

# **Cancer Imaging Program (CIP)**

## **Website Evaluation**

### **Final Report**

Prepared by NOVA Research Company

August 30, 2013

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>iv</b>
Web Traffic Analysis .....	iv
Competitive Analysis .....	iv
Heuristic Assessment .....	iv
Usability Testing .....	v
Testing of CIP Documents for Section 508---Compliance .....	v
508---Compliance Software Review .....	v
Final Recommendations .....	v
<b>INTRODUCTION</b> .....	<b>1</b>
<b>WEB TRAFFIC OVERVIEW</b> .....	<b>1</b>
Pages and Content Areas Most Valued by Visitors .....	1
<i>Most---Viewed Pages</i> .....	1
<i>Least---Viewed Pages</i> .....	3
Visit Duration .....	4
Ke Audience Activity .....	4
<i>Patients, the General Public, and Medical Practitioners</i> .....	4
<i>Imaging Investigators</i> .....	5
<i>Comparison of Site Sections</i> .....	5
Referrers: Finding the CIP Site .....	6
Directed Searches .....	7
Website Pathways .....	8
Changes i Traffic Volume .....	9
<b>METHODOLOGY: COMPETITIVE ANALYSIS, HEURISTIC ASSESSMENT, USABILITY TESTING</b> .....	<b>10</b>
Competitive Analysis .....	10
Heuristic Assessment .....	10
<i>Scorecard 1: Requirements an Best Practices Checklist for Government Web Managers</i> .....	10
<i>Scorecard 2: Forrester Research Website Review</i> .....	11
Usability Testing .....	11
<i>OMB Clearance</i> .....	11
<i>Recruitment</i> .....	11
<i>Test Participants</i> .....	13
<i>Testing</i> .....	13
<i>Script Revisions</i> .....	13
<i>Preference Metrics</i> .....	14
<i>Performance Metrics</i> .....	14
<b>RESULTS: COMPETITIVE ANALYSIS, HEURISTIC ASSESSMENT, USABILITY TESTING.</b> 14	
Competitive Analysis .....	14
Heuristic Assessment .....	14
Usability Testing .....	15
<i>Satisfaction</i> .....	15
<i>Performance</i> .....	16
<b>DISCUSSION</b> .....	<b>18</b>

Strengths .....	18
<i>Content Management</i> .....	18
<i>Visual Appearance</i> .....	19
<i>Site Planning an Maintenance</i> .....	20
<i>Usability</i> .....	20
<i>Design Scheme</i> .....	20
<i>Collaboration / Avoiding Duplication</i> .....	21
<i>Legal Requirements</i> .....	21
<i>Search</i> .....	21
<i>Management and Governance</i> .....	21
Weaknesses .....	22
<i>Readability</i> .....	22
<i>Required and Recommended Content</i> .....	22
<i>Navigation</i> .....	22
<i>Search</i> .....	22
<i>Content Layout</i> .....	24
<i>Trust</i> .....	25
<i>Interactivity</i> .....	25
<i>Social Media</i> .....	26
<b>ADDITIONAL DELIVERABLES</b> .....	<b>27</b>
Section 508 Compliance Testing .....	27
Review of Commercial 50 Compliance Software .....	27
<i>Methodology</i> .....	27
<i>Analysi Results</i> .....	28
Content .....	29
Format .....	29
Errors .....	29
SOPS and Policies .....	30
Navigation .....	30
Search .....	30
<b>CONCLUSION</b> .....	<b>30</b>
<b>APPENDIXES</b> .....	<b>32</b>

## **EXECUTIVE SUMMARY**

The Cancer Imaging Program (CIP) is a component of the National Cancer Institute's Division of Cancer Treatment and Diagnosis (NCI/DCTD). The CIP website (<http://imaging.cancer.gov/>) has not been evaluated since its original launch in October 2004. From September 2012 through August 2013, NOVA Research Company conducted an evaluation of the website for the purposes of determining the site's effectiveness and usability.

The evaluation included a web traffic analysis, a competitive analysis, a heuristic assessment, usability testing, testing of CIP files for 508 compliance, and review of available 508-compliance testing and repair software.

### **Web Traffic Analysis**

To better understand how visitors are accessing and using the CIP website, NOVA reviewed the CIP Omniture Web traffic report for September 2011 through August 2012. During that 12-month period, about 47,000 visitors came to the CIP website; 80 percent were unique visitors. Visits peaked in November 2011 and March 2012, followed by a slow decline through August 2012.

More than 60 percent of visitors who arrived at the site were referred from either [nih.gov](http://nih.gov) or [cancer.gov](http://cancer.gov). Directed searches related to cancer imaging show that the most-used search engines Google and Bing return the CIP site in the top 25 results for searches that include NCI, imaging, and imaging research as well as searches for new-to-market medical imaging procedures and technologies.

Analysis of key visitor activity revealed that more visitors viewed pages intended for patients and medical practitioners than those associated with investigators.

### **Competitive Analysis**

While evaluating the usability and effectiveness of the CIP website, NOVA reviewed four other DCTD program websites. Sites were evaluated for compliance with NCI Web Standards and Policies and the Requirements and Best Practices Checklist for Government Web Managers. CIP was compared with the other sites in terms of compliance with each standard, policy, and best practice.

The CIP website was superior to or in line with other DCTD sites in terms of following best practices, particularly in content management, content for the public, visual appeal, and design scheme. However, the site compared less favorably in the areas of readability, navigation, search function, and interactivity.

### **Heuristic Assessment**

A heuristic assessment was conducted to confirm CIP website compliance with NCI Web Standards and Policies, federal guidelines, and evidence-based best practices. The site was assessed using the Requirements and Best Practices Checklist for Government Web Managers and a comprehensive 25-point checklist from Forrester Research.

CIP partially meets 84 percent of the requirements and recommendations included on the Web Managers scorecard and achieved perfect scores for management and governance, collaboration, legal requirements, and ongoing site improvements. The site scored well on two other sections: (1) Required and Recommended Content and (2) Usability, Accessibility, and Design. Improvement is needed on requirements listed under Managing Content and Search.

The CIP website fell 1 point below a passing score on the Forrester checklist. The CIP site excelled in areas of Value and Presentation. Scores indicate that improvement is needed in Navigation and Trust.

Bringing the website into compliance with best practices, guidelines, and requirements included in the assessment is achievable. CIP staff can accomplish most required and recommended changes with minimal support from NCI information technology/web staff.

## Usability Testing

NOVA conducted two rounds of usability testing of the CIP website: Round 1 in February and March 2013 and Round 2 during June 2013. A total of 24 individuals (four imaging investigators, four medical practitioners, and four members of the general population in each round) participated in 1-hour test sessions. During each session, test participants performed real-world tasks using the website while thinking aloud, completed a satisfaction assessment, and answered questions about their overall impressions of how the website looked and worked.

NOVA recommended changes intended to address specific issues that had been identified during Round 1 testing. Following implementation of changes to the CIP website, NOVA conducted a second testing round to detect whether these changes resulted in improved user satisfaction and website performance.

A comparison of Round 1 and Round 2 performance scores indicates that overall performance improved during Round 2. Notably, error-free rates changed in a positive direction for all target groups, with medical practitioners showing the greatest improvement.

## Testing of CIP Documents for Section 508-Compliance

NOVA conducted 508-compliance testing of over 300 CIP files using Adobe Acrobat software. Approximately 17 percent of the files met all Section 508 requirements; the remaining 83 percent failed. The most common compliance issues related to file structure and failure to assign a language to the file.

## 508-Compliance Software Review

At contract initiation, CIP staff recently had begun to use CommonLook software to make Microsoft Word files and PDFs compliant with Section 508 requirements. CIP was interested in determining whether other software could perform these tasks more efficiently.

NOVA interviewed CIP staff responsible for 508 compliance to identify typical tasks and inform development of review criteria. A NOVA compliance specialist reviewed four commercially available 508-compliance software programs. Reviews included compliance testing of two documents and completion of a checklist and a satisfaction scale. Each program was scored on the basis of performance and satisfaction scores.

Based on these scores, NOVA concluded that CommonLook software is the best choice for CIP. This software achieved the highest performance score of all four products included in the test and received the second highest user satisfaction score of all four products included in the test.

## Final Recommendations

CIP website strengths and weaknesses were identified throughout the course of the evaluation. Combined findings from the competitive analysis, heuristic assessment, and usability testing components of the evaluation highlight areas in which the website excels and where improvement is needed. Final recommendations for site improvements are provided in tabular format. CIP staff are encouraged to review and prioritize the recommendations in a way that reflects urgency of the identified issue and availability of resources.

Where changes require more resources than are feasible, CIP might consider establishing a standard operation procedure (SOP) that complies with specific guidelines and applying it to all new content. For example, to improve readability of site content, use the MS Word readability statistics function to test all new text and revise it needed to meet target reading ease and grade level scores before posting it to the site.

## INTRODUCTION

The Cancer Imaging Program is a component of the National Cancer Institute's Division of Cancer Treatment and Diagnosis. The CIP website (<http://imaging.cancer.gov/>) has not been evaluated since its original launch in October 2004. From September 2012 through August 2013, NOVA Research Company conducted an evaluation of the website for the purposes of determining the site's effectiveness and usability.

The evaluation included the following components:

- Web traffic analysis
- Competitive analysis
- Heuristic assessment
- Usability testing
- Testing of CIP documents for 508-compliance
- Review of available 508-compliance testing and repair software

## WEB TRAFFIC OVERVIEW

In an effort to improve understanding of how visitors are accessing and using the CIP website, NOVA reviewed the CIP Omniture Web traffic report for September 2011 through August 2012.

Views of the top 200 most-viewed pages totaled 92,062 page views during this reporting period and ranged from 17 to 12,084. (A **page view** is a request to load a single web page from an Internet site.) The CIP site averaged close to 4,000 visits per month, for a total of 46,178 visits during the reported time period. (A **visit or session** is a series of page requests from the same uniquely identified client within a specified time limit, usually 30 minutes.) The majority (37,795) were unique visitors. (A **unique visitor** is a uniquely identified client who is viewing pages within a defined time period. A client usually is identified by a combination of his/her machine [e.g., desktop computer] and a browser [e.g., Firefox].)

This summary report identifies which pages visitors viewed most and least, visit duration, and key audience activity. The report also details how traffic volume changed over time and how most visitors arrive at the CIP site, whether from other websites or search engines. Further, the report presents results of a limited keyword search NOVA conducted using primary search engines.

### Pages and Content Areas Most Valued by Visitors

The CIP site encompasses seven main sections: *About CIP*, *Research Funding*, *Programs & Resources*, *Clinical Trials*, *Informatics*, *News & Events*, and *Patients & Providers*.<sup>1</sup> Each main menu item links to multiple pages.

#### Most-Viewed Pages

The page viewed by the most visitors was Clinical Trials/Imaging Response Criteria (12,084 views, Figure 1). The second most commonly viewed page was the homepage (7,427 views, Figure 2). The staff directory also was viewed many times (2,514). Table 1 lists the top 11 most-viewed pages within CIP.

---

<sup>1</sup> After Round 1 usability testing was completed, this menu item was changed to *Patient Information*.

**Table 1: Top-Viewed Pages by Number of Views**

Rank	Total Page Views, September 2011 August 2012	Number of Views
1	Clinical Trials/Imaging Response Criteria	12,084
2	CIP Home	7,427
3	Programs & Resources/Information Systems/Lung Image Database Consortium (LIDC)	3,664
4	About CIP/Cancer Imaging Program - Staff Directory	2,514
5	Patients & Providers/Cancer Imaging/Nuclear Imaging (PET and SPECT)	2,457
6	Patients & Providers/Cancer Imaging	2,064
7	Programs & Resources/Cancer Tracer Synthesis Resources	1,635
8	Programs & Resources/Specialized Initiatives/Quantitative Imaging for Evaluation of Responses to Cancer Therapies	1,301
9	imaging.cancer.gov/newsandmeetings/workshops/cric *	1,223
10	Patients & Providers/Cancer Imaging/Virtual Colonoscopy	1,038
11	Clinical Trials/Imaging Guidelines for Clinical Trials	1,037

\* Page no longer available at the address provided in the Omniture report; content has been moved.

**Figure 1: Clinical Trials/Imaging Response Criteria Page**

The screenshot shows the National Cancer Institute website. The header includes the NCI logo and the text 'National Cancer Institute at the National Institutes of Health | www.cancer.gov'. The main navigation bar contains links for 'CIP Home', 'About CIP', 'Research Funding', 'Programs & Resources', 'Clinical Trials', 'Informatics', 'News & Events', and 'Patients & Providers'. A search bar is located on the right side of the navigation bar. The 'Clinical Trials' section is highlighted in the navigation bar. The main content area features a 'Clinical Trials' banner with an image of two people in a clinical setting. Below the banner is a section titled 'Imaging Response Criteria' with a 'Print This Page' button. The text explains that since 2000, an international committee promulgated unified, easily applicable criteria for measuring tumor response using X-ray, CT and MRI, known as Response Evaluation Criteria in Solid Tumors (RECIST). It also mentions that RECIST criteria are a voluntary, international standard and are based on a simplification of former methods (WHO, ECOG) and based on measurable disease.

Figure 2: CIP Homepage

The screenshot shows the CIP Homepage with a navigation bar at the top containing links: CIP Home, About CIP, Research Funding, Programs & Resources, Clinical Trials, Informatics, News & Events, and Patients & Providers. Below the navigation bar is a header section with four images: two people in a lab, a vertical heatmap of a human torso, a person looking at a monitor, and another heatmap. To the right of these images is a 'Contact Us' section for the Cancer Imaging Program, including the address (6130 Executive Blvd, MSC 7412, Suite 6000, Bethesda, MD 20892-7412), phone (301-496-9531), fax (301-480-3507), and a 'Contact Us >' link. Below the header is a paragraph describing the mission of the Cancer Imaging Program. Further down are two columns: 'News and Announcements' with an RSS icon and a link to 'DOE: Integrated Nuclear Medicine Research and Training Projects of Excellence' (dated January 20, 2012), and 'Programs & Resources' with a link to 'The Cancer Imaging Archive'.

Of the remaining top ten pages (all with over 1,000 views), three were under *Programs & Resources* and three under *Patients & Providers*. The top page under *Programs & Resources* was the Lung Image Database Consortium (LIDC) with 3,664 views. Under *Patients & Providers*, the most viewed page was Nuclear Imaging (PET and SPECT), with 2,457 views.

### Least-Viewed Pages

The ten least-viewed pages were viewed fewer than 20 times during the time period (Table 2). Several were in the *Programs & Resources* and *Reports and Publications* sections.

Table 2: Least-Viewed Pages by Number of Views

Total Page Views: September 2011	August 2012	Views
reportsandpublications/reportsandpresentations/challengesandopportunitiesforinviv*		17
programsandresources/reportsandpublications/reportsandpresentations/lidc-data-col*		17
programsandresources/reportsandpublications/reportsandpresentations/mammography		17
programsandresources/informationssystemslidc/universityofiowa		17
programsandresources/specializedinitiatives/ntroi/print		17
aboutcip/Lauren*		18
programsandresources/informationssystemslidc/cornelluniversity		18
newsevents/newsannouncements/archive/2011		19
reportsandpublications/reportsandpresentations/petimagequantitation		19
programsandresources/informationssystemslidc/imagearchiveresources/generalreferences		19

\* Page not available at the address provided in the Omniture report; URL is truncated.



## Visit Duration

Average time spent viewing pages ranged from .12 seconds to 7.73 seconds. Of the ten pages with the longest average viewing times (Table 3), most were in the *News and Meetings* and *Reports and Publications* sections, where users likely were engaged in downloading reports.

**Table 3: Pages Ranked by Viewing Time**

Rank by Viewing Time	Average Viewing Time: September 2011 August 2012		Average time (seconds)
1	reportsandpublications/reportsandpresentations/focusgrouponmagneticresonancespect *		7.73
2	newsandmeetings/events **		7.01
3	reportsandpublications/reportsandpresentations/firstdataset **		5.62
4	programsandresources/reportsandpublications/reportsandpresentations/ultrasoundima *		4.47
5	programsandresources/specializedinitiatives/sairp/mdandersibcancercenter		4.15
6	newsandmeetings/meetings/pastmeetings **		3.88
7	newsandmeetings/workshops/cric**		3.83
8	programsandresources/specializedinitiatives/sairp/universityofcalifornialosangeles		3.80
9	researchfunding/fundingopportunities/currentother		3.53
10	reportsandpublications/reportsandpresentations/consensusrecommendationforacquisit *		3.52

\*Page not available at the address provided in the Omniture report; URL is truncated.

\*\*Page not available at the address provided in the Omniture report; content has been moved.

## Key Audience Activity

To better understand how three key audiences—patients and the general public, medical practitioners, and imaging investigators—use the CIP site, page views were tabulated for the *Patients & Providers* (Figure 3) and *Research Funding* (Figure 4) website sections. For purposes of this report, NOVA made the following assumptions:

1. Imaging investigators are interested in the *Research Funding* section, which describes funding opportunities, types of grant and contract mechanisms, and how to apply for funding opportunities.
2. Patients, the general public, and noninvestigator medical practitioners are interested in the *Patients & Providers* section, which offers an introduction to cancer imaging technologies and their uses as well as information on imaging clinical trials.

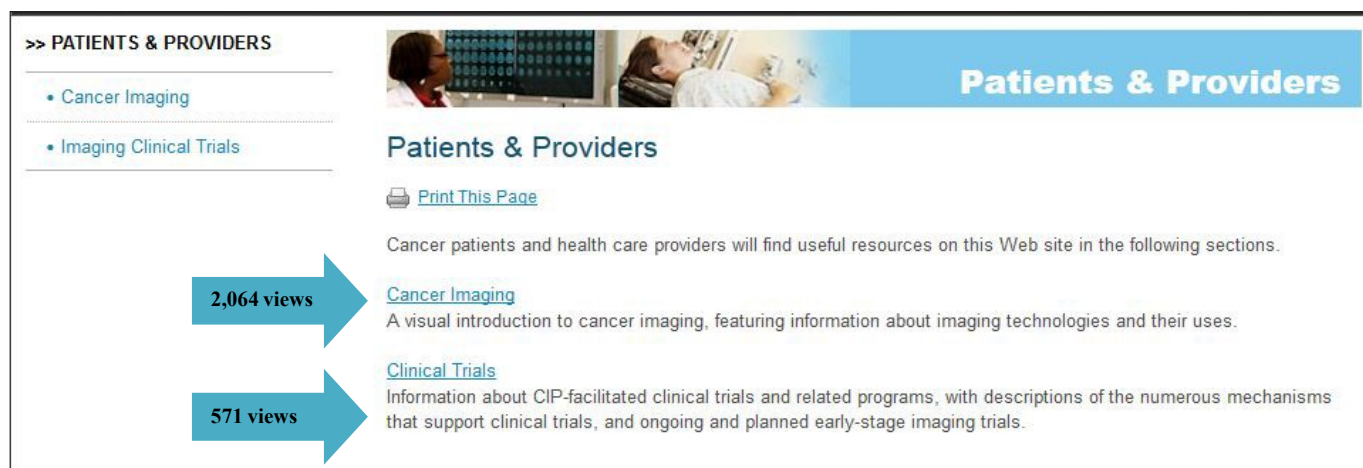
### Patients, the General Public, and Medical Practitioners

*Patients & Providers* has two subsections: Cancer Imaging<sup>2</sup> (2,064 views) and Clinical Trials<sup>3</sup> (571 views). The Cancer Imaging main page was one of the most viewed pages; the most commonly viewed pages within the Cancer Imaging subsection were “Virtual colonoscopy” and “CT scans.” The most-viewed page in Cancer Imaging Clinical Trials was the first choice on the list, “What are the types of imaging clinical trials?” followed by “Finding an imaging clinical trial.”

<sup>2</sup> After Round 1 testing, this subsection was changed to “Cancer Imaging Basics.”

<sup>3</sup> After Round 1 testing, this subsection was changed to “Imaging Clinical Trials Basics.”

**Figure 3: Patients & Providers Page**



### Imaging Investigators

*Research Funding* has four subsections: Funding Opportunities, Mechanisms, Application Guidelines, and Career Training and Education. The *Research Funding* main page had 511 views. The most-viewed pages in this section were “Funding Opportunities/Current CIP Initiatives” and “Funding Opportunities,” both with over 850 views, followed by “Mechanisms,” with 817 views.

**Figure 4: Research Funding Page**



### Comparison of Site Sections

On average, *Patients & Providers* pages were viewed more times than pages in *Research Funding*.

Four out of the top five most-viewed pages in *Patients & Providers* were viewed more times than their *Research Funding* counterparts (Table 4). Total views for the top five most-viewed pages in these sections were 5,074 and 3,486, respectively.

On average, visitors to the *Research Funding* pages spent more time there, possibly due to differences in the amount and density of content provided on each page (*Research Funding* pages are longer than

*Patients & Providers* pages). Visitors to the *Patients & Providers* sections may be scanning for a specific detail or definition, while those visiting the *Research Funding* section may be reading more deeply to identify a potential funding source.

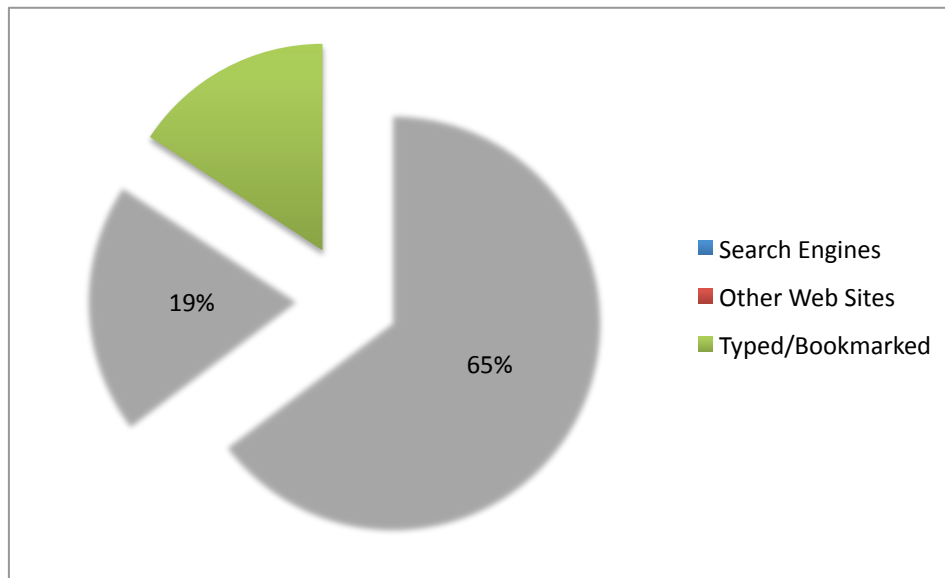
**Table 4: Average View Time for Top Most-Viewed Pages in *Patients & Providers* versus *Research Funding***

Rank	<i>Patients &amp; Providers</i> Section	Views	Average time (seconds)	<i>Research Funding</i> Section	Views	Average time (seconds)
1	Cancer Imaging (main page)	2,064	1.24	Funding Opportunities/Current CIP Initiatives	876	3.09
2	Cancer Imaging / Virtual Colonoscopy	1,038	2.14	Funding Opportunities	856	0.23
3	Cancer Imaging / CT Scans	931	1.72	Mechanisms	817	1.76
4	Cancer Imaging / Cancer Imaging Clinical Trials	571	0.93	Funding Opportunities/ Current Other NCI & NIH Initiatives	610	3.53
5	Cancer Imaging / Magnetic Resonance Imaging (MRI)	470	1.50	Career Training and Education	326	1.98
	<b>Total Views</b>	5,074			3,485	

### Referrers: Finding the CIP Site

The majority of CIP website visitors followed links from search engine results (64.6%) or from other websites (19.5%). A much smaller percentage (15.7%) of visitors keyed in the site name or used a bookmark. A negligible number (72, 0.2%) arrived from a social network (not shown in Figure 5 below).

**Figure 5: Number and Percent of Visits by Referrer Type**



Those who came to the CIP site from another website were most likely to arrive from the largest and best-known health and cancer websites. Most referrals came from cancer.gov (42.9%), followed by nih.gov (17.4%), and aacr.org (American Association for Cancer Research, 5.8%). This indicates that most users find the site through a directed search rather than through random browsing (as from a social media site).

## Directed Searches

Because so many visitors reach the CIP pages as the result of a search, NOVA conducted keyword searches using Google and Bing (the two search engines that account for 82.5 percent of market share) to see whether CIP pages appeared among the top search results. (Note: Reported ranks disregard ads, scholarly articles, images and "News about..." boxes.) Table 5 displays selected search terms and where relevant CIP pages ranked in search results.

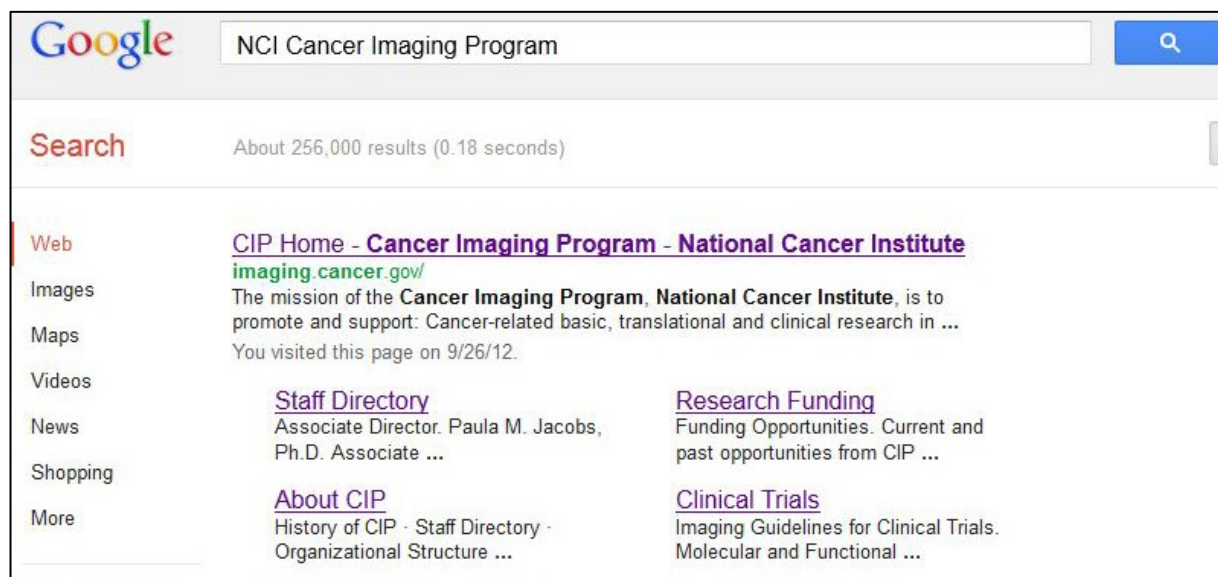
**Table 5: Selected Search Terms by Rank in Search Results**

Search Terms	Rank		CIP Page
	Google	Bing	
NCI Cancer Imaging Program	1	1	CIP Home (Google also lists Staff Directory, About, Network for Translational..., Research Funding, Association Websites, Mechanisms)
NCI CIP	1	1	CIP Home (Google also lists Staff Directory, About, Network for Translational..., Research Funding, Association Websites, Mechanisms)
Cancer imaging	2	4	Cancer Imaging Page (Google lists CIP Home in third position; Bing lists CIP Home in second position.)
Cancer imaging guidelines	1	1	Imaging Guidelines for Clinical Trials (Google lists Imaging Response Criteria in second position.)
Cancer imaging research		2	CIP Home (Google lists Research Funding in third position.)
Cancer imaging research funding	1	*	Research Funding (Google lists Career Training and Education in second position and CIP Home in third position; Bing lists Funding Opportunities in second position.)
Cancer imaging standards	17	*	The Cancer Imaging Archive
Cancer imaging trials	1	1	Clinical Trials (Google lists Cancer Imaging Clinical Trials in second position; Bing lists Screening and Interventional Clinical Trials in third position.)
Image-guided brain surgery	3	5	Image-Guided Brain Surgery
Nuclear Imaging	2	24	Nuclear Imaging
Sentinel node mapping for breast cancer staging	1	1	Sentinel Node Mapping for Breast Cancer Staging
Virtual colonoscopy	25	16	Virtual Colonoscopy
X-ray imaging	10	*	X-Ray Imaging
Cancer imaging regulations, CT scans, Digital mammography, Magnetic resonance imaging (MRI), Medical imaging, Medical imaging regulations, Medical imaging research, Medical imaging research funding, Ultrasound	*	*	

\*Not listed on first three search result pages.

The most effective searches employed specific terms. Searching for *NCI Cancer Imaging Program* and *NCI CIP* both produced the CIP homepage as the first result in Bing and Google (Figure 6). In addition, Google listed six other CIP pages, making it easy for searchers to go directly to their final destinations. The search terms *Cancer imaging guidelines* and *Cancer imaging trials* also produced the most appropriate CIP pages as first results in both search engines—Imaging Guidelines for Clinical Trials and Cancer Imaging Trials, respectively. Three additional cancer-specific search terms (i.e., *Cancer imaging*, *Cancer imaging research*, and *Cancer imaging research funding*) produced the most relevant CIP page(s) within the top five results for both Bing and Google.

**Figure 6: Google Results of Search for NCI Cancer Imaging Program**



CIP pages did not appear in highly ranked results of searches for more general terms such as *Medical imaging*, *Medical imaging regulations*, *Medical imaging research*, and *Medical imaging research funding*. This is likely due to the number of competing resources that offer information about these topics.

