

# A PROCESS MODEL TO GUIDE QUESTIONNAIRE FORMS REDESIGN

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Forms can be an efficient means of collecting information, but when forms are poorly written and designed, the information they collect is often inaccurate, incomplete, or late. Such forms are not only expensive and a waste of time for everyone involved – from the people filling them out to the people making decisions based on the analyzed data – but the information they collect is useless, and the resulting bad decisions can harm an organization.

To assess the quality of information that tax forms collect and to reduce the taxpayer's burden, the Statistics of Income Division (SOI) of the Internal Revenue Service (IRS) sponsored a series of studies on forms redesign. For three of these projects, which involved major IRS forms, SOI worked with the Bureau of Labor Statistics' Behavioral Science Research Center in collaboration with the Document Design Center of the American Institutes for Research, under subcontract to Westat, Inc.

The major goals of this redesign effort are to ensure the quality of the data collected, identify the areas on the forms that cause confusion or errors, reduce taxpayer burden, reduce processing costs and time, and develop formats for different technologies, like optical scanners, software packages, and electronic filing.

As part of this series, the IRS recently asked BSRC and DDC to test and redesign Form 2119, Sale of Your Home, which people use to report capital gains and losses when they sell their homes. This paper focuses on the process model developed by BSRC and used in this project. The examples from the redesign of IRS Form 2119 presented here demonstrate but one application of this process model.

## The process model

Figure 1 below shows the process model used to evaluate and revise forms at BSRC. It also illustrates the iterative process needed for any redesign project. This process

model was developed to

- ensure that any project involving forms redesign follows an efficient, consistent procedure;
- provide customers with a formal means to suggest changes to a form;
- ensure that alternative designs are considered;
- control the dynamic nature of a form to ensure that it meets customers' needs throughout its evolution; and
- ensure that a form meets organizational needs in a climate of customer satisfaction.

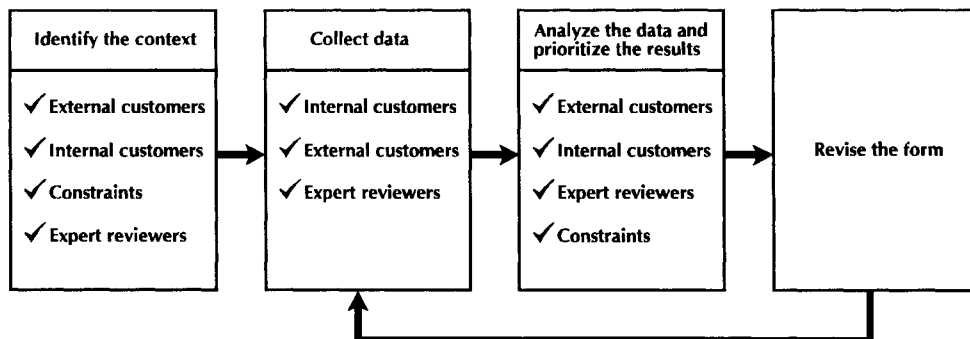
The model has four basic steps: identify the context, collect data, analyze the data and prioritize the results, and revise the form. To ensure that a revised form does not create new problems while solving old ones, the last three steps – collect data, analyze the data and prioritize the results, and revise the form – should be repeated at least twice, using the latest version of the form.

### Identify the context

This first step in the model involves determining the people and issues that affect a form's design: the internal and external customers who use the form by filling it out or by processing its information, the constraints involved, and the expert reviewers who can evaluate the form's usability.

**Internal and external customers.** All documents communicate information. Forms, however, are unique because they establish a dialogue that essentially begins and ends with the form owner (the company or agency needing the information) although others are involved (Barnett, 1991). The form owner uses the form to ask for information from the external customer who provides that information by answering the questions on the form. The form owner then interprets and analyzes this information, completing the dialogue. As in any conversation, the prospects for misinterpretation abound. To reduce the chances of misinterpretation and to ensure the quality of information being collected, forms designers must first identify the external customers and their needs.

