

Redesign Options for the Consumer Expenditure Survey

Nancy Mathiowetz, University of Wisconsin-Milwaukee

Kristen Olson, University of Nebraska-Lincoln

Courtney Kennedy, Abt SRBI

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Understanding the Problem

- **Disparity between CE and Benchmarks**
 - Measurement error
 - Nonresponse error
 - Both
- **Changes in the Survey and Consumer Environment**
 - Use of technology in data collection
 - E-commerce; big box shopping
- **Flexible, Responsive Design**
 - Ecological validity: one size does not fit all
 - Mode, number of diaries, technology

New Design: Overview

- **Sample Design**
 - Cross-sectional and panel components
- **Questionnaire**
 - In person interview with four week diary
 - Tablet computer + scanner + barcode reader
 - Flexible memory 'triggers'
- **Alternative Data Sources**
 - Federal and nonfederal sources
- **Nonresponse**
 - Active monitoring
 - Responsive 'end-stage' design
- **Costs**

Study Design

- **Cross-sectional component**
 - Initial interview
 - Diary: One month of data collection
 - Wrap up interview
 - N=7000 completes per quarter
- **Panel component**
 - Three points in time, administered at six month intervals
 - Same design as cross sectional component
 - Initial Interview
 - One Month Diary
 - Wrap up Interview
 - N=450 completes per quarter per wave
- **Total number of interviews**
 - 8350 completes per quarter
 - $8350 \times 4 = 33400$ completes per year
 - Increase over the current design

Why a two-sample design?

- **Prospective data collection vs. retrospective recall**
 - Primary goal: Minimize use of retrospective recall
 - Minimum requirement: 12 month change estimates for the same household
 - 6 month interview allows additional information on a sample of households; less 'reteaching'
 - Retrospective questions to 'set the stage' and diagnose potential nonresponse errors
- **Respondent burden**
 - One or three interviews rather than five
 - Use all three interviews rather than throw away data
 - Outcome: lower attrition and panel conditioning
- **Micro-level analyses**
 - Within-CU change over an entire month
 - 2 weeks longer than the current design
 - Within-CU change over 6 months and one year
 - Analogous to Q1, Q3 and Q5 of current design, but current design does not release Q1

Precision levels

- **We estimate a SRS sample size of at least 41,100 to achieve the desired precision level specified by the CPI.**
 - This assumes no design effects, which would increase the required sample size
- **Current design achieves an estimated CV of 1.1% for mean total expenditures, again assuming an SRS**
- **As outside researchers, we have insufficient information on overall design effects, within-stratum standard deviations, or costs per stratum, cluster or interview to make reliable recommendations on stratification and allocation, or PSU subsampling rates**

Weighting Protocol

- General approach remain unchanged
- **Final Weight = Base Weight x Weighting Control Factor x Nonresponse Adjustment Factor x Calibration Adjustment Factor**
- We recommend evaluating inputs into the nonresponse adjustment factor
 - We will discuss this in more detail later

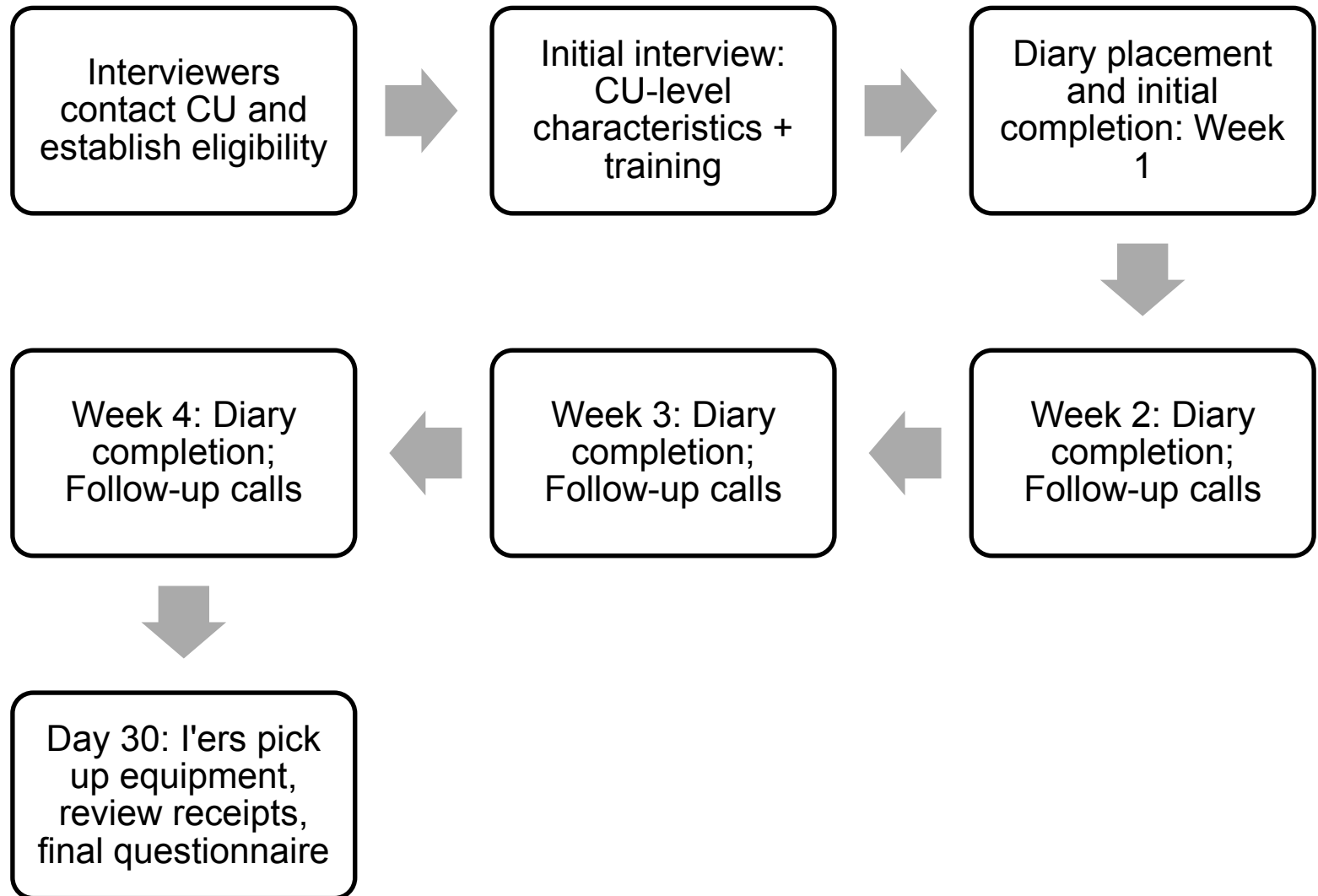
Survey Design: Overview

- **An initial face to face interview**
 - CU demographic characteristics (including income)
 - Technology ownership and use
 - Global questions for past year expenditures
 - Questions on expenditure monitoring by the CU
 - Retrospective questions on past year purchase of low frequency, high cost items (e.g., automobiles)
 - Training as to what and how to record information
- **An electronic diary recording device (e.g. tablet computer) with a web-based & computer-assisted diary**
 - Separate diaries for each member of the CU ages 16 and older
 - 30 day diary collection period
 - Additional hardware to scan barcodes and capture receipts, bills, and other documents electronically