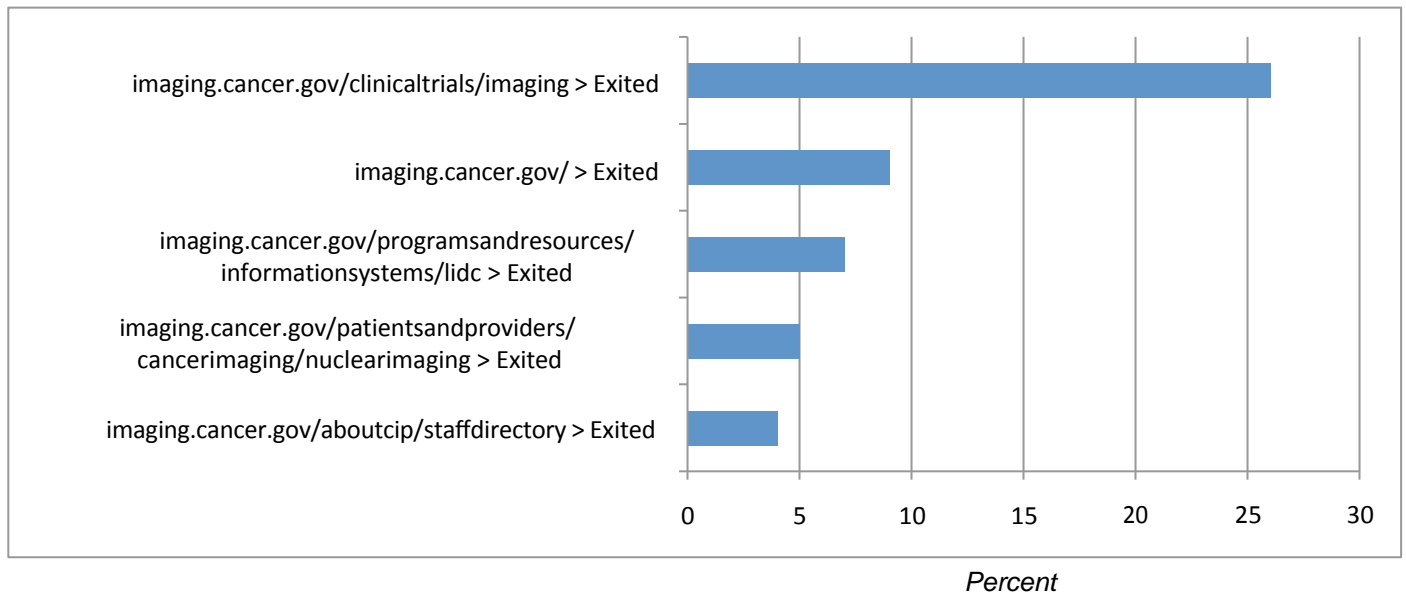
Searching for specific imaging procedures had mixed results. CIP pages were not among the top results of searches for the following procedures: *CT scans*, *Digital mammography*, *Magnetic resonance imaging (MRI)*, and *Ultrasound*. A great deal of information about these procedures is available elsewhere on the Internet.

By contrast, searches for specific imaging techniques described in *Patients & Providers* (i.e., Image-guided brain surgery, Nuclear imaging, Sentinel node mapping for breast cancer staging, Virtual colonoscopy, and X-ray imaging) produced the corresponding pages on the CIP website within the first 25 results on either Google or Bing. In fact, the “CIP Node Mapping for Breast Cancer Staging” page was the number-one result for this search term in both Google and Bing. This may suggest that the CIP site is a key source for information on medical imaging procedures and technologies about which information is less likely to be available elsewhere on the Internet.

### Website Pathways

The vast majority of visitors view a single page on the CIP website and then exit—a “one and done” approach. Corresponding precisely with the top-viewed pages, most visitors started at the “Clinical Trials/Imaging Response Criteria” page and then exited the site (8,862 visits, Figure 7). The second most common path started on the homepage, followed by exiting the site (3,074 visits). This suggests that most visitors arrived via direct links to a specific page rather than searching for the CIP site and then browsing for the desired information. It also may suggest that visitors find what they want right away; however, further information is necessary to confirm this.

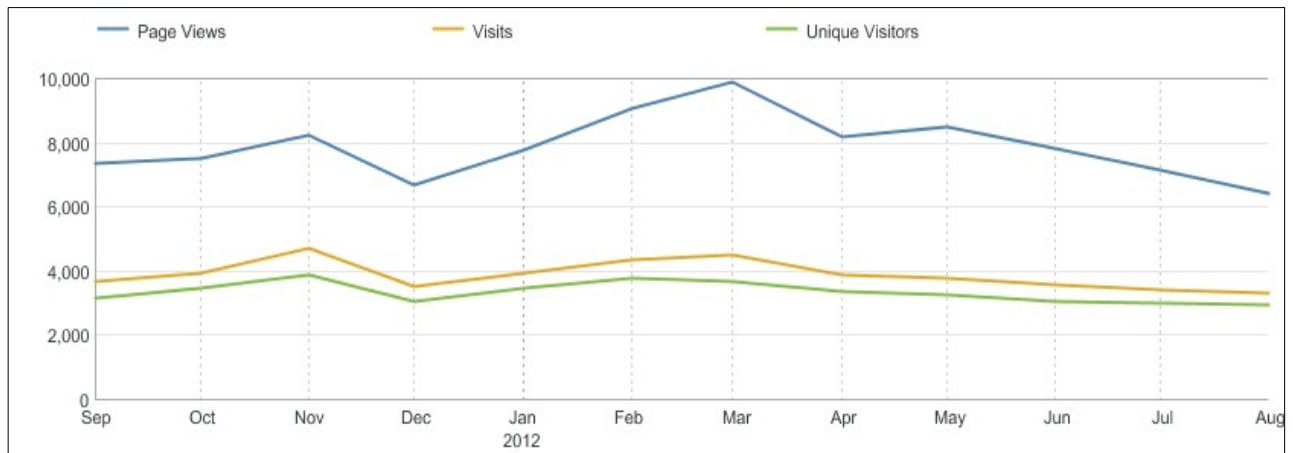
**Figure 7: Five Most Popular Paths**



### Changes in Traffic Volume

Traffic volume—or total page views—and visits between September 2011 and August 2012 varied across months, peaking in March 2012 at around 10,000 views (Figure 8). Another peak occurred during November 2011 (just over 8,000 page views). CIP staff may want to consider what website changes, CIP-related events, or other factors might explain these peaks.

**Figure 8: Page Views, Visits, and Unique Visitors by Month**



Lows occurred in December 2011 and August 2012 (just over 6,000 views). These valleys likely can be attributed to holiday and vacation seasons.

The number of visits and unique visitors tracked each other very closely and loosely followed the same pattern as page views. The majority of visitors were unique, suggesting that they found the necessary information in one visit to the CIP site.

The complete Web Traffic Analysis Report is provided as Appendix A.

## METHODOLOGY: COMPETITIVE ANALYSIS, HEURISTIC ASSESSMENT, USABILITY TESTING

### Competitive Analysis

While evaluating the usability and effectiveness of the CIP website, NOVA looked not only at what CIP is doing online but also at websites of four other DCTD programs:

1. Cancer Diagnosis Program (CDP, <http://cdp.cancer.gov/>)
2. Cancer Therapy Evaluation Program (CTEP, <http://ctep.cancer.gov/>)
3. Developmental Therapeutics Program (DTP, <http://dtp.nci.nih.gov/>)
4. Translational Research Program (TRP, <http://trp.cancer.gov/>)

Sites were evaluated for compliance with NCI Web Policies (<http://www.cancer.gov/global/web/policies>), NCI Web Standards (<http://www.cancer.gov/global/webresources>), and the Requirements and Best Practices Checklist for Government Web Managers, a scorecard containing best practices and requirements from WebContent.gov. CIP was compared with the other sites in terms of how well they followed each standard, policy, and best practice (i.e., superior to, in line with, or below), thus identifying CIP site strengths and weaknesses. In addition, the competitive analysis identified innovations on other sites that might serve as a model for CIP to improve website performance and content quality.

CIP site strengths and weaknesses are summarized in the Findings section of this report.

The complete Competitive Analysis Report is provided as Appendix B.

### Heuristic Assessment

NOVA conducted a heuristic assessment of the CIP website to confirm compliance with National Cancer Institute (NCI) Web Standards and Policies, federal guidelines, and evidence-based best practices. During the review, the CIP website was measured against NCI Web Standards and NCI Web Policies. In addition, the site was assessed using two scorecards:

1. Requirements and Best Practices Checklist for Government Web Managers, a scorecard containing best practices and requirements from WebContent.gov
2. A comprehensive 25-point checklist from Forrester Research

NCI's web policies address various legal issues such as endorsement and liability, privacy and security, copyright, Freedom of Information Act (FOIA), accessibility, and exit disclaimers. For most of these issues, CIP compliance is covered by providing links to the relevant NCI policy pages in the page footer. Exceptions are discussed in the Findings section of this report. Recommendations for compliance with NCI standards, policies, and guidelines are provided in the Recommendations section at the end of this report.

#### **Scorecard 1: Requirements and Best Practices Checklist for Government Web Managers**

This scorecard is based on a comprehensive assessment checklist developed by the Federal Web Managers Council to help determine how well a website meets federal website requirements and evidence-based best practices such as those published in *Research-Based Web Design & Usability Guidelines* ([http://www.usability.gov/guidelines/guidelines\\_book.pdf](http://www.usability.gov/guidelines/guidelines_book.pdf)). The tool encompasses current laws and regulations, Office of Management and Budget (OMB) Policies for Federal Public Websites, and other directives that pertain to federal public websites.

Scores are always a positive or negative number. No zeros are assigned in this measurement. Scorecard questions that refer to policies or practices that are met by NCI or where compliance is achieved

exclusively within the NCI footer were not considered. In total, the site was assessed for compliance with 88 requirements and recommendations.

The heuristic assessment included examining content on primary pages for adherence to plain language standards published on Howto.gov. Plain language best practices, methods used to determine readability, and target readability scores are described in detail in the full Heuristic Assessment Report (Appendix C).

## **Scorecard 2: Forrester Research Website Review**

The CIP website also was assessed using a comprehensive 25-point checklist developed by Forrester Research. Scores are always a positive or negative number. No zeros are assigned in this measurement.

The completed scorecard is included in the full Heuristic Assessment Report (Appendix C).

This scorecard measures site performance in four key areas: Value, Navigation, Presentation, and Trust. Answering the questions for these measures required development of sample goals for the website's target audiences: researchers, nonresearcher healthcare providers, and patients/general public. The following goals were used:

- Understand the purpose or mission of the Cancer Imaging Program. (What is CIP? What does CIP do?)
- Learn basic information about cancer imaging. (What is imaging? What kinds of imaging are used in cancer treatment and diagnosis? What research is being conducted in this area?)
- Learn about current research being conducted in cancer imaging.
- Identify funding opportunities for research in this area.
- Learn about CIP resources (e.g., services, infrastructure) available to researchers in this field.

Value refers to whether the site provides value to visitors. Can visitors accomplish specified goals? Navigation questions focus on whether the menu items, navigation buttons/icons, and related functions work well. Does the navigation scheme support visitors' ability to accomplish their goals? The Presentation section concerns how well the appearance of the site and its components support visitor success. The Trust section hones in on how well the website's performance earns visitor trust. For example, do visitors feel confident that they are reaching their intended destination?

The completed scorecards are included in the full Heuristic Assessment Report (Appendix C).

Recommendations for compliance with NCI requirements and policies and for following best practices described in the scorecards are included in the Recommendations section of this report.

## **Usability Testing**

During February and March 2013, NOVA conducted usability testing of the CIP website (Round 1). During June 2013, NOVA conducted a second round of usability testing that was designed to detect whether changes implemented after Round 1 testing had improved user satisfaction and website performance. This report section describes the usability testing methodology—from OMB clearance through recruitment and testing—for both rounds.

### **OMB Clearance**

Due to the number of participants involved, OMB clearance was required for the usability testing activity. NOVA staff drafted recruitment messages, a participant screener, a consent form, and a usability test script. These documents were submitted for OMB clearance via the NIH Fast Track Process. After minor revisions, the materials received official clearance.

### **Recruitment**

CIP identified three target groups for usability testing: medical imaging investigators, medical practitioners, and general population/patients. The goal was to recruit 12 participants for each test

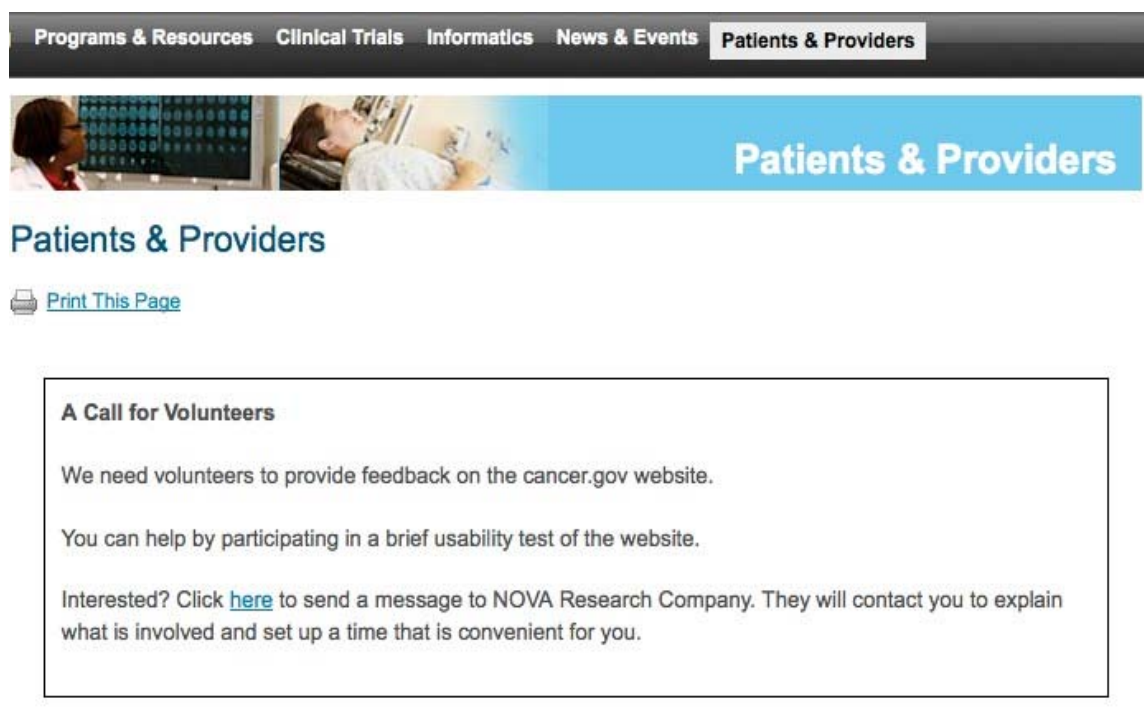


round—four members for each target group—with participants split between experienced (those who had visited the CIP website previously) and naïve (those who had never visited the site before). Recruitment efforts for each target group are summarized below.

**Medical Imaging Investigators.** To recruit the medical imaging investigators, NOVA conducted a search using NIH RePORT to identify researchers with grants focused on cancer imaging. Those whose funding was administered by CIP were considered likely to have experience with the CIP website; those whose funding was from outside of NCI (e.g., the National Institute of Biomedical Imaging and Bioengineering) were expected to have little or no experience with the CIP website. NOVA sent e-mail invitations to persons on the list.

In addition, CIP posted a call for volunteers on researcher-relevant pages of the website (Figure 9). The call included a link that sent an automated expression of interest to NOVA staff. Individuals who responded to the call were assumed to have experience with the CIP website.

**Figure 9: Call for Volunteers**



**Medical Practitioners.** To recruit medical practitioners, NOVA searched the NCI clinical trials database for clinical trials that involved cancer imaging. Trial staff (Principal Investigators and other staff) were invited to participate in the usability test via an e-mail message. In addition, CIP posted a call for volunteers on the main “Patients & Providers” page on the website (similar to the one targeted to investigators).

**General Population/Patients.** CIP posted a call for volunteers on the main patients/providers page on the website (similar to the one targeted to investigators). In addition, NOVA staff contacted a number of imaging societies and associations to request assistance in identifying patients and other members of the general population.

All individuals who responded to CIP website calls for volunteers or to e-mail invitations were screened via telephone. Those who met target audience criteria were invited to participate and asked to complete and return a consent form. (The telephone screener and consent form are included in the Usability Test Report Round 1, Appendix D.)

Each participant received a \$40 Visa gift card as a token of appreciation.

To recruit test participants for Round 2, NOVA repeated activities employed for Round 1 recruitment. This included sending e-mail invitations to individuals identified from a search of NIH RePORT and contacting local resources for medical practitioners and general population participants. Several participants who had responded too late to participate in Round 1 were recontacted and scheduled for Round 2.

## Test Participants

All recruited imaging investigators (n=8) were conducting or had conducted research funded by NCI. Two Round 1 investigators had received funding administered by CIP; none of the Round 2 investigators had received funding administered by CIP. All investigators are from large academic institutions, as defined by the Carnegie Foundation, which uses number of full-time students enrolled as the basis for determining institution size.<sup>4</sup> A total of four investigators (three in Round 1 plus one in Round 2) were identified as junior investigators, as defined by the National Institutes of Health (NIH).<sup>5</sup>

Two Round 1 participants (one investigator and one member of the general population/patient target group) were recruited via the website call for volunteers. All other participants were recruited via direct solicitation.

## Testing

Usability testing of the CIP website was conducted online. Participants accessed a private Adobe Connect session and then “shared” their computer desktops (i.e., allowed the NOVA facilitator to view what they were doing on their computers). Sessions were recorded via Adobe Connect and a digital audio recorder.

During the usability test, participants:

- Provided basic information about themselves to confirm that they represented the appropriate target audience
- Answered questions about initial impressions of the CIP website
- Performed real-world tasks using the website while thinking aloud
- Completed a System Usability Scale (SUS)
- Answered questions about their overall impressions of how the website looked and worked

Five tasks were completed by participants in all three target groups. Members of the general population target group completed seven additional tasks. Investigators completed 11 additional tasks in Round 1 and 10 tasks in Round 2. Practitioners completed 9 additional tasks in Round 1 and 8 in Round 2.

## Script Revisions

Website changes implemented after Round 1 testing made it necessary to revise the usability test script for Round 2. Two items from the Round 1 script were excluded from the Round 2 script:

1. Download a Frequently Asked Questions (FAQ) document for one of the Investigational New Drug (IND) applications CIP has created.
2. What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?

---

<sup>4</sup> Carnegie Foundation for the Advancement of Teaching. The Carnegie Classification of Institutions of Higher Education [Internet]. Washington (DC): the Foundation; [cited 2013 Apr 5]. Available from: <http://classifications.carnegiefoundation.org/>

<sup>5</sup> National Institutes of Health. New and Early Stage Investigator Policies [Internet]. Bethesda (MD): NIH; [cited 2013 Apr 5]. Available from: [http://grants.nih.gov/grants/new\\_investigators/](http://grants.nih.gov/grants/new_investigators/)

The test scripts for Rounds 1 and 2 are included in the full reports for each testing round (Appendices D and E).

### Preference Metrics

The System Usability Scale was administered as a measure of satisfaction. Test participants indicated their agreement with each of 10 statements, using a scale from 1 to 5 where 1 equaled strongly disagree and 5 equaled strongly agree. (The SUS is included in the test script in the Appendices of this report.)

Statements in the SUS touch on site complexity, consistency, and user-friendliness.

### Performance Metrics

The following performance metrics were collected during the usability tests.

**Task Completion.** The task was considered completed when participants indicated they had obtained the data or achieved the goal (whether successfully or unsuccessfully) or when participants indicated they could not complete the task.

**Completion Rate.** The completion rate is the percentage of test participants who successfully complete the task without critical errors. This rate represents the percentage of participants who, when they were finished with the specified task, have an outcome or answer that is correct. A completion rate of 80 percent was the goal for each task in this usability test.

**Time on Task (TOT).** Time on Task is the time required to complete a task. It was measured from the time the person began the task to the time he/she signaled completion.

**Critical Errors.** Critical errors are unresolved errors that occur during the process of completing the task or errors that produce an incorrect outcome (answer). Participants may not be aware that the task goal is incorrect or incomplete. Independent completion of the scenario was a universal goal; if help was obtained from the facilitator, the task was scored as a critical error.

**Non-critical Errors.** Non-critical errors are “recoverable” errors such as taking a long or unexpected path to find an answer. Non-critical errors do not have an impact on the final task outcome but do reflect inefficiency. Participants may not detect non-critical errors, but they usually are frustrating to participants.

**Error-Free Rate.** Error-free rate is the percentage of test participants who complete the task without any critical or non-critical errors. An error-free rate of 75 percent was the goal for each task in this usability test.

## RESULTS: COMPETITIVE ANALYSIS, HEURISTIC ASSESSMENT, USABILITY TESTING

### Competitive Analysis

The CIP website scored better than or equal to other DCTD sites in terms of following best practices, particularly in content management content for the public, visual appeal, and design scheme. However, the site compared less favorably in the areas of readability, navigation, search function, and interactivity.

### Heuristic Assessment

**Government Web Managers Scorecard.** CIP scored 80 out of a possible 127 points (63%), falling 7 points below the target passing score of 88 points. The site at least partially met 84 percent of the requirements and recommendations included on the scorecard and achieved a perfect score on the following sections: Improving Your Site and Making Changes; Collaboration/Avoiding Duplication; Legal Requirements; and Management and Governance. The site scored acceptably on the Required and Recommended Content section and the Usability, Accessibility, and Design section, but it needs improvement on requirements listed under Managing Content and Search.

**Forrester Checklist.** The CIP website missed an overall passing score by 1 point (score=20, passing score=21). The site achieved a better than passing score in the areas of Value (score=5, passing score=3) and Presentation (score=13, passing score=9). However, improvement is needed in Navigation (score=1, passing score=6) and Trust (score=1, passing score=3).

Overall, the CIP site met less than one-half of the NCI website content standards, scored below passing on the Government Web Managers scorecard, and scored just below passing on the Forrester Research scorecard. Although these results may be disappointing, bringing the site into compliance with best practices, guidelines, and requirements is achievable. Most of the required and recommended changes can be accomplished by CIP staff with minimal support from NCI information technology/web staff.

The completed scorecards are available in Appendix C. Recommendations for compliance with these requirements are summarized in the Recommendations section of this report.

## Usability Testing

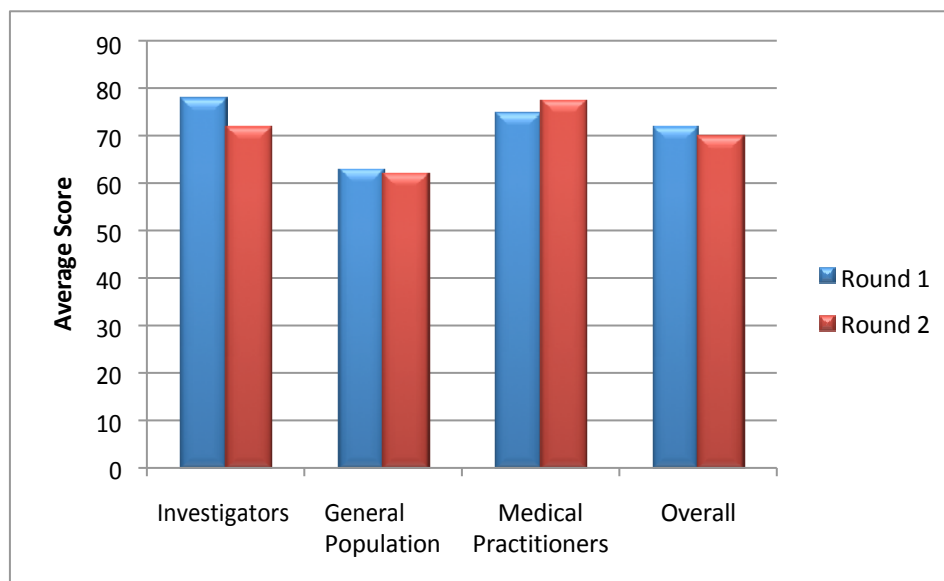
Response to the website was generally positive in both rounds. Round 1 participants indicated that they liked the way the site looked and functioned. Round 2 participants were impressed by the depth and breadth of content available on the site and the clean page layouts.

In both rounds, testers experienced some frustration with specific aspects of the CIP website. In Round 1, testers had difficulty finding specific information, encountered some broken links and page errors, and perceived that some sections of the site were not up to date. In Round 2, testers continued to have difficulty finding some key information due to the complexity of the site structure and poor performance of the search function. Tester comments are provided in the Round 1 and Round 2 reports (Appendices D and E).

## Satisfaction

The SUS was administered as a measure of satisfaction of website usability in both test rounds. Average SUS scores by target group are shown for both rounds in Figure 10.

**Figure 10: Average System Usability Scores, Round 1 Versus Round 2**



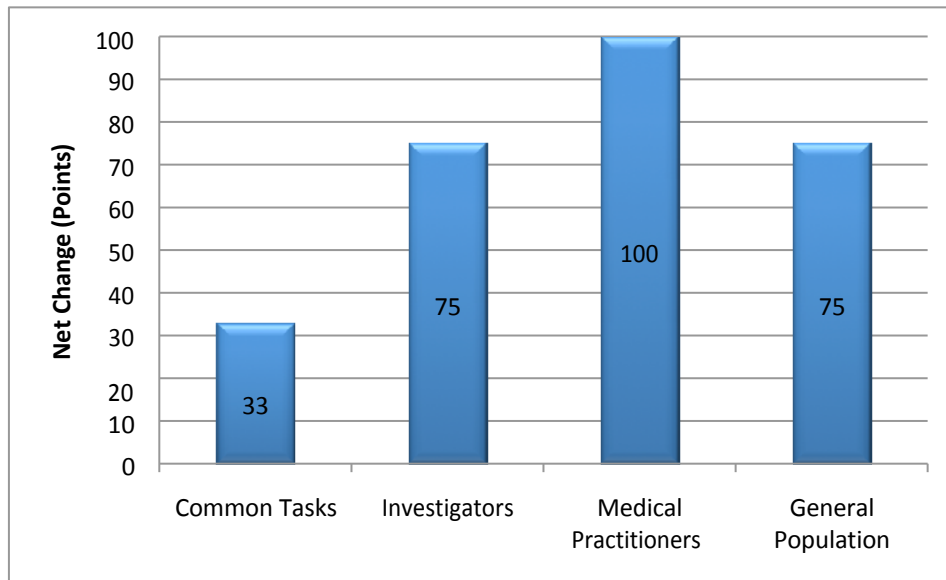
Overall, average satisfaction scores dropped slightly (5 points) from Round 1 to Round 2. Median satisfaction scores varied only slightly between the two rounds: a 1.25-point difference. If lowest satisfaction scores from both rounds are excluded, the median scores are equal: 75 points for both rounds.

## Performance

During Round 1 and 2 usability tests, NOVA collected the following performance data: time on task, completion rate, and error-free rate. Performance goals for each task in the usability test were a completion rate of 80 percent and an error-free rate of 75 percent.

It was hypothesized that website improvements would have a positive impact on performance during Round 2. In general, performance rates increased during Round 2 compared with Round 1. In fact, error-free rates changed in a positive direction for all target groups (Figure 11), with medical practitioners showing the greatest improvement.

**Figure 11: Changes in Error-Free Rates Between Round 1 and Round 2**



Two website changes that were implemented between Round 1 and Round 2 can be linked to performance improvements:

- Adding the Phase 2 N01 program to the list of specialized initiatives on the *Programs and Resources* page resulted in a 50-point completion rate gain and a 25-point error-free rate gain (I15).
- Changing “Clinical Trials” under *Patients & Providers* to “Clinical Trials Basics” improved net completion rates by 25 points and error-free rates by 125 points (P8, P9, P10, and GP11).

Two other website changes produced mixed results:

- Changing the *Patients & Providers* section to *For Patients* resulted in a net error-free rate gain of 175 points (P8, P9, P10, P12, P13, GP6, GP7, GP8, GP9, GP10, GP11). However, rates dropped for several tasks where improvements were expected: P8, GP6, GP7.
- Changing “Cancer Imaging” under *Patients & Providers* to “Cancer Imaging Basics” was expected to help distinguish this content from the main topic of the site. Error-free rates showed a net improvement of 50 points (P12, P13, GP6, GP7, GP8, GP9, GP10), despite losing points for tasks GP6 and GP7.

Table 6 displays performance rates (completion and error-free) and inter-round changes for every question included in both rounds. (Note: Some tasks were renumbered due to adjustments in the Round 2 script. Round 1 scores were mapped to Round 2 task numbers for comparisons shown in Table 6.)

**Table 6: Comparison of Round 1 and 2 Performance Rates**

Task #	Question	Completion Rate			Error-Free Rate		
		R1 (%)	R2 (%)	Change	R1 (%)	R2 (%)	Change
1	What is the CIP's mission statement?	92	100	+8	75	92	+17
2	Who is the Associate Director of the CIP?	100	100	0	83	100	+17
3	What NCI division is the Cancer Imaging Program a part of?	100	100	0	92	83	-9
4	Does the CIP website offer information specifically for patients?	100	100	0	92	92	0
5	How many branches does the CIP have?	83	83	0	75	83	+8
I6	What is the name of the most recently released CIP funding initiative?	100	100	0	75	75	0
I7	Where was the Cancer Imaging Research Camp held in 2012?	100	75	-25	75	50	-25
I8	Find information about NIH funding mechanisms such as P20 exploratory grants.	100	100	0	75	100	+25
I9	What is the expiration date for PAR-11-150?	100	100	0	100	75	-25
I10	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	100	75	-25	75	75	0
I11	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?	100	100	0	75	100	+25
I12	What were the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?	75	75	0	75	75	0
I13	Name two of the working groups in the Quantitative Imaging Network.	100	75	-25	75	50	-25
I14	Find one CIP publication that appeared in a peer-reviewed journal.	50	75	+25	0	75	+75
I15	What group is collaborating with the CIP in the Phase 2 N01 Program?	25	75	+50	0	25	+25
P6	Where was the Cancer Imaging Research Camp held in 2012?	100	50	-50	75	25	-50
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	75	75	0	75	75	0
P8	What kinds of groups or organizations sponsor clinical imaging trials?	50	0	-50	0	0	0
P9	Show me where you would look for an imaging clinical trial in which your patients might participate.	50	75	+25	0	75	+75
P10	How are imaging clinical trials and drug treatment trials different?	50	75	+25	50	50	0
P11	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?	75	75	0	75	50	-25

Task #	Question	Completion Rate			Error-Free Rate		
		R1 (%)	R2 (%)	Change	R1 (%)	R2 (%)	Change
P12	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?	100	100	0	75	100	+25
P13	What is the purpose of sentinel node mapping for breast cancer staging?	100	100	0	50	100	+50
GP6	What are two of the five uses for cancer imaging described on the website?	75	0	-75	75	0	-75
GP7	How long does a virtual colonoscopy examination take to complete?	75	75	0	50	25	-25
GP8	How is digital mammography different from conventional mammography?	75	75	0	75	75	0
GP9	Name one kind of nuclear imaging.	75	100	+25	75	100	+25
GP10	Can humans hear the sound waves that are used to perform an ultrasound?	75	100	+25	50	100	+50
GP11	Show me where you would look for help finding a clinical trial in which to participate.	75	100	+25	0	50	+50
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?	25	100	+75	25	75	+50

Recommendations for addressing these issues are described in the Recommendations section of this report.