Figure 1: The process model



External customers are the people who fill out the form. Depending on the form, they could be members of the general public or employees who fill out forms used internally by the form owner. While their specific needs will vary depending on their relationship to the form owner, all external customers must understand what they are to do, understand what information the form is asking for, know where to get that information, and have the questions presented in a logical sequence.

Internal customers are responsible for processing, analyzing, and using the information on the form. To be effective, the form must also meet their needs. Frequently, however, their needs are in direct conflict with those of external customers. For example, a form owner might have a database set up with fields in a specific order, such as Employer Name, Social Security Number, Employer Address, and Date of Birth. Although arranging the questions on the form in this same order would speed data entry, mixing business and personal information is illogical for the external customer completing the form.

Because form owners depend on external customers for information, the needs of external customers must *always* be given priority over those of internal customers. The form owner can adjust internal systems and procedures, although not always easily, but the form owner has no such control over external customers.

**Constraints.** Every redesign project has restrictions that the forms designer must take into account. Typically, these include computer systems, budget restraints, paper size, and deadlines. Identifying these constraints early in the process and determining which are rigid and which might be adjusted establishes the boundaries that the forms designer must work within.

**Expert reviewers.** Expert reviewers are skilled in the language and presentation of documents, and, therefore, can objectively assess the readability and usability of a form. A well-designed form not only collects accurate information but often collects it more quickly. When a form merely looks complex, external customers tend to postpone dealing with it; some may reject it entirely (Dillman, 1978). Expert reviewers might be employees of the form owner or might work for an outside company. If employed by the form owner, he or she must let them evaluate the form fairly, giving priority to gathering accurate information over satisfying internal procedures.

### ***Collect data***

The fact that a form is being redesigned indicates the form owner knows of some problems with the form. However, testing the form will pinpoint almost all areas that confuse customers and the reasons why. Although we prefer formal testing, informal testing can provide useful information, particularly on an early draft of the form. The primary requirements are simply that the subjects represent typical users and that each test be conducted the same way. For formal testing, subjects are often recruited and paid for

their time; for informal testing, a colleague, friend, or family member can provide valuable feedback.

For both formal and informal testing, we have found that the best method for identifying problems is having people *use* the form and think aloud throughout the process. This think-aloud protocol tells us not only what the subject is doing but also the thought processes that lead to the answer, the terms that are confusing, and the instructions that are inadequate or misleading. Focus groups in which people describe how they *might use* the form are not as helpful because they do not simulate the actual process of completing the form.

To realistically simulate this process, both BSRC and AIR frequently observe customers using the form in their own environments with information from their own files. This method helps us better understand all the steps, literally and figuratively, that customers must take to use the form. When using information from their files is impractical, we develop scenarios that provide the raw data needed to fill out the form, but external customers must still decide how to use this data to answer the form's questions. We prefer individual test sessions because the face-to-face interview process lets us probe for detailed explanations when subjects have trouble articulating a problem.

We also have found structured interviews, in which every subject is asked the same questions, to be valuable in determining whether language on the form is being interpreted consistently. Asking customers to define certain terms on the form or to explain an instruction in their own words tells us if they are interpreting the form correctly and whether important information is being overlooked.

**From internal customers.** Because internal customers work with completed forms to identify and correct errors as well as process information, these people often have insight into the areas of the form that confuse external customers. Collecting data from internal customers first can help to focus the data collection from external customers.

**From external customers.** External customers are the key to the form's collecting quality information. Any problem they have with the form directly affects the information they supply. To gather the most information about how they use the form, we recommend using a think-aloud protocol followed by a structured interview, preferably conducted in the external customer's own environment.