Survey Design: Overview (2)

- **Memory ‘triggers’**
 - Paper portable diaries
 - Training to use CU-owned electronic devices as portable diaries
 - Placement of paper mini-diaries for children ages 7 to 15
 - Electronic file cabinets for CU members to upload electronic receipts
- **Ongoing monitoring of compliance throughout the one-month diary period**
- **Wrap up interview**
 - Scan receipts as needed
 - Review expenditures to collect payments that may not have been captured in the diary (e.g., automatic deductions)
 - Adjudicate reimbursements (e.g. medical expenses)
 - Retrospective questions as needed to establish as complete a record as possible for the CU

Field Protocol



Face to Face interview

- **In person recruitment and initial interview**
 - **Identify CU membership**
 - **Collect demographic and socioeconomic information, including income**
 - Past month & past year
 - **Retrospective questions focusing on major purchases**
 - During the past 12 months, have you or anyone in your family purchased a car, sport utility vehicle, minivan, or truck?
 - **Global questions**
 - How much do you spend on food in an average week?
 - How much are your monthly mortgage payments?
 - How much is your total yearly homeowner's insurance premium?
 - In the last month, how much did you and your family living there pay for each of these transportation related expenses....Gasoline? Repairs and maintenance? Parking and carpool? Bus fares and train fares? Taxicabs? Other transportation?
- **Expenditure monitoring behavior**

Computer-assisted diary

- **Completed by all members of the CU**
- **Tablet computer for all consumer units**
 - Eliminates potential mode effects for those with and without internet access
 - Permits individual confidential IDs for each CU member to log in
- **Web-based instrument**
 - Online web questionnaire for persons with broadband internet access at home
 - Information automatically reported to data collector
 - Compliance can be monitored
 - Provide wireless data plan access for persons without broadband internet access (about 34% in 2010)
- **Computer-assisted instrument**
 - Identical questionnaire to web instrument, but data stored on tablet
 - Provides same mode for those without broadband internet access at home or for whom wireless data plans not possible

Computer-assisted diary (2)

- **Four week reporting period**
 - Balance between costs of recruiting and training on equipment and respondent burden
 - Empirical literature is many decades old; does not reflect use of technology
 - CUs report something every day, even if it's simply that they made no purchases
 - Expands within-CU analytic ability across an entire month
- **Use of 'pick lists' for previously purchased items**
- **Source and type of expenditure cues**

Barcode and Receipt Scanning

- **Goal: Simplify the task of data entry into the diary for the CU as much as possible**
 - **Hypothesis:** If CU data entry is eased by record keeping, then they will be more likely to keep records
- **Goal: Provide electronic access to receipts and records in a confidential, secure manner directly linked to a diary entry**
 - **Hypothesis:** Directly linking record keeping to the survey task will improve reporting

Barcode and Receipt Scanning (2)

■ Barcode readers

- Advantage: Detailed information about each item with a barcode
- Disadvantage: No price information; not everything has a barcode
- Stand-alone vs. apps
 - Stand-alone: Ease of use; storage capacity; example: Scanfob 2002
 - Apps: potentially familiar; additional portable diary device; Example: Barcode Scanner; RedLaser; ShopSavvy

■ Receipt scanners

- Advantage: Capture details about item, cost, details on discounts and coupons
- Disadvantage: May be clunky; not all transactions yield receipts
- Stand-alone vs. apps
 - Stand-alone: Interface with device; designed for expense reports, not itemized costs; example: NeatReceipts
 - Apps: Use camera; may not be easy to capture all details on long receipts; Example: ProOnGo

Memory Triggers

- **Small “Portable” diary**
- **Cell phones, smart phones, PDAs for “real time” capture of pictures or voice diaries**
 - Paper portable diaries for those who prefer paper
 - 7 to 15 year olds: paper? Electronic?
- **IVR “drop boxes”**
- **Electronic receipts to personalized “file cabinet”**
- **Interface with existing financial software, e.g., Point of Purchase information from mint.com**

Feasibility Study

- **Conducted by Mathiowetz and graduate students**
- **Use of iPad2, iPod Touch, Short Questionnaire developed in Qualtrics, several different free or low cost apps**
- **Maintained “diary” for two weeks**
- **Questions of Interest**
 - Is this possible?
 - How burdensome?
 - How costly is the development?
 - How difficult to train user?
- **Results**
 - Possible to develop with little money and time using currently available applications, hardware, and software
 - Possible to train those of us who are technologically challenged
- **Of course, not recommending this approach—but demonstrates that the recommendation is not “pie in the sky”**

Example Diary: Requires data entry every day concerning purchases, bills, and services.

Q1. Did you (or anyone in your household) make any purchases today?

- Yes
 No

Q2. Did you (or anyone in your household) pay any bills today?

- Yes
 No

Q3. Did you (or anyone in your household) receive any services today for which there was a fee?

- Yes
 No

Q27. Please list all of the different types of food and beverages that you spent money on today.

	Item barcode or item name	Where did you buy the item?	How much did you spend on the item?	Were any coupons or discounts applied to this price?		Are you likely to purchase the item again this month?	
				Yes	No	Yes	No
Item 1	<input type="text" value="2049586765"/>	<input type="text" value="Grocery store"/>	<input type="text" value="2.49"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 2	<input type="text" value="4958374621"/>	<input type="text" value="Grocery store"/>	<input type="text" value="3.79"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 3	<input type="text" value="9304756384"/>	<input type="text" value="Grocery store"/>	<input type="text" value="5.95"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 4	<input type="text" value="7465837495"/>	<input type="text" value="Grocery store"/>	<input type="text" value="1.50"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 5	<input type="text" value="3746586948"/>	<input type="text" value="Grocery store"/>	<input type="text" value="5.29"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 6	<input type="text" value="1627384657"/>	<input type="text" value="Grocery store"/>	<input type="text" value="6.84"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 7	<input type="text" value="9067584934"/>	<input type="text" value="Grocery store"/>	<input type="text" value="4.47"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 8	<input type="text" value="1827364636"/>	<input type="text" value="Grocery store"/>	<input type="text" value="8.99"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 9	<input type="text" value="Hot dog"/>	<input type="text" value="Street vendor"/>	<input type="text" value="3.00"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 10	<input type="text" value="Coffee"/>	<input type="text" value="Cafe"/>	<input type="text" value="2.50"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

Feasibility Study Options for Data Entry:

1. Scan receipts and create individual items from receipt
2. Barcode items
3. Keying the information

Example: Prizmo is a multi-purpose document and image scanner with built-in Optical Character Recognition (OCR) made by Creaceed SPRL

Prizmo for iPhone FR DE



Process any Documents on the Road.

