Standing Out in a Crowd: Improving Customer Utility on a Centrally Administered, Shared Web Site*

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The Internet has become the primary public interface for many statistical organizations, offering opportunities to reach larger audiences with more products than ever before. Often, however, a statistical organization's virtual existence must be shared with other, dissimilar organizations, due either to resource constraints or policy decisions. In countries without a centralized statistical agency, such as the United States, statistical organizations are often housed within much larger agencies whose missions are primarily administrative. In such cases, the needs of the statistical function are often at odds with those of the administrative function. Similar tensions can exist in countries where the statistical functions are centralized. In these cases, subject matter with a relatively small customer base may compete for visibility and resources with topics that have broader appeal. Shared use of a single Web site may reduce flexibility in design and limit the types of products that can be offered. Often, design decisions are driven by the component with the largest customer base and may not optimally serve smaller statistical functions and their customers.

Statistics of Income (SOI), a division of the U.S. Internal Revenue Service (IRS) and the primary source of data on the U.S. tax system, provides an excellent case study for this sort of coexistence. The irs.gov Web site is designed primarily to assist taxpayers in filing their taxes. It contains tax forms, filing instructions, regulatory rulings, and other resources for answering questions about the myriad tax and information reporting requirements that compose the U.S. tax system. It is also home to SOI's Web pages, "TaxStats," which provide public access to more than 4,000 statistical data products and average almost 500,000 downloads per month. This paper will focus on SOI's efforts to improve the TaxStats pages on irs.gov. It will discuss recent redesign efforts and share future plans, all in the context of working within the design limits imposed by a multiuse Web site. The goal is to provide guidance and encouragement for other statistical organizations in similar situations.

▶ Background

The official public IRS Web site, irs.gov, is maintained by a contractor, under the supervision of two organizations within the Service. The Communications and Liaison division (C&L) oversees the general look and feel of the Web site and maintains a set of detailed guidelines for page design, including approved fonts, colors, page formats, writing style, etc. All Web pages and content posted to irs.gov must be created and modified through the Content Management Application (CMA). This tool, through validation checks and the use of dropdown menus, helps ensure that all Web pages comply with the parameters specified in these guidelines. The IRS Electronic Tax Administration division (ETA) oversees the hardware and software aspects of irs.gov. Jointly, these two divisions set standards, plan upgrades, conduct user-testing, and facilitate monthly meetings with irs.gov's major content providers.

Statistics of Income began disseminating data electronically in 1992 via an electronic bulletin board, which was maintained on a personal computer by SOI staff. In 1996, SOI replaced the bulletin board with the TaxStats pages on irs.gov. These pages were organized by subject matter, primarily reflecting SOI's internal structure. Downloads and Web content grew annually, but, by 2003, it became clear that customers, particularly those new to TaxStats, were having difficultly locating products and services. To learn more about customer experiences on TaxStats and to address problems, SOI formed a small, cross-functional "Web team" made up of economists, statisticians, and computer specialists from a diverse array of subject matter areas.

▶ Gathering Feedback

Any organization with a Web presence needs to periodically measure how well it is serving its customer base. For SOI, informal feedback provided a catalyst for evaluating the effectiveness of SOI's Web pages. Initially, some of the most useful comments came from customers who contacted its Statistical Information Services (SIS) office after failing to find the information they wanted on TaxStats. Many times, SIS staff were able to help these customers navigate the TaxStats pages to find the information they sought, a clear indication that the Web pages needed improvements. In addition, SOI has a panel of expert tax policy researchers who meet biannually to offer feedback and provide direction to SOI. These users not only provided additional, informal feedback about their experiences using TaxStats, but also became an integral part of the redesign process.

