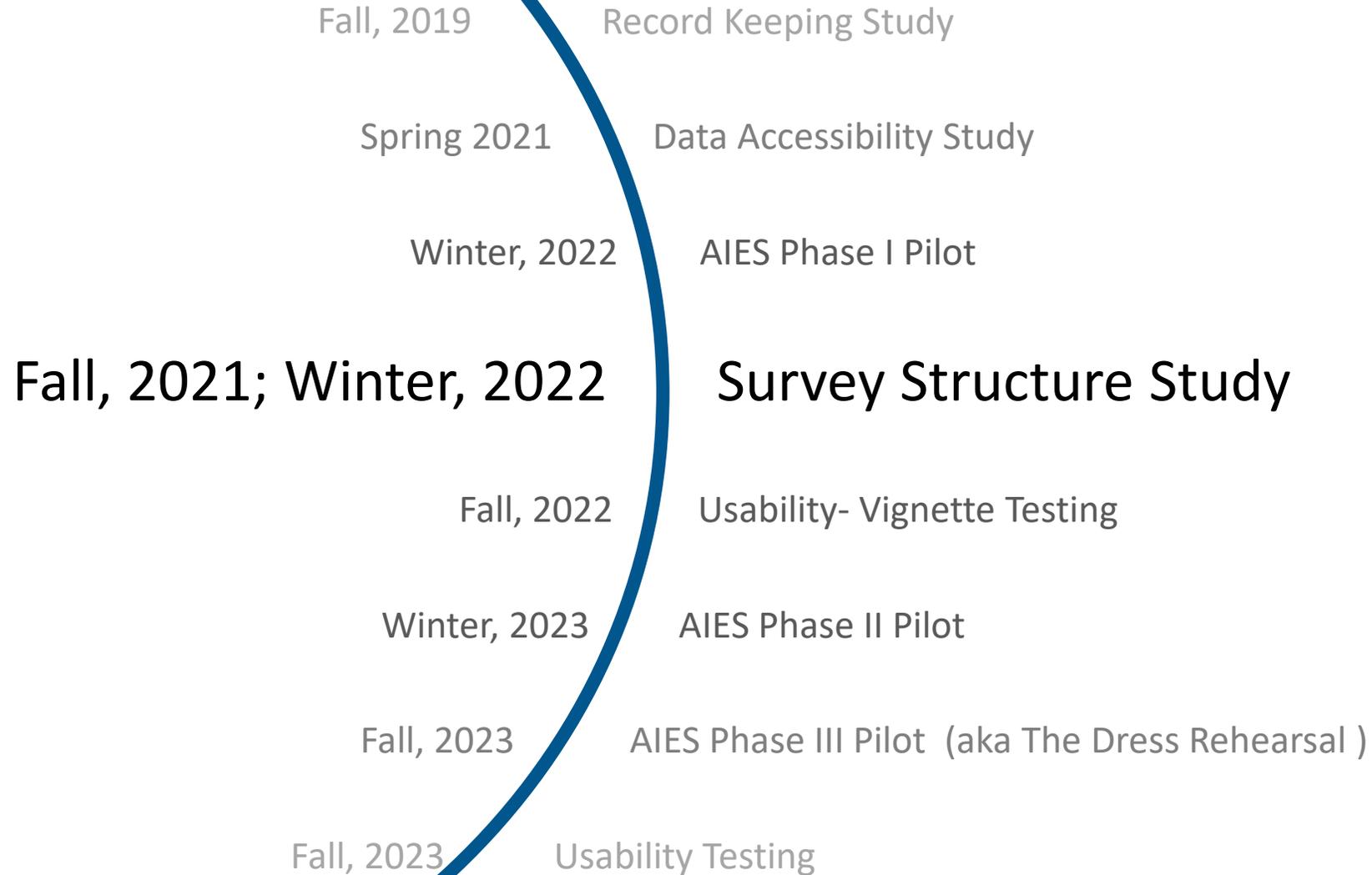
Best Practices:

- Instrument flexibility is a must
- Use design features to cue response

Research Methodologies:

- Usability testing – task-oriented interviews
- Debriefing interviews – retrospective reporting
- Paradata analyses – data generated by the instrument

User Research Timeline





Design Intuitively

What did we consider?