From an iPhone Picture to your Address Book, Dropbox Account, Google Translate...
Accurate OCR and TTS Technologies in 10 Languages.

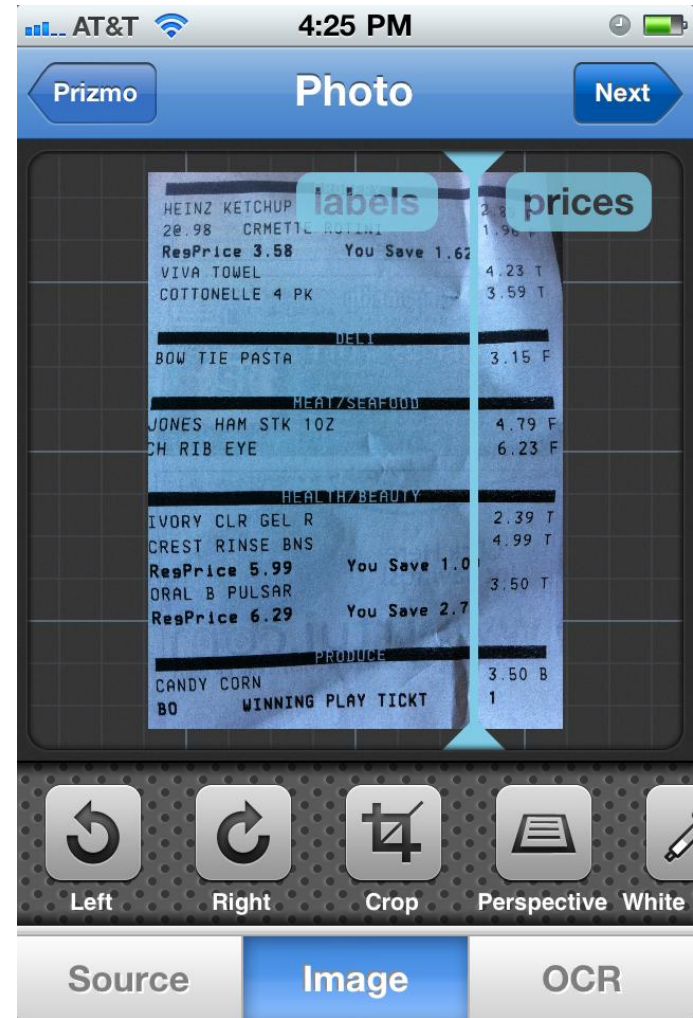
Image obtained from: <http://www.creaceed.com/prizmo/iphone/>

Importing Receipts

Receipts are imported into the application either through stored photos on the device, or by taking a image of a receipt in the application itself.

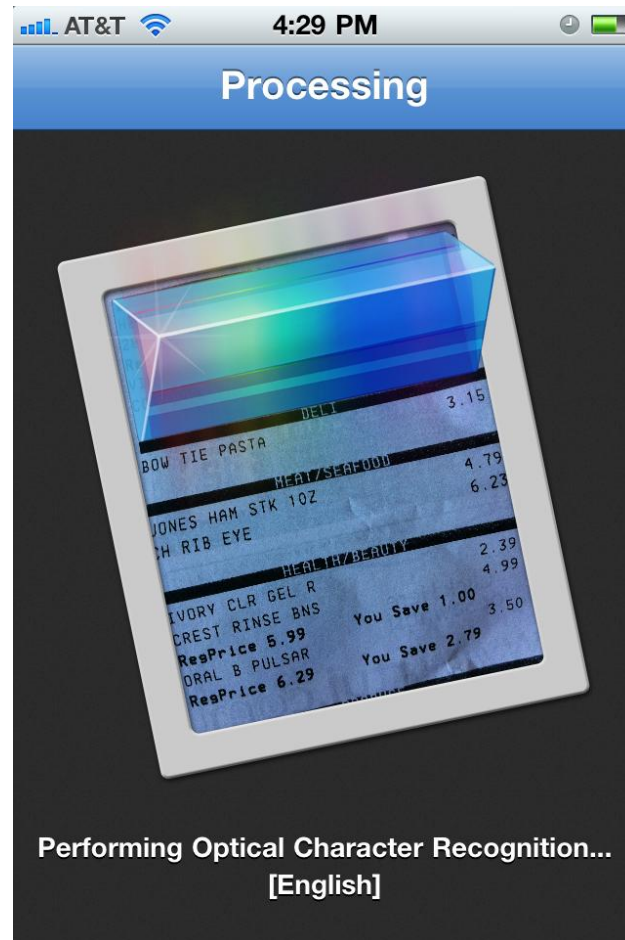


- After importing, images may be altered to improve the accuracy of the optical character recognition.
- This includes: Crop, perspective, white balance, and image rotation.
- The user is also asked to select the region in which prices and labels are displayed on the receipt itself.

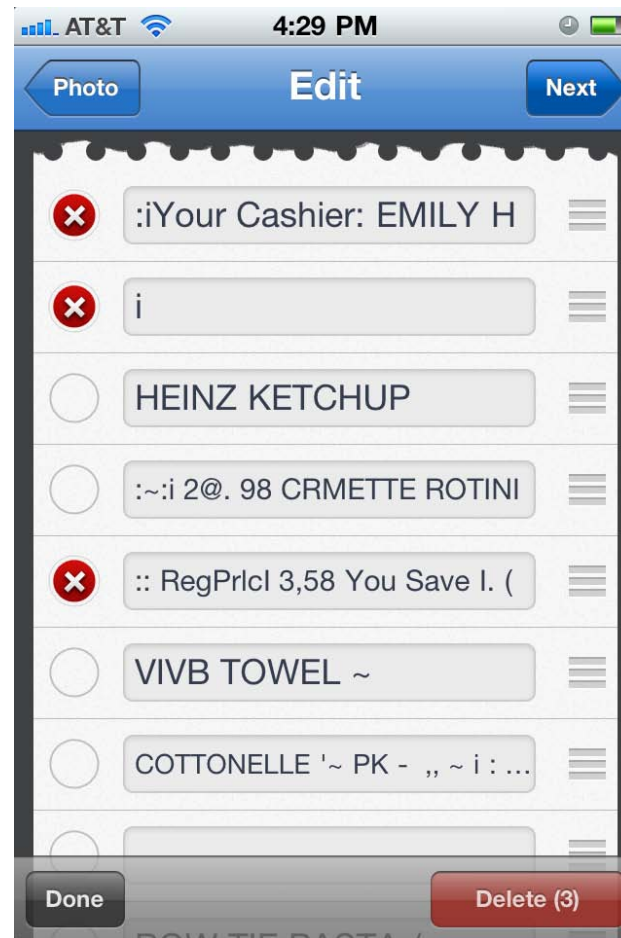


Optical Character Recognition of Receipts

After the user has selected preferences for the imported image, the application performs an automatic scan to detect labels and prices for individual items.