To gather formal information from customers, SOI developed a survey that was given to all callers who contacted SOI's SIS staff [1]. This survey included 11 structured questions and an opportunity for general comments. Questions included general respondent information (occupation, frequency of visits to TaxStats, subject matter interests), general satisfaction with TaxStats (ease of use, quality of products, overall satisfaction), and suggestions for improvements (expanded content, preferred file formats, specific changes to improve navigation). In addition, the survey was administered to the membership of the U.S. National Tax Association, whose participants are considered key users of SOI data, and to SOI's consultants. The results showed that SOI customers had a wide range of occupations but were mainly researchers from universities; Federal, State, or local government employees; or individuals providing consulting or issue advocacy services. In general, customers found SOI products useful and of high quality but often had difficulty locating items on TaxStats. They specifically cited problems with Web page organization. Other comments included requests for more data, especially historic data, and easier-to-use product formats for data tables and articles [2].

In addition to formal and informal customer feedback, irs.gov provided SOI with monthly Web metrics that identified popular products. These metrics were also useful as benchmarks against which redesigned pages could be evaluated. After analyzing data from all sources, it was clear that both page and overall Web site design issues were contributing to user dissatisfaction. Page design problems were generally things that SOI could address directly. Site design problems posed a greater challenge, since these necessitated working with irs.gov personnel to change the structure of irs.gov or modify style guidelines.

▶ Attacking the Problem

Having confirmed that customers were having difficulty finding information on the TaxStats pages of irs.gov, the next step was to identify products that SOI wanted to make available to the public via the Web. This was done through conducting a careful inventory of existing TaxStats content, brainstorming new product offerings, and researching the types of products available from other statistical functions in the U.S. and in other countries. Customer feedback from the surveys was also very important to this process. A few prime customers provided additional input by participating in a card sort exercise.

Card sorting, as applied to information management, is a technique for developing an information structure, as well as suggesting navigation, menus, and possible taxonomies [3]. SOI used its panel of 15 consultants as subjects for this exercise, which was conducted via mail [4]. Each test subject received a package consisting of: 1) slips of paper, each with a single content item printed on it, 2) instructions, and 3) some blank slips of paper for subjects to write in additional content items. Participants were asked to create subgroups from items they perceived as related, by grouping individual cards using rubber bands and paper clips, and then to organize these subgroups into larger categories. Participants then mailed the cards back to SOI, along with any comments or suggestions they wished to add. While response rates were somewhat disappointing, the six subjects who chose to participate represented a range of research interests. Despite their varied interests, the subjects provided results that were surprisingly similar. Each also provided a number of suggestions for new content items. The results of this exercise were

instrumental in developing the structure and content of a prototype for the new TaxStats Web pages.

Another important component of the redesign effort involved examining Web sites of major U.S. and international statistical agencies, as well as a number of commercial Web sites. The team also reviewed articles and research papers that presented guidelines for effective Web pages [5]. At the time, the recently redesigned U.S. Bureau of Labor Statistics (BLS) Web site was particularly helpful, because it is an organization whose mission and scope are similar to those of SOI. Since BLS is renowned for its cognitive research, all its new Web pages were subject to extensive usability tests, the results of which are well documented in a series of papers on Web design and testing [6]. In addition, the BLS Web designers were very generous in sharing their expertise with SOI's Web team.

▶ Developing a Plan

The official irs.gov design guidelines provided three basic page layouts at the time SOI undertook its redesign. All Web pages contained static content, primarily text in HyperText Markup Language (HTML) or documents in Portable Document Format (PDF). As SOI Web team members developed new page layouts, a guiding factor was to keep, as much as possible, the specifics of the designs within the written guidelines established for irs.gov, but, within those guidelines, to be as innovative as possible. Several new layouts were developed, and these were presented to SOI's panel of consultants for feedback. Based on their feedback, SOI developed a working prototype of the new site using Microsoft FrontPage.

While developing the prototype Web pages, SOI met with some of the individuals who oversee irs.gov. At this meeting, SOI presented research results and a detailed short- and long-term vision for TaxStats and unveiled a few prototype pages. An important feature of this presentation was the use as examples of other successful Web pages from organizations with missions similar to that of SOI. A few key factors made this meeting successful. First, SOI had empirical research to show that the current irs.gov TaxStats pages were not serving customers well. Second, SOI was careful

to draw a distinction between customers who access tax statistics and those who came to irs.gov in search of tax filing or compliance information.