## DISCUSSION

During the course of the evaluation, specific CIP website strengths and weaknesses were identified. This report section combines findings from the competitive analysis, heuristic assessment, and usability testing components of the evaluation to highlight areas in which the website excels and where improvement is needed.

### Strengths

#### Content Management

The competitive analysis indicated that the CIP website is superior to other DCTD websites in the area of content management. For the most part, content is written and organized from the audiences' point of view and includes basic content suitable for a general audience. A separate section of interest to patients and providers is clearly labeled in the navigation bar; only one of the four other sites (TRP) has content designated for the general public audience.

- *I like the fact that both professionals and patients can go to one website and get information and/or links to where they need to go. — Medical Practitioner (Experienced)*

CIP provides considerable information about funding opportunities in programs that CIP administers as well as those administered by other NCI components. Links to specific funding announcements also are included.

- *I didn't know they had very specific clinical trials based on different imaging modalities. ... I thought I was really familiar with the current funding opportunities, but it seems there are a lot more than I'm aware of. — Researcher (Experienced)*

The site avoids posting content of interest only to agency employees that would be more suitable for use on an intranet.

Obsolete content in *News and Announcements* and other sections (e.g., meetings, workshops, active grants) is deleted or archived on a regular basis.

**Common Content.** CIP includes common content found on most federal websites.

CIP's *Contact Us* page is superior to what the other DCTD sites offer. CIP contact information is prominently displayed on the homepage, and there are text links to this information in the footer of every page. The contact information is complete, including a mailing address, telephone numbers, and a web-based e-mail form. A test inquiry submitted via the e-mail form was answered within 2 hours; considerably faster than the 48-hour response time recommended in the guidelines developed by the Citizen Service Levels Interagency Committee (CSLIC). The CIP policy on responding to specific medical questions, making referrals, or providing consultation is clearly stated.

The CIP site has an "About Us" page describing basic information, including CIP's mission, its history, organizational structure, and a staff directory. The staff directory includes photographs of staff, which help "humanize" the organization.

- *I like that they have contact information right there so you don't have to search around for that. — Medical Practitioner (Naïve)*

**Required Content.** The site scored well on this section of the Web Managers scorecard, with reviewed pages including all but one required content element. The agency name (i.e., National Cancer Institute) and CIP are clearly displayed on every page. Every page on the site has graphical and text links back to the homepage. In addition, cross-agency links and text links to policies, accessibility, and FOIA are mandatory in the page footer.

**Metatags.** CIP source code includes description and language metatags not found on other reviewed sites. Appropriate metatags (i.e., title, description, language) have been included on the homepage and all primary pages. Best practices published by the Federal Web Managers Council include using minimum standard metadata elements on the homepage and all major entry points. Although Google, Bing, and other commercial search engines no longer rely upon metadata to identify relevant sites, they do include text from the description metatag to generate the descriptive text shown in search results. For example, the description tag for the "Association Web Sites" page appears as the page description in the results of a Google search for "Cancer imaging associations."

## Visual Appearance

CIP complies with all NCI Web Standards and Policies in this area. These standards include proper use of the NCI minibanner, application of the NCI color palette, and inclusion of colorful, realistic images of people.

The CIP website's visual appearance is superior to other DCTD sites, displaying colorful high-quality images in the top menu area (Figure 1) and using images relevant to the content on specific pages.

Site graphics, icons, and symbols are easily understood by users. Controls have good affordance; that is, they behave as their appearance suggests. Links display destinations when rolled over, and the mouse cursor display changes to a hand symbol.

Other sites use poorer quality images or image treatments (Figure 12) or repeat the same picture on all or nearly all of their pages.



Figure 12: CTEP Homepage



## Site Planning and Maintenance

The site met all requirements in the “Improving Your Site and Making Changes” section. The CIP staff member responsible for managing site content stays informed about industry best practices, attempts to follow relevant usability guidelines, and notifies interested parties and website visitors about changes to the site. Formal usability testing with representatives of target audiences is planned as a part of this evaluation.

## Usability

For the most part, the site provides access to documents using open, industry standard/native web formats (e.g., HTML) or alternative formats (e.g., Portable Document Format [PDF]) that do not impose unnecessary burdens for the intended audience. These file formats offer the greatest flexibility for visitors. The site provides a link to the downloadable free Adobe viewer in the footer.

The site makes proper use of “on this page” navigation links and page options links (e.g., print this page).

The site design works well on lower-end hardware, multiple browsers and versions of browsers, multiple operating systems, low connection speeds, and low screen resolutions. HTML page sizes average less than 20 kilobytes (kb), minimizing page download times to accommodate visitors with low connection speeds. (The guideline maximum file size is 50kb, so the CIP site received an additional point for this item.) The site’s persistent navigation scheme is used consistently throughout. With a few exceptions, navigation menus are positioned in the same place on every page, they are formatted and worded consistently, and they behave the same way on every page.

## Design Scheme

CIP’s design scheme also stands out. The simple grid system makes use of white space to provide structure and consistency. Links and other interactive items are arranged with appropriate spacing such that visitors can easily click on them without errors. No complex mouse movements are required. Critical

information, content, and graphics appear above the fold, making it easy for visitors to scan text for desired information.

**Figure 13: CDP Homepage**



Related items are grouped together, and the layout is not cluttered with unnecessary buttons, icons, bars, or other graphic elements. Other sites crowd their pages with too much text. For example, the CDP home page uses boxes in different sizes and colors that compete with one another for attention (Figure 13).

Text is legible and scalable (i.e., the user can enlarge or reduce as desired) and the default font size is easy to read.

Site graphics, icons, and symbols are easily understood by users. Controls have good affordance; that is, they behave as their appearance suggests. Their design is internally consistent.

### Collaboration / Avoiding Duplication

The site avoids recreating content that already exists on other components of the NCI website and provides links to appropriate cross-agency websites to guide visitors to additional relevant resources.

### Legal Requirements

The CIP website complies with federal accessibility requirements. The CIP site is designed to comply with Section 508 of the Rehabilitation Act, and no accessibility issues were detected on website pages during the heuristic assessment. CIP staff are taking action to ensure that all downloadable resource files are fully compliant with Section 508 requirements.

### Search

A search box appears on every page, is entitled “Search,” and is positioned in the upper third of the page. Search results are produced in less than 3 seconds and are displayed in an easy-to-read format with the search term shown at the top of the page.

### Management and Governance

Site visitors can identify the CIP site as an official federal website and trust that it provides accurate information. The site complies with most requirements for federal public websites, and plans are in place to bring the site into compliance with those requirements it does not currently meet.

A training plan is in place to ensure that CIP staff who have website responsibilities receive the training required to do this work.

## Weaknesses

### Readability

All four of the other DCTD sites scored better than CIP on reading ease, and three out of four sites scored better on reading grade level and use of passive voice. The majority of content management issues identified on the CIP site relate to plain language—that is, language that the site’s typical visitor can understand in one reading. CIP does not have SOPs that would ensure plain language standards are met.

The heuristic assessment included examining content on primary pages for adherence to plain language standards published on Howto.gov. Plain language best practices, methods used to determine readability, and target readability scores are described in detail in the full Heuristic Assessment Report (Appendix C).

### Required and Recommended Content

Some required content is missing from the site. The site does not include related pages or back-to-top links.

Three of the other DCTD sites provide a site map or subject index, which CIP lacks. This is considered a required element.

The site fails to display a date showing that it is current, that it has been reviewed within the past 12 months, or that it is historical material. The date serves as a key indicator of content currency.

Many key pages lack the introductory text recommended in NCI Web Guidelines. For example, the “Clinical Trials” page, which provides links to highly technical information relevant to clinical trials, could benefit from an introductory statement about what these resources are. A statement such as “For information about clinical trials and why they are important, see...” could guide general public visitors to the Cancer Imaging Clinical Trials subpage under *Patients & Providers*.

The site does not include relevant links to the NCI Dictionary of Cancer Terms (<http://www.cancer.gov/dictionary/>), which would be especially helpful to patients, providers, and members of the general public who visit the site.

### Navigation

The primary navigation menu is missing on two pages in the News and Announcements section.

### Search

CIP’s search engine functionality lags behind that of other sites (Figure 14). Search terms are not highlighted in each search result. The search function does not allow visitors to sort results or conduct more refined, focused searches within results. The site does not offer search help, hints, or tips and does not accommodate wildcard searching. In contrast, the CTEP site highlights search terms in the results, and results are sortable by relevance and date (Figure 15).

Figure 14: CIP Search Results

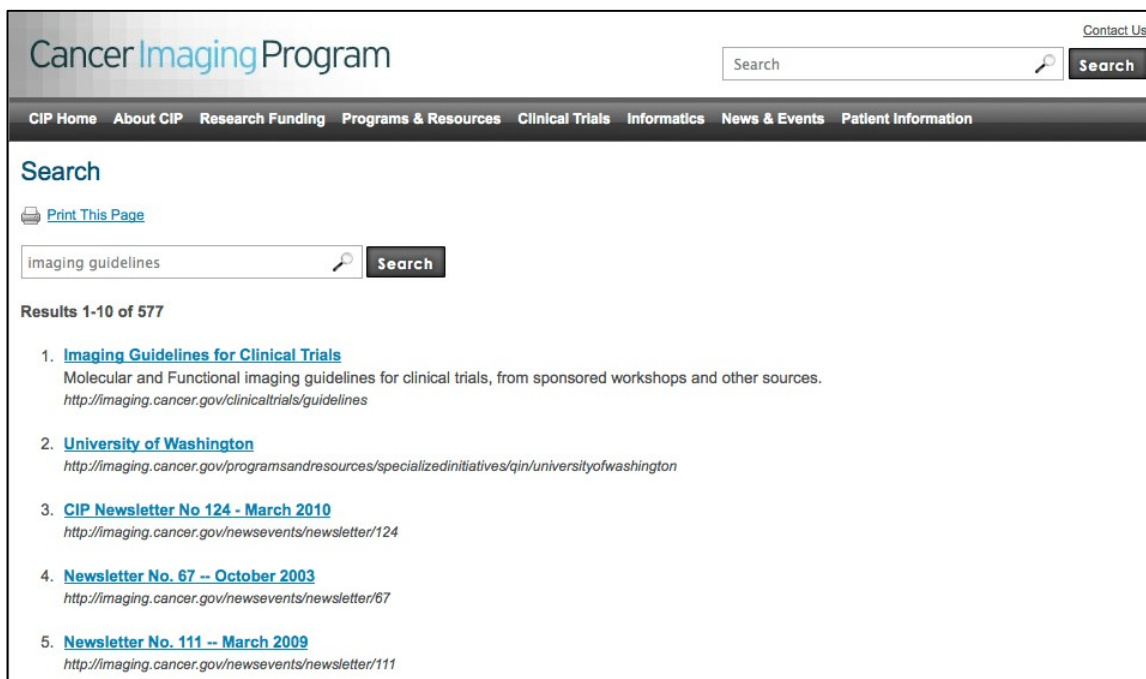
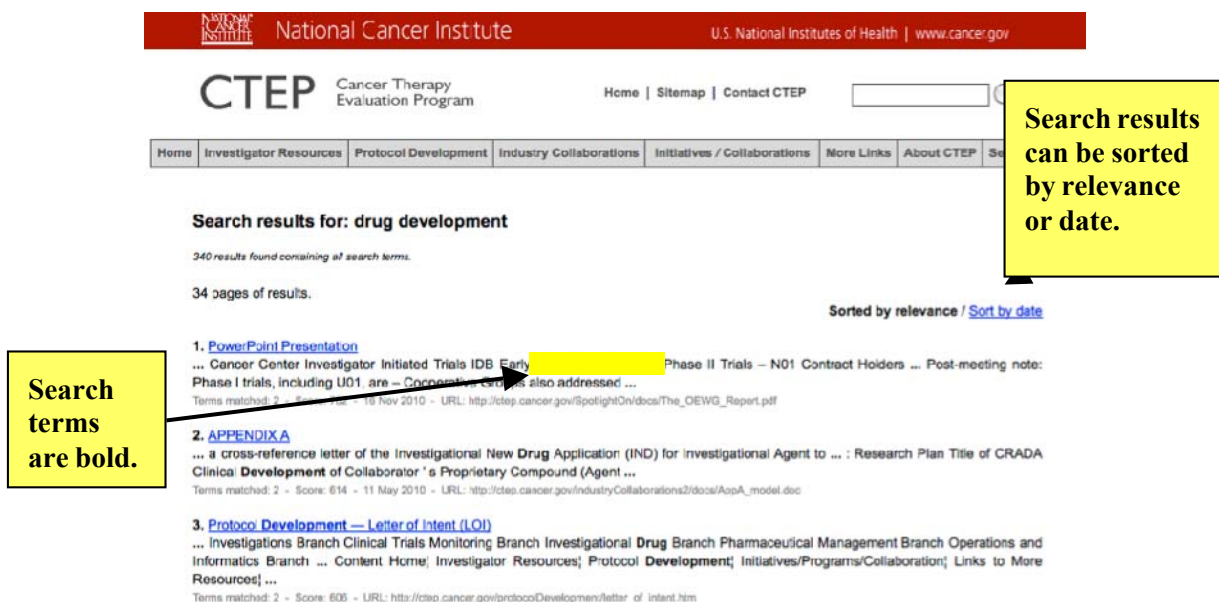


Figure 15: CTEP Search Results



Keyword-based searches on CIP are not comprehensive and precise. Visitors who use the search box rather than clicking through the navigation bar may not be able to find key information. Some search results do not appear to be the most relevant. For example, results of a search for “CIP purpose” were topped by a list of CIP newsletter issues rather than the CIP mission statement (found on the homepage) or the mission and vision information published on “About CIP.”

## Content Layout

The CDP website presents relevant funding opportunities in a table format that is easy to scan (Figure 16). The table has three columns: (1) program announcement number (with links to each announcement on grants.gov); (2) announcement title; and (3) expiration date. CIP currently presents similar information in a prose format (Figure 17) that takes longer to read. CIP could adapt this table format to display funding opportunities. Columns could be added to display the CIP contact names, e-mail addresses, and telephone numbers. In addition, columns could be made sortable.

**Figure 16: CDP Funding Opportunities**

Home About CDP Scientific Programs **Funding Opportunities** Funded Research Human Specimens for Research Technology Development Diagnostics Research

**Funding Opportunities**

Go >

□ Main  
 □ Exploratory Studies (R21 and R03 grants)  
 □ Technology Development  
 ■ **Clinical Correlative Studies**  
 □ Human Tissue Specimen Resources  
 □ Small Business (SBIR and STTR grants)  
 □ Full List of Cancer Diagnosis Initiatives

**Clinical Correlative Studies** Last Updated: 08/18/10

**Active Program Announcements (PA) and Requests for Applications (RFA)**

The Cancer Diagnosis Program offers several program announcements to encourage patient-oriented research on new strategies for cancer diagnosis. Some of these announcements are sponsored by the NCI Cancer Therapy Evaluation Program to support the integration of translational studies into clinical trials. Investigators may apply for several types of awards in addition to the standard (R01) research project grant.

**Current Initiatives**

Announcement #	Title	Expiration
<a href="#">PA-08-134 (R01)</a>	Correlative Studies with Specimens from Multi-site Trials	05/08/12
<a href="#">PA-08-133 (R21)</a>		05/08/11
<a href="#">PA-09-158 (R21)</a>	Developmental Research in Cancer Prognosis and Prediction	05/08/12
<a href="#">PA-09-159 (R33)</a>		05/08/12
<a href="#">PA-10-025 (R01)</a>	Development, Application, and Evaluation of Prediction Models for Cancer Risk and Prognosis	01/08/13
<a href="#">PA-10-026 (R21)</a>		01/08/13

**Additional Funding Opportunities**

[NCI Extramural Funding Opportunities Home Page](#)

[NCI Funding Announcements](#)

[NIH Small Business Funding Opportunities](#)

[NIH Guide for Grants and Contracts](#)


Figure 17: CIP Funding Opportunities

The screenshot shows the 'Research Funding' section of the CIP website. The navigation bar includes 'CIP Home', 'About CIP', 'Research Funding', 'Programs & Resources', 'Clinical Trials', 'Informatics', 'News & Events', and 'Patients & Providers'. The sidebar menu lists 'Funding Opportunities', 'Current CIP Initiatives', 'Current Other NCI & NIH Initiatives', 'Past CIP Initiatives', 'Past Other NCI & NIH Initiatives', 'Mechanisms', 'Application Guidelines', and 'Career Training and Education'. The main content area is titled 'Current CIP Initiatives' and includes an RSS link, a 'Print This Page' button, and a paragraph stating: 'This page lists current opportunities from CIP. For information about the funding process, go to [Mechanisms](#) or [Guidelines](#). The NCI's Division of Extramural Activities provides information about newly approved concepts, which may become RFAs and PAs. Check the [Concepts Cleared at the NCI Board of Scientific Advisors Meeting](#) web site for the earliest possible information about future initiatives.' Below this is a link to 'PAR-11-216: Early Phase Clinical Trials in Imaging and Image-Guided Interventions (R21)' and a list of details: Release Date: May 24, 2011; Application Receipt Date: See below; Expiration Date: March 14, 2014; and Contacts: Imaging trials (Lalitha K. Shankar, M.D., Ph.D., NCI, Phone: 301-496-9531, [shankarl@mail.nih.gov](mailto:shankarl@mail.nih.gov); Frank I. Lin, M.D., NCI, Phone: 301-496-9531, [frank.lin2@nih.gov](mailto:frank.lin2@nih.gov)); Image-Guided Intervention trials (Keyvan Farahani, Ph.D., NCI, Phone: 301-496-9531, [farahank@mail.nih.gov](mailto:farahank@mail.nih.gov)); Radiation Therapy trials (Bhadrasain Vikram, M.D., NCI, Phone: 301-480-5785, [vikramb@mail.nih.gov](mailto:vikramb@mail.nih.gov)).

## Trust

The site's overall trust score suffered somewhat due to a number of errors. These include broken links (e.g., several image enlargements in the *Cancer Imaging Basics* section) and nonworking icons (i.e., magnifying glass icons in the *Cancer Imaging Basics* section).

- *I would like to be able to see the larger images, but for whatever reason they are not available. — Medical Practitioner (Naive)*

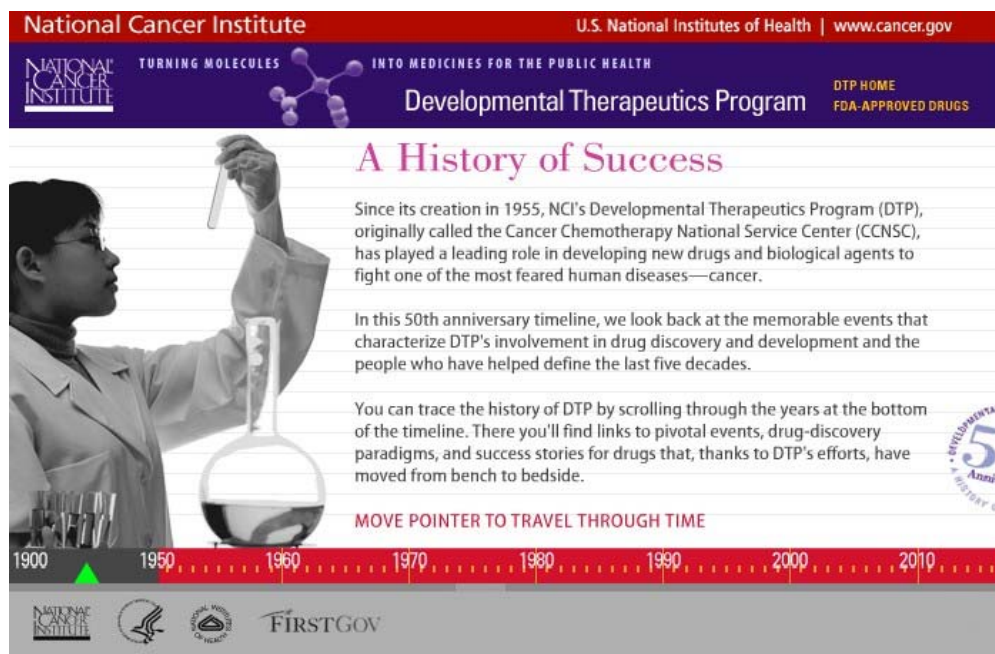
The CIP website does not comply with the NCI exit disclaimer policy that requires putting a graphic notice () next to links that lead to non-federal government websites. For example, the Associations Web Sites page at <http://imaging.cancer.gov/programsandresources/associationwebsites> does not indicate that these association sites are not hosted by federal agencies.

When linking to non-HTML documents, the site does not provide a text description of the file with file type, file size, or effective date. Therefore, site visitors have no advance knowledge that clicking on a link will open a non-HTML file. On the *Imaging Guidelines for Clinical Trials* page, for example, the first two links open PDFs, but the third link opens an HTML page containing a link to a journal article in PDF format.

## Interactivity

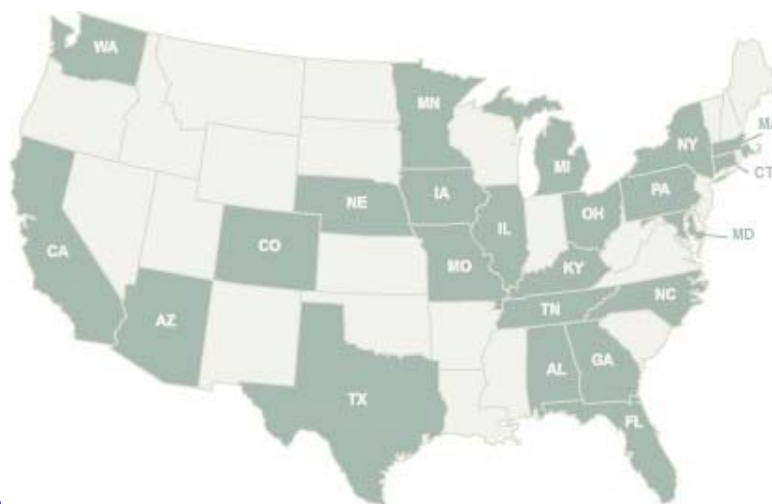
Both DTP and TRP offer some interactive features that make their sites “sticky”—that is, they keep people on the site. For example, the DTP 50<sup>th</sup> anniversary timeline (Figure 18) incorporates photos and links to key events since DTP was formed; users can move the pointer along the timeline. CIP has similar information about its own history (<http://imaging.cancer.gov/aboutcip/history>) that could be converted from a prose-style presentation to a more visually exciting format. This section also appears to be due for an update, as the most recent initiative shown is from 2004.

Figure 18: DTP Timeline



The TRP site includes interactive maps: SPOREs by state (Figure 19) and SPOREs by location (<http://trp.cancer.gov/spores/bylocation.htm>). The CIP grant funding bar chart on the “About CIP” page (<http://imaging.cancer.gov/aboutcip/history>) might be re-imagined so that visitors can click on specific fiscal years or specific bar sections for more details.

Figure 19: TRP SPORES by State Map



## Social Media

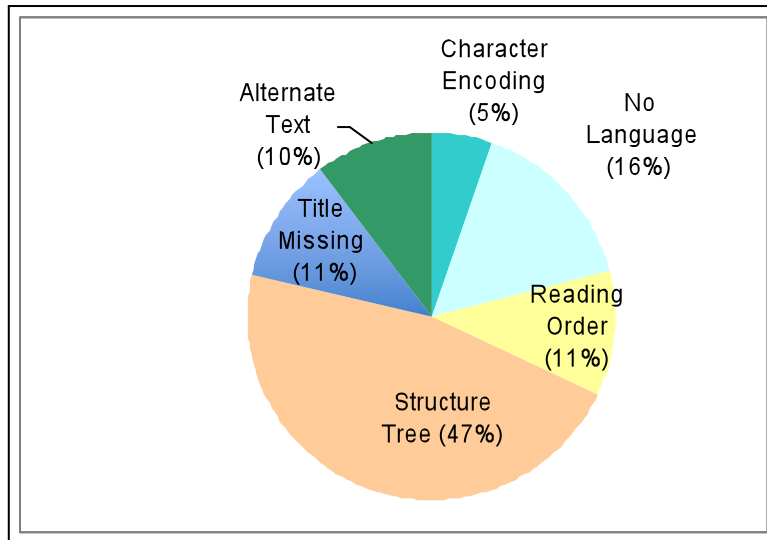
While conducting the competitive analysis, it was noted that none of the DCTD programs appear to have a social media presence. CIP should consider posting videos on the NCI YouTube channel such as demonstrations of imaging procedures (with links on the *Patients & Providers* section of the CIP site) or interviews of past and current CIP grantees talking about their work. This is one way CIP can leverage its grantees to help tell the CIP story.

## ADDITIONAL DELIVERABLES

### Section 508 Compliance Testing

NOVA conducted 508 compliance testing of over 300 files using Adobe Acrobat software. About 17 percent of the files met all Section 508 requirements; the remaining 83 percent did not pass. According to compliance error reports, most issues fell into one of the following six categories: structure tree, language assignment, reading order, missing title, images missing alternate text, and character encoding. Distribution of errors is shown in Figure 20.

**Figure 20: 508 Compliance Errors**



### Review of Commercial 508 Compliance Software

NOVA reviewed commercially available software programs that enable 508 compliance testing and file repair. At contract initiation, CIP staff had begun to use CommonLook software to make Microsoft Word files and PDFs compliant with Section 508 requirements. CIP was interested in determining whether other programs could perform these tasks more efficiently. A copy of the full report is available as Appendix F.

#### Methodology

To clarify characteristics of the 508 compliance work routinely performed by CIP staff and commonly encountered compliance issues, NOVA conducted a telephone interview with Ms. Brenda Fevrier-Sullivan, the individual CIP staffer most involved in 508 compliance work. The interview included discussion of typical 508 compliance tasks as well as Ms. Fevrier-Sullivan's CommonLook training and past experience with Adobe Acrobat. Following the interview, required and desired review criteria were established; the first two criteria are required and the remainder are considered desirable.

#### Review Criteria

1. Identify errors (Required).
2. Provide an exportable error/issue report (Required).
3. Display errors on page of occurrence.
4. Enable users to click on each error to view point(s) of occurrence.
5. Allow error-by-error rechecks to confirm that a problem has been resolved.



6. Provide error-specific correction tips.
7. Allow individual artifact correction.
8. Enable selection of specific components on a page to be read aloud.
9. Offer script feature to automate common actions (e.g., correction of specific artifacts, specification of language, identification of punctuation that should not be read).

Following an Internet search for available 508 compliance testing and repair software, NOVA recommended a list of programs for review. CIP approved testing of the following: 3-Heights PDF Validator, Accessibility Management Platform, Acrobat Pro XI, and CommonLook.

A NOVA 508 compliance specialist conducted the reviews. First, she used each program to test two precompliant sample documents and recorded test results. The compliance specialist explored user guides and other available software documentation to determine whether the program met specific criteria and recorded findings. Next, the reviewer completed the software usability scale.

## Analysis Results

Software was scored based on two rates: pass-fail and preference. The pass rate is the percentage of the required criteria (items 1–2 above) that the software met. To pass criterion 1, the software must have had zero compliance issue identification failures. An *issue identification failure* is defined as any type of compliance issue the software failed to identify and did not report that a manual check was required. Both Acrobat Pro and CommonLook earned a 100 percent pass rate.

The preference rate is the percentage of seven preference criteria (items 3–9 above) met by the software. CommonLook had the highest preference rate (86%), followed by Acrobat Pro.

The reviewer reported the highest level of satisfaction (83%) with Acrobat Pro software, followed by CommonLook (70%). It should be noted that the NOVA reviewer had several years of experience using an earlier version of Adobe Acrobat Pro (version IX) prior to this software review; her familiarity with the earlier version of this product likely influenced her higher level of satisfaction with Acrobat Pro XI.

CommonLook software appears to be the best choice for CIP. This software achieved the highest performance score of all four products included in the test and received the second highest user satisfaction score of all four products included in the test. The CIP expert user (Ms. Fevrier-Sullivan) expressed a high level of satisfaction with the product compared with her previous experience using Adobe Acrobat Pro.

NOVA recommends that CIP staff check for availability of CommonLook software upgrades on at least an annual basis. It is possible that future versions will incorporate some of the preferred features and functions the current version lacks.

## RECOMMENDATIONS


Recommendations from all previously submitted reports are provided below. CIP staff are encouraged to review and prioritize the recommendations in a way that reflects urgency of the identified issue and availability of resources. When changes require more resources than are feasible, CIP might consider establishing an SOP that complies with specific guidelines and applying it to all new content. For example, to improve readability of site content, use the MS Word readability statistics function to test all new text and revise it as needed to meet target reading ease and grade level scores before posting it to the site.

Source reports for each recommendation are provided in parentheses. CA indicates Competitive Analysis, HA indicates Heuristic Assessment, UT indicates Usability Test, and 508 indicates 508 Compliance.