- Structure
 - Establishment versus company data organization
- Records
 - Does the structure map to their records?
- Response Mode
 - Spreadsheet or traditional page-by-page

What we did:

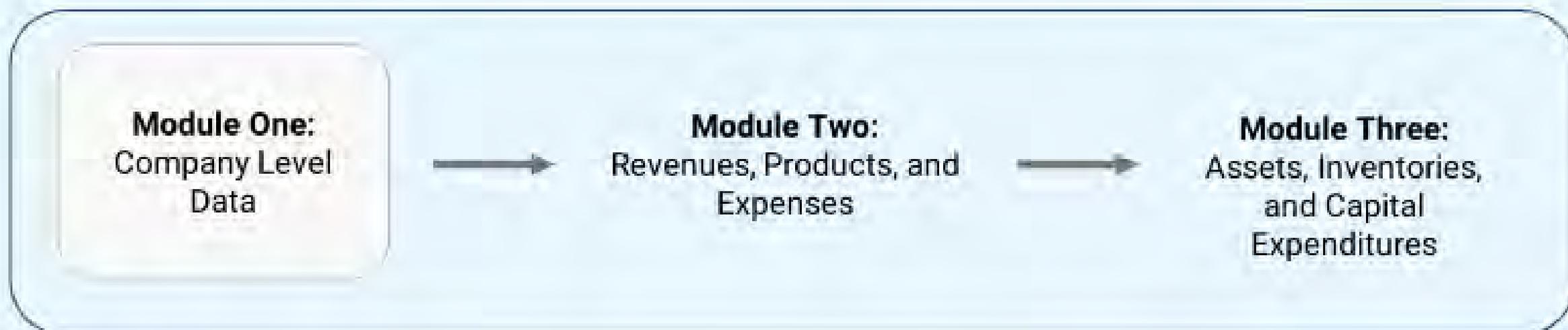
Survey Structure

- Cognitive Testing
 - 2 Rounds
 - N = 39
- Participants viewed:
 - Early mockups of the instrument
 - A consolidated list of the question topics within each module

Overview

Welcome to the **Annual Integrated Economic Survey**. This survey is designed to merge the annual surveys you receive from the Census Bureau into one consolidated report.

To begin, first you will complete **Module One** which relates to higher level company data. That data will then carry over into **Modules Two and Three** which ask for more detailed company data.



[Save and Continue >](#)



Design Intuitively

Survey Structure

Findings:

- Structure
 - Separating company totals from establishment data made sense
- Record Keeping
 - Want survey question previews
- Response Mode
 - Spreadsheet better for detailed data
 - Page-by-page better for data that is easy to obtain