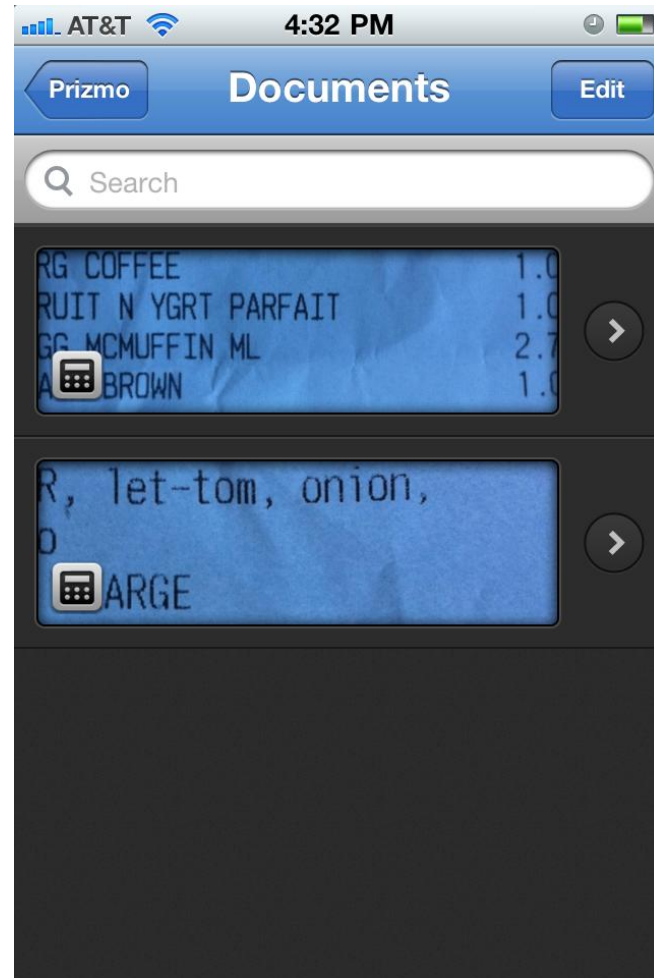
The output shows the user the individual items from the receipt. The user is free to edit the details of items or delete information that is not needed.



Storage and Exporting of Receipts

Receipts are stored locally on the device itself, but may be exported through email or various cloud services.

Images may be exported as the original receipt or as a .csv file that is already broken up in to a grid format separating individual items and prices.



Example of a handheld scanner.

Serialio - Scanfob® OPN-2002 Mobile Wireless Keychain Barcode Scanner



Scanfob® 2002

Scanfob® 2002 Wireless Laser Barcode Scanner With Batch Storage featur

Like 18 people like this. Be the first of your friends.

"Serialio.com has provided an very easy to use restocking solution and the support provided has been exceptional. Workers can take orders 50% faster than previously ... We saved approximately \$1,400 each (including the price of an iPad touch)..." testimonials.

Works with Apple iOS4 devices : iPad, iPhone, iPod.

The Scanfob® 2002 wireless Bluetooth laser barcode scanner enables collection bar coded data with ease. The scanner has an advanced scan engine that can read scans in many common environments (e.g. in plastic name tag holders at trade shows).

Very Small - Very Wireless - Very Easy-To-Use

The Scanfob® 2002 has a Wireless Bluetooth radio fast and easy connectivity for mobile applications. The

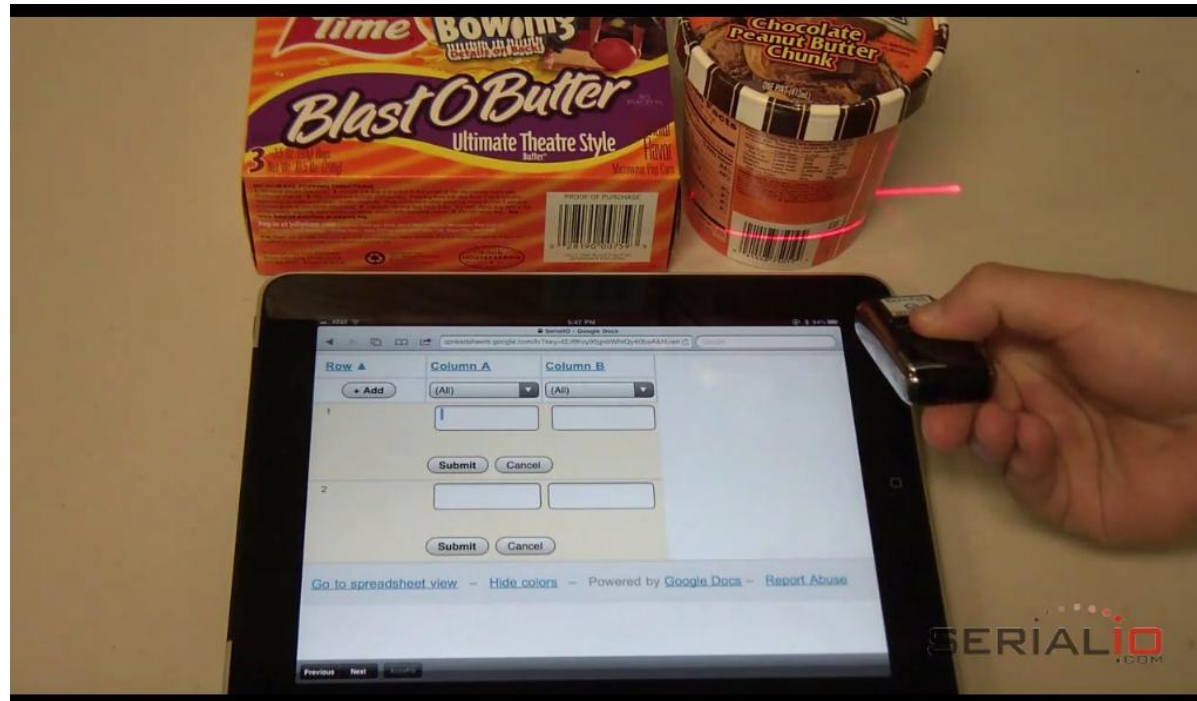


unit also has a batch mode* with memory of 20,000 scans. The small size of the scanner provides