## Content

- Improve readability of content on the site by reducing use of passive voice <10 percent; eliminating unnecessarily complex sentence structure; increasing reading ease to 50+ on pages intended for the public and 20+ on pages intended for researchers; reducing grade level to 10 or lower for public audience and 16 or lower for researcher pages; eliminating undefined acronyms. (CA, HA)
- Update the CIP grant funding graphic to include data through Fiscal Year (FY) 2011 or, if possible, through FY 2012. (HA)
- Periodically compile and publish a list of journal articles that result from CIP-administered research; include links to the abstracts on PubMed. (UT)
- Include a link to a PubMed list of free, full-text journal articles on NCI-supported research relevant to imaging. (UT)
- Present information in an interactive format that will engage visitors; for example, the DTP history timeline and the TRP SPORES map. (CA)
- Consider posting videos on the NCI YouTube channel such as demonstrations of imaging procedures (with links on the *Patients & Providers* section of the CIP site) or interviews of past and current CIP grantees talking about their work; this is one way that CIP can leverage its grantees to help tell the CIP story. (CA)
- Add relevant links to the NCI Dictionary of Cancer Terms at <http://cancer.gov/dictionary>, particularly in the *Patients & Providers* section. (HA)
- Add relevant links to the NCI Drug Dictionary at <http://cancer.gov/drugdictionary>. (HA)

## Format

- Convert list-type content (e.g., funding opportunities) from prose format to an easy-to-scan table format. (CA)
- Format event dates and times consistently; the current format employs multiple font sizes. (UT)
- Simplify event entries by including event title, event date (omit times), and event location. (UT)
- Make the event listings easier to scan by including annual separators (i.e., 2013, 2012, 2011) in a larger font. (UT)
- Reformat citations to follow NCI style guidelines. (NCI policies, HA)
- Except for very short pages, add introductory text. (NCI Standard, HA)
- Add a graphic notice () next to links that lead to non-federal government websites. (HA)
- Add related pages or back-to-top links on long pages. (NCI Standards, HA)
- Add date (posted, reviewed, updated, or last modified) to every page. (CA, HA)

## Errors

- Fix broken links to image enlargements in *Patients & Providers*, “Cancer Imaging” (i.e., CT scans, ultrasound, digital mammography). (HA)
- Fix non-working enlargement icons on “Nuclear Imaging” page. (HA)
- Correct text wrap issues on the “Feasibility Trials” page. (HA)
- Change the heading on the “NIH Roadmap” page from NIH Common Fund to NIH Roadmap or change the page name and menu references to NIH Common Fund. (HA)

## SOPS and Policies

- Schedule routine content reviews to ensure that material is current. (HA)
- Develop a policy and SOPs to ensure that new content meets plain language criteria. (CA, HA)
- Regularly review the homepage and major entry points to ensure they are written in plain language appropriate for the site's intended visitors. (HA)
- Create an inventory of content categories that each targeted audience needs or wants (e.g., press releases, publications) and determine a schedule for posting additional content in the future. (HA)
- Check for availability of CommonLook software upgrades on at least an annual basis; future versions may incorporate some of the preferred features and functions the current version lacks. (508)

## Navigation

- Add a site map or subject index. (CA, HA)
- When linking to a non-HTML document, include a text description of the file, including file name, type, and size. (HA)
- Reorder content on “News & Events” page to match the order shown on the drop-down list. (HA)
- Reposition “Reports & Publications” content so that it appears at the top of the “Programs & Resources” page to match the order shown on the *Programs & Resources* menu drop-down list and its position in the secondary menu on the left side of the page. (HA)
- On the homepage, link to the TCIA descriptive page on the CIP site. (UT)
- Guide patients to the patient version of clinical trial information by adding a link under the main *Clinical Trials* drop-down menu. Call it “Clinical Trials Basics (for Patients).” (UT)
- Conduct card sort activities with members of the general public to identify the appropriate menu terms that would best match their expectations. (UT)
- Change the *Patient Information* menu item to *Introduction to Cancer Imaging*. (UT)
- Consider adding a level 3 QIN Site link to the left-side navigation bar, shifting the individual site links to level 4.

## Search

- Upgrade the search results display to highlight search terms and make results sortable by relevance and date. (CA, HA)
- Enable wildcard searching. (HA)
- Regularly evaluate the relevance of the search results for most frequently used search terms and take steps to ensure that search results include the most relevant pages. (HA)
- Work with NCI web staff to include the N01 Program in search results for the term “NO1” as this is likely to be a common search error. (UT)

## CONCLUSION

In brief, the CIP website is a source of important information. Usability test participants were impressed by the depth and breadth of information provided.

- *It's a pretty comprehensive website. — General Population (Naive)*
- *I can click on those links and then there's some more resources... a wealth of information here. Okay, wow! — Medical Practitioner (Naive)*

To ensure that the site is as useful as possible, it is recommended that the corrective steps described in this report be taken. Emphasis should be placed on addressing issues related to readability, navigation, and search.

## **APPENDIXES**

**Appendix A. Web Traffic Report**

**Appendix B. Competitive Analysis Report**

**Appendix C. Heuristic Assessment Report**

**Appendix D. Usability Testing Round 1 Report**

**Appendix E. Usability Testing Round 2 Report**

**Appendix F. 508 Software Comparison Report**

## APPENDIX A. WEB TRAFFIC REPORT

# **Web Traffic Report for the Cancer Imaging Program (CIP) Site**

Prepared by NOVA Research Company

October 12, 2012

## Traffic Summary Data

The Cancer Imaging Program (CIP), a component of the National Cancer Institute's Division of Cancer Treatment and Diagnosis (NCI/DCTD), maintains its own website at <http://imaging.cancer.gov/>. To better understand how visitors are accessing and using the CIP website, NOVA reviewed the CIP Omniture Web traffic report for September 2011 through August 2012.

This report lists the number of page views for the top 200 pages, where views ranged from 17 to 12,084 for a total of 92,062 page views during the reporting period. (A **page view** is a request to load a single web page from an Internet site.) The CIP site averaged close to 4,000 visits per month, for a total of 46,178 visits during the reported time period. (A **visit or session** is a series of page requests from the same uniquely identified client within a specified time limit, usually 30 minutes.) The majority (37,795) were unique visitors. (A **unique visitor** is a uniquely identified client who is viewing pages within a defined time period. A client usually is identified by a combination of his/her machine [e.g., desktop computer] and a browser [e.g., Firefox].)

This summary report examines many aspects of the data to better understand traffic patterns during the past year, including what pages visitors viewed the most and least and how long visitors remained on site pages. In addition, it considers what pages were most visited by key audiences such as patients, medical professionals, and imaging investigators. The Omniture report also details paths visitors followed, what pages they exited from, and how this traffic volume changed over time. Data collected also tell us how visitors arrive at the CIP site, whether from other websites or search engines.

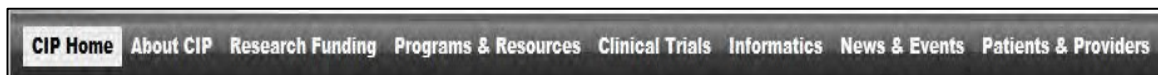
The Omniture report does not include data on keyword searches, so NOVA conducted a limited keyword search using primary search engines. This report includes results of those keywords searches and identifies which types of search terms were most effective at finding CIP pages.

## Pages and Content Areas Most Valued by Visitors

### What pages did visitors view the most?

The CIP site encompasses seven main sections: *About CIP*, *Research Funding*, *Programs & Resources*, *Clinical Trials*, *Informatics*, *News & Events*, and *Patients & Providers* (Figure 1). All of these main menu items link to multiple pages.

Figure 1: CIP Website Menu





The page viewed by the most visitors was the Clinical Trials/Imaging Response Criteria (Figure 2). With 12,084 views, this was by far the most active page.

**Figure 2: Clinical Trials/Imaging Response Criteria Page**

**National Cancer Institute** at the National Institutes of Health | www.cancer.gov

**Cancer Imaging Program** Search  Search

**CIP Home About CIP Research Funding Programs & Resources Clinical Trials Informatics News & Events Patients & Providers**

**>> CLINICAL TRIALS**

- Imaging Guidelines
- Imaging Response Criteria**
- Screening and Interventional Trials
- Radiology Network (ACRIN)
- Single Institution Feasibility Trials
- Phase I/II Trials
- CIP ARRA-Funded Clinical Trials

**Imaging Response Criteria** [Print This Page](#)

Since the year 2000, an international committee promulgated unified, easily applicable criteria for measuring tumor response using X-ray, CT and MRI which is known as Response Evaluation Criteria in Solid Tumors (RECIST). The technique is recommended but not mandatory for NCI sponsored trials and involves formalized rules for measurement of tumor target lesions.

[RECIST Guideline \(Version 1.1\)](#) and a [RECIST Measurement of Effect](#) document for incorporating the procedure are available online, and detailed explanations for application of the method in clinical trials can be found at the [European Organization for Research and Treatment of Cancer \(EORTC\) RECIST Web page](#). NCI-funded cooperative groups are encouraged, but not required, to use RECIST criteria.

RECIST criteria are a voluntary, international standard, and are not an NCI standard. They are based on a simplification of former methods (WHO, ECOG) and based on measurable disease, i.e., the presence of at least one measurable lesion.

RECIST criteria offer a simplified, conservative, extraction of imaging data for wide application in clinical trials. They presume that linear measures are an adequate substitute for 2-D methods and registers four response categories:

- CR (complete response) = disappearance of all target lesions
- PR (partial response) = 30% decrease in the sum of the longest diameter of target lesions
- PD (progressive disease) = 20% increase in the sum of the longest diameter of target lesions
- SD (stable disease) = small changes that do not meet above criteria

Plans call for improving on RECIST methodology by developing and validating clinical trial-acceptable methods and standards to incorporate:

- volumetric (3D) anatomical imaging
- dynamic contrast imaging
- functional (molecular) imaging

If successful, the use of medical image data as a surrogate endpoint in clinical trials could lead to:

- Smaller clinical trials with fewer patients
- Earlier go/no decisions on drug compounds
- Faster regulatory approval for new drugs
- Earlier use in clinical care

The second most commonly viewed page was the homepage (Figure 3), with 7,427 views. The staff directory was also very commonly viewed (2,514).

**Figure 3: CIP Homepage**

The screenshot shows the CIP Homepage with a navigation bar at the top containing: **CIP Home**, **About CIP**, **Research Funding**, **Programs & Resources**, **Clinical Trials**, **Informatics**, **News & Events**, and **Patients & Providers**.

Below the navigation bar is a row of four images: two scientists in a lab, a PET scan of a human torso, a scientist looking at a monitor, and another PET scan of a human torso.

**Contact Us**  
**Cancer Imaging Program**  
 Division of Cancer Treatment and Diagnosis  
 National Cancer Institute  
 6130 Executive Blvd. MSC 7412  
 Suite 6000  
 Bethesda, MD 20892-7412  
 Delivery: Rockville, MD 20852-4910  
 Phone: 301-496-9531  
 Fax: 301-480-3507  
[Contact Us >](#)

The mission of the **Cancer Imaging Program**, National Cancer Institute, is to promote and support: Cancer-related basic, translational and clinical research in imaging sciences and technology, and integration and application of these imaging discoveries and developments to the understanding of cancer biology and to the clinical management of cancer and cancer risk. [more >](#)

---

**News and Announcements** RSS

January 20, 2012  
[DOE: Integrated Nuclear Medicine Research and Training Projects of Excellence](#)  
 Source: *Grant Announcement*

December 27, 2011  
[Quantitative Imaging Network \(QIN\) adds three members: UCSF, OHSU, and John Hopkins University](#)  
 Source: *CIP Specialized Initiatives*

June 29, 2011  
[National Lung Screening Trial shows 20% reduction in lung cancer mortality](#)  
 Source: *NCI Press Release*

May 24, 2011  
[CIP Early Phase Clinical Trials Funding Initiative Announced \(PAR-11-216\)](#)  
 Source: *Grant Announcement*

**Programs & Resources**

[The Cancer Imaging Archive](#)  
 A large archive of medical images of cancer accessible for public use. Images for imaging-genomics research and the LIDC/IDRI collections are archived here.

[Cancer Tracer Synthesis Resources](#)  
 Tracer synthesis resources such as Production Documents and Investigator's Brochures for Investigational New Drug Applications (IND) imaging agents held by the Cancer Imaging Program.

[ACRIN American College of Radiology Imaging Network](#)  
 ACRIN Centers of Quantitative Imaging Excellence Program

[NExT Funding](#)  
 NCI Experimental Therapeutics (NExT) Program

[View All Programs & Resources >](#)

Of the top remaining ten pages viewed (all with over 1,000 views), three were under **Programs & Resources** and three under **Patients & Providers**. The top page under **Programs & Resources** was the Lung Image Database Consortium (LIDC) with 3,664 views. Under **Patients & Providers**, the most viewed page was Nuclear Imaging (PET and SPECT), with 2,457 views.

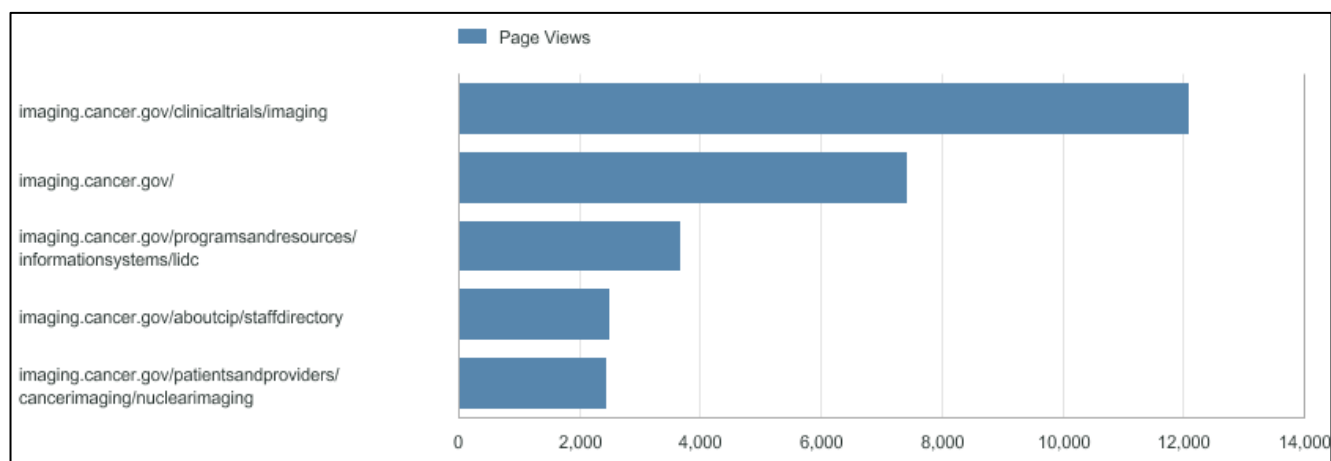
Table 1 and Figure 4 provide a breakdown of the top-viewed pages within CIP.

**Table 1: Top-Viewed Pages by Number of Views**

Rank	Total Page Views, September 2011 August 2012	Number of Views
1	Clinical Trials/Imaging Response Criteria	12,084
2	CIP Home	7,427
3	Programs & Resources/Information Systems/Lung Image Database Consortium (LIDC)	3,664
4	About CIP/Cancer Imaging Program - Staff Directory	2,514
5	Patients & Providers/Cancer Imaging/Nuclear Imaging (PET and SPECT)	2,457
6	Patients & Providers/Cancer Imaging	2,064
7	Programs & Resources/Cancer Tracer Synthesis Resources	1,635
8	Programs & Resources/Specialized Initiatives/Quantitative Imaging for Evaluation of Responses to Cancer Therapies	1,301
9	imaging.cancer.gov/newsandmeetings/workshops/cric *	1,223
10	Patients & Providers/Cancer Imaging/Virtual Colonoscopy	1,038
11	Clinical Trials/Imaging Guidelines for Clinical Trials	1,037
12	Patients & Providers/Cancer Imaging/CT Scans	931
13	Research Funding/Funding Opportunities/Current CIP Initiatives	876
14	Research Funding/Funding Opportunities	856
15	Research Funding/Mechanisms	817
16	Programs & Resources/Specialized Initiatives/Small Animal Imaging Resource Program (SAIRP)	801
17	Clinical Trials/American College of Radiology Imaging Network (ACRIN)	783
18	About CIP	682
19	Programs & Resources/Information Systems/Image Archive Resources	665

\* Page no longer available at the address provided in the Omniture report; content has been moved.

**Figure 4: Top-Viewed Pages by Number of Views**



## What pages did visitors view least?

The ten least-viewed pages had fewer than 20 views during the time period (Table 2). Several were in the *Programs & Resources* and *Reports and Publications* sections.

**Table 2: Least-Viewed Pages by Number of Views**

Rank	Total Page Views: September 2011	August 2012	Views
1	imaging.cancer.gov/reportsandpublications/reportsandpresentations/challengesandopportunitiesforinviv*		17
2	imaging.cancer.gov/programsandresources/reportsandpublications/reportsandpresentations/lidc-data-col*		17
3	imaging.cancer.gov/programsandresources/reportsandpublications/reportsandpresentations/mammography		17
4	imaging.cancer.gov/programsandresources/informationssystemslidc/universityofiowa		17
5	imaging.cancer.gov/programsandresources/specializedinitiatives/ntroi/print		17
6	imaging.cancer.gov/aboutcip/lauren		18
7	imaging.cancer.gov/programsandresources/informationssystemslidc/cornelluniversity		18
8	imaging.cancer.gov/newsevents/newsannouncements/archive/2011		19
9	imaging.cancer.gov/reportsandpublications/reportsandpresentations/petimagequantitation		19
10	imaging.cancer.gov/programsandresources/informationssystemslidc/imagearchiveresources/generalreferences		19

\* Page not available at the address provided in the Omniture report; URL is truncated.

## How long did visitors remain on CIP pages?

Average time spent viewing pages ranged from .12 seconds to 7.73 seconds (Table 3). The pages with the longest average viewing time were in the *News and Meetings* and *Reports and Publications* sections, where users likely were engaged in downloading reports.

Generally, pages with longer viewing times were not those with the most views. One exception was the cric page (imaging.cancer.gov/newsandmeetings/workshops/cric; page now believed to be available at [imaging.cancer.gov/newsevents/workshops/cric](http://imaging.cancer.gov/newsevents/workshops/cric)), which was the ninth highest viewed and where visitors spent an average of 3.83 seconds. Some of the most viewed pages had low average viewing times, such as CIP Home (1.75 seconds) and Clinical Trials/Imaging Guidelines for Clinical Trials (.81 seconds), which visitors scanned briefly before clicking through to another page.

It should be noted that the Omniture report truncates URLs after a specific number of characters. Due to this limitation, it is not possible to be certain that pages in the report are the same as those currently on the site. Further, where it appears that a page was moved, page views and average viewing times are reported twice for the same content. For example, if imaging.cancer.gov/newsandmeetings/workshops/cric and [imaging.cancer.gov/newsevents/workshops/cric](http://imaging.cancer.gov/newsevents/workshops/cric) are the same content, one might combine their separate page view counts (1,223 and 541, respectively) for a total of 1,765 views over the course of the year, improving its rank from 9<sup>th</sup> to 7<sup>th</sup> place.

**Table 3: Pages Ranked by Viewing Times**

Rank by Viewing Time	Average Viewing Time: September 2011 August 2012	Average time (seconds)	Views	Ranking by Number of Views
1	imaging.cancer.gov/reportsandpublications/reportsandpresentations/focusgroupo nmagneticresonancespect*	7.73	32	168
2	imaging.cancer.gov/newsandmeetings/events**	7.01	26	178
3	imaging.cancer.gov/reportsandpublications/reportsandpresentations/firstdataset**	5.62	113	86
4	imaging.cancer.gov/programsandresources/reportsandpublications/reportsandpre sentations/ultrasoundima*	4.47	23	182
5	imaging.cancer.gov/programsandresources/specializedinitiatives/sairp/mdandersi bcancercenter	4.15	70	115
6	imaging.cancer.gov/newsandmeetings/meetings/pastmeetings**	3.88	93	100
7	imaging.cancer.gov/newsandmeetings/workshops/cric**	3.83	1,223	9
8	imaging.cancer.gov/programsandresources/specializedinitiatives/sairp/universityo fcalifornialosangeles	3.80	43	147
9	imaging.cancer.gov/researchfunding/fundingopportunities/currentother	3.53	610	23
10	imaging.cancer.gov/reportsandpublications/reportsandpresentations/consensusre commendationforacquisit*	3.52	22	184
11	imaging.cancer.gov/aboutcip/staffdirectory	3.49	2,514	4
12	imaging.cancer.gov/programsandresources/specializedinitiatives/icbio/site	3.30	52	132
13	imaging.cancer.gov/programsandresources/informationssystemslidc	3.27	3,664	3
14	imaging.cancer.gov/reportsandpublications/reportsandpresentations/challengesan dopportunitiesforinviv*	3.18	17	196
15	imaging.cancer.gov/researchfunding/fundingopportunities/currentcip	3.09	876	13
16	imaging.cancer.gov/programsandresources/fit-documentation	3.06	268	50
17	imaging.cancer.gov/programsandresources/specializedinitiatives/qin/ucsf	3.03	37	157
18	imaging.cancer.gov/programsandresources/specializedinitiatives/sairp/johnshopki nsuniversity	3.03	85	108
19	imaging.cancer.gov/newsevents/meetings/pastmeetings	3.02	181	63
20	imaging.cancer.gov/programsandresources/specializedinitiatives/dcide/dcideproje cts	3.00	45	143

\*Page not available at the address provided in the Omniture report; URL is truncated.

\*\*Page not available at the address provided in the Omniture report; content has been moved.

## Key Audience Activity

To gain a better understanding of how key audiences—patients, medical professionals, and imaging investigators—are using the site, page views were tabulated for the **Patients & Providers** section (Figure 5) and the **Research Funding** section (Figure 6). For purposes of this report, we assumed (1) that imaging investigators would be interested in the **Research Funding** section, which describes funding opportunities, types of grant and contract mechanisms, and how to apply for funding opportunities and (2) that patients and non-investigator medical professionals would be interested in the **Patients & Providers** section, which offers an introduction to cancer imaging technologies and their uses as well as information on clinical trials.

## Medical Professionals and Patients Audiences

The **Patients & Providers** section has two primary sections: Cancer Imaging (2,064 views) and Clinical Trials (571 views). The Cancer Imaging main page was one of the most viewed pages; the most commonly viewed pages within Cancer Imaging were Virtual colonoscopy, CT scans, and the Cancer Imaging Clinical Trials page. Under Cancer Imaging Clinical Trials, the most-viewed page was the first choice on the list, “What are the types of imaging clinical trials?” followed by “Finding an imaging clinical trial.”

Figure 5: Patients & Providers Page



## Imaging Investigator Audience

The **Research Funding** section has four primary sections: Funding Opportunities, Mechanisms, Application Guidelines, and Career Training and Education. The **Research Funding** main page had 511 views. Interestingly, many of the other pages in this section had more views than the main page for this section. This is likely because they accessed the specific page they desired by clicking on a link from another website.

The most-viewed pages were Funding Opportunities/Current CIP Initiatives and Funding Opportunities, both with over 850 views, followed by Mechanisms, with 817 views.

**Figure 6: Research Funding Page**



Except for the Cancer Imaging page in the *Patient & Providers* section, the top numbers of page views were fairly comparable across the two sections, as shown in Figure 7. Pages in the *Patients & Providers* section were viewed more times, on average.

**Figure 7: Number of Views for Top 5 Pages for the Research Funding and Patients & Providers Sections**

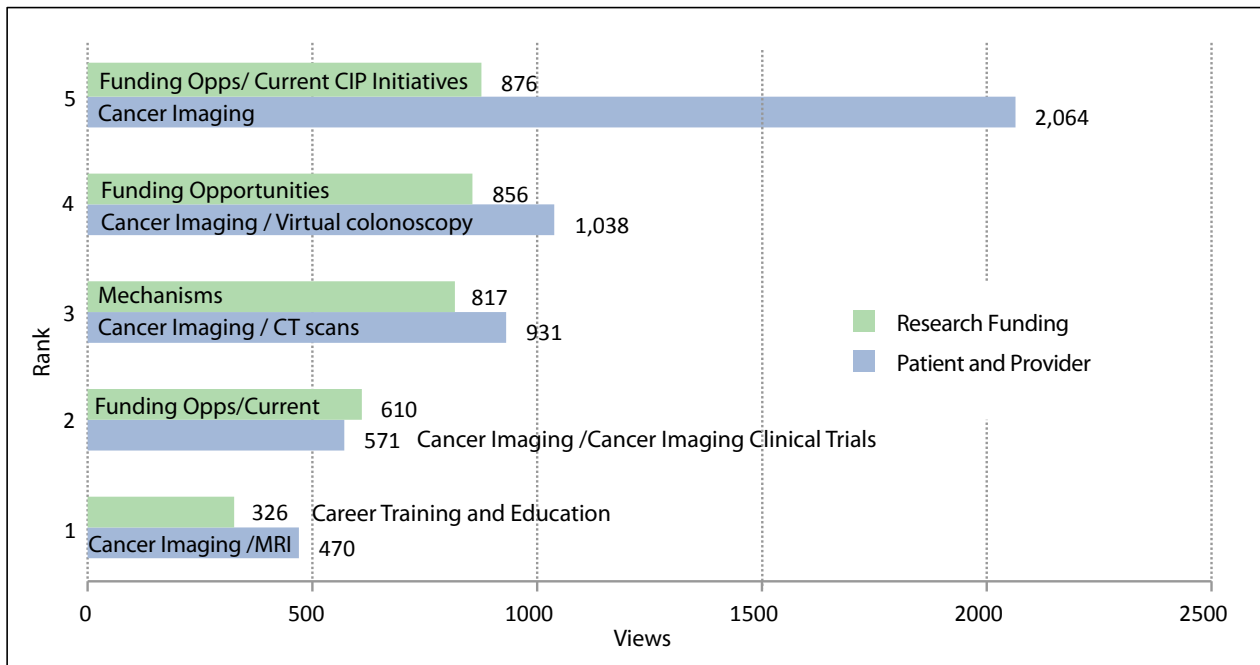
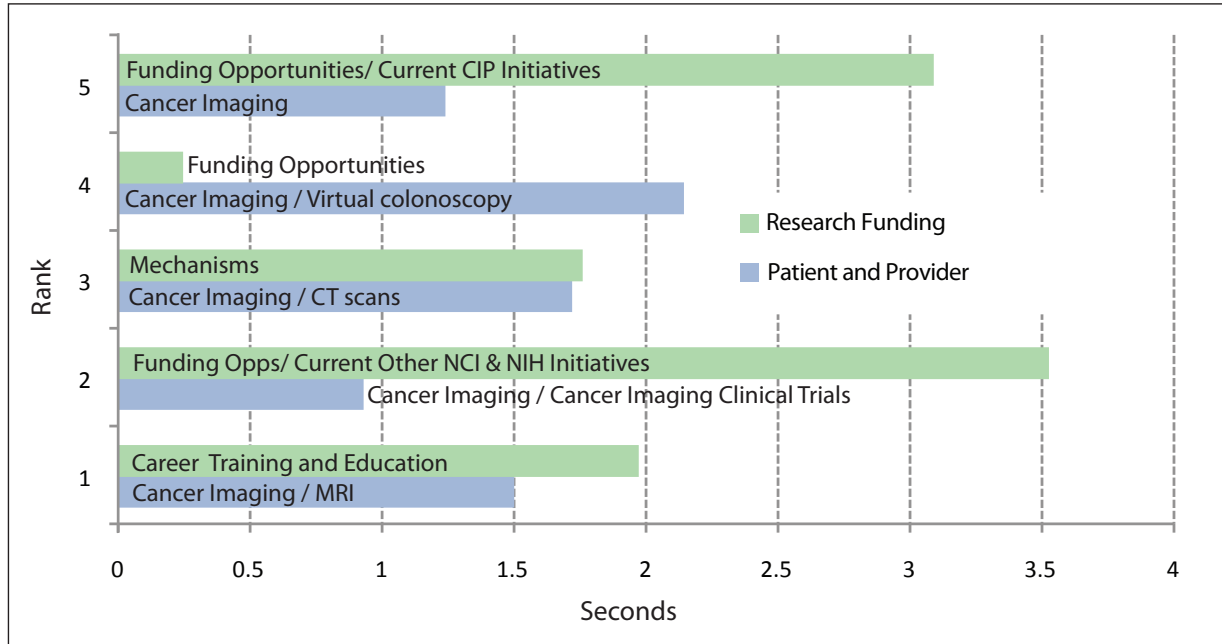


Figure 8 shows the viewing length in seconds for the top five pages for the **Research Funding** and **Patients & Providers** website sections. On average, visitors to the **Research Funding** pages spent more time there. Differences in viewing time may be due to differences in the amount and density of content provided on each page (**Research Funding** pages are longer than **Patients & Providers** pages). Visitors to the **Patients & Providers** sections may be scanning for a specific detail or definition, while those visiting the **Research Funding** section are reading more deeply to identify a potential funding source.

**Figure 8: Viewing Time for Top 5 Pages in the Research Funding and Patients & Providers Sections**





### Overall, how does activity in these two site sections compare?

Four out of the top five most-viewed pages in *Patients & Providers* were viewed more times than the top-viewed pages in *Research Funding* (Table 4). Total views for the top five most-viewed pages in these sections were 5,074 versus 3,486, respectively.

Although four out of the top five most-viewed pages in *Research Funding* had longer average viewing times than those in *Patients & Providers*, all average viewing times were less than 4 seconds. Additional research is necessary to uncover reasons for such short visits.