**From expert reviewers.** Expert reviewers should analyze the form line by line, focusing on organization, language, and overall layout. For complex forms, reviewers should perform a task analysis to identify every decision or operation that external customers must make in order to fill out the form. Having this information helps ensure that items on the form are arranged logically.

### ***Analyze the data and prioritize the results***

This step pulls together all the collected data and prioritizes the results to ensure that the revised form meets the needs of both internal and external customers. In cases where the

needs of these customers conflict, we stress that the needs of external customers must be given priority. When external customers are confused or misinterpret an item, the information collected will be useless to internal customers, no matter how well the form meets their needs.

### ***Revise the form***

The final step in the first iteration of the process model is to revise the form based on the results of the data collection and the principles of forms design, such as using a readable type size, adequate white space, logical organization, simple terms, and consistent use of design elements. Revising the form's instructions is an integral part of this process. Effective instructions clearly describe what external customers must do and present that information in a logical order. Instructions that confuse external customers can render even the most well-designed form useless.

### ***The second and third iterations***

The form owner now reviews the revised form to ensure that it is technically accurate. Then, the process begins again with collecting data. New sets of internal and external customers test the revised form, and the results are compared with those from the first round of testing. This round of testing is critical because fixing a problem on the original form often creates a new problem on the revised form; these problems also must be identified and corrected.

Based on the results of the second iteration, the cycle should be repeated again with the latest version of the form to ensure that all problems have been corrected and no new ones introduced.

## **Using the process model to redesign IRS Form 2119**

To evaluate and redesign IRS Form 2119, Sale of Your Home, we followed the process model through two iterations: in the first, we evaluated the 1991 form; in the second, we tested our revised version of the form.

### ***Identifying the context***

To ensure that our revised form would meet the needs of everyone concerned, we first identified both internal and external customers and the existing constraints. DDC staff served as primary expert reviewers with input from BSRC.

**Internal customers.** The IRS identified three types of internal customers: IRS editors, a statistical support team, and the data collectors and users. IRS editors code line items from individual and business tax returns that become one source of data for decisions that affect tax policy. Because these editors correct math errors and fill in any skipped line items that can be deduced from other lines on the form, they have firsthand knowledge of taxpayer mistakes. The Statistics of Income Division (SOI) of the IRS is responsible for the collection of data and the development of the database that both Treasury and Congress use to help formulate tax policy. The Office of Tax Analysis of the Treasury Department and IRS employees use the data to decide tax policy and to make administrative decisions.

**External customers.** External customers using Form 2119 are the taxpayers themselves along with the accountants, tax lawyers, and professional preparers who help taxpayers complete their forms.

**Constraints.** The IRS does not require taxpayers to use official IRS forms to report their income and expenses. However, because processing non-IRS forms takes longer, we needed to design a form that both satisfied taxpayers, reducing their use of non-IRS forms, while conforming to IRS internal standards.

A second constraint involved the number of line items allowed on the form. The Office of Management and Budget (OMB) considers the number of line items when assessing the burden that a form places on individuals and businesses. The more line items, the greater the expected burden. We were asked to clarify the form while keeping the number of line items to a minimum.

**Expert reviewers.** The staff from BSRC and DDC, who served as expert reviewers included forms designers, editors, linguists, and psychologists.

### ***Collecting data***

BSRC collected data from internal customers by conducting focus groups of IRS editors and by gathering statistics from SOI. BSRC designed the focus groups to pinpoint specific errors on completed forms, such as the lines that taxpayers left blank, the errors taxpayers made, and the amount of time the division spent correcting information.

DDC collected data from external customers. First, DDC conducted structured interviews with ten professional tax preparers to identify the problems they had with the form as well as the problems that they thought taxpayers had. DDC used this information and three scenarios, developed by BSRC and IRS, to test the 1991 form with taxpayers.

The scenarios were drawn from the examples in IRS *Publication 523, Tax Information on Selling Your Home*. This publication, available to taxpayers, defines the terms on Form 2119 and, through examples, shows how to fill out the form for different situations. Because the examples represent actual situations from the previous year's returns, they are considered to be relevant and helpful to taxpayers.