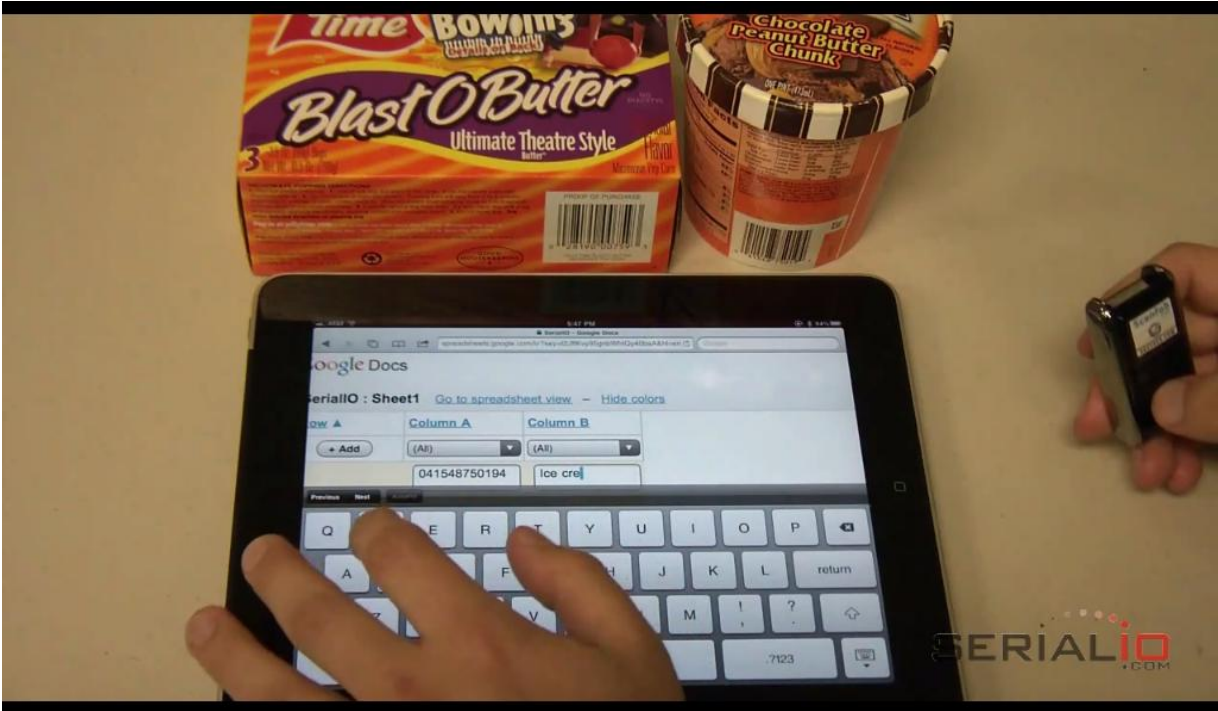
<http://www.serialio.com/>

The participants can scan the barcode information right into a text field provided as part of the diary.



<http://www.serialio.com/>


Other information about the products can be keyed directly with the onscreen keyboard




<http://www.serialio.com/>


ProOnGo Example: You can use pictures of receipts to capture the expense

Total Amount

 Amount **0.00** USD

 Tax **OFF** 1 Tax 2 Taxes

Split Amount

 Split Expense: **Dis**

Others

1 Category Other

2 Type Other

3 Client Other













4 Payment... Other

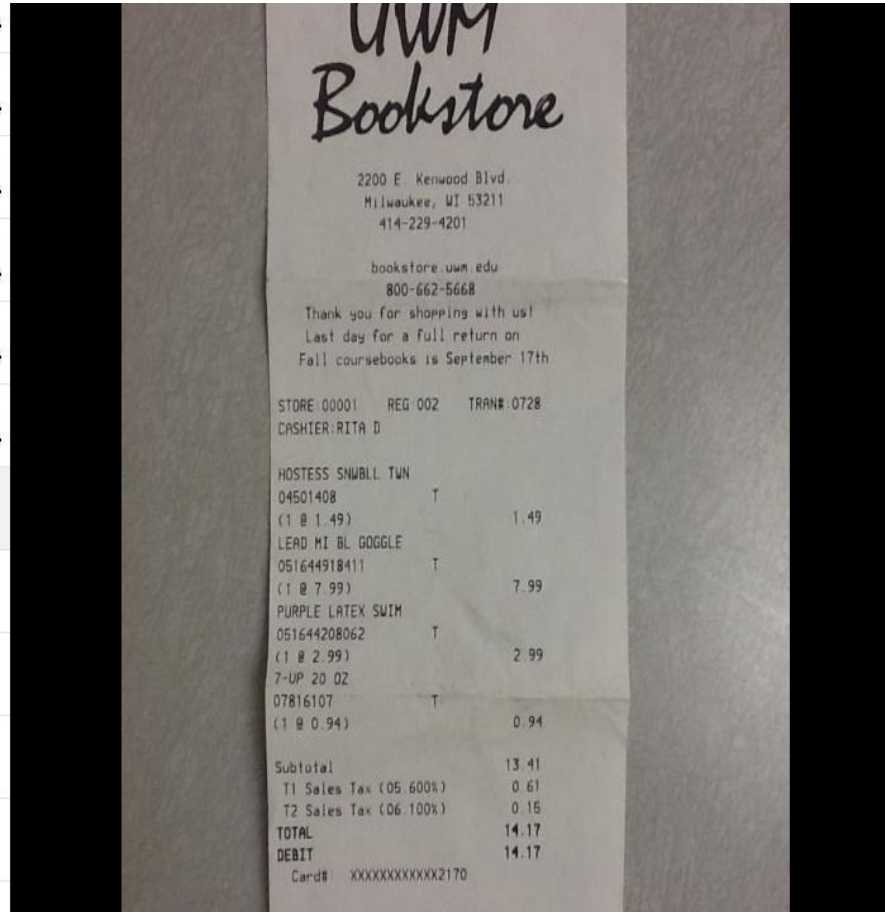
Choose to add a receipt now?

Add Receipt from Camera

Add Receipt from Library

This is an example of a receipt being used to capture this purchase from the bookstore


	14.17	10/11/2011	
	BP 19.50	10/11/2011	
	Aeropostale 89.11	10/07/2011	
	Alterra 4.56	10/01/2011	
	GameStop 73.35	09/30/2011	
	JO-ANN 62.61	09/17/2011	
<p><i>This list shows 6 of 6 expenses. Tap on Filter or the Manager button to hide, or show, additional expenses.</i></p>			




From the receipts the app extracts the main information such as where the expense is from, the total, and the date

	14.17	10/11/2011	
	BP 19.50	10/11/2011	
	Aeropostale 89.11	10/07/2011	
	Alterra 4.56	10/01/2011	
	GameStop 73.35	09/30/2011	
	JO-ANN 62.61	09/17/2011	


This list shows 6 of 6 expenses. Tap on Filter or the Manager button to hide, or show, additional expenses.