Third, SOI acknowledged the value of design constraints that had been developed to enhance the experiences of the latter group and provided evidence that these very features were making it difficult for SOI's customers to find the products they needed. Finally, recognizing resource limitations, SOI chose to focus on a limited number of requests for changes in irs.gov policies or practices. The results of this meeting included a clearer understanding of SOI's needs, an agreement to make a significant change to the existing irs.gov page structure, and a promise for continued dialogue.

▶ User Testing

After developing a working prototype Web site, SOI conducted user-testing prior to implementing any actual changes to the TaxStats pages. While the prototype did not have working links for all 4,000 SOI data products, it included examples of all the page styles that SOI was proposing, including several pages with similar functions, but different design features, in the hope that testing would indicate a clear "best" choice. After consulting with professional Web developers and SOI's own staff of statisticians, a series of test tasks were developed. Testing was conducted at the BLS cognitive research laboratory, and a trained facilitator administered these tasks individually to a diverse group of seven test subjects while members of the Web team observed from a separate room [7]. Observers were able to hear each of the test subject's comments, as well as view their facial expressions and all computer key strokes via a computer monitor. Each session was also captured on videotape for further analysis. At the end of each test session, subjects were debriefed using a questionnaire. The test results were used to finalize Web design plans.

▶ Implementation

Once the plan was finalized, Web team members set about the task of programming new Web pages. Hierarchies of pages were developed, and design attributes, such as font sizes, spacing, text justification, grid

styles, and usage, etc., were determined and documented in written guidelines that included instructions and examples to ensure uniformity across pages. Actual programming was performed by individuals with some expertise in the subject matter whenever possible. This ensured that specific content items were correctly categorized and described. To assist in final page design, classroom training in writing for the Web was offered to team members. Once all of the pages were completed, subject matter experts were enlisted to thoroughly test each page for accuracy. In total, nearly 150 pages were developed with more than 4,000 links to content items. The new pages included a new main (home) page and a redesigned left navigation bar. Based on customer feedback, all tabulated data on the site were made available as Microsoft Excel spreadsheets, and all research reports were posted in PDF format, with free readers provided for each. Web pages were nearly all programmed in HTML and were certified as compliant with U.S. standards for accessibility by individuals with disabilities [8].

▶ Future Directions

SOI is currently working to improve several aspects of the TaxStats Web pages. First, while all of the actual TaxStats Web pages are certified as accessible to individuals with disabilities using screenreading software, many of the PDF documents available through those pages are not. SOI is committed to correcting this problem by improving both the techniques used to create the documents and their overall design. The software used to produce SOI documents has recently been upgraded, and SOI is seeking training and advice from desktop publishing experts.

Second, many of the tables on TaxStats contain extra formatting features that are necessary for creating printed publications but that make certain types of analysis difficult. Customers who use these tables for analysis must first remove some formatting features before applying even simple math functions to the data. SOI has just issued draft guidelines for producing researcher-friendly data tables. These guidelines were developed by incorporating extensive feedback from customers.

Third, a prototype application that allows customers to create customized tables from SOI data is being tested on TaxStats. This application uses off-the-shelf software with custom-designed display screens that allow users to access a database containing tabulated SOI data (microdata are not made available due to privacy protection concerns). Users can combine data across different tax years, select variables of interest, and choose categories of data to include in a table, as well as calculate simple descriptive statistics using this application.

Fourth, metadata designed to help users better interpret the data available on TaxStats are being developed. Possible metadata items include tax forms marked to indicate the origin of specific data items, written descriptions of individual data items, and sample selection information, including variance estimates where applicable. Samples of metadata are currently being tested. In addition, SOI is working closely with irs. gov officials to develop a fully articulated taxonomy of TaxStats that, in time, will be used to improve search capabilities and navigation, as well as provide common definitions of concepts and terms across all irs.gov content areas.