Design Intuitively

Survey Structure

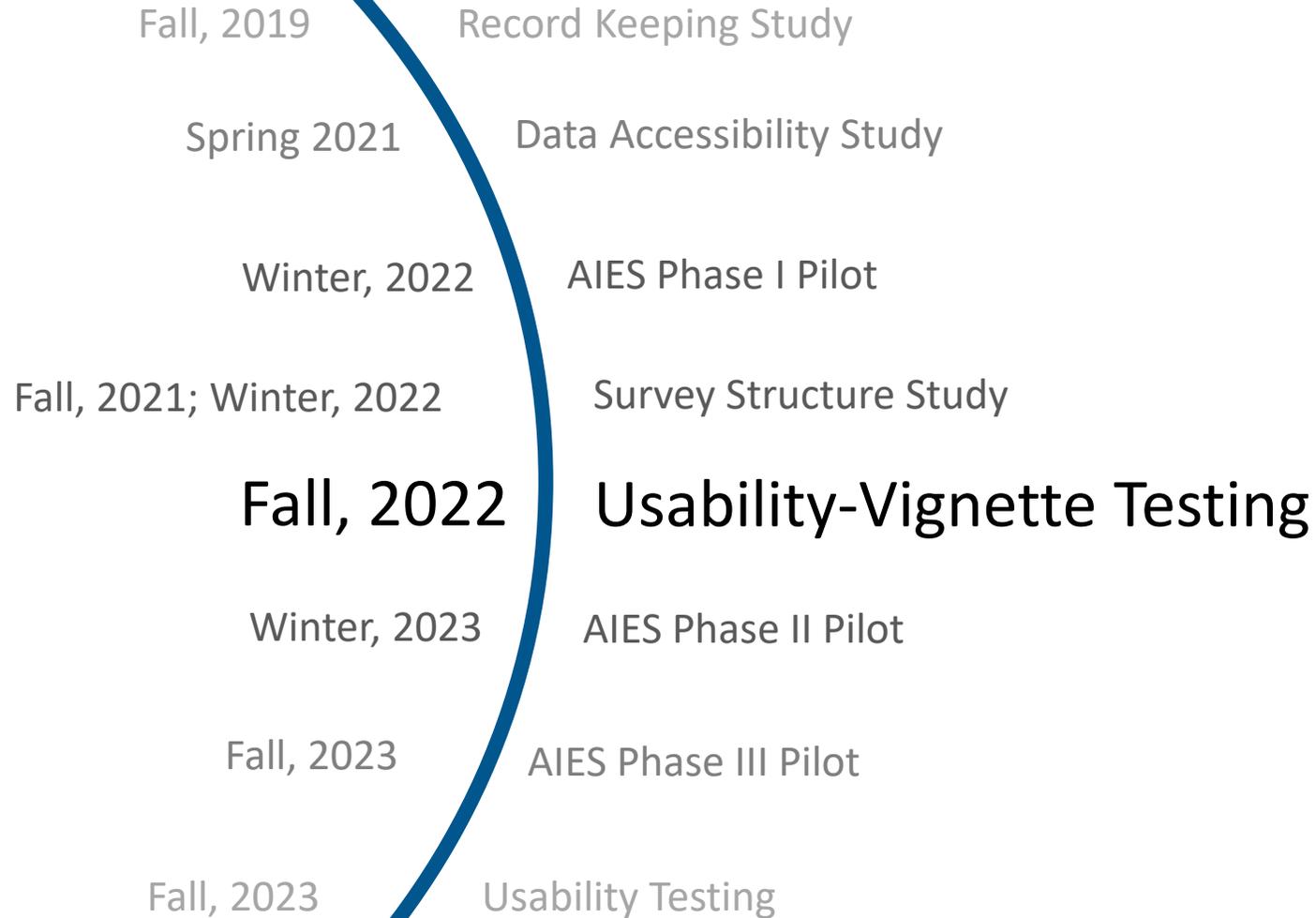
How did we implement?

- Structure
 - Company totals collected separately from establishment data
- Record Keeping
 - Survey question previews made available
- Flexible Response Mode
 - Spreadsheet for detailed data
 - Page-by-page company level

User Research Timeline



User Research Timeline





Design intuitively: Usability Testing

Usability Testing:

- Method of assessing how functional a website is.
- Respondents given tasks designed to ensure they interact with key features
- Researchers draw conclusions about the website's:
 - Layout
 - Navigation
 - Functionality
- Using three measures of evaluation:
 - Effectiveness (Accuracy)
 - Efficiency
 - Satisfaction



Design Intuitively

Usability- Vignettes

What did we consider?

- Spreadsheet Design
 - Concept: Answering by Establishment or Industry
 - Navigation
- Features:
 - Auto-summing; Company totals reference

What we did:

- Low Fidelity Usability Testing
 - N = 10
- Assigned respondents 1 of 3 proxy companies & a ledger
- Task topics:
 - Navigation; Auto-summing
 - Concept: Answering by Establishment or Industry



Usability-Vignette Testing

Census Cat Company

Assigned a Company:

- Complex Company
 - 12 establishments
 - 5 industries
 - 2 manufacturing
 - 3 non-manufacturing (R, W, S)
- 

Task:

“There is a section of the survey that asks about the value of each product that you sell at the Census Cat Company. **Please indicate the value of your *canned cat food*.**”



Ledger:

Financial Data for Census Cat Company					
Annual Revenue					
Dog and Cat Food Manufacturing				Manufacture	
Name 1	Street	City	State	Canned cat food	
CENSUS CAT COMPANY	1001 CAT FOOD WAY	ELLWOOD CITY	PA	70	
CENSUS CAT COMPANY	1002 CAT FOOD WAY	BEAVER FALLS	PA	90	

**all data fictional*



Design Intuitively

Usability- Vignettes

What we found:

- Spreadsheet Design
 - Concept: Answering by Establishment or Industry
 - Well liked
 - Difficult to understand
 - Amount of content overwhelming
 - Familiar functionality for navigation and manipulation desired
 - E.g, ctrl+f, copy/paste, filter and sort, hide and freeze.
- Features helpful, but not intuitive
 - Auto-summing; Company totals reference



Design Intuitively

Usability- Vignettes

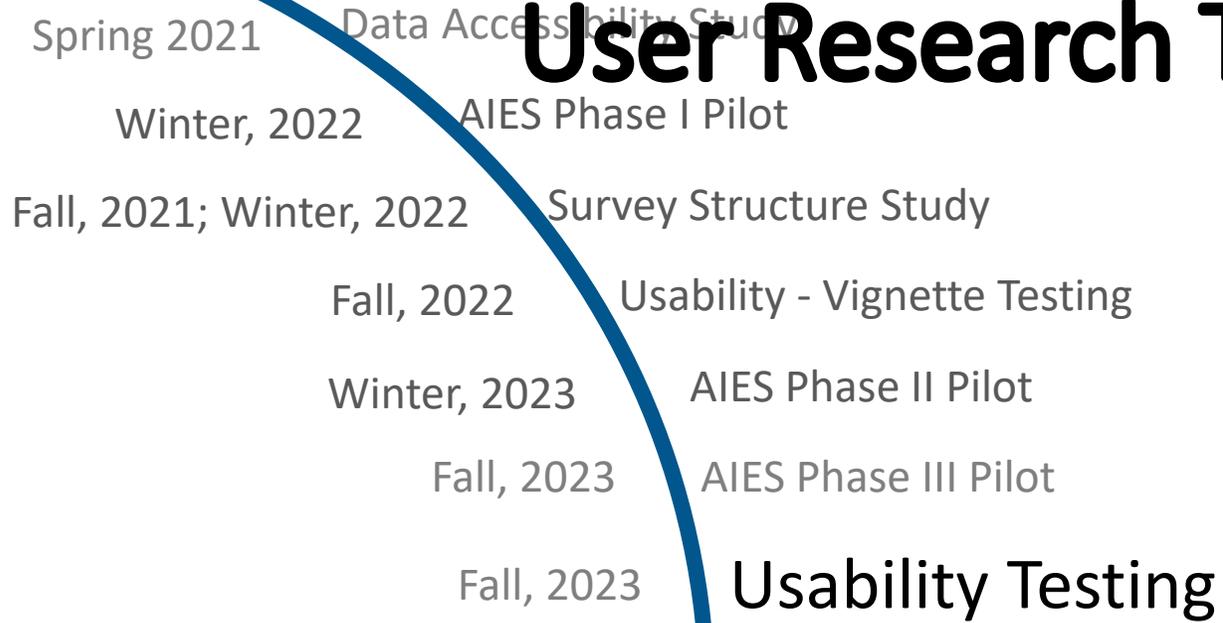
How did we implement?

- Spreadsheet design:
 - Incorporated establishment or industry choice into *Pilot II* for testing
 - Content parsed out
 - Company totals separated from establishment data
 - Familiar functionality incorporated
 - E.g, ctrl+f, copy/paste, filter and sort, hide and freeze
- Features:
 - Auto-summing & company totals reference given more attention in Pilot II and production instrument

User Research Timeline



User Research Timeline





Design Intuitively

Usability

What will we consider?

- End-to-end usability testing of instrument prototype
- **Topics:** Navigation, layout, edits, satisfaction

What we will do:

- Respondents given tasks designed to understand how they interact with the web instrument
 - N ≈ 30
 - Interviews happening, now!