**Table 4: Top Page Views and Average View Time for *Patients & Providers* Section versus *Research Funding* Section**

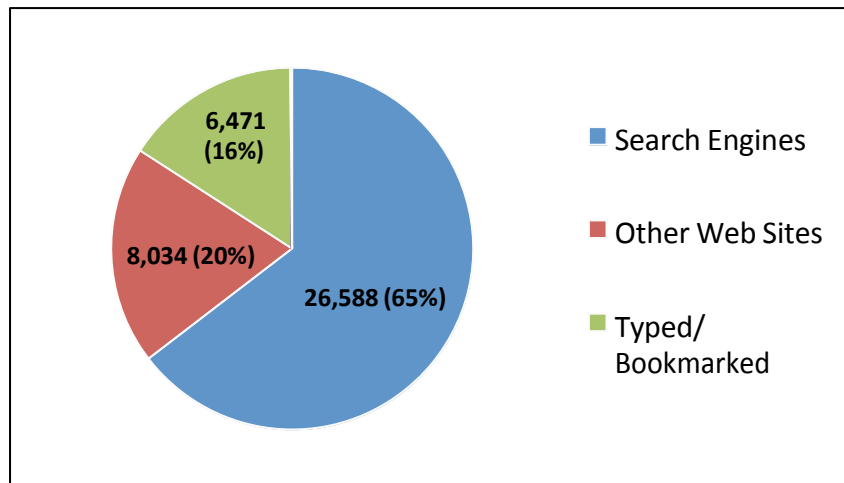
Rank	Patients & Providers Section	Views	Average time (seconds)	Research Funding Section	Views	Average time (seconds)
1	Cancer Imaging (main page)	2,064	1.24	Funding Opportunities/Current CIP Initiatives	876	3.09
2	Cancer Imaging / Virtual Colonoscopy	1,038	2.14	Funding Opportunities	856	0.23
3	Cancer Imaging / CT Scans	931	1.72	Mechanisms	817	1.76
4	Cancer Imaging / Cancer Imaging Clinical Trials	571	0.93	Funding Opportunities/ Current Other NCI & NIH Initiatives	610	3.53
5	Cancer Imaging / Magnetic Resonance Imaging (MRI)	470	1.50	Career Training and Education	326	1.98
	<b>Total Views</b>	5,074			3,485	

### Methods of Finding the CIP Site

#### How do visitors arrive at the CIP site?

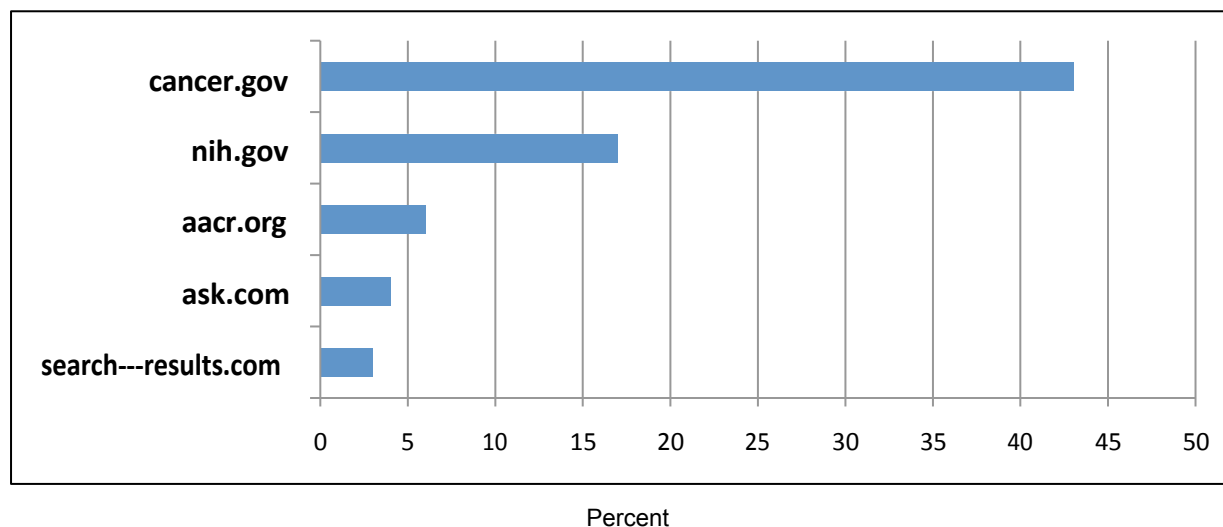
The majority of visitors arrive at the site indirectly through search engines (64.6%) or from other websites (19.5%). A much smaller percentage (15.7%) of visitors key in the site name or use a bookmark. A negligible number (72, 0.2%) arrive from a social network (not shown in Figure 9 below).

**Figure 9: Number and Percent of Visits by Referrer Type**



Those who come to the CIP site from another website are most likely to arrive from the largest and best-known health and cancer websites. The most frequent referrer was cancer.gov (42.9%), followed by nih.gov (17.4%), and aacr.org (American Association for Cancer Research, 5.8%). This indicates that most users find the site through a directed search rather than through random browsing (as from a social media site). The next highest referrer was ask.com, a question-answering-focused web search engine. The next highest referrer was ask.com, a question-answering-focused web search engine.

**Figure 10: Percent of Visits by Top 5 Referrers**



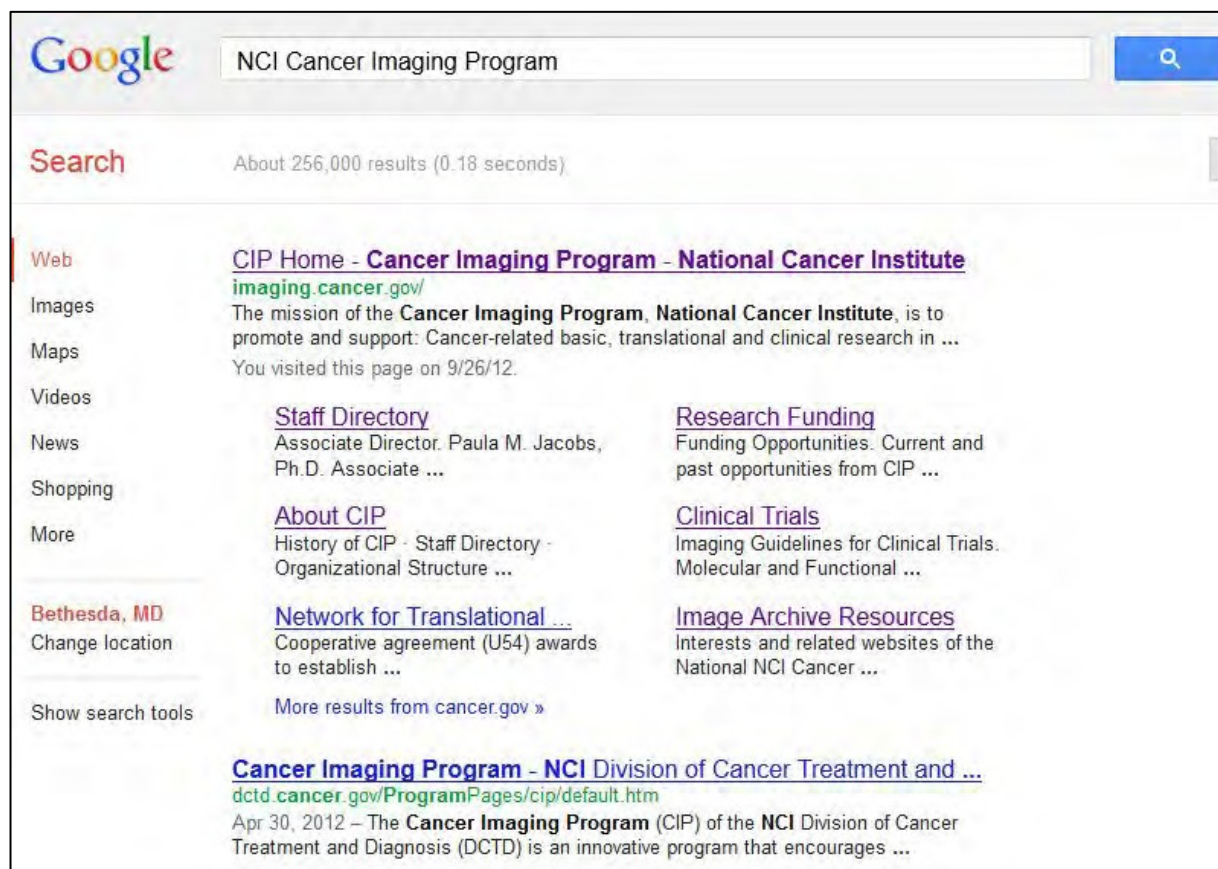
### Directed Searches

Because many visitors reach the CIP pages as the result of a search, NOVA conducted keyword searches using Google and Bing (the two search engines that account for 82.5% of market share) to see whether CIP pages appeared among the top search results. (Note: reported ranks disregard ads, scholarly articles, images and "News about..." boxes.)

#### Searching for cancer-specific terms had the best results.

The most effective searches involved specific terms. Searching for *NCI Cancer Imaging Program* and *NCI CIP* both produced the CIP homepage as the first result in Bing and Google (Figure 11). In addition, Google listed the following pages: Staff Directory subpages, About, Network for Translational..., Research Funding, Association Web sites, and Mechanisms, making it easy for searchers to identify their final destinations. The search terms *Cancer imaging guidelines* and *Cancer imaging trials* also produced the most appropriate CIP pages as first results in both search engines—Imaging Guidelines for Clinical Trials and Cancer Imaging Trials, respectively.

Figure 11: Google Results of Search for *NCI Cancer Imaging Program*




Three additional cancer-specific search terms (i.e., *Cancer imaging*, *Cancer imaging research*, and *Cancer imaging research funding*) produced the most relevant CIP page(s) within the top five results for both Bing and Google.

Figure 12: Google Results of Search for Cancer Imaging

The image shows a screenshot of a Google search results page for the query "Cancer imaging". The search bar at the top contains the text "Cancer imaging". Below the search bar, the word "Search" is displayed in red, followed by the text "About 55,300,000 results (0.22 seconds)".

On the left side, there is a vertical navigation menu with the following items: "Web", "Images", "Maps", "Videos", "News", "Shopping", "More", "Bethesda, MD", "Change location", and "Show search tools".

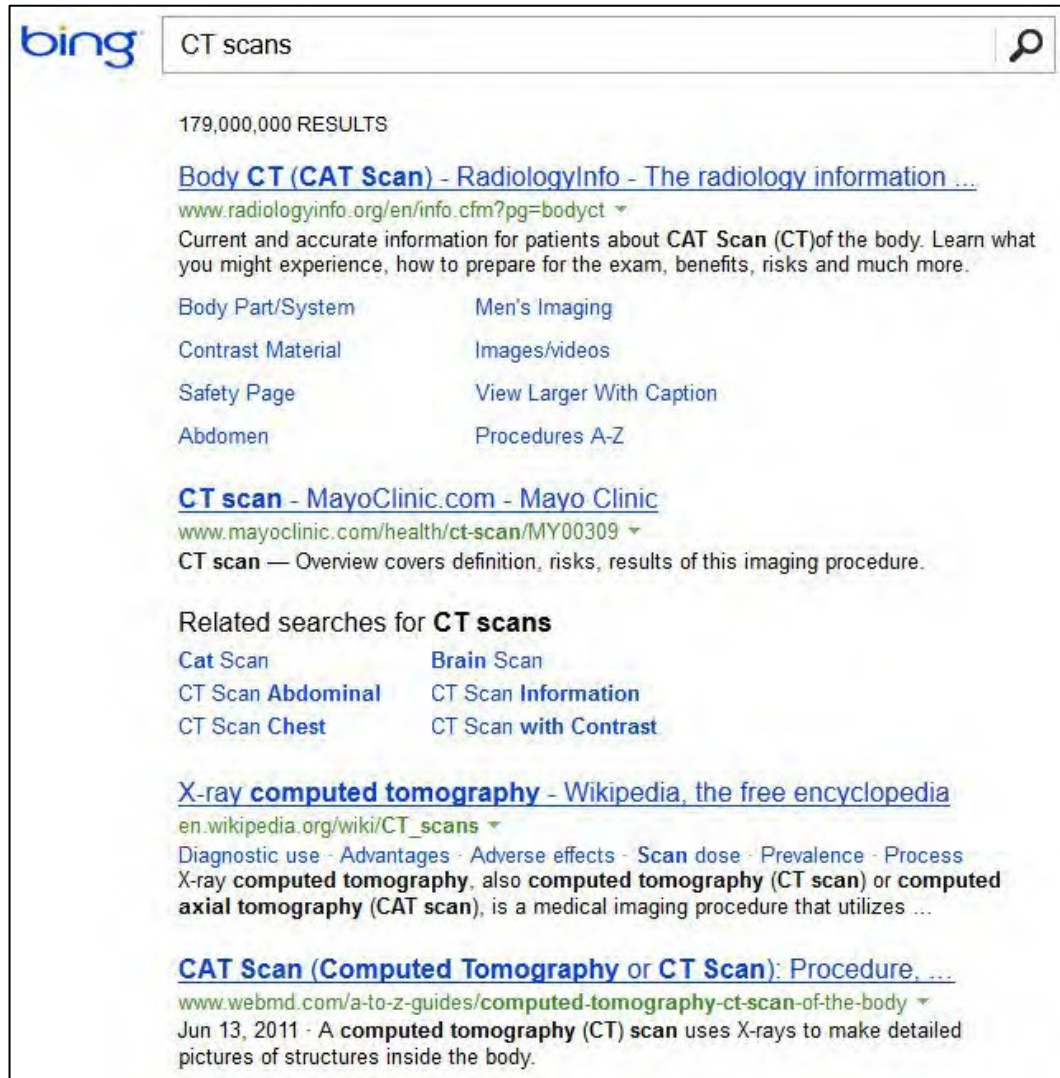
The main content area displays several search results:

- Scholarly articles for Cancer imaging**
  - ... nanoshells for integrated cancer imaging and therapy - Loo - Cited by 890
  - ... resonance imaging and its application to cancer - Charles-Edwards - Cited by 111
  - ... noninvasive measurement by imaging, and value of ... - Tatum - Cited by 249
- Cancer Imaging - a dynamic online journal for radiologists in ...**  
[www.cancerimaging.org/](http://www.cancerimaging.org/)  
CANCER IMAGING is a vibrant online journal publishing cutting edge articles on the new developments, techniques and innovations in imaging malignant ...  
Read The Journal - Info for Authors - Contact Us - Join ICIS
- News for Cancer imaging**
  -  **Digital Mammography Finds More Invasive Breast Cancers**  
Diagnostic Imaging - 3 hours ago  
Digital mammography is better for detecting life-threatening breast cancers than is screen film mammography, without increasing ...
  - Breast Cancer Detection, Treatment, and the Bottom Line**  
Fox Business - 22 hours ago
- Cancer Imaging - Cancer Imaging Program - National Cancer Institute**  
[imaging.cancer.gov/patientsandproviders/cancerimaging](http://imaging.cancer.gov/patientsandproviders/cancerimaging)  
Cancer may be difficult to detect, but for some types of cancer, the earlier it is detected, the better are the chances of treating it effectively. Imaging techniques ...  
You visited this page on 9/26/12.
- CIP Home - Cancer Imaging Program - National Cancer Institute**  
[imaging.cancer.gov/](http://imaging.cancer.gov/)  
The mission of the Cancer Imaging Program, National Cancer Institute, is to promote and support: Cancer-related basic, translational and clinical research in ...

### Searching for specific imaging procedures had mixed results.

CIP pages were not among the top results of searches for the following procedures: *CT scans* (Figure 13), *Digital mammography*, *Magnetic resonance imaging (MRI)*, and *Ultrasound*. A great deal of information about these procedures is available elsewhere on the Internet.

Figure 13: Bing Results of Search for CT Scans



The image shows a screenshot of a Bing search engine results page for the query "CT scans". The search bar at the top contains the text "CT scans" and the Bing logo is on the left. Below the search bar, it indicates "179,000,000 RESULTS". The first result is from RadiologyInfo, titled "Body CT (CAT Scan) - RadiologyInfo - The radiology information ...". Below this is a table of links: "Body Part/System" (Men's Imaging), "Contrast Material" (Images/videos), "Safety Page" (View Larger With Caption), and "Abdomen" (Procedures A-Z). The second result is from MayoClinic.com, titled "CT scan - MayoClinic.com - Mayo Clinic". Below this is a section for "Related searches for CT scans" with links for "Cat Scan", "Brain Scan", "CT Scan Abdominal", "CT Scan Information", "CT Scan Chest", and "CT Scan with Contrast". The third result is from Wikipedia, titled "X-ray computed tomography - Wikipedia, the free encyclopedia". The fourth result is from WebMD, titled "CAT Scan (Computed Tomography or CT Scan): Procedure, ...".

bing CT scans

179,000,000 RESULTS

[Body CT \(CAT Scan\) - RadiologyInfo - The radiology information ...](#)  
[www.radiologyinfo.org/en/info.cfm?pg=bodyct](http://www.radiologyinfo.org/en/info.cfm?pg=bodyct) ▾  
Current and accurate information for patients about **CAT Scan (CT)** of the body. Learn what you might experience, how to prepare for the exam, benefits, risks and much more.

Body Part/System	Men's Imaging
Contrast Material	Images/videos
Safety Page	View Larger With Caption
Abdomen	Procedures A-Z

[CT scan - MayoClinic.com - Mayo Clinic](#)  
[www.mayoclinic.com/health/ct-scan/MY00309](http://www.mayoclinic.com/health/ct-scan/MY00309) ▾  
**CT scan** — Overview covers definition, risks, results of this imaging procedure.

Related searches for **CT scans**

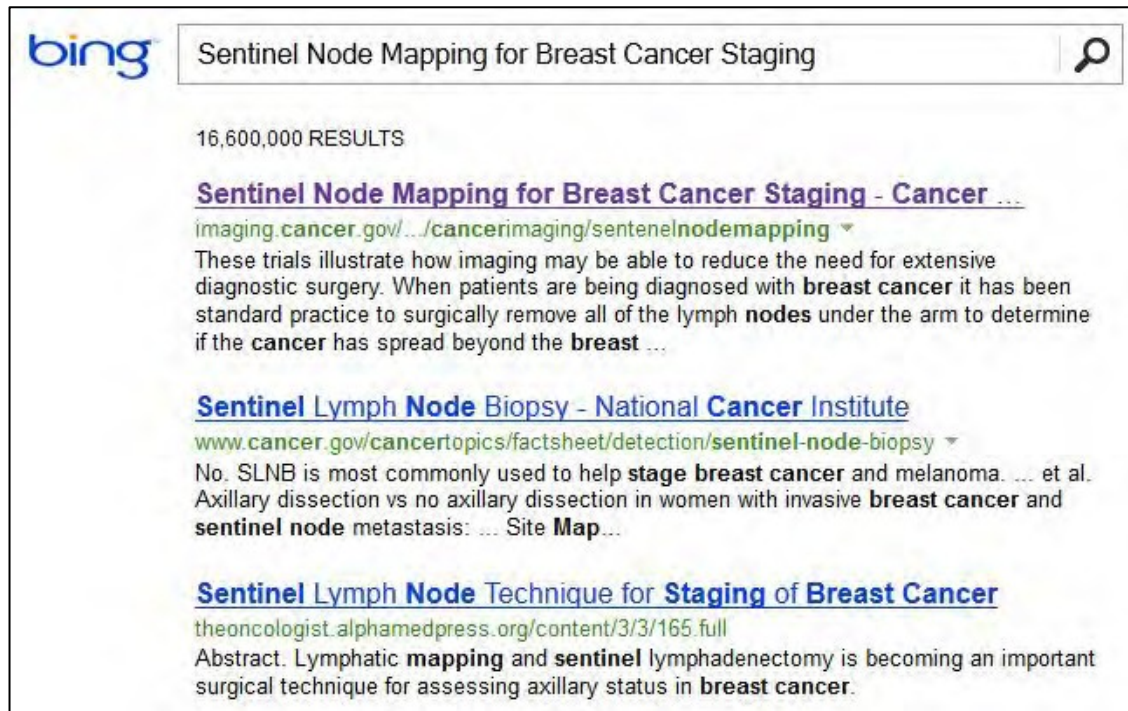
<a href="#">Cat Scan</a>	<a href="#">Brain Scan</a>
<a href="#">CT Scan Abdominal</a>	<a href="#">CT Scan Information</a>
<a href="#">CT Scan Chest</a>	<a href="#">CT Scan with Contrast</a>

[X-ray computed tomography - Wikipedia, the free encyclopedia](#)  
[en.wikipedia.org/wiki/CT\\_scans](http://en.wikipedia.org/wiki/CT_scans) ▾  
Diagnostic use - Advantages - Adverse effects - **Scan dose** - Prevalence - Process  
X-ray **computed tomography**, also **computed tomography (CT scan)** or **computed axial tomography (CAT scan)**, is a medical imaging procedure that utilizes ...

[CAT Scan \(Computed Tomography or CT Scan\): Procedure, ...](#)  
[www.webmd.com/a-to-z-guides/computed-tomography-ct-scan-of-the-body](http://www.webmd.com/a-to-z-guides/computed-tomography-ct-scan-of-the-body) ▾  
Jun 13, 2011 · A **computed tomography (CT) scan** uses X-rays to make detailed pictures of structures inside the body.

By contrast, searches for specific imaging techniques (i.e., *Image-guided brain surgery*, *Nuclear imaging*, *Sentinel node mapping for breast cancer staging*, *Virtual colonoscopy*, and *X-ray imaging*) found in the **Patients & Providers** section produced the corresponding pages on the CIP website within the first 25 results on either Google or Bing. In fact, the CIP Node Mapping for Breast Cancer Staging page was the number-one result for this search term in both Google and Bing (Figure 14). This may suggest that the CIP site is a key site for information on medical imaging procedures and technologies about which information is less likely to be available elsewhere on the Internet.

**Figure 14: Bing Results of Search for Sentinel Node Mapping for Breast Cancer Staging**



Searches for more general terms such as *Medical imaging*, *Medical imaging regulations*, *Medical imaging research*, and *Medical imaging research funding* did not produce highly ranked results, likely due to the number of competing resources that offer information about these topics (Table 5).

**Table 5: Selected Search Terms by Rank in Search Results**

Search Terms	Rank		CIP Page
	Google	Bing	
NCI Cancer Imaging Program	1	1	CIP Home (Google also lists Staff Directory, About, Network for Translational..., Research Funding, Association Web sites, Mechanisms)
NCI CIP	1	1	CIP Home (Google also lists Staff Directory, About, Network for Translational..., Research Funding, Association Web sites, Mechanisms)
Cancer imaging	2	4	Cancer Imaging Page (Google lists CIP Home in third position; Bing lists CIP Home in second position.)
Cancer imaging guidelines	1	1	Imaging Guidelines for Clinical Trials (Google lists Imaging Response Criteria in second position.)
Cancer imaging research		2	CIP Home (Google lists Research Funding in third position.)
Cancer imaging research funding	1		Research Funding (Google lists Career Training and Education in second position and CIP Home in third position; Bing lists Funding Opportunities in second position.)
Cancer imaging standards	17	*	The Cancer Imaging Archive
Cancer imaging trials	1	1	Clinical Trials (Google lists Cancer Imaging Clinical Trials in second position; Bing lists Screening and Interventional Clinical Trials in third position.)
Image-guided brain surgery	3	5	Image-Guided Brain Surgery
Nuclear Imaging	2	24	Nuclear Imaging
Sentinel node mapping for breast cancer staging	1	1	Sentinel Node Mapping for Breast Cancer Staging
Virtual colonoscopy	25	16	Virtual Colonoscopy
X-ray imaging	10	*	X-Ray Imaging
Cancer imaging regulations, CT scans, Digital mammography, Magnetic resonance imaging (MRI), Medical imaging, Medical imaging regulations, Medical imaging research, Medical imaging research funding, Ultrasound	*	*	

\*Not listed on first three search result pages.

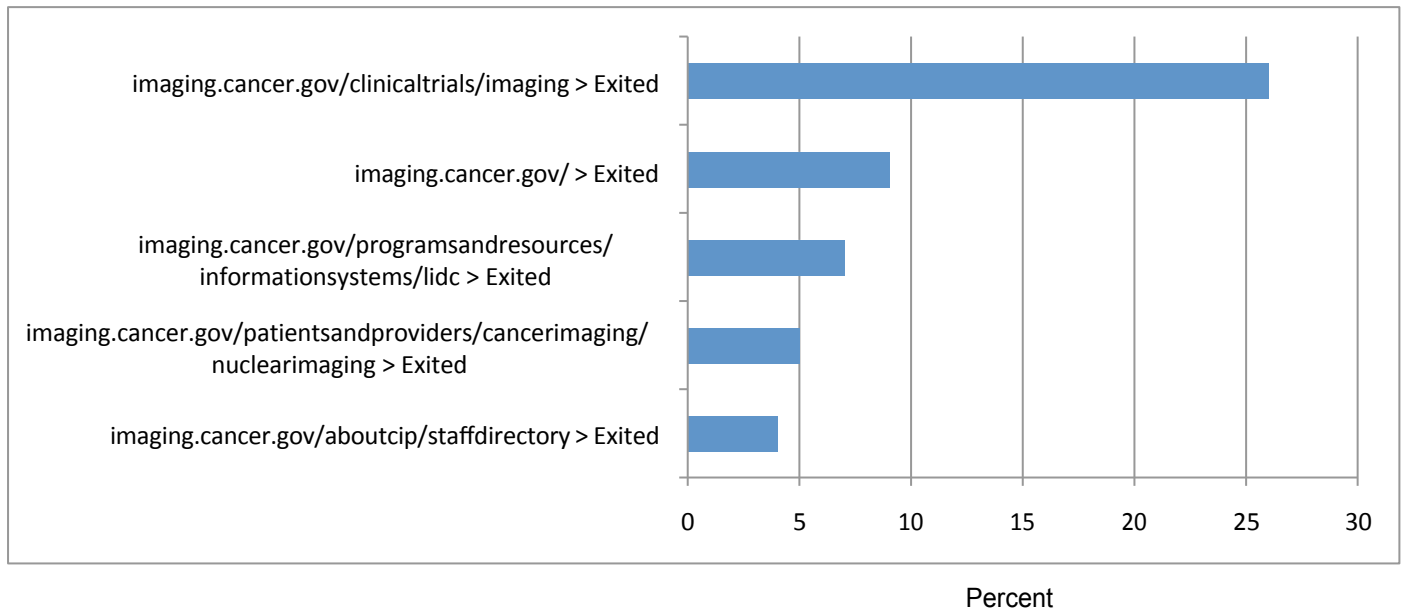
### What paths do visitors follow through the CIP website?

The vast majority of visitors view a single page on the CIP website and then leave—sort of a “one and done” approach. Corresponding precisely with the top-viewed pages, most visitors started at the Clinical Trials/Imaging Response Criteria page and then exited the site (8,862 visits; Table 6 and Figure 15). The second most common path started at CIP Home, followed by exiting the site (3,074 visits). This suggests that most visitors arrived via direct links to that page from another website rather than searching for the CIP site and then browsing for the desired information. It also may suggest that visitors find what they want right away; however, further information is necessary to confirm this.

**Table 6: Percent Visits by Path**

Rank	Most Common CIP Site Paths	Visits	
		Number	%
1	Entered Site > <a href="http://imaging.cancer.gov/clinicaltrials/imaging">imaging.cancer.gov/clinicaltrials/imaging</a> > Exited Site	8,862	26.5
2	Entered Site > <a href="http://imaging.cancer.gov/">imaging.cancer.gov/</a> > Exited Site	3,074	9.2
3	Entered Site > <a href="http://imaging.cancer.gov/programsandresources/informationssystemslidc">imaging.cancer.gov/programsandresources/informationssystemslidc</a> > Exited Site	2,453	7.3
4	Entered Site > <a href="http://imaging.cancer.gov/patientsandproviders/cancerimaging/nuclearimaging">imaging.cancer.gov/patientsandproviders/cancerimaging/nuclearimaging</a> > Exited Site	1,523	4.6
5	Entered Site > <a href="http://imaging.cancer.gov/aboutcip/staffdirectory">imaging.cancer.gov/aboutcip/staffdirectory</a> > Exited Site	1,255	3.8
6	Entered Site > <a href="http://imaging.cancer.gov/newsandmeetings/workshops/cric">imaging.cancer.gov/newsandmeetings/workshops/cric</a> > Exited Site	921	2.8
7	Entered Site > <a href="http://imaging.cancer.gov/patientsandproviders/cancerimaging/virtualcolonoscopy">imaging.cancer.gov/patientsandproviders/cancerimaging/virtualcolonoscopy</a> > Exited Site	632	1.9
8	Entered Site > <a href="http://imaging.cancer.gov/researchfunding/mechanisms">imaging.cancer.gov/researchfunding/mechanisms</a> > Exited Site	525	1.6
9	Entered Site > <a href="http://imaging.cancer.gov/programsandresources/cancer-tracer-synthesis-resources">imaging.cancer.gov/programsandresources/cancer-tracer-synthesis-resources</a> > Exited Site	520	1.6
10	Entered Site > <a href="http://imaging.cancer.gov/patientsandproviders/cancerimaging">imaging.cancer.gov/patientsandproviders/cancerimaging</a> > Exited Site	488	1.5

**Figure 15: Top 5 Most Popular Paths**





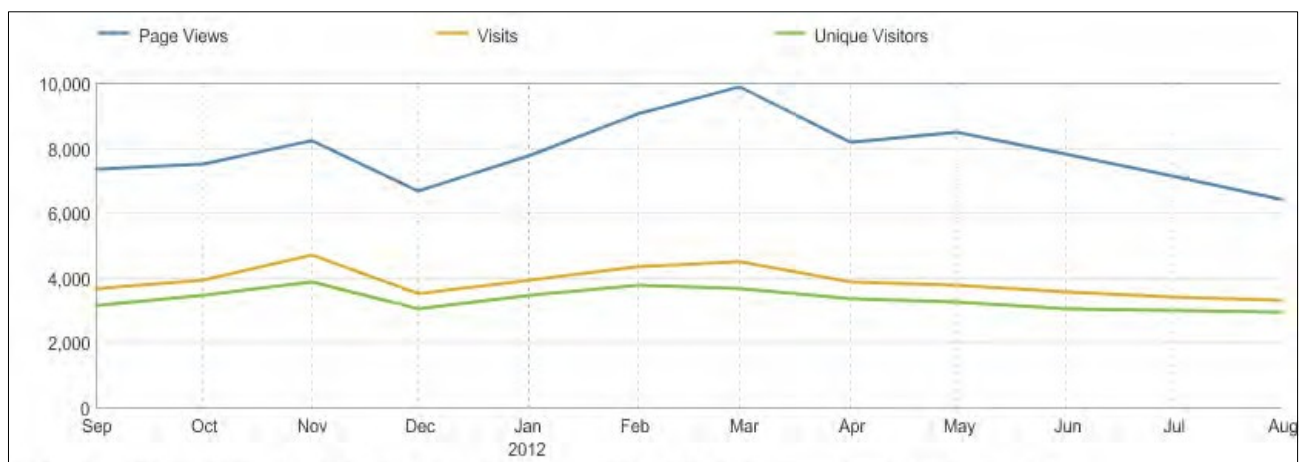
## Changes in Traffic Volume

Traffic volume (i.e., total page views) between September 2011 and August 2012 varied across months, peaking in March 2012 at around 10,000 views (Figure 16). Another peak occurred during November 2011 (just over 8,000 page views). CIP staff may want to consider what website changes, CIP-related events, or other factors might explain these peaks.

Lows occurred in December 2011 and August 2012 (just over 6,000 views). These valleys likely can be attributed to holiday and vacation seasons.

The number of visits and unique visitors tracked each other very closely and loosely followed the same pattern as for page views. The majority of visitors were unique, suggesting that they found the necessary information in one visit to the CIP site.

**Figure 16: Page Views by Month**



## Summary

During the 12 months between September 2011 and August 2012, about 47,000 visitors came to the CIP website, or about 4,000 per month. The vast majority (80%) were unique visitors. Visits peaked in November and March followed by a slow decline through August.