 **View Receipt**

Merchant


 Merchant **UWM BOOKSTORE**

Total Amount


 Amount **14.17 USD**


 Tax **OFF** **1 Tax** **2 Taxes**


Split Amount


 Split Expense: **Disable** **Enable**

Others

 **1** Category **Other**

 **2** Type **Other**

 **3** Client **Other**

 **4** Payment... **Other**

4.56 10/01/2011

GameStop 73.35 09/30/2011

This list shows 2 of 2 expenses. Tap on Filter or the Manager button to hide, or show, additional expenses.



As you can see this application automatically retrieved the proper information from this receipt.



<http://blog.travelpod.com/travel-photo/emmaroach/1/1270093417/parking-meter.jpg/tpod.html>

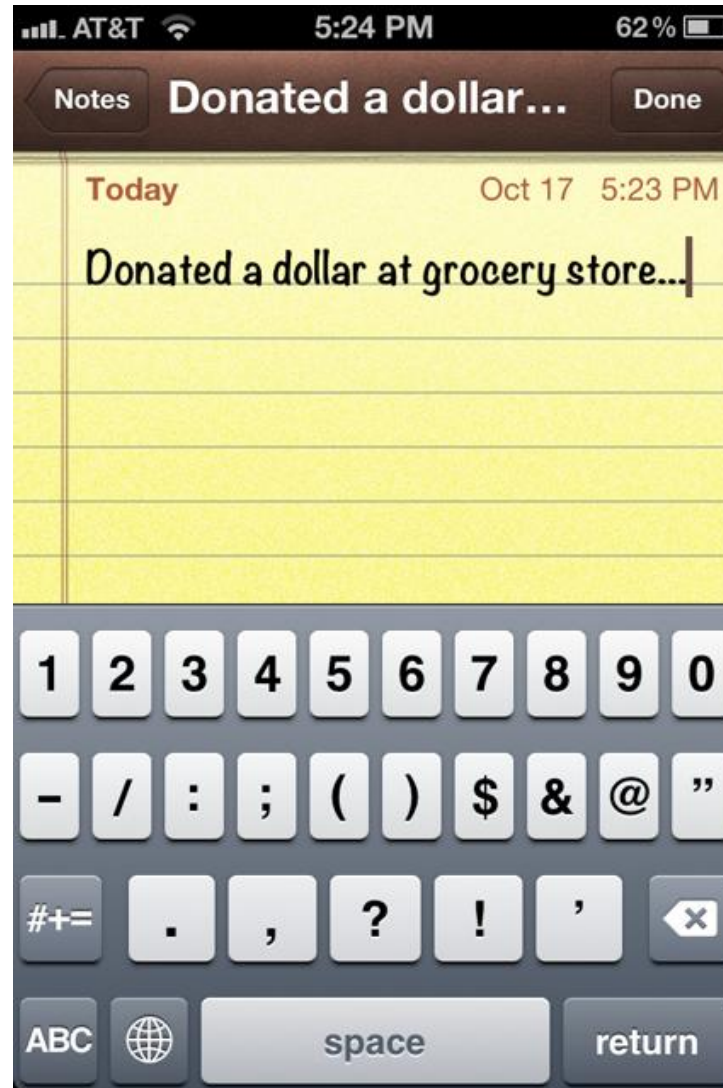
The iPod touch can be used to capture expenses that don't usually offer receipts



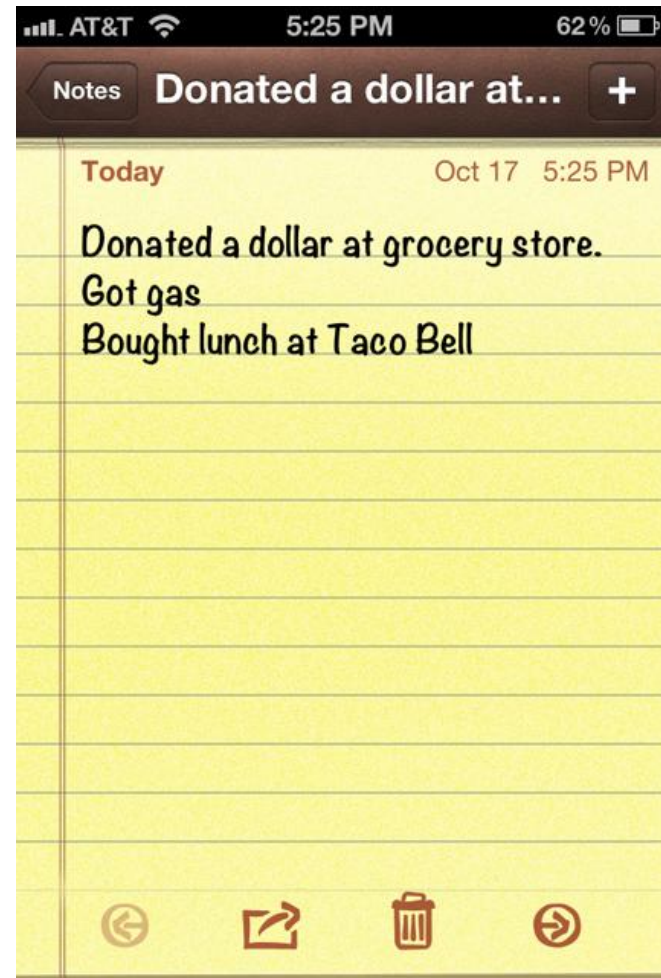
<http://movies.apple.com/fr/ipodtouch/features/voice-memos.html>

To remind oneself of the expenses throughout the day one could record notes using the voice memos aspect of the iPod touch.

The notes application on the iPod touch would allow participants to write reminders of their purchases on the go.



Information from Notes can be referenced by the respondent or can be “bumped” from the iPod Touch (or similar device) to the tablet used for diary data collection



14.17	10/11/2011	
BP 19.50	10/11/2011	
Aeropostale 89.11	10/07/2011	
Alterra 4.56	10/01/2011	
GameStop 73.35	09/30/2011	
JO-ANN 62.61	09/17/2011	

This list shows 6 of 6 expenses. Tap on Filter or the Manager button to hide, or show, additional expenses.



Another example of how one can use the iPod touch to capture expenses.

Expenses without receipt can be manually entered into this application and then linked to the survey fields.

	0.00	10/14/2011	
	UWM BOOKSTORE 14.17	10/11/2011	
	BP 19.50	10/11/2011	
	Aeropostale 89.11	10/07/2011	
	Alterra 4.56	10/01/2011	
	GameStop 73.35	09/30/2011	
	JO-ANN 62.61	09/17/2011	

This list shows 7 of 7 expenses. Tap on Filter or the Manager button to hide, or show, additional expenses.