▶ Lessons Learned

Statistics of Income's experience in redesigning the TaxStats pages on irs.gov serves as a model for other organizations faced with a Web site that is not specifically designed to serve its customers' needs. The resulting redesigned Web pages, while not cutting-edge, nevertheless have garnered favorable feedback from both regular and new customers. More products are now offered on clearer, better organized pages. Product formats have been standardized and, in some cases, redesigned. The effort was not expensive. In fact, the only direct expense was the cost of sponsoring a Web-writing training class. There were opportunity costs in the time spent on the redesign efforts by employees, but SOI's Web team was careful not to let Web design activities interfere with their day-to-day responsibilities. And as is often the case, the team project brought energy to SOI that provided benefits beyond the successful completion of this specific task. The key to

SOI's success was involving subject matter specialists and customers in all phases of transforming the Tax-Stats pages. This fostered a sense of commitment to the project, a deeper understanding of customer needs and SOI products, and the creativity needed to work within the constraints of a design framework that initially appeared to be fundamentally unsuitable. Some specific lessons learned include:

a. Gather specific feedback from users in order to thoroughly understand opportunities for improvement. If possible, involve a group of core customers in redesign efforts.

b. Research best practices used by organizations with similar products or customers. Also examine commercial Web sites since these may reflect the most current design practices and technology.

c. Focus initially on those things that are under the control of the content provider. Consider questions such as:

   • Are products being provided in formats that meet customer needs?

   • Are products and pages accessible to all users?

   • Is content organized and adequately described so that users outside the provider's culture can clearly understand what is being provided?

d. Take as much control over content management as possible. Involve employees who are familiar with the mission and products of the organization in redesign efforts. Keep management informed of team progress and ideas to ensure executive-level support. This is especially important if redesign plans require any site-level policy changes.

e. Develop a thorough understanding of design guidelines and restrictions, and, if possible, meet with Web site managers to better understand them.

f. Present research results to Web site managers along with a clear plan for improvement that respects current Web site guidelines. When necessary, propose modifications that will meet the needs of specific customer groups, focusing on a few essential changes.

g. Become involved in the Web site's user group, or urge the formation of such a group if none exists. These are excellent forums for educating Web site managers about customer needs.

h. Prototype and test pages prior to implementing any changes.

i. Continuously monitor user experiences on the Web site. Web pages are not static, but must continue to change as technology and Web practices evolve.

▶ Endnotes

[1] While an online survey of TaxStats users would have been preferred, at the time of the redesign, irs.gov did not have the technical capacity to implement Web surveys.

[2] Prior to the redesign, documents were available in PDF, Lotus, and Microsoft EXCEL. In addition, larger files were compressed and provided as executable files.

[3] Maurer, Donna and Warfel, Todd, "Card Sorting: a definitive guide," http://www.boxesandarrows.com/view/card_sorting_a_definitive_guide, 2004.

[4] The minimum recommended number of card sort participants is 15. While conducting this exercise face-to-face allows observers to record respondent reactions, it is acceptable to mail packages to participants when cost is an important consideration or when conducting the exercise via mail improves participation rates. Nielsen, Jakob, "Card Sorting: How Many

Users To Test," http://www.useit.com/alert-box/20040719.html, 2004.

[5]   See, for example, "Best Practices in Design-ing Web Sites for Dissemination of Statistics," United Nations Statistical Commission and Economic Commission for Europe, 2001.

[6]   See, for example, Levi, Michael D., "Usabil-ity Testing Web Sites at the Bureau of Labor Statistics," National Institute of Standards and Technology Symposium, Transcript, 1997.

[7]   While five is considered the minimum number of test subjects required to discover the major-ity of usability problems, SOI determined that its users fell into two broad groups, experienced statistical data users and individuals with a general interest in the U.S. tax system, so that it was necessary to try to get representatives of both groups. Nielsen, Jakob, "Why You Only Need To Test with 5 Users," http://www.useit.com/alertbox/20000319.html, 2000.

[8]   See Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended by the Workforce Investment Act of 1998 (P.L. 105-220), August 7, 1998 (herein referred to as Section 508).