More visitors viewed pages intended for patients and providers than those associated with researchers. The Clinical Trials Imaging Response Criteria, predominantly for use by practitioners, was the most visited page.

Most visitors spent less than 4 seconds on the most-visited pages and then immediately exited the site. This may indicate that visitors found the desired information right away since they did not click on another CIP page; however, additional research is necessary to uncover reasons for such short visits.

More than 60% of visitors who arrived at the site were referred from either [nih.gov](http://nih.gov) or [cancer.gov](http://cancer.gov). Directed searches related to cancer imaging show that the most-used search engines Google and Bing return the CIP site in the top search 25 results for many common search terms, indicating that people who are looking for information on topics the CIP website covers should be able to find it easily using a search engine.

**APPENDIX B. COMPETITIVE ANALYSIS REPORT**

# **Competitive Analysis for the Cancer Imaging Program (CIP) Site**

**Prepared by NOVA Research Company**

**January 9, 2013**

## Comparing CIP to Other DCTD Program Sites

While evaluating the usability and effectiveness of the CIP website, we looked not only at what CIP is doing online but also at websites of four other Division of Cancer Treatment and Diagnosis (DCTD) programs:

1. [Cancer Diagnosis Program](http://cdp.cancer.gov/) (CDP, <http://cdp.cancer.gov/>)
2. [Cancer Therapy Evaluation Program](http://ctep.cancer.gov/) (CTEP, <http://ctep.cancer.gov/>)
3. [Developmental Therapeutics Program](http://dtp.nci.nih.gov/) (DTP, <http://dtp.nci.nih.gov/>)
4. [Translational Research Program](http://trp.cancer.gov/) (TRP, <http://trp.cancer.gov/>)

### Best Practices

In terms of following best practices, the CIP website compared favorably with other DCTD sites in most cases. CIP's site is superior in content management and in line with other sites on required and recommended content; usability, accessibility, and design best practices; and management and governance. However, CIP lags behind other sites on search engine functionality.

**Content Management.** CIP provides basic content intended for patients and providers; only one of the four other sites (TRP) has content designated for the general public audience. In addition, CIP source code includes description and language metatags not found on other reviewed sites. However, all four sites scored better than CIP on reading ease, and three out of four sites scored better on reading grade level and use of passive voice.

**Required and Recommended Content.** CIP's *Contact Us* page is superior to what the other sites offer. However, three out of four other sites provide a site map or subject index, which CIP lacks.

**Usability, Accessibility, and Design.** CIP is in line with other reviewed sites on best practices for page download times (accommodating visitors with low connection speeds) and maintaining a consistent navigation scheme and navigation labels.

**Management and Governance.** The CIP website is in line with other DCTD sites on adherence to best practices for seamless government and overall quality.

**Search Engine Performance.** CIP's search function provides a minimal level of service (Figure 1). The search engine on the other sites scored much higher in this area. For example, the CTEP site highlights search terms in the results, and results are sortable by relevance and date (Figure 2).

Figure 1: CIP Search Results

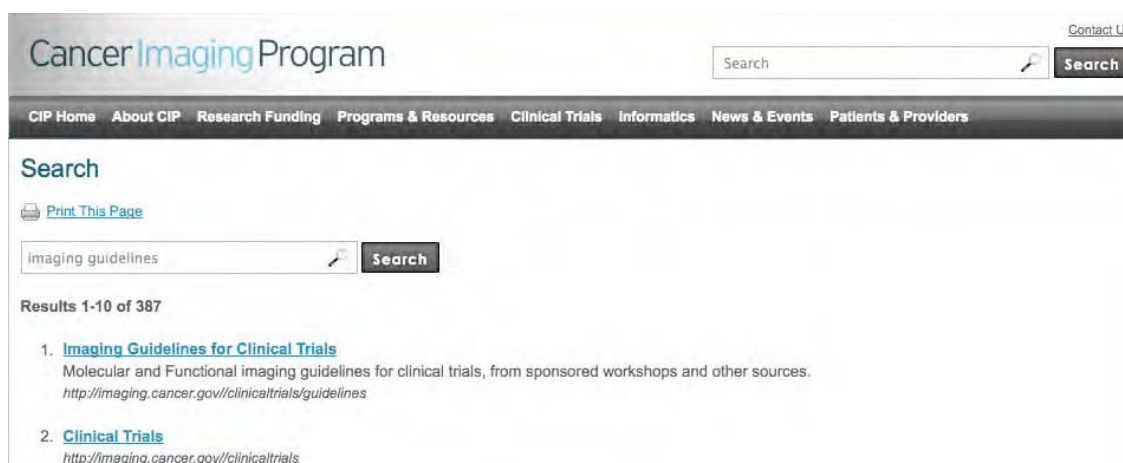
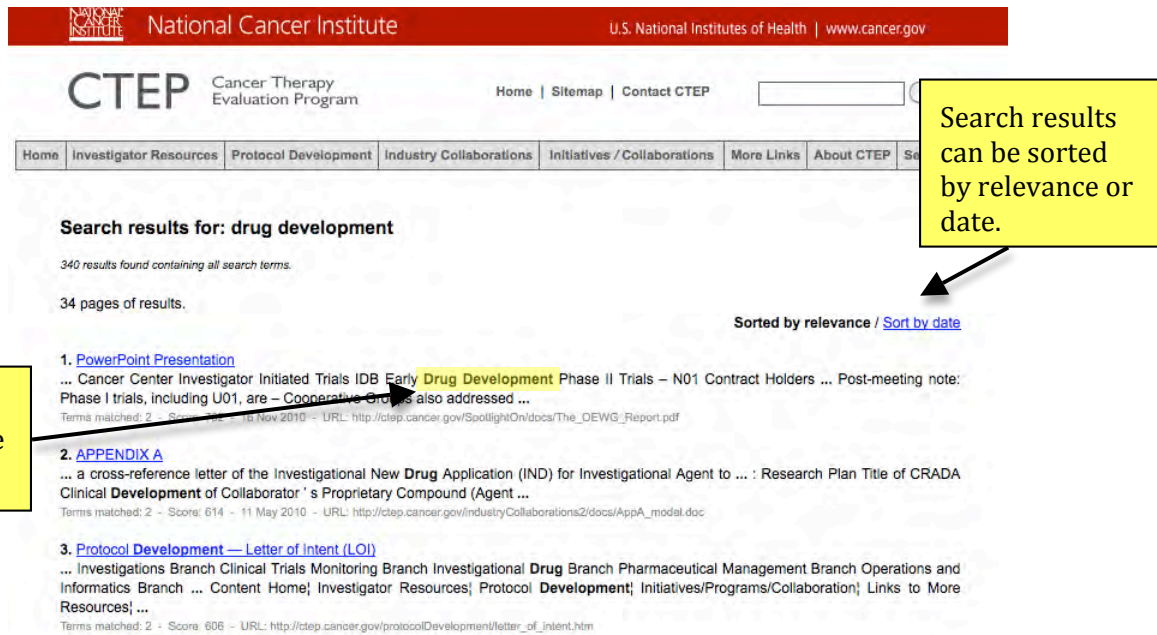


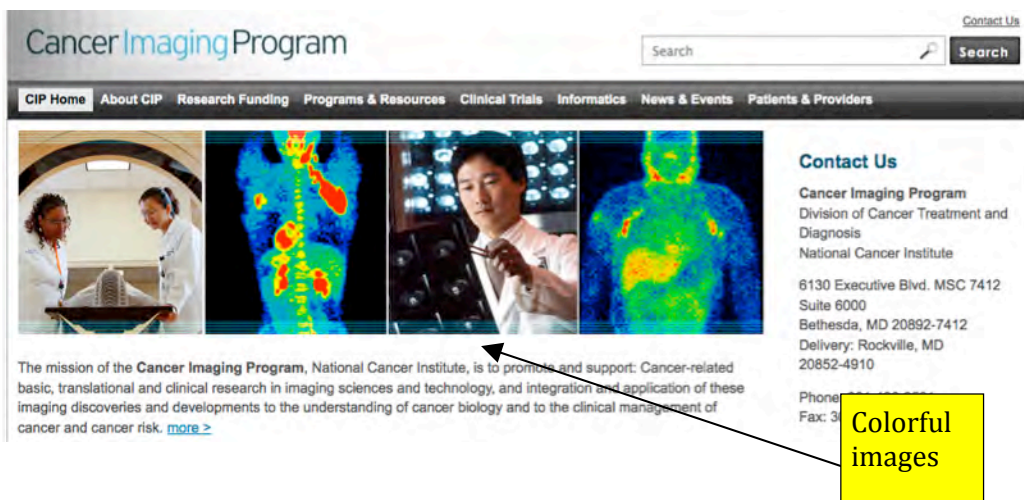
Figure 2: CTEP Search Results



### Visual Appeal

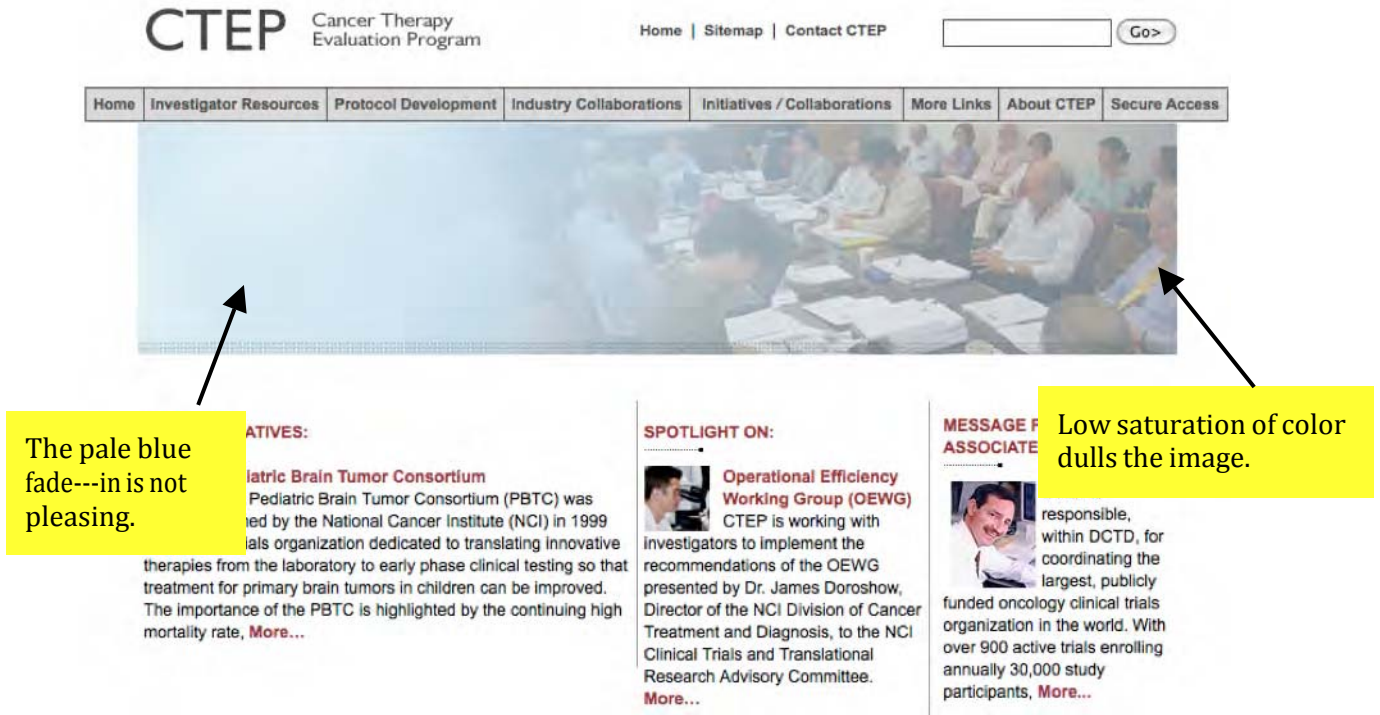
The CIP website's visual appearance is superior to other sites, displaying colorful high-quality images in the top menu area (Figure 3) and using images relevant to the content on specific pages.

Figure 3: CIP Homepage



Other sites used poorer quality images or image treatments (Figure 4) or repeated the same picture on all or nearly all of their pages.

**Figure 4: CTEP Homepage**



CIP's design scheme also stands out. The simple grid system makes use of white space to provide structure and consistency. Critical information, content, and graphics appear above the fold, making it easy for visitors to scan text for desired information.

Other sites crowd their pages with too much text. For example, the CDP home page uses boxes in different sizes and colors that compete with one another for attention (Figure 5).

**Figure 5: CDP Homepage**

Home About CDP Scientific Programs Funding Opportunities Funded Research Human Specimens for Research Technology Development Diagnostics Research

**CDP** Cancer Diagnosis Program

Go

**Welcome to the Cancer Diagnosis Program**

The Cancer Diagnosis Program (CDP) strives to improve the diagnosis and assessment of cancer by effectively moving new scientific knowledge into clinical practice. This national program stimulates, co-ordinates and funds resources and research on diagnostics and improved technologies to better characterize cancers to guide the choice of treatment as well as to evaluate the response to treatment.

On October 1, 2012, the Cancer Diagnosis Program welcomed its new branch, the **Biorepositories and Biospecimen Research Branch** or **BBRB**, formerly known as the Office of Biorepositories and Biospecimen Research (OBBR). Visit the **BBRB site** for more information and valuable resources.

**Clinical Assay Development Program (CADP)**  
The CADP is designed to identify promising tests, assess the needs for further development, and provide services to facilitate optimization of analytical performance and to establish clinical validity so that the clinical utility of the assay can be evaluated in well-designed clinical studies. [More...](#)

**Performance Standards Required for Essential Assays in Clinical Trials**

**Templates for Clinical Assay Development**

**Strategic Partnering to Evaluate Cancer Signatures (SPECS)**  
The SPECS program consists of a group of grants that support multi-institutional, multidisciplinary research teams. The program leverages NCI's investment in cancer clinical trials, cancer centers, NCI intramural programs, and the Specialized Programs of Research Excellence (SPORE) program. The projects include collaborations with biotechnology companies, community hospitals, national laboratories, and academic institutions in the United States, Canada, and Europe. [More...](#)

**DCTD**  
Division of Cancer Treatment and Diagnosis

**NEXT**  
Next-Generation Experimental Therapeutics

Technology Development Branch  
Resources Development Branch  
Diagnostics Evaluation Branch  
Office of the Associate Director

**Related Links**  
[Specimen Resource Locator](#) | [Innovative Molecular Analysis Technologies](#)  
[NCI Cancer Imaging Program](#) | [NCI Early Detection Research Network](#)  
[NCI Cancer Therapy Evaluation Program](#)

**NCI Specimen Resources**  
[Cooperative Human Tissue Network \(CHTN\)](#)  
[Cooperative Group Banks \(COB\)](#)  
[CDP Tissue Microarrays \(TMAs\)](#)

**Information for Patients and Health Professionals**

**Announcements**

**Draft guidelines**  
Criteria for the use of omics-based predictors in clinical trials

**NIST Meeting Presentation (08/16/2012)**  
A Plasma-based Referential Control Strategy for Targeted NGS in Oncology

**MARKERS IN CANCER**  
A Joint Meeting By ASCO, EDRTC, and NCI  
October 11-13, 2012  
Westin Diplomat  
Hollywood, Florida

**Focus on Molecular Diagnostics**  
The CDR Focus section of the March 16, 2012 issue of Clinical Cancer Research is devoted to exploring the challenges inherent in developing analytically and clinically validated molecular diagnostics for the management of cancer patients. [Read more...](#)

**Next-Generation DNA Sequencing as a Tool for Clinical Decision-Making in Cancer Patient Management**  
May 3-4, 2012  
[See the agenda and slide sets.](#)

In the right column alone, there are nine text boxes vying for attention.

## Presentation of Lists

The CDP website presents relevant funding opportunities in a table format that is easy to scan (Figure 6). The table has three columns: (1) program announcement number (with links to each announcement on grants.gov); (2) announcement title; and (3) expiration date.

**Figure 6: CDP Funding Opportunities**

**Funding Opportunities**

Go >

- Main
- Exploratory Studies (R21 and R03 grants)
- Technology Development
- **Clinical Correlative Studies**
- Human Tissue Specimen Resources
- Small Business (SBIR and STTR grants)
- Full List of Cancer Diagnosis Initiatives

### Clinical Correlative Studies

#### Active Program Announcements (PA) and Requests for Applications (RFA)

The Cancer Diagnosis Program offers several program announcements to encourage patient-oriented research on new strategies for cancer diagnosis. Some of these announcements are sponsored by the NCI Cancer Therapy Evaluation Program to support the integration of translational studies into clinical trials. Investigators may apply for several types of awards in addition to the standard (R01) research project grant.

#### Current Initiatives

Announcement #	Title	Expiration
<a href="#">PA-08-134 (R01)</a>	Correlative Studies with Specimens from	05/08/12
<a href="#">PA-08-133 (R21)</a>	Multi-site Trials	05/08/11
<a href="#">PA-09-158 (R21)</a>	Developmental Research in Cancer	05/08/12
<a href="#">PA-09-159 (R33)</a>	Prognosis and Prediction	
<a href="#">PA-10-025 (R01)</a>	Development, Application, and	01/08/13
<a href="#">PA-10-026 (R21)</a>	Evaluation of Prediction Models for	
	Cancer Risk and Prognosis	
<a href="#">PAR-08-025 (R21)</a>	Quick-Trials for Novel Cancer Therapies	11/10/10
	and Prevention: Exploratory Grants	
<a href="#">PA-08-208 (R21)</a>	Pilot Studies in Pancreatic Cancer	09/08/11
<a href="#">PA-08-209 (R03)</a>		

Shading alternate rows in the table helps guide the viewer's eye.

CIP currently presents similar information in a prose format (Figure 7) that takes longer to read. CIP could adapt this table format to display funding opportunities. Columns could be added to display the CIP contact names, e-mail addresses, and telephone numbers. In addition, columns could be made sortable.



Figure 7: CIP Funding Opportunities

Research & Funding

### Current CIP Initiatives [RSS](#)

[Print This Page](#)

This page lists current opportunities from CIP.

For information about the funding process, go to [Mechanisms](#) or [Guidelines](#).

The NCI's Division of Extramural Activities provides information about newly approved concepts, which may become RFAs and PAs. Check the [Concepts Cleared at the NCI Board of Scientific Advisors Meeting](#) web site for the earliest possible information about future initiatives.

[PAR-11-216: Early Phase Clinical Trials in Imaging and Image-Guided Interventions \(R21\)](#)

- Release Date: May 24, 2011
- Application Receipt Date: See below
- Expiration Date: March 14, 2014
- Contacts:
  - Imaging trials:**  
Lalitha K. Shankar, M.D., Ph.D., NCI, Phone: 301-496-9531, ([shankarl@mail.nih.gov](mailto:shankarl@mail.nih.gov))  
Frank I. Lin, M.D., NCI, Phone: 301-496-9531, ([frank.lin2@nih.gov](mailto:frank.lin2@nih.gov))
  - Image-Guided Intervention trials:**  
Keyvan Farahani, Ph.D., NCI, Phone: 301-496-9531, ([farahank@mail.nih.gov](mailto:farahank@mail.nih.gov))
  - Radiation Therapy trials:**  
Bhadransain Vikram, M.D., NCI, Phone: 301-480-5785, ([vikramb@mail.nih.gov](mailto:vikramb@mail.nih.gov))

Although the initiative characteristics are organized in a consistent and logical way, the prose style entries take longer for visitors to spot specific details of interest.

### Interactivity

Both DTP and TRP offer some interactive features that make their sites “sticky”—that is, they keep people on the site. For example, the DTP 50<sup>th</sup> anniversary timeline (Figure 8) incorporates photos and links to key events since DTP was formed; users can move the pointer along the timeline. CIP has similar information about its own history (<http://imaging.cancer.gov/aboutcip/history>) that could be converted from a prose-style presentation to a more visually exciting format. This section also appears to be due for an update, as the most recent initiative shown is from 2004.

Figure 8: DTP Timeline

National Cancer Institute U.S. National Institutes of Health | www.cancer.gov

TURNING MOLECULES INTO MEDICINES FOR THE PUBLIC HEALTH

Developmental Therapeutics Program DTP HOME FDA-APPROVED DRUGS

## A History of Success

Since its creation in 1955, NCI's Developmental Therapeutics Program (DTP), originally called the Cancer Chemotherapy National Service Center (CCNSC), has played a leading role in developing new drugs and biological agents to fight one of the most feared human diseases—cancer.

In this 50th anniversary timeline, we look back at the memorable events that characterize DTP's involvement in drug discovery and development and the people who have helped define the last five decades.

You can trace the history of DTP by scrolling through the years at the bottom of the timeline. There you'll find links to pivotal events, drug-discovery paradigms, and success stories for drugs that, thanks to DTP's efforts, have moved from bench to bedside.

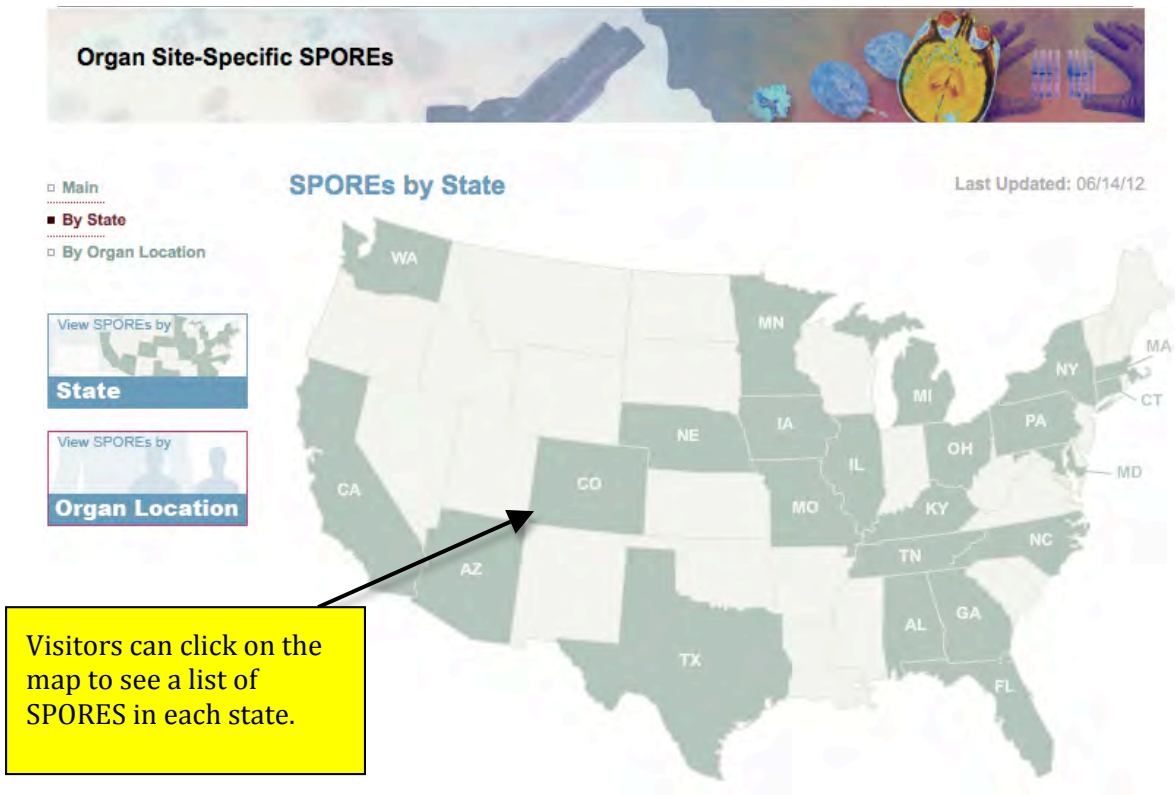
MOVE POINTER TO TRAVEL THROUGH TIME

1900 1950 1960 1970 1980 1990 2000 2010

50th Anniversary

The TRP site includes interactive maps: SPORES by state (Figure 9) and SPORES by location (<http://trp.cancer.gov/spores/bylocation.htm>). The CIP grant funding bar chart on the “About CIP” page (<http://imaging.cancer.gov/aboutcip/history>) might be re-imagined so that visitors can click on specific fiscal years or specific bar sections for more details.

**Figure 9: TRP SPORES by State Map**



### Social Media

While conducting this competitive analysis, it was noted that none of the DCTD programs appears to have a social media presence. CIP should consider posting videos on the NCI YouTube channel such as demonstrations of imaging procedures (with links on the Patients and Providers section of the CIP site) or interviews of past and current CIP grantees talking about their work. This is one way that CIP can leverage its grantees to help tell the CIP story.

### Conclusions and Recommendations

CIP compares well in many areas with other DCTD websites in terms of best practices and visual appeal. However, several improvements could enhance the user experience. These improvements are summarized in the table below.

## Recommendations

Topic	Recommendation
Content Management	Improve readability of content on the site and develop policies and practices to ensure the new content meets plain language criteria.
Required and Recommended Content	Add a site map or subject index.
Search Engine Performance	Upgrade the search results display to highlight search terms and make results sortable by relevance and date.
Presentation of Lists	Convert list-type content (e.g., funding opportunities) from prose format to an easy-to-scan table format.
Interactive Elements	Present information in an interactive format that will engage visitors.

**APPENDIX C. HEURISTIC ASSESSMENT REPORT**

# **Heuristic Assessment of the Cancer Imaging Program (CIP) Site**

Prepared by NOVA Research Company

December 10, 2012

## Heuristic Assessment

NOVA conducted a heuristic assessment of the CIP website to confirm compliance with National Cancer Institute (NCI) Web Standards and policies, federal guidelines, and evidence-based best practices.

During the review, the CIP website was measured against NCI Web Standards published at <http://www.cancer.gov/global/webresources> and NCI Web Policies published at <http://www.cancer.gov/global/web/policies>. In addition, the site was assessed using two scorecards:

1. Requirements and Best Practices Checklist for Government Web Managers, a scorecard containing best practices and requirements from WebContent.gov (Appendix A)
2. A comprehensive 25-point checklist from Forrester Research (Appendix B).

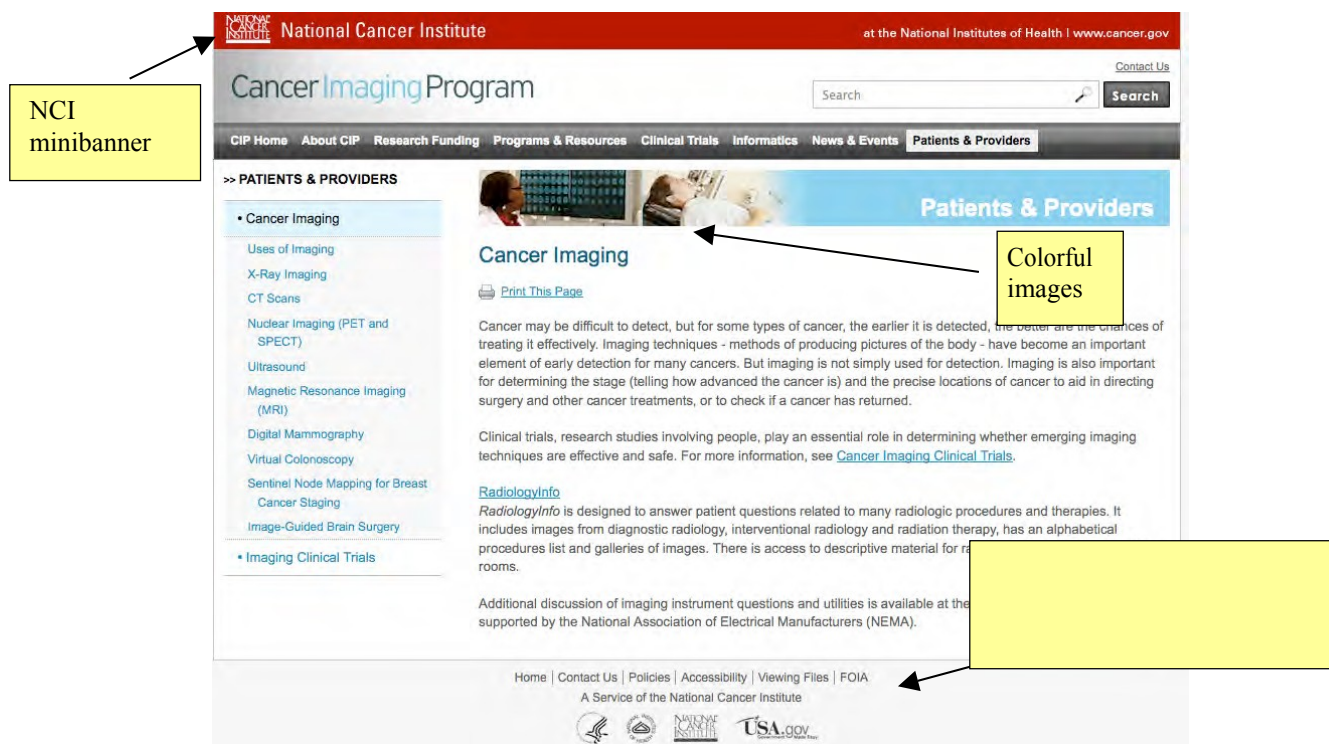
## NCI Web Standards and Policies

### Content Standards for NCI Websites

Overall, the CIP site met 14 out of 20 NCI website content standards.

CIP scored highly on Visual Standards (4 out of 4). These standards include proper use of the NCI minibanner, application of the NCI color palette, and inclusion of colorful, realistic images of people. In addition, cross-agency links and text links to policies, accessibility, and FOIA (Freedom of Information Act) are mandatory in the page footer. The site meets all of these standards (Figure 1).