DDC used think-aloud protocols in one-on-one sessions to test the 1991 form with 21 taxpayers who used data from one of the three scenarios to fill out the form. When they finished, DDC used structured interviews to learn how they interpreted certain terms and line items on the form.

Finally, expert staff at both BSRC and DDC thoroughly analyzed the existing form to identify design issues that created readability and usability problems. DDC staff also conducted a task analysis to identify every decision and operation taxpayers must make while filling out the form.

### ***Analyzing the data and prioritizing the results***

We found that internal customers thought Form 2119 was working well. Professional preparers also liked it, saying that it was one of the simplest IRS forms to fill out. Only taxpayers and expert reviewers saw problems with it.

**Data from internal customers.** Overall, the IRS editors and the people at SOI found few problems with the existing form. They told BSRC that taxpayers made few errors in calculating line items and seldom left lines blank.

**Interviews with professional preparers.** Although most preparers said that they understood the 1991 form completely, they sometimes disagreed about the meanings of specific terms and line items. When asked what problems they thought taxpayers might have with the form, they replied that most would be confused by the language – either by the terms themselves or by their specific IRS meanings. Several preparers specifically cited **line 7 Basis of home sold** as the line that would most confuse taxpayers.

**Tests with taxpayers.** Of the 21 subjects tested, only one person completed Form 2119 correctly. One other person almost completed it correctly, making one error that affected no other line on the form. We found that most errors occurred on three lines of the form. As several preparers predicted, **line 7 Basis of home sold** caused the most confusion – 81 percent of the subjects made errors here. Because this line affected other lines on the form, errors multiplied. The other two lines with numerous errors were **line 10**, which instructed taxpayers to subtract a line they had not filled out from another line, and **line 1b**, which asked about the amount of the mortgage that the taxpayer was providing the buyer – a concept people had trouble understanding. To answer **line 1b** correctly, all subjects should have left this line blank. Most, however, left it blank because they didn't understand it. Without the think-aloud protocols, we would have thought that subjects understood this line.

**Analyzing the form.** Expert reviewers at BSRC and DDC agreed that Form 2119 looks difficult to fill out. (Figure 2 shows the 1991 form. The figures in this paper serve only to give an impression of the redesign. For full-size copies, please write the authors.) A variety of lines, boxes, and type styles clutters the form, and insufficient white space causes words and lines of text to run together. Some lines of text extend into the column of answer blanks, obscuring checkboxes. An inconsistent use of such design elements as bold type and arrowheads (▶) also confuses the user. In addition, most line items are identified by a number and a letter, making them difficult

Figure 2: 1991 Form 2119

to remember and reference. However, the biggest problem is the use of terms, such as **basis of home sold**, **installment method**, or **one-time exclusion of gain**, that are unfamiliar to the average person.

In the task analysis, DDC found individual line items to be quite complex, often requiring taxpayers to make as many as three decisions before they could answer. For example, **line 9e** asks for the

**Social security number of spouse at time of sale if you had a different spouse from the one above at time of sale. (If you were not married at time of sale, enter "None.")**

To answer, taxpayers must ask themselves three separate questions:

1. Was I married when I sold my home?
2. If I was married, was it to the same person I'm married to now?
3. If I was married to someone else, what is my former spouse's Social Security number?

Then, taxpayers must decipher the line item once more to decide what, if anything, based on their circumstances, they should write in the answer blank – "None," nothing, or a Social Security number. In all, DDC found that to fill out the 26 blanks on the 1991 Form 2119, taxpayers must make 43 separate decisions and calculations.

This complexity seemed to stem from OMB's requirement to keep the number of line items to a minimum. Because form owners, like the IRS, still need to collect the data and to route taxpayers through the form, they often let one line item do the work of many. Because taxpayers must read such lines several times, separate the pieces, make decisions, and write the answers, their burden increases, and the information is often inaccurate.