Respondent-centered Response Options and the AIES

Rebecca J. Hutchinson

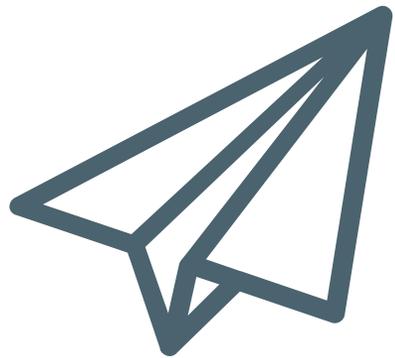
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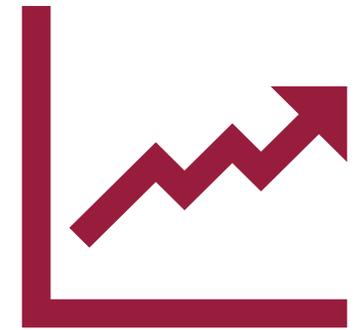
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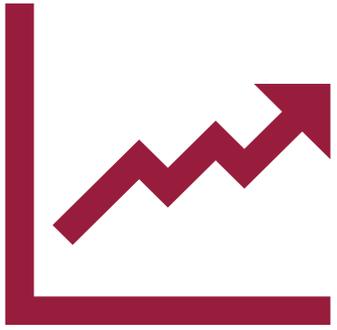
Collect Adaptively

What it means

- Use new and emerging response options to make the collection experience more automated and less burdensome
- Supplement or replace traditional survey collection

What did we consider?

- What are non-traditional methods of response that might be useful?
- Do these data fulfill the traditional AIES collection instrument ask?



Alternative Data Sources

Benefits

- More timely and granular data
- Reduced respondent burden
- Mitigated survey nonresponse

Challenges

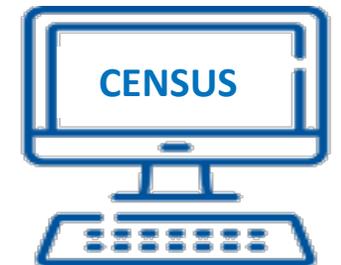
- Cost
- Processing
- Storage
- Unstructured Data



Administrative Data

Obtain data received by other government agencies for non-statistical purposes or through special agreements or publicly available feeds

- Benefits
 - Repurposes data already submitted for other use
 - Long history of use at Census Bureau
- Constraints
 - Can be available on a lag
 - Can be difficult to align data to survey items

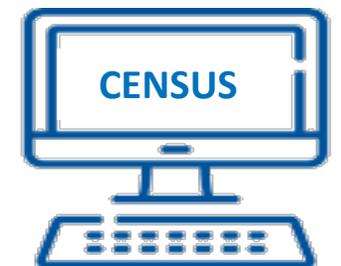
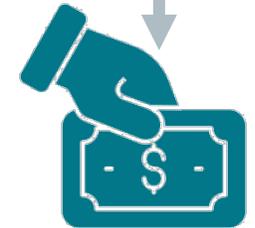




Third-Party Data

Purchase data from a vendor using acquisitions process

- Build upon success of using point-of-sale retail data in our retail and construction indicator programs
- Benefits
 - More granular
 - More timely
- Constraints
 - Data items can be limited
 - Limited or no availability in some sectors

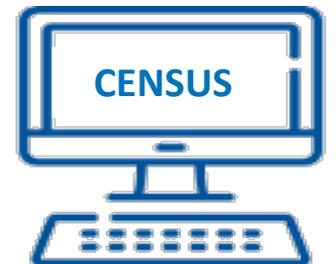




Direct Company Feed

Companies push financial feeds rich in data to Census either directly or via a third-party platform