Figure 1: Cancer Imaging Page

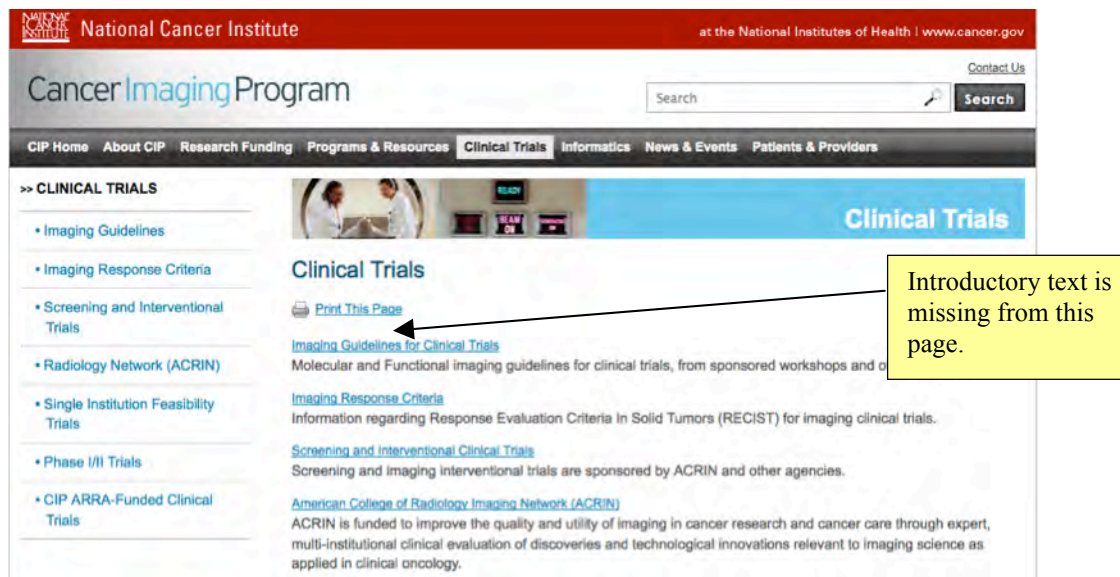


The CIP website met most of the content style criteria.

The site also performed well on Required Content Elements (4 out of 5). Reviewed pages include all required content elements except a date (i.e., posted, reviewed, updated, or last modified). The date serves as a key indicator of content currency.

The site did not score as well on Recommended Content Elements (3 out of 6). Although the site makes appropriate use of headings, subheadings, and hyperlinks within text, many key pages on the CIP site lack the introductory text recommended in NCI Web Guidelines. For example, the *Clinical Trials* page (Figure 2), which provides links to highly technical information relevant to clinical trials, could benefit from an introductory statement about what these resources are. A statement such as “For information about clinical trials and why they are important, see...” could guide general public visitors to the *Cancer Imaging Clinical Trials* subpage under *Patients & Providers*.

**Figure 2: Clinical Trials Page**



The site does not include relevant links to the NCI Dictionary of Cancer Terms (<http://www.cancer.gov/dictionary/>), which would be especially helpful to patients, providers, and members of the general public who visit the site. Finally, citations on the site do not follow the style provided in the NCI guidelines.

The site met one-half of the guidelines under How to Write Navigation Links (2 out of 4). The site makes proper use of “on this page” navigation links and page options links (e.g., print this page) but does not include related pages or back-to-top links.

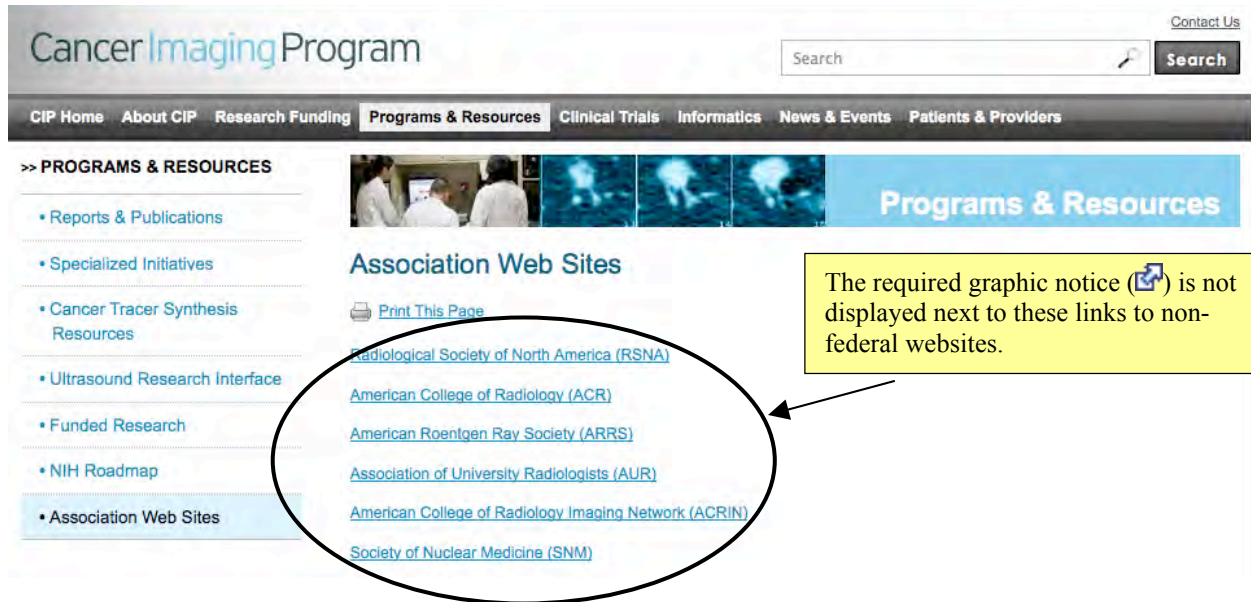
## NCI Web Policies

NCI’s web policies address various legal issues such as endorsement and liability, privacy and security, copyright, Freedom of Information Act, accessibility, and exit disclaimers. For most of these issues, CIP compliance is covered by providing links to the relevant NCI policy pages in the page footer. Exceptions are accessibility and the exit disclaimer.

The CIP site is designed to comply with Section 508 of the Rehabilitation Act, and no accessibility issues were detected during the heuristic review. (Note: Compliance of electronic files that are available for download from the site will be addressed under a separate deliverable.)

NCI exit disclaimer policy requires putting a graphic notice (ⓘ) next to links that lead to non-federal-government websites. The CIP website does not comply with this policy. For example, the *Associations Web Sites* page at <http://imaging.cancer.gov/programsandresources/associationwebsites> (Figure 3) does not indicate that these association sites are not hosted by federal agencies.

**Figure 3: Associations Web Sites Page**



Recommendations for compliance with NCI standards, policies, and guidelines are provided in the Recommendations section at the end of this report.

### **Scorecard 1: Requirements and Best Practices Checklist for Government Web Managers**

This scorecard is based on a comprehensive assessment checklist developed by the Federal Web Managers Council to help determine how well a website meets federal website requirements and evidence-based best practices such as those published in *Research-Based Web Design & Usability Guidelines* ([http://www.usability.gov/guidelines/guidelines\\_book.pdf](http://www.usability.gov/guidelines/guidelines_book.pdf)). The tool encompasses current laws and regulations, Office of Management and Budget (OMB) Policies for Federal Public Websites, and other directives that pertain to federal public websites. The completed scorecard is available as Appendix A.

Scores are always a positive or negative number. No zeros are assigned in this measurement.

Scorecard questions that refer to policies or practices that are met by NCI or where compliance is achieved exclusively within the NCI footer were not considered. In total, the site was assessed for compliance with 88 requirements and recommendations.

Overall, CIP scored 80 out of a possible 127 points (63%), falling 7 points below the target passing score of 88 points. The site at least partially meets 84% of the requirements and recommendations included on the scorecard.

#### **Getting Started: The Basics**

The website met 2 out of 4 requirements in the Basics section: (1) the url is a .gov domain and (2) the agency name (i.e., National Cancer Institute) and CIP are clearly displayed on every page. However, the site fails to notify visitors when they are being taken to non-federal-government sites (as previously noted in the section on NCI Web Standards), and CIP does not have a standard operating procedure (SOP) for regularly reviewing appropriateness and relevancy of external links.



## Managing Content

The website met 8 out of 13 content management requirements.

Overall, content is written and organized from the audiences' point of view and includes basic content suitable for a general audience. Separate sections of interest to patients and providers are clearly labeled in the navigation bar, as are sections of greatest interest to current and prospective grantees (e.g., *Research Funding*). Obsolete content in *News and Announcements* and other sections (e.g., meetings, workshops, active grants) is deleted or archived on a regular basis. The site avoids posting content of interest only to agency employees that would be more suitable for use on an intranet. Appropriate metatags (i.e., title, description, language) have been included on the homepage and all primary pages.

Best practices published by the Federal Web Managers Council include using minimum standard metadata elements on the homepage and all major entry points. Although Google, Bing, and other commercial search engines no longer use metadata to identify relevant sites, they do include text from the description metatag to generate the descriptive text shown in search results. For example, the description tag for the *Association Web Sites* page appears as the page description in the results of a Google search for *cancer imaging associations* (see Figure 4).

**Figure 4: Source Code and Search Results for Association Web Sites Page**

Source of: <http://imaging.cancer.gov/programsandresources/associationwebsites>

```
1 <!DOCTYPE html>
2 <html>
3 <head><meta http-equiv="Content-Type" content="text/html; charset=UTF-8" /><script
src="/PublishedContent/js/popEvents.js" type="text/javascript"></script><link
href="/PublishedContent/Styles/reset.css" rel="stylesheet" media="screen, projection" /><link
href="/PublishedContent/Styles/layout.css" rel="stylesheet" media="screen, projection"
/><link href="/PublishedContent/Styles/layout-print.css" rel="stylesheet" media="print"
/><link href="/PublishedContent/Styles/baseline.css" rel="stylesheet" media="screen,
projection" /><link href="/PublishedContent/Styles/baseline-print.css" rel="stylesheet"
media="print" /><link href="/PublishedContent/Styles/cip.css" rel="stylesheet" media="screen,
projection" /><script src="/PublishedContent/js/imgEvents.js" type="text/javascript">
</script><link rel="canonical" href="http://imaging.cancer.gov/programsandresources
/Associationwebsites" /><meta name="keywords" /><meta name="description" content="A listing
of associations which have imaging as one of their interests." /><meta name="content-
language" content="en" /><meta name="english-linking-policy" content="http://www.cancer.gov
/global/web/policies/page8" /><meta name="espanol-linking-policy"
content="http://www.cancer.gov/espanol/global/politicas/page8" /><title>
Association Web Sites - Cancer Imaging Program - National Cancer Institute
</title></head>
```

This is the description text in the source code.

Google cancer imaging associations

Web Images Maps Shopping More Search tools

About 23,700,000 results (0.38 seconds)

[Scholarly articles for cancer imaging associations](#)  
... and localization of early lung cancer by imaging ... - Palcic - Cited by 163  
[Revised American Thyroid Association management ...](#) - Cooper - Cited by 1024  
... by whole-body positron emission tomographic imaging - Valk - Cited by 317

[Educational Workshops & Special Courses - American Association ...](#)  
www.aacr.org › Scientists › Meetings & Workshops  
Sponsored by the **Cancer Imaging** Program of the NCI in partnership with the American  
**Association for Cancer Research**. 21st Annual AACR Aspen Workshop: ...

[Association Web Sites - Cancer Imaging Program - National Cancer ...](#)  
imaging.cancer.gov/programsandresources/associationwebsites  
A listing of associations which have imaging as one of their interests.

The same description appears in the Google search results.

Content management issues include failure to display a date showing that it is current, that it has been reviewed within the past 12 months, or that it is historical material. (The lack of page dates was noted previously in the NCI Web Standards and Policies review.)

### Plain Language

The majority of content management issues identified on the CIP site relate to plain language—that is, language that the site’s typical visitor can understand in one reading. CIP does not have SOPs that would ensure plain language standards are met. Such SOPs might include (1) using language tools to evaluate content readability and (2) regularly reviewing the homepage and major entry points to ensure they are written in plain language appropriate for the site’s intended visitors.

The heuristic review included examining content on primary pages for adherence to plain language standards published on Howto.gov. Primary pages (i.e., homepage, *About CIP*, *Research Funding*, *Programs & Resources*, *Clinical Trials*, *Informatics*, *News & Events*, and *Patients & Providers*) were scored for readability, including the Flesch Reading Ease (FRE) tool, which measures reading ease on a scale from 0 to 100. (Interpretations of FRE scores are shown in Table 1. In addition, percentage of sentences written in passive voice, Flesch-Kincaid Grade (FKG) level, and use of undefined acronyms were recorded (see Table 2).

**Table 1: Flesch Reading Ease Scale**

Score	Interpretation
90.0–100.0	Easily understood by an average 11-year-old student
60.0–70.0	Easily understood by 13- to 15-year-old students
0.0–30.0	Best understood by university graduates

Best practices suggest that, at a minimum, homepages, all major entry points, and navigational elements should be written in plain language suitable for the general public. With this in mind, target scores for pages intended for the public were set as follows: FRE of 50 or higher and FKG of 10 or lower. For those pages intended primarily for researchers, the target FRE was 20 or higher and FKG of 16 or lower. Targets for percent passive sentences and undefined acronyms for both audiences were set at 10 or lower and 0, respectively. (NCI, CIP, and NIH were not included in counts of undefined acronyms.)

**Table 2: Readability Scores**

Web Page	%		Undefined Acronyms	Intended Audience		
	FRE	FKG		Public	Research	
Homepage	0	12	33	5	x	x
About CIP	13.9	12	0	0	x	x
Research Funding	32.9	16.2	0	0		x
Programs & Resources	21.1	12.3	11	3		x
Clinical Trials	11.5	15.2	26	1		x
Informatics	18.7	16.2	0	1		x
News & Events	15.8	14.6	0	0	x	x
Patients & Providers	10	13.2	0	0	x	
Average	15.6	16.9	8.75	1.4		
Target Scores for Public	50+	≤0	<10%	0		
Target Scores for Researcher	20+	≤6	<10%	0		

Figures shown in **green** were acceptable for intended audience(s); those shown in **red** were not acceptable.

## Required and Recommended Content

The website met 19 out of 22 requirements and recommendations.

The site includes common content found on most federal websites. “Contact Us” information is prominently displayed on the homepage, and there are text links to this information in the footer of every page. The contact information is complete, including a mailing address, telephone numbers, and a web-based e-mail form. A test inquiry submitted via the e-mail form was answered within 2 hours; considerably faster than the 48-hour response time recommended in the guidelines developed by the Citizen Service Levels Interagency Committee (CSLIC). The program’s policy on responding to specific medical questions, making referrals, or providing consultation is clearly stated.

The CIP site has an “About Us” page describing basic information, including the program’s mission, its history, organizational structure, and a staff directory. The staff directory includes photographs of staff, which help “humanize” the organization.

Every page on the site has graphical and text links back to the homepage.

The site provides considerable information about funding opportunities in programs CIP administers as well as for related research administered by other components of NCI. Links to specific funding announcements also are included.

The site lacks two key types of recommended content: (1) a site map or subject index and (2) a Frequently Asked Questions (FAQ) page.

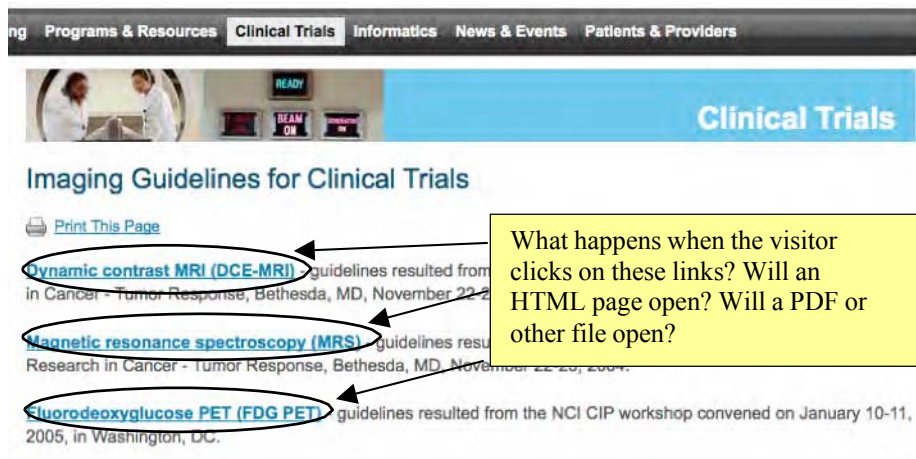
## Usability, Accessibility, & Design

The site at least partially met 23 out of 26 requirements and recommendations in this section. The site design works well on lower-end hardware, multiple browsers and versions of browsers, multiple operating systems, low connection speeds, and low screen resolutions. HTML page sizes average less than 20 kilobytes (kb), minimizing page download times to accommodate visitors with low connection speeds. (The guideline maximum file size is 50kb, so the CIP site received an additional point for this item.) The site’s persistent navigation scheme is used consistently throughout. With a few exceptions, navigation menus are positioned in the same place on every page, they are formatted and worded consistently, and they behave the same way on every page. Exceptions occur in the *News and Announcements* section, where two pages are missing the primary navigation menu (See Figure 5).

Figure 5: Upcoming Meetings Page

Users can accomplish key tasks with relative ease. (Note: This aspect of the site will be tested by actual and potential users during the Usability Testing phase.)

**Figure 6: Clinical Trials Links**



For the most part, the site provides access to documents using open, industry standard/native web formats (e.g., HTML) or alternative formats (e.g., Portable Document Format [PDF]) that do not impose unnecessary burdens for the intended audience. These file formats offer the greatest flexibility for visitors. The site provides a link to the downloadable free Adobe viewer in the footer.

When linking to non-HTML documents, the site does not provide a text description of the file with file type, file size, or effective date. Therefore, site visitors have no advance knowledge that clicking on a link will open a non-HTML file. On the *Imaging Guidelines for Clinical Trials* page (Figure 6), the first two links open PDFs, but the third link opens an HTML page that contains a link to a PDF of a journal article.

Additionally, some files are provided only in proprietary formats (e.g., PowerPoint). This practice is not recommended as viewing such files requires purchase or licensing of commercial software.

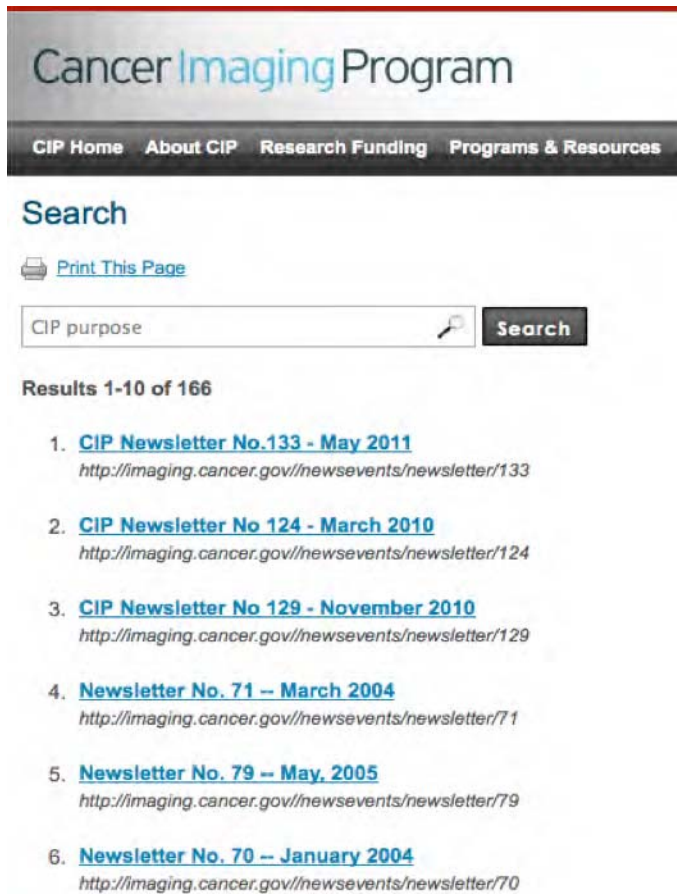
### **Improving Your Site and Making Changes**

The site met all requirements in this section. The CIP staff member responsible for managing site content stays informed about industry best practices, attempts to follow relevant usability guidelines, and notifies interested parties and website visitors about changes to the site. Formal usability testing with representatives of target audiences is planned as a part of this evaluation.

### **Collaboration / Avoiding Duplication**

The site met all requirements in this section. The site avoids recreating content that already exists on other components of the NCI website and provides links to appropriate cross-agency websites to guide visitors to additional relevant resources.

**Figure 7: Search Results**



CIP mission statement (found on the homepage) or the mission and vision information published on “About CIP.” (See Figure 7.)

## Management and Governance

The site met all requirements in this section. Visitors can identify the CIP site as an official federal website and trust that it provides accurate information. The site complies with most requirements for federal public websites, and plans are in place to bring the site into compliance with those requirements it does not currently meet. In addition, CIP website management has arranged for conduct of a competitive review of other NCI website components. The competitive review will determine how well CIP performs in comparison to other sites in terms of meeting NCI’s style guidelines and will identify functionality and graphical/design elements used by other sites that could enhance CIP’s site.

A training plan is in place to ensure that web staff receive the training required to do their jobs.

## Total Score

Overall, CIP scored 8 points below the target passing score of 88 points. The site at least partially met 84% of the requirements and recommendations included on the scorecard and achieved a perfect score on the following sections: Improving Your Site and Making Changes; Collaboration/Avoiding Duplication; Legal Requirements; and Management and Governance. The site scored acceptably on the Required and

## Legal Requirements

The site met all requirements in this section. As mentioned previously, the CIP website complies with federal accessibility requirements, and staff are taking action to ensure that all downloadable resource files are fully compliant as well.

## Search

The site meets only one-fourth of the search function requirements and recommendations.

A search box appears on every page, is entitled “Search,” and is positioned in the upper third of the webpage. Search results are produced in less than 3 seconds and are displayed in an easy-to-read format with the search term shown at the top of the page.

Search terms are not highlighted in each search result. The search function does not allow visitors to sort results or conduct more refined, focused searches within results. Wildcard searches are not accommodated. The site does not offer search help, hints, or tips.

Some search results do not appear to be the most relevant. For example, results of a search for “CIP purpose” were topped by a list of CIP newsletter issues rather than the

Recommended Content section and the Usability, Accessibility, and Design section, but it needs improvement on requirements listed under Managing Content and Search.

Recommendations for compliance with these requirements are summarized in the Recommendations section at the end of this report.

## **Scorecard 2: Forrester Research Website Review**

The CIP website also was assessed using a comprehensive 25-point checklist developed by Forrester Research. Scores are always a positive or negative number. No zeros are assigned in this measurement. The completed scorecard is available as Appendix B.

This scorecard measures site performance in four key areas: Value, Navigation, Presentation, and Trust. Answering the questions for these measures required development of sample goals for the website's target audiences: researchers, nonresearcher healthcare providers, and patients/general public. The following goals were used:

- Understand the purpose or mission of the Cancer Imaging Program. (What is CIP and what does it do?)
- Learn basic information about cancer imaging. (What is imaging? What kinds of imaging are used in cancer treatment and diagnosis? What research is being conducted in this area?)
- Learn about current research being conducted in cancer imaging.
- Identify funding opportunities for research in this area.
- Learn about CIP resources (e.g., services, infrastructure) available to researchers in this field.

### **Value**

This section focuses on whether the site provides value to visitors. Can visitors accomplish specified goals? The site scored 5 out of a possible 6 points in this section. The primary menu bar includes keywords relevant to all of the goals. The content required to accomplish the specified goals is available on the homepage or within two clicks, and content exceeds minimum needs. The search function is available on every page.

### **Navigation**

The navigation questions focus on whether the menu items, navigation buttons/icons, and related functions work well. Does the navigation scheme support visitors' ability to accomplish their goals? The site scored 1 out of 12 points in this section.

Category and subcategory names are clear and mutually exclusive. Some names (but not all) include trigger words related to the specified visitor goals. Content appears to be where users would look for it. (Note: Usability testing will provide a further assessment of this aspect of the site.) Task flows for the specified visitor goals are efficient.

The "Viewing Files" link included in the page footer may be too vague. This link takes the visitor to information about software or browser plug-ins that may be required to view some of the information available on the website (e.g., Adobe Reader). The Division of Cancer Treatment and Diagnosis (DCTD) website uses the phrase "File Readers/Plug-ins" for this link, more clearly suggesting what the visitor can expect to find upon clicking this link.

As noted in the Web Managers Scorecard summary, keyword-based searches are not comprehensive and precise, and search results are not sorted by relevance or currency. Visitors who use the search box rather than clicking through the navigation bar may not be able to find key information. Although search results

are displayed in an easy-to-read format with the search term shown at the top of the page, the search terms themselves are not highlighted in the results.

## Presentation

The CIP site scored 13 out of 18 possible points in this section, which focuses on how well the appearance of the site and its components support visitor success.

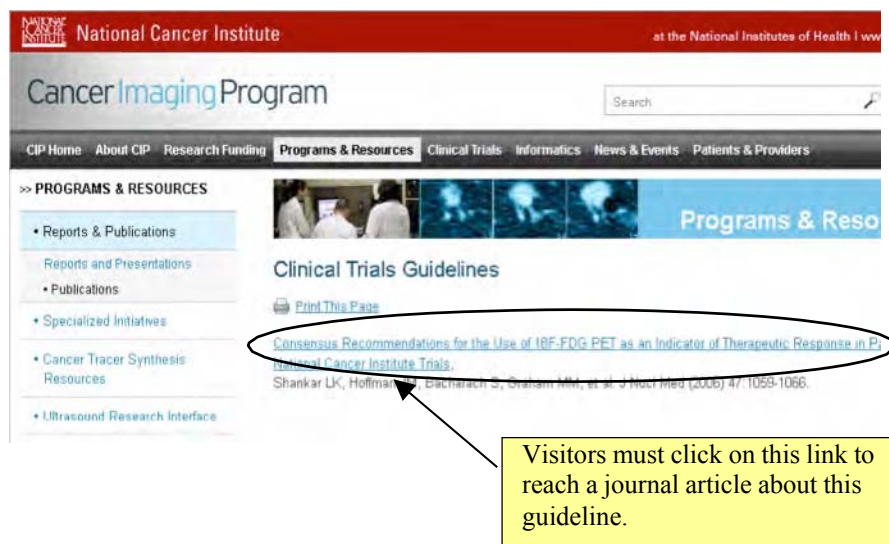
Site graphics, icons, and symbols are easily understood by users. Text is legible and scalable, and text formatting and layout support easy scanning.

Content, functionality, and navigation are prioritized in the display. There are no obvious instances of wasted space. Interactive elements are placed logically in the display—related items are grouped together, and the layout is not cluttered with unnecessary buttons, icons, bars, or other graphic elements. Controls have good affordance; that is, they behave as their appearance suggests. Their design is internally consistent.

Links and other interactive items are arranged with appropriate spacing such that visitors can easily click on them without errors. No complex mouse movements are required.

Links display destinations when rolled over, and the mouse cursor display changes to a hand symbol. Navigation elements and page titles consistently confirm that the correct page loaded.

**Figure 8: Fluorodeoxyglucose PET Guideline**



Except for undefined acronyms that appear on some key pages, the site uses language that is easy for most visitors to understand. Readability could be improved by reducing use of passive voice and eliminating unnecessarily complex sentence structure.

There is at least one instance where the site requires unnecessary extra steps. On the *Imaging Guidelines for Clinical Trials* page, clicking on the link for the Fluorodeoxyglucose PET

Guideline opens an HTML page and visitors must click on the title of a journal article (Figure 8) to read about this guideline. Revising the description of the guideline could eliminate the need for this second step.

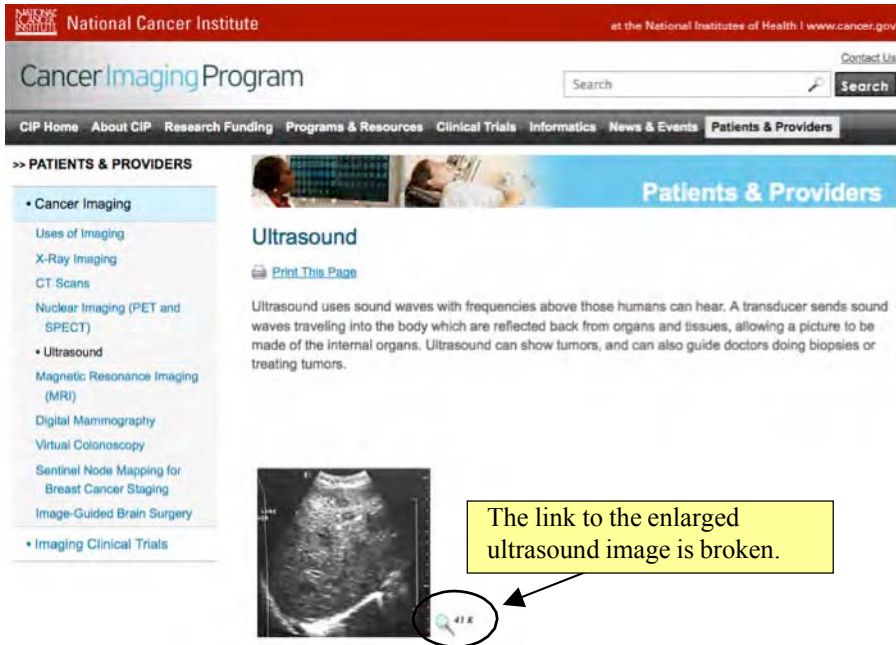
## Trust

This section focuses on how well the website's performance earns visitor trust. For example, do visitors feel confident that they are reaching their intended destination? The site scored 1 out of 6 possible points in this section.

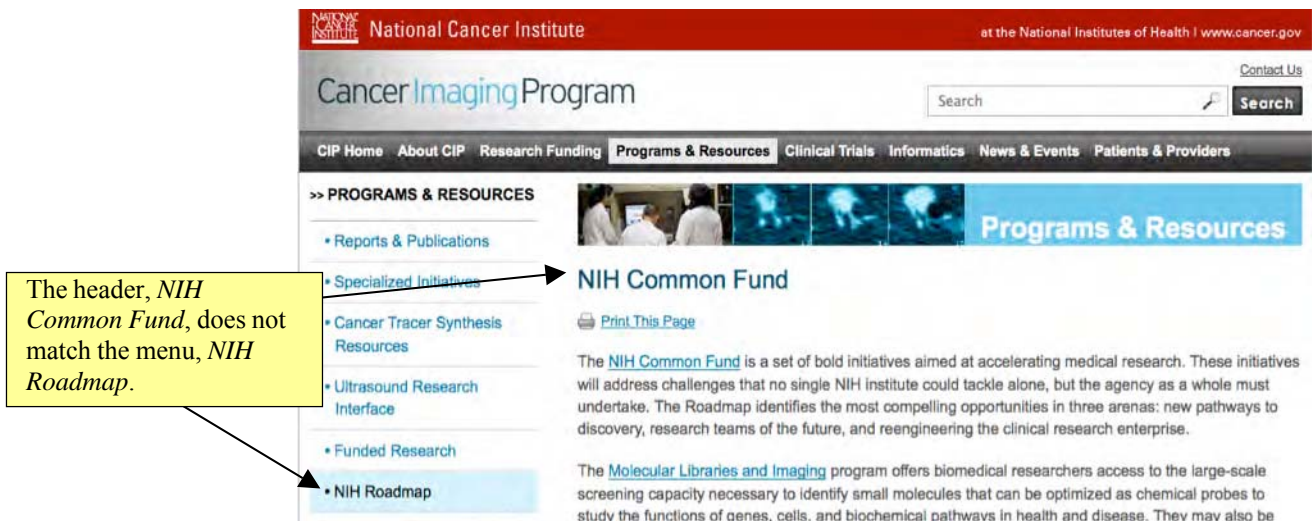
Navigation elements and page titles consistently confirm that the correct page loaded. The site clearly indicates results of users' actions.