### Revising the form

Using the results of the interviews with preparers, the tests with taxpayers, and the analysis of the form, DDC redesigned the form (see Figure 3), spreading it over both sides

Figure 3: Front of the revised form

of a page. DDC arranged the form in three distinct columns to give it a cleaner, more structured appearance which makes it look easier to fill out. The three-column format also keeps the lines of text short and adds white space, making the form easier to read. Design elements used consistently serve as guideposts to help

taxpayers anticipate what is expected. DDC numbered all line items consecutively, including the name, address, and Social Security blanks, to ensure none would be overlooked. DDC also tried to simplify terms wherever possible; but, because rewording might have tax implications, many terms were left unchanged and continued to cause problems when we tested the revised form. To simplify complex line items, DDC added two line items to the form.

DDC then modified the instruction sheet (see Figure 4) to correspond to the redesigned form and to give taxpayers more information. In the revised instructions, DDC

- added relevant information, such as what documents taxpayers need in order to fill out the form and what other IRS forms taxpayers might need to complete;
- deleted irrelevant information, such as how to fill out other IRS forms;
- arranged information in the order that taxpayers would need it, from the purpose of the form to how to file;
- incorporated a mini-worksheet to help taxpayers calculate **line 7 Basis of home sold**; and
- added help for more line items. The 1991 instructions addressed 27 percent of the line items on the form. The revised instructions addressed 76 percent of the line items, covering all lines except those requiring a straightforward calculation or a Yes/No response.

### Second iteration

After the IRS verified that the revised form was technically accurate, we began the cycle again.

**Collecting data.** DDC tested the revised form with 51 taxpayers. In five test sessions, groups of taxpayers filled out the new form using one of the same three scenarios created to test the original form. In this round of testing, time constraints dictated that DDC not use structured interviews or think-aloud protocols.

**Analyzing the data and prioritizing the results.** Because we had changed few terms on the revised form, we knew that taxpayers would still have problems with the form.

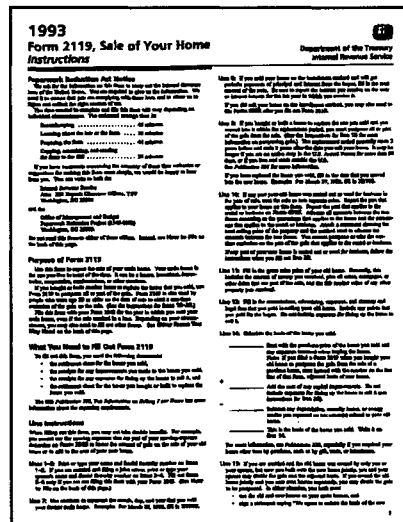


Figure 4: Front of revised instructions

Overall, however, we found that subjects performed significantly better on the revised form than they had on the original, making fewer errors in about the same amount of time.

Of the taxpayers who tested the revised form, 55 percent performed well, compared with 10 percent who had performed well with the 1991

form. Specifically, 29 percent completed the revised form correctly, compared with 5 percent who correctly completed the original form. The balance who performed well made minor errors affecting either no other line or only the last few lines.

Tables 1 and 2 below compare the performance of taxpayers who tested the 1991 form with those who tested the revised form. Table 1 compares the percentage of line items each group answered correctly. Table 2 shows the percentage of line items with original errors – incorrect answers not caused by errors on previous lines.

Scenario	1991 form	Revised form
1	67%	84%
2	52%	66%
3	74%	85%
	n=21	n=51

Note: Higher percentages are better.

Table 1: Percentage of line items correct

Scenario	1991 form	Revised form
1	8%	5%
2	10%	9%
3	20%	7%
	n=21	n=51

Note: Lower percentages are better.