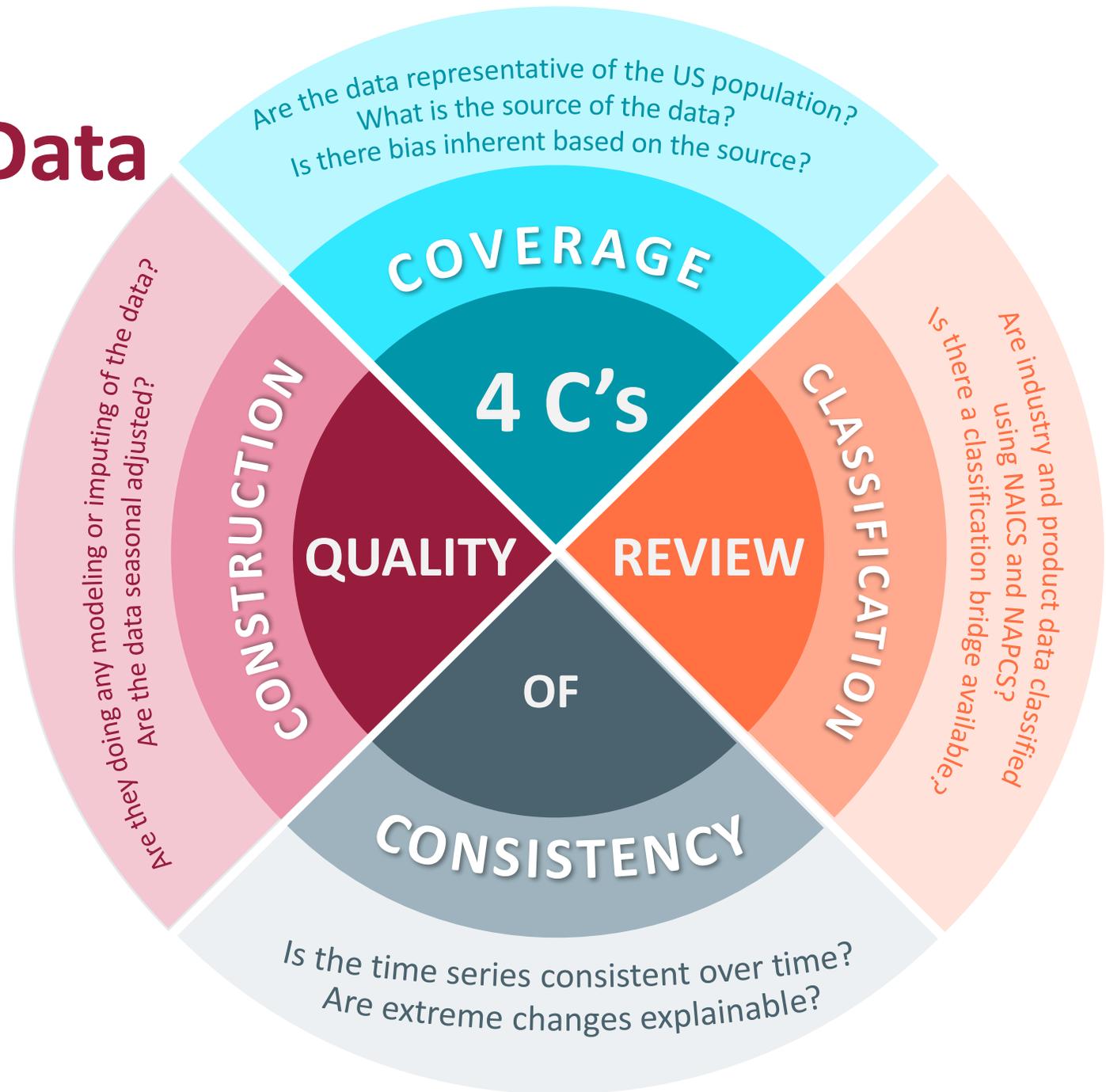
- Benefits
 - Makes use of existing company feeds or files
 - Can pass high volume of data along to Census
- Constraints
 - Need to align items in feeds to survey items
 - Currently limited to a small number of companies
 - Requires data cleaning

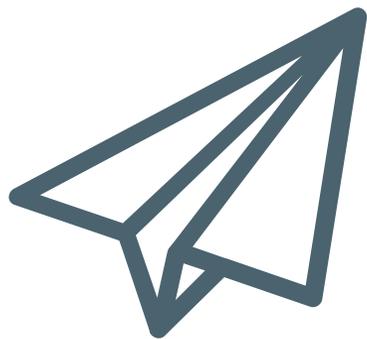




Third Party Data

How do we QA other data sources?





**Contact
Knowledgeably**



**Question
Carefully**

Thank you!

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Design Intuitively



Collect Adaptively