View Receipt

Merchant

Merchant **BP**

Total Amount

Amount **19.50 USD**

Tax **OFF** 1 Tax 2 Taxes

Split Amount

Split Expense: **Disable** **Enable**

Others

1 Category **Transportation**

2 Type **Other**

3 Client **Other**

4 Payment... **Other**

The results could be a daily report of the barcodes of all the products purchased, along with reference receipt and bill statement information

Consumer Expenditure Survey, Test 1

Q15. You said that you spent money on food. Please list all of the different types of food that you spent money on today.

	--	--	--	Are you likely to purchase the item again this month?	
	What is the item?	Where did you buy the item?	How much did you spend on the item?	Yes	No
Item 1	<input type="text" value="752688339407"/>	<input type="text" value="Walmart"/>	<input type="text" value="\$2.47"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 2	<input type="text" value="864764432123"/>	<input type="text" value="GameStop"/>	<input type="text" value="\$46.07"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 3	<input type="text" value="762848274764"/>	<input type="text" value="Aeropostale"/>	<input type="text" value="\$76.44"/>	<input type="radio"/>	<input checked="" type="radio"/>
Item 4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 6	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 7	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 8	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 9	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Item 10	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>

Create dynamic pick lists for future purchases of the same item.

Consumer Expenditure Survey

https://milwaukee.qualtrics.com/SE/?SID=SV_7Wmrz5UVFShPelu

Q34. Please list all of the different types of food and beverages that you spent money on today.

	What is the item?	Where did you buy the item?	How much did you spend on the item?	Were any coupons or discounts applied to this price?		Are you likely to purchase the item again this month?	
				Yes	No	Yes	No
Item 1	Milk (skim)	Grocery store	2.19	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 2	Bananas	Grocery store	3.64	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 3	White bread	Grocery store	1.99	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 4	Grande latte	Coffee shop	4.50	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Item 5				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 6				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 7				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 8				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 9				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Item 10				<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Survey Powered By [Qualtrics](#)

Q49. Did you purchase any of the following food or beverage items again today?

- Milk (skim)
- Bananas
- White bread
- Grande latte

Survey Powered By [Qualtrics](#)



Disclaimer

- **Not advocating a particular product**
- **Our only goal was to address whether in 2011 what we are recommending is possible**
 - **No budget**
 - **No design team**
 - **No means by which to modify existing product**
- **Many of the products and apps are modifiable**
- **Used by low tech and high tech individuals**

Engaging the Respondent

- **Monetary incentives**
 - **Methodological experiment recommended for identifying prepaid vs. promised; CU-level vs. person level**
- **“Information Exchange”**
 - **What would be beneficial and of interest to CU members?**
 - **Summary of expenditures**
 - **Comparison to other CUs of comparable size, region and household composition**

Alternative Data Sources

- **Use as benchmarks or for insights into survey errors**
 - **Current research indicates significant issues in linkage, inaccuracies in records, consent for linkage (where necessary), missing data in records**
- **Federal data sources as benchmarks**
 - **MEPS**
 - **FoodAPS**
 - **RECS**
- **Non-federal data sources as insights into survey errors**
 - **Location, type and quantities better reported than prices**
 - **Add to sample file for monitoring of nonresponse errors**

Risks

- **Extension of diary period**
- **Technology**
- **Data user needs**

Methodological Experiments

- **Recommended Methodology Experiments**
 - Length of Diary and Effect of Technology Experiments
 - Technology Training
 - Monetary Incentives
- **Design Features Requiring Further Development**
 - The use of multiple formats of memory trigger diaries and receipts
 - The level and frequency of interviewer-respondent interaction over the diary month.
 - The incorporation of respondents' financial management and tracking systems.
 - The incorporation of feedback mechanisms for responding consumer units.

Experiment #1: Length of Diary and Effect of Technology Experiments

- **Factor A: Length of the diary field period**
 - One week vs. Two weeks vs. Four weeks vs. Six weeks
- **Factor B: Mode of diary**
 - Tablet diary: Respondents are given the tablet diary with the web-based questionnaire, scanner and bar code reader described above.
 - Paper diary: Respondents are given the current paper diary.
- **The Comparison:** Interviewers conduct the initial interview as outlined in Section III above. The tablet with the web diary or the current paper diary is placed in the CU. The CU is instructed to record all expenditures for a total of <1/2/4/6> weeks. Interviewers make follow-up calls as appropriate to encourage participation. The interviewer returns on day <7/14/28/42> to collect the equipment/diaries and conduct the final interview

Experiment #1: Sample Size and Power

	1 week	2 weeks	4 weeks	6 weeks	Total
Electronic	787 cases; 630 initial Rs	787 cases; 591 initial Rs	788 cases; 552 initial Rs	788 cases; 551 initial Rs	3150 cases; 2324 initial Rs
Paper	788 cases; 630 initial Rs	788 cases; 591 initial Rs	787 cases; 552 initial Rs	787 cases; 551 initial Rs	3150 cases; 2324 initial Rs
Total	1585 cases; 1260 initial Rs	1585 cases; 1182 initial Rs	1585 cases; 1104 initial Rs	1585 cases; 1102 initial Rs	6300 cases; 4648 initial Rs

- 0.80 power to detect a 5 percentage point difference in response rates between any two main effect groups
- 0.81 power to detect an interaction effect of 4 reported expenditure items

Experiment #1: Practical insights

- **New design changes both technology and diary recording period**
 - This experiment experimentally evaluates each with a full factorial design
- **Evaluate effects on participation and data quality**
 - Diary cooperation rates per week, item missing rates, number of goods reported, number of receipts scanned; number of items with bar code readers used; number of e-receipts sent to email; number of individual diaries used; and total dollar amount reported in each expenditure category (e.g., Gonzalez, et al. 2009)
- **Serves as a Feasibility Study: Other Benefits and Information**
 - Durability of the equipment, rate of failure of the devices during the diary period and whether the failure rate changes as the diary reporting period increases, and safety/security of leaving equipment of this value in CU members' homes

Experiment #1: Financial and Time Requirements

- **Assume cost of equipment is between \$900 and \$1500 for all pieces**
- **Equipment cost**
 - If all sample released simultaneously = \$4 million to \$7 million
 - If sample released in four random replicates = \$1 million to \$1.7 million
 - Assuming today's costs for tablets; technology costs trend downward over time
- **Field cost = \$1.5 million**
 - Assuming \$325 per completed interview; may be lower if effort exerted is less

Experiment #2: Technology Training

- **Each consumer unit will be instructed on the basics of**
 - **keeping records,**
 - **scanning receipts,**
 - **reading bar codes,**
 - **emailing e-receipts,**
 - **calling the in-bound IVR line, and**
 - **entering information into the diary in all methods.**
- **Consumer units will be given a text document containing the basic instructions in all methods.**

Experiment #2: Technology Training

Group 1: Video

- Brief (15 minute) video training session preloaded on the tablet
- Video will demonstrate how to enter a “market basket” of goods, service bills, and receipts using the tablet computer and equipment.
- Interviewers will be present while the video is playing, but will not provide instructions.