Table 2: Percentage of line items correct

We also found that, unlike the errors made on the 1991 form, which were grouped primarily on three lines, the errors on the revised form had no general pattern. Some people subtracted wrong lines; some people had trouble subtracting large numbers from small numbers; some people put an answer on the wrong line. But because we didn't use a think-aloud protocol when testing the revised form, we don't know why subjects made these errors.

In general, we found that people using the revised form made fewer conceptual errors and seemed to better understand the form and the instruction sheet. In addition, when we compared the taxpayers' performance on the lines that caused problems on the 1991 form (**lines 1b, 7, and 10**) with the corresponding lines on the revised form (**lines 8, 14, and 24**), we found that their performance greatly improved, as Table 3 shows. However, subjects still had difficulty understanding the terms on the form, particularly **fixing-up expenses** and **capital improvements**.

Line	(On 1991 form)	1991 form	Revised form
8	(1b)	29%*	94%
14	(7)	19%	69%
24**	(10)	54%	96%
		n=21	n=51
* Does not include correct guesses.			
** Includes correct calculations even if amounts were wrong; includes only Scenarios 1 and 2.			

Table 3: Percentage of correct answers on key lines

The amount of time needed by subjects in both tests differed only by seconds. However, because think-aloud protocols were used when testing the original form but not the revised form, we believe that subjects using the revised form actually needed slightly more time than those who tested the 1991 form, although the difference is probably both statistically and practically insignificant.

While they might have needed more time, subjects using the revised form appeared less confused and less frustrated than those who tested the 1991 form. Because we did not use think-aloud protocols or interview the taxpayers who tested the revised form, we do not have micro-level data; however, their body language suggested that while there were more line items on the revised form, they found it easier to fill out. Most subjects using the revised form seemed to simply follow the instructions and move easily through the form, unlike those testing the 1991 form, who often seemed unsure about how to answer. Some subjects commented on the revised form, saying

"I enjoyed filling out the tax form because it was easy for me to understand! Instructions on the form were clear, and I appreciated the examples on the instructions page. I have never filled out a tax form before, and it wasn't painful at all."

"This IRS form is one of the cleanest and simplest of all the forms and instructions I have seen. Yea!"

Therefore, although we might not have reduced the taxpayers' burden as it relates to time, we did reduce the burden as it relates to frustration and confusion, and we did improve the quality of the data collected.

## Conclusions and recommendations

Forms are and always will be dynamic, evolving to meet changing needs. A form that works well this year will need to collect another bit of information next year, and another the year after. Soon, an originally well-designed form will have become a patchwork of line items and answer blanks. Using the iterative process of identifying needs, testing, modifying, and retesting ensures that a form's evolution is planned and that the quality of information it collects is never jeopardized.

Although the revised version of Form 2119 is an improvement, it needs more revision and testing. Time and resources prevented revising the form again and taking it through a third iteration of the process model. We knew that taxpayers had problems understanding the terms on the form and subtracting amounts that were inches away from one another. We also suspected that some line items were outdated. Therefore, we recommended that the IRS simplify the terms that confuse taxpayers, arrange line items so amounts used in calculations or comparisons are next to each other, and eliminate line items no longer needed.

We also believe we saw evidence that burden should not be measured solely by the number of line items or the time needed to complete a form, which confirms Dillman's (1978) statement in *Mail and Telephone Surveys*. While these measures are important, they must be combined with the frustration level and the perceived amount of effort needed. Who has the least burden? Someone who struggles with a form, completes it in ten minutes, and says, "I'm done, but I don't think it's right." Or someone who moves easily through it, needs fifteen minutes, but seems content with the result. This project showed us both situations.

Although more research is needed, we believe that limiting the number of line items on a form imposes an artificial constraint. Typically, the amount of information needed remains the same, so the line items used to collect information become extremely complex, and those used to route or help the user are eliminated. The result is users who are confused and provide inaccurate data – an expensive issue and a waste of everyone's time.

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