Group 2: In person, basic

- Interviewers will briefly (15 minute) instruct CUs
- Interviewer will demonstrate how to enter a “market basket” of goods, service bills, and receipts using the tablet computer and equipment.
- Interviewer will not engage in extensive one-on-one time with the CU using the tablet.

Group 3: In person, extended

- Interviewers will run an extended (30-45 minute) training session on how to use the tablet computer and other survey tasks
- Interviewer will demonstrate how to enter a “market basket” of goods, service bills, and receipts using the tablet computer and equipment.
- Interviewer will engage in practice sessions with the respondent, showing them how to scan a practice receipt, asking them to call in to the inbound IVR line to practice memory cues, and walking through entering information in a practice diary from three receipts from different locations.

Experiment #2: Laboratory Evaluation

- **Administer the first questionnaire for the field data collection**
- **Administer the assigned training method**
- **Provide respondents with a set of items, records and receipts to enter into the diary, reflecting approximately the number of items and types of items purchased during a normal week of diary keeping**
 - Example: Sacks of groceries, bags from a warehouse or multi-category retail 'big box' store including purchases that fall into a variety of categories (e.g., Costco, Walmart, Sam's Club and/or Target), a receipt for a haircut, utility bills, mortgage or rent bills, gasoline receipts, paychecks, and bank statements that reflect automatic transfer payments.
- **R will scan items using the barcode scanner, scan receipts, and complete the appropriate sections of the diary.**
- **Provides a direct measure of accuracy of entering information across the three training groups**

Experiment #2: Field Evaluation

- Obtain home address from each lab respondent
- Interviewer delivers equipment to lab respondent's house
- Interviewer will identify whether or not the respondent has a high-speed internet connection
 - If not, household will be given a tablet permitting wireless internet connection.
- Expenditure diary will be kept for two weeks.
 - Interviewer will make follow-up calls and visits, as needed.
- At the end of the two weeks, the interviewers will return to the lab respondent's house to pick up the equipment

Experiment #2: Sample Sizes

Week	Month 1	Month 2	Month 3
1	Recruit n=50 lab participants Group 1: 16 Group 2: 17 Group 3: 17 Start Lab + Diary	Recruit n=50 lab participants Group 1: 17 Group 2: 17 Group 3: 16 Start Lab + Diary	Recruit n=50 lab participants Group 1: 17 Group 2: 16 Group 3: 17 Start Lab + Diary
2	Lab + Diary	Lab + Diary	Lab + Diary
3	Complete Diary; pick up equipment	Complete Diary; pick up equipment	Complete Diary; pick up equipment
4	Ready equipment for next group	Ready equipment for next group	End of study

0.80 power to detect a difference in 10 items between any two groups

Experiment #2: Practical Insights

- **Feasibility study**
 - Risk of placing equipment in respondent's homes
 - Durability of equipment
 - Logistics of setup of equipment
- **Measure of accuracy in lab component**
- **'Real' field outcomes, as in Experiment #1**

Experiment #2: Financial and Time Requirements

- **Total costs for small sample (n=150 total) estimated to be up to \$75,000**
 - Excludes instrument development or programming or development of training materials
 - Very small samples over three months
 - More power can be obtained with larger samples, but this obviously is more costly
- **Small scale seems reasonable for this experiment, given that it is best served in a laboratory**

Experiment #3: Monetary Incentives

- **Group 1: No incentive**
- **Group 2: \$10 per consumer unit adult per week promised & \$5 per consumer unit child per week promised**
- **Group 3: \$10 per week per consumer unit promised**
- **Group 4: \$10 per week per consumer unit prepaid**

- **Dollar amounts adapted from UK's Food and Living Expenses Study**

Experiment #3: Practical Insights

- **Group 2 vs. Group 3**
 - Evaluate promised CU-level incentives compared to promised person-level incentive
- **Group 3 vs. Group 4**
 - Evaluate prepaid vs. promised CU-level incentives
- **Group 1 vs. Groups 2, 3, 4**
 - No incentive vs. any incentive

Considerations concerning nonresponse

- **Responsive Design**
 - Modify data collection efforts given field progress
 - Pre-identify changes to protocol
 - Pre-identify triggers for implementing new protocol components
- **Field Effort**
 - Phase capacity
 - Calls vs. days
- **Key Estimates**
 - Field Effort Indicators
 - Response rates, ineligible rates, contact rates, cooperation rates
 - % of CUs visited at least once, during peak times, HPI
 - % of CUs submit data; successfully complete full week; # items reported; change in # items reported
 - Key estimates vs. global questions

Considerations concerning nonresponse

- **Monitoring**
 - Subgroups
 - Urbanicity, type of PSU, housing tenure (own/rent), housing value, number of rooms in the dwelling unit, region, sex, race, educational attainment, CU size, and CU income
 - Observations of presence of children; interviewer observations of HU value; Merged administrative data
 - Variation in response rates; R-indicators
 - **Interviewers**
 - Variation in response rates; subgroup response rate variation over interviewers
- **New Protocol Components**
 - Shorter Diary Period
 - Global Questions Only
 - Increased Incentives
- **Triggers for New Protocol Components**
 - Prespecified # of days vs. monitoring for 'phase capacity'
- **Monitoring System Requirements**

Costs

- **Field Costs**
 - Assume \$325/successful interview
 - Assume at least 2 field interviews (beginning and end of diary period)
 - Costs = \$22.6 million to \$32.4 million
- **Technology Costs**
 - Assume total 2011 costs of \$900 to \$1500
 - Costs = \$6 million to \$12 million
- **Incentive Costs**
 - Assume promised \$10 / week / CU
 - Costs = \$1.33 million
- **Post-Survey Processing Costs**
 - Unknown
- **Development Costs**
 - Unknown; likely \$10-\$20 million over three years

Conclusions

- **Radical departure from current CE Design**
 - Reduce reliance on retrospective recall
 - Reduce reliance on proxy reports
 - Attempt to minimize burden by harnessing technology
 - Scanners, barcode readers
 - Saving receipts
 - Utilize portable diaries
 - Form of the diary to match the technology of the CU
 - Include CU members as young as 7
- **Integration of all expenditure data for a sampled CU**
 - Moves away from two sources of data for various expenditures
- **Preservation of longitudinal features**
 - Year to year comparison for CU for a given month
 - Synthetic estimation for quarterly, annual data