The site's overall trust score suffered somewhat due to a number of errors. These errors include broken links (Figure 9), nonworking icons, and instances where the order of content does not match that shown on the menu bar and/or secondary navigation box (Figure 10).

**Figure 9: Ultrasound**



**Figure 10: NIH Roadmap**





## Total Score


The CIP website missed an overall passing score by 1 point (score=20, passing score=21). The site achieved a better than passing score in the areas of Value (score=5, passing score=3) and Presentation (score=13, passing score=9). However, improvement is needed in Navigation (score=1, passing score=6) and Trust (score=1, passing score=3).

Recommendations for compliance with the Forrester Research checklist are provided in the Recommendations section.

## Recommendations

The table below summarizes actions required to bring the site into compliance with guidelines as well as recommendations from the tools that were employed during the heuristic assessment.

### Required Improvements and Recommendations


Required Improvements and Recommendations	Source	Required or recommended?
Except for very short pages, add introductory text.	NCI Standard	Recommended
Add a graphic notice (  ) next to links that lead to non-federal- government websites.	NCI Policy	Required
Add relevant links to the NCI Dictionary of Cancer Terms at <a href="http://cancer.gov/dictionary">http://cancer.gov/dictionary</a> , particularly in the <i>Patients &amp; Providers</i> section.	NCI Standard	Recommended
Add relevant links to the NCI Drug Dictionary at <a href="http://cancer.gov/drugdictionary">http://cancer.gov/drugdictionary</a>	Web Managers	Recommended
Reformat citations to follow NCI style guidelines.	NCI Standard	Recommended
Add related pages or back-to-top links on long pages.	NCI Standard	Recommended
Add date (posted, reviewed, updated, or last modified) to every page.	NCI Standard/ Web Managers	Required
Develop an SOP: Schedule routine content reviews to ensure that material is current. (For example, many of the events on the <i>Upcoming Meetings</i> page already have occurred. This page should be scheduled for review at least monthly.)	Web Managers	Recommended
Define acronyms on first use per page throughout site (home page, <i>Programs &amp; Resources</i> , <i>Clinical Trials</i> , <i>Informatics</i> ).	Web Managers	Recommended
Develop an SOP: Use language tools to evaluate content readability.	Web Managers	Recommended
Develop an SOP: Regularly review the homepage and major entry points to ensure they are written in plain language appropriate for the site's intended visitors.	Web Managers	Recommended
Improve content readability: Reduce use of passive voice to <10%; increase reading ease to 50+ on pages intended for the public and 20+ on pages intended for researchers; reduce grade level to 10 or lower for public audience and 16 or lower for researcher pages; eliminate undefined acronyms.	Web Managers	Recommended
Add a site map or subject index.	Web Managers	Recommended
Add a Frequently Asked Questions (FAQ) page.	Web Managers	Recommended

Required Improvements and Recommendations	Source	Required or recommended?
In search results, highlight the search term(s) in each search result.	Web Managers	Recommended
Enable wild card searching.	Web Managers	Recommended
Regularly evaluate the relevance of the search results for most-frequently-used search terms and take steps to ensure that search results include the most relevant pages.	Web Managers	Recommended
Enable sorting of search results by relevance and date last updated.	Web Managers /Forrester	Recommended
Correct the layout of the <i>Upcoming Meetings</i> and <i>Workshops</i> pages to include the primary menu bar.	Error	Required
When linking to a non-HTML document, include a text description of the file, including file name, type, and size.	Web Managers	Recommended
Create an inventory of content categories that each targeted audience needs or wants (e.g., press releases, publications) and determine a schedule for posting additional content in the future.	Web Managers	Recommended
Change “Viewing Files” link in footer to something that more clearly denotes the content of the page (e.g., “File Readers/Plug-ins”).	Forrester	Recommended
Update the CIP grant funding graphic to include data through FY2011 or, if possible, through FY2012.	Web Managers	Recommended
Fix broken links to image enlargements in <i>Patients &amp; Providers</i> , <i>Cancer Imaging</i> (i.e., CT scans, ultrasound, digital mammography).	Error	Required
Correct content on <i>News &amp; Events</i> page so that order of items on page matches order shown on drop-down list.	Error	Required
Fix non-working enlargement icons on <i>Nuclear Imaging</i> page.	Error	Required
Correct text wrap issues on the <i>Feasibility Trials</i> page.	Error	Required
Change the heading on the <i>NIH Roadmap</i> page from NIH Common Fund to NIH Roadmap or change the page name and menu references to NIH Common Fund.	Error	Required
Reposition <i>Reports &amp; Publications</i> content so that it appears at the top of the <i>Programs &amp; Resources</i> page to match order shown on the <i>Programs &amp; Resources</i> menu drop-down list and its position in the secondary menu on the left side of the page.	Error	Required
Correct broken link to <i>Learning About Cancer Trials</i> on <a href="http://imaging.cancer.gov/patientsandproviders/cancerimaging/clinicaltrials">http://imaging.cancer.gov/patientsandproviders/cancerimaging/clinicaltrials</a> .	Error	Required
Correct typo ( <i>resouce</i> instead of <i>resource</i> ) in last link on homepage.	Error	Required

## Conclusion

Overall, the CIP site met less than one-half of the NCI website content standards, scored below passing on the Government Web Managers scorecard, and scored just below passing on the Forrester Research

scorecard. Although these results may be disappointing, bringing the site into compliance with best practices, guidelines, and requirements can be achieved easily. Most of the required and recommended changes can be accomplished by CIP staff with minimal support from NCI information technology/web staff.

CIP staff are encouraged to review and prioritize the recommendations in a way that reflects urgency of the identified issue and availability of resources. Required changes that are relatively simple to make include (1) adding a graphic notice (  ) next to links that lead to non-federal-government websites and (2) changing the heading on the *NIH Roadmap* page.

A recommendation that would require a higher commitment of resources is adding links to the NCI Dictionary of Cancer Terms. This would require: (1) reviewing current copy for terms that may be new to the public; (2) looking up the terms in the NCI dictionary; and (3) inserting links to the respective NCI definitions. For example, the term *radioactive*, which appears in the first paragraph of the *Nuclear Imaging* page, would be linked to <http://cancer.gov/dictionary?CdrID=46550>. Adding links to the NCI Drug Dictionary would require a similar procedure.

In cases where changes would require more time than is feasible with current resources, CIP might consider establishing an SOP that complies with specific guidelines and applying it to all new content. For example, to improve readability of site content, use the MS Word readability statistics function to test all new text and revise as needed to meet target reading ease and grade level scores before posting it to the site.

In brief, the CIP website is a source of important information. To ensure that the site is as useful as possible, it is recommended that the corrective steps described in this report be taken. Emphasis should be placed on addressing issues related to readability, navigation, search, and trust, areas that scored lowest on the assessment.

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Please note: Scores are always a positive or negative number. There are no "zeros" assigned in this measurement.

### Getting Started (The Basics)

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Domain:</b> Is your URL a .gov, .fed, .us, or .mil domain?	1	1	1	1	
<b>Agency Name:</b> Does every web page on your site clearly Display the name of your agency?	1	1	1	1	
<b>Linking to Non-Federal Sites:</b> Does your site notify visitors when they are being taken to a non-federal government state?	1	1	1	-1	CIP does not comply with symbol use
<b>Reviewing External Links:</b> Does your site have and follow a schedule for reviewing the appropriateness and relevancy of external links?	1	2	-2	-1	

### Managing Content

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Keeping Content Current:</b> Does each page of your website have a date showing that it is current, or that it has been reviewed within the past 12 months, or that it is historical material?	1	2	-2	-1	
Do you regularly delete or archive content that is obsolete and it not required by law or regulation?	1	2	-2	1	Yes, but only for the "News and Announcement" and some other sections such as meetings, workshops, active grants, act...
<b>Audience-Driven Content:</b> Overall, is your site written and organized from the audiences' point of view, with content that they care about most	1	2	1	2	
<b>Content for the General Public:</b> If your site is for a specialized audience, do you still offer basic content for a general audience with basic descriptive or identifying language?	1	2	-2	2	
<b>Avoiding Internal Employee Information:</b> Do you refrain from using public website for content of interest or use to agency employees only using intranets or extranets for this purpose?	1	2	-2	2	
<b>Common Terminology:</b> Does your site use common expressions, generally used terminology, and refrain from using acronyms or technical terms without defining them in context?	1	2	-2	1	
<b>Plain Language:</b> Have you insured that, at a minimum, homepages, all major entry points, and navigational elements are written in plain language. (Plain language is language the website's typical visitor can understand in one reading; it is writing designed for the reader. Organizations should assume that the intended audience for the homepages is the general public.)	1	2	-2	-1	

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

<b>Editorial Review:</b> Do you have a process for regularly reviewing your homepage, major entry points, and navigational elements to ensure they continue to be written in plain language, consisting your sites intended visitors?	1	2	-2	-1	
<b>Language Tools:</b> Do you use language tools, including language software, to evaluate the readability of the website's content?	1	2	1	-1	
<b>Metadata:</b> Minimum Metadata Elements: Do your new sites include the following metatags on the homepage and all second-level pages? Such as Title, Description, and Language?	1	2	-1	1	Scores in this section are based on review of source files for homepage and patients and provider page. Only tags for title and language are included on all pages. Audience tag is recommended for the Patient and Provider Section.

### Required and Recommended Content

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Common Content:</b> Does your site include the same types of "common content" found on most federal websites (such as contact information and basic information about your agency)?	1	1	1	1	
<b>"Contact Us" Page:</b> Does your site have a "Contact Us" page linked prominently from your home page and every major entry point (ideally from EVERY page)? <b>Does that page contain:</b>	1	1	1	1	
<ul style="list-style-type: none"> <li>Your organization's mailing address?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Phone number(s) including numbers for any regional or local offices, including toll-free numbers and TTY numbers?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Means to communicate by e-mail (for example, email address or web-based contact form)?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Your policy and procedures for responding to email inquiries, including whether your agency will answer inquiries and the expected response time?</li> </ul>	1	1	-1	1	
<b>Do you follow the guidelines, developed by the Citizen Service Levels Interagency Committee (CSLIC), for providing phone, e-mail and other customer service to citizens? See:</b> <a href="http://www.howto.gov/sites/default/files/citizen-servicelevels-interagency-committee-final-report.doc">http://www.howto.gov/sites/default/files/citizen-servicelevels-interagency-committee-final-report.doc</a>	1	2	-2	1	Submitted online inquiry via the Contact Us email page at <a href="http://imaging.cancer.gov/global/contact">http://imaging.cancer.gov/global/contact</a> On 11/7 6 p.m. Passing score would be an auto-reply and a human e-mail response within 48 hours.
<b>"About Us" Page</b>					
<ul style="list-style-type: none"> <li>Does your site have an "About Us" or similar page describing basic information about the organization that sponsors and is responsible for the site?</li> </ul>	1	1	-1	1	

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<ul style="list-style-type: none"> <li>Does the “About Us” page contain a description of the organization’s mission, including its statutory authority?</li> </ul>	1	1	-1	1	Mission yes; statutory authority not applicable.
<p><b>Reference: Section 207 (f)(1)(A)(iii) of the E-Government Act of 2002)</b> Information about your organizational structure?</p>	1	1	-1	1	CIP org structure illustrated and staff directory
<p><b>Reference: Section 207 (f)(1)(A)(iii) of the E-Government Act of 2002)</b>  <ul style="list-style-type: none"> <li>Basic information about parent and/or subsidiary organizations and regional and field offices, as</li> </ul> </p>	1	1	-1	1	Links to Division
<ul style="list-style-type: none"> <li>Name of the agency head and other key staff, as appropriate?</li> </ul>	1	1	-1	1	<b>CIP Director</b>
<ul style="list-style-type: none"> <li>Contact Information such as a link to the “Contact Us” page or other elements listed above?</li> </ul>	1	1	-1	1	
<p><b>“Site Map” or “Subject Index”</b> Does your site have a page entitled “Site Map” or a page entitled “Subject Index” that gives and overview of the major content categories on the site?</p>	1	1	-1	-1	
<p><b>Frequently Asked Questions</b> Does your site have a page called “Frequently Asked Questions” or “Common Questions”?</p>	1	1	-1	-1	
<p><b>Online Services, Forms, and Publications</b>  <ul style="list-style-type: none"> <li>Does your site offer easy access to online services, displaying them as prominently as possible?</li> </ul> </p>	1	2	-2	2	
<ul style="list-style-type: none"> <li>Does your site offer easy, prominent access to forms and publications?</li> </ul>	1	2	-2	1	
<p><b>Information about Jobs</b>  <ul style="list-style-type: none"> <li>Do you provide information on special jobs programs like internships and work-study, and other information particular to working for your organization?</li> </ul> </p>	1	2	-2	1	<b>Fellowships</b>
<ul style="list-style-type: none"> <li>If your website represents a small organization within a larger agency, do you point to the jobs information for your parent organization?</li> </ul>	1	2	-2	1	
<p><b>Information about Grants</b>  <ul style="list-style-type: none"> <li>If your organization provides grants or has contracting opportunities, do you provide information about those opportunities on your website?</li> </ul> </p>	1	1	-1	1	
<ul style="list-style-type: none"> <li>If your organization posts grants information, do you also link to grants.gov and any other federal portal(s) related to grants?</li> </ul>	1	1	-1	1	

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Required and Important Links</b> <b>Home Page:</b> Does every page on your site have a text link back to your homepage? (if you use a graphical link, you must also provide a text link)	1	1	-1	1	

### Usability, Accessibility, and Design

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Common Access</b>					
<ul style="list-style-type: none"> <li>Has your site been designed, developed, and tested for a broad range of visitors, including those with lower-end hardware and software capabilities?</li> </ul>	1	2	-2	1	
<ul style="list-style-type: none"> <li>Has your site been designed, developed and tested for multiple brows and versions of browsers, operating systems, connection speeds and screen resolutions?</li> </ul>	1	2	-2	1	
<b>Page Download Times</b> Do you accommodate visitors with low connection speeds to the maximum extent feasible by minimizing page download times for your visitors and in most cases, keeping your HTML pages under 50KB?	1	2	-2	2	Most files were about 20kb
<b>Advanced Technology (Including Flash)</b> Do you avoid the most advanced web design technologies (such as Flash) if your target audience generally does not have access to those technologies?	1	2	-2	2	
<b>Consistent Navigation Scheme</b> Does your site have a coherent navigation scheme, which is used consistently across the website?	1	2	-2	1	
<b>Consistent Navigation Labels:</b>					
<ul style="list-style-type: none"> <li>Do common items that exist on different sections of the site appear, if possible, in the same location on each page and have the appearance and wording?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>If a navigation item is shared by a group of pages (such as a set of pages on a tingle topic, or for a division of the organization) does it have the same location, appearance and wording on each page?</li> </ul>	1	2	-2	2	
<ul style="list-style-type: none"> <li>Do navigation items of the same type also look and behave the same way? (For example, if a set of pages on one topic has subtopic links in the left navigation bar, pages on other topics should also have subtopic links in the left navigation bar that look and behave the same way)</li> </ul>	1	2	-2	2	

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<ul style="list-style-type: none"> <li>Do you avoid having the same button/navigation phrase behave differently in different sections of a site?</li> </ul>	1	2	-2	1	Clinical trials main menu button / similar submenu item in P&P (clinical imaging trials)
<ul style="list-style-type: none"> <li>Do you avoid using one navigation scheme (for example, left navigation) in one area and other scheme elsewhere?</li> </ul>	1	2	-2	2	
<p><b>Specialized or Local Navigation:</b> If a particular set of web pages requires specialized or local navigation, do you apply that navigation to the largest possible logical grouping (such as topic, an audience, or a complete organizational unit)?</p>	1	2	-2	2	
<p><b>File Formats</b></p> <ul style="list-style-type: none"> <li><b>Industry Standard Formats:</b> Do you provide access to documents using open, industry standard web formats (currently HTML, XHTML or XML) or alternative formats (such as Portable Document Format), that do not impose an unnecessary burn for the intended audience?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li><b>Choosing the Appropriate Format:</b> When choosing file format(s), do you consider: <ul style="list-style-type: none"> <li>Intended use of the material by your target</li> </ul> </li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Frequency of use by the target audience?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Accessibility of the format to the target audience?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Level of effort and time required by your organization to convert the material to the format?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li><b>Preferred Format:</b> Do you generally use native web formats (HTML, XHTML, or XML) for the greatest flexibility for visitors, especially those that are most frequently accessed by the public?</li> </ul>	1	1	-1	1	Some links and imaging guidelines open files without cluing in the visitor (no label, no format, no size)
<ul style="list-style-type: none"> <li><b>PDF and Other Alternate Formats:</b> <ul style="list-style-type: none"> <li>Do you use Portable Document Formats (PDF), such as Adobe Acrobat, only as an alternate format to native web formats when there is a clear business need to use this format?</li> </ul> </li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>When using PDF files, do you provide a link to the downloadable free viewer?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>When using PDF or other non-standard file formats, do you also</li> </ul>	1	1	-1	-1	



## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
provide an HTML version of the document whenever feasible?					
<ul style="list-style-type: none"> <li>When linking to a non-HTML document, do you include a text description of the file, including the name, file type, file size, and effective date?</li> </ul>	1	1	-1	-1	
<ul style="list-style-type: none"> <li>Do you avoid providing documents that are only available in proprietary formats that require purchase or licensing of commercial software (for example, MS Word or MS PowerPoint)?</li> </ul>	1	1	-1	-1	Some Word, PPT
<ul style="list-style-type: none"> <li>Can users accomplish key tasks?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Is Text scalable – easy to read?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Is there good contrast within site?</li> </ul>	1	1	-1	1	Comment: Blue in header is a little light.
<ul style="list-style-type: none"> <li>Are navigation and interface items intuitive?</li> </ul>	1	1	-1	1	

### Search

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Search Box:</b>					
<ul style="list-style-type: none"> <li>Do you include either a “Search Box” or a link to a “Search” page on every page?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Is the search box or link entitled “Search”?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Is the search box placed in the same position on all pages (usually within the upper third of the webpage)?</li> </ul>	1	1	-1	1	
<b>Search results and response Times:</b>					
<ul style="list-style-type: none"> <li>On average, does your search engine produce results in less than three (3) seconds?</li> </ul>	1	1	-1	1	
<ul style="list-style-type: none"> <li>Are search results displayed in an easy-to-read format that, at a minimum, shows visitors the term(s) they searched for and highlights the term(s) in each search results?</li> </ul>	1	2	-2	1	Search term is displayed but the terms are not highlighted.
<b>Advanced and Broader Searches:</b>					
<ul style="list-style-type: none"> <li>Do you allow visitors to conduct more refined, focused searches to achieve more relevant results?</li> </ul>	1	2	-2	-1	
<ul style="list-style-type: none"> <li>Do you accommodate wild card searches?</li> </ul>	1	1	-1	-1	Search for ‘digital mam’ produced fewer results than ‘digital mammo’
<b>Search Help:</b>					
Do you provide search help, hints, and tips, including examples?	1	2	-2	-1	

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

### Improving Your Site and Making Changes

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Latest Research:</b> Do you keep informed of the latest research in web design, usability, and user behavior to ensure your site follows current industry best practices?	1	2	-2	2	
<b>Usability Guidelines:</b> To the extent possible, do you follow the “Researched-based Web Design and Usability Guidelines” published by the Department of Health and Human Services? <a href="http://usability.gov/guidelines/index.html">http://usability.gov/guidelines/index.html</a>	1	1	-1	1	
<b>Usability Testing:</b> Do you periodically test your site with your audience (either through informal testing or more formal one-on-one lab-based usability testing)?	1	2	-2	2	
<b>Notifying Visitors of Site Changes:</b> Do you have a way of informing interested parties and website visitors about changes to your website, both before and after changes have been made? (The method for notifying visitors should consider the magnitude of changes)	1	1	-1	1	

### Collaboration/Avoiding Duplication

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Avoiding Duplication:</b> Do you avoid duplicating or recreating content that already exists on a federal public website?	1	1	-1	1	
<b>Links to Relevant Cross-Agency Websites:</b> Do you link to appropriate cross-agency portals when applicable, to guide visitors to additional resources that exist across the U.S. government? B231	1	1	-1	1	
<b>Link to Relevant Cross Agency Websites:</b> To avoid confusion and clutter, do you avoid linking to cross-agency portals unless those websites are related to your organizations mission or dunction? See: <a href="http://hoto.gov/web-content/manage-cross-agency-portals/links">http://hoto.gov/web-content/manage-cross-agency-portals/links</a>	1	2	-2	2	

### Requirements from Federal Laws, Regulations, Or Other Directives

## Appendix A: Requirements and Best Practices Checklist for Government Web Managers

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Accessibility (Section 508):</b> Does your site comply with the requirements of Section 508 of the Rehabilitation Act (29 U.S.C 794d), designed to make online information and services fully available to citizens with disabilities?	1	2	-2	2	

### Management and Governance

Requirement	Passing Score	Max Score	Min Score	CIP Score	Comments
<b>Web Policies</b> Do you have a plan in place to review and improve web content policies and practices for your site?	1	2	-2	1	
<b>Best Practices:</b> Do you periodically review best practices of other sites to incorporate into your own website?	1	2	-2	2	
<b>Overall Quality:</b> Overall, can a citizen identify your site as an official federal government websites and trust that your website will provide current and accurate government information?	1	1	-1	1	
<b>Staff Training:</b> <ul style="list-style-type: none"> <li>Are all the members of your web team aware of these requirements and best practices and how their work contributes to meeting these practices?</li> </ul>	1	2	-2	2	
<ul style="list-style-type: none"> <li>Do you have a training plan to ensure that your web staff has the training they need to do their jobs?</li> </ul>	1	2	-2	2	
<b>Compliance:</b> <ul style="list-style-type: none"> <li>Have you determined if you are in compliance with all requirements for federal public websites and that you meet the best practices contained on this website?</li> </ul>	1	2	-2	2	
<ul style="list-style-type: none"> <li>Do you have a process (current or planned) for bringing your site into compliance with federal requirements or for the meeting the best practices?</li> </ul>	1	2	-2	2	

Standard	WC.gov Target	Highest Possible Score	Lowest Possible Score	CIP Score
Total Score	88	127	-127	80

<b>Scoring Summary for CIP</b>	
<b>Value</b>	
1. Does the homepage provide evidence that the specified goals can be completed?	<b>2</b>
2. Is the content that's required to support the user goals available where needed?	<b>2</b>
3. Is the functionality that's required to support the site goals available where needed?	<b>1</b>
<b>Subtotal</b>	<b>5</b>
<b>Navigation</b>	
4. Are menu category and subcategory names clear and mutually exclusive?	<b>2</b>
5. Are content and functionality classified logically?	<b>1</b>
6. Is the wording in hyperlinks and controls clear and informative?	<b>-1</b>
7. Are task flows for the specified user goals efficient?	<b>1</b>
8. Are keyword-based searches comprehensive and precise?	<b>-1</b>
9. Are search results presented in a useful interface?	<b>-1</b>
<b>Subtotal</b>	<b>1</b>
<b>Presentation</b>	
10. Does site content use language that's easy to understand?	<b>-1</b>
11. Does the site use graphics, icons, and symbols that are easy to understand?	<b>2</b>
12. Is text legible?	<b>2</b>
13. Do text formatting and layout support easy scanning?	<b>1</b>
14. Do layouts use space effectively?	<b>2</b>
15. Are form fields and interactive elements placed logically in the display?	<b>2</b>
16. Are interactive elements easily recognizable?	<b>2</b>
17. Do interactive elements behave as expected?	<b>1</b>
18. Does the site accommodate users' range of hand-eye coordination?	<b>2</b>
<b>Subtotal</b>	<b>13</b>
<b>Trust</b>	
19. Does the site present privacy and security policies in context?	<b>NA</b>
20. Do location cues orient users?	<b>1</b>
21. Does site functionality provide clear feedback in response to users' actions?	<b>1</b>
22. Does the site allow users to reverse completed actions?	<b>NA</b>
23. Is contextual help available where needed?	<b>NA</b>
24. Does the site help users avoid and recover from errors?	<b>NA</b>
25. Does the site perform well?	<b>-1</b>
<b>Subtotal</b>	<b>1</b>

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Value Category	Score Criteria	Comments	Score
1	<b>Does the homepage provide evidence that the specified user goals can be completed?</b>	<p>-2 if the homepage does not provide evidence that users can complete several key portions of their specified goals.</p> <p>-1 if the homepage does not provide evidence that users can complete a key portion of their specified goals.</p> <p>+1 if the homepage provides evidence that users can likely complete their specified goals.</p> <p>+2 if the homepage provides evidence that users can definitely complete their specified goals.</p>	The navigation bar includes keywords relevant to all of the goals specified for this portion of the assessment.	+2
2	<b>Is the content that's required to support the specified user goals available where needed?</b>	<p>-2 if there are several instances (or one major instance) where the content required to complete the specified user goals is not available where needed.</p> <p>-1 if there is one instance where the content required to complete the specified user goals is not available where needed.</p> <p>+1 if all of the content required to complete the specified user goals is available where needed.</p> <p>+2 if as above, plus content exceeds users' minimum needs, delivering added value.</p>	The content required to accomplish the specified goals is available on the homepage or within two clicks. Content exceeds minimum needs.	+2
3	<b>Is the functionality that's required to support the specified user goals available where needed?</b>	<p>-2 if there are several instances (or one major instance) where functionality required to complete the specified user goals is not available where needed.</p> <p>-1 if there is one instance where functionality required to complete the specified user goals is not available</p>	The search function is available "above the fold" on every page. Search results are produced in less than 3 seconds and are displayed in an easy-to-read format with the search	+1

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Value Category	Score Criteria	Comments	Score
		<p>where needed.</p> <p>+1 if all of the functionality required to complete the specified user goals is available where needed.</p> <p>+2 if as above, plus functionality exceeds users' minimum needs, delivering added value.</p>	term shown at the top of the page.	
4	<b>Are menu category and subcategory names clear and mutually exclusive?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where category names overlap or are ambiguous.</p> <p>-1 if there is one major instance (or several minor instances) where category names overlap or are ambiguous.</p> <p>+1 if category names do not overlap and are unambiguous.</p> <p>+2 if as above, plus names include trigger words related to the specified user goals.</p>		+2

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Navigation	Score Criteria	Comments	Score
4	<b>Are menu category and subcategory names clear and mutually exclusive?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where category names overlap or are ambiguous.</p> <p>-1 if there is one major instance (or several minor instances) where category names overlap or are ambiguous.</p> <p>+1 if category names do not overlap and are unambiguous.</p> <p>+2 if as above, plus names include trigger words related to the specified user goals.</p>	Category and subcategory names are clear and mutually exclusive. Some names (but not all) include trigger words related to the specified visitor goals.	+2
5	<b>Are content and functionality classified logically?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where an item is not listed in a category where the specified users would look for it.</p> <p>-1 if there is one major instance (or several minor instances) where an item is not listed in a category where the specified users would look for it.</p> <p>+1 if all items are listed in the categories where the specified users would look for them.</p> <p>+2 if as above, plus items are listed in alternative categories that support the specified user goals.</p>	Content appears to be where users would look for it. (Note: We will have a better understanding of this after the usability testing has been conducted.)	+1
6	<b>Is the wording in hyperlinks and navigation controls clear and informative?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where wording in hyperlinks or controls is confusing or vague for the specified users.</p> <p>-1 if there is one major instance (or several minor instances) where wording in a hyperlink or control is</p>	The “Viewing Files” link included in the footer may be ambiguous. DCTD uses “File Readers/Plug-ins.”	+1

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Navigation	Score Criteria	Comments	Score
		<p>confusing or vague for the specified users.</p> <p>+1 if wording in hyperlinks and controls is clear and informative for the specified users.</p> <p>+2 if as above, plus wording in hyperlinks and controls is highly descriptive and free of redundant words.+</p>		
7	<b>Are task flows for the specified user goals efficient?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where there are unnecessary steps in the task flow.</p> <p>-1 if there is one major instance (or several minor instances) where there are unnecessary steps in the task flow.</p> <p>+1 if there are no unnecessary steps in the task flow.</p> <p>+2 if as above, plus the site provides time-saving elements that make the task flow more efficient.</p>	<p>There is at least one instance where the site requires unnecessary steps. On the <i>Imaging Guidelines for Clinical Trials</i> page, clicking on the third guideline opens a page where visitors must click on the title of a journal article to read about the guidelines.</p>	-1
8	<b>Are keyword-based searches comprehensive and precise?</b>	<p>-2 if search engine fails to retrieve essential information and does a poor job of putting what it does retrieve in order of relevance, or site has no search engine but specified user goals require one.</p> <p>-1 if search engine fails to retrieve essential information or does a poor job of putting what it does retrieve in order of relevance.</p> <p>+1 if search engine retrieves essential information and does an acceptable job of putting results in order of relevance.</p> <p>+2 if as above, plus the search engine</p>	<p>Search results do not appear to be sorted by relevance or currency. Some test searches did not produce the most relevant pages.</p>	-1



## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Navigation	Score Criteria	Comments	Score
		compensates for common misspellings and accommodates synonyms.		
9	<b>Are search results presented in a useful interface?</b>	<p>-2 if interface does not display user input and the results do not include trigger words, or site has no search engine but the specified user goals require one.</p> <p>-1 if interface does not display user input, or users cannot initiate a new search immediately, or results do not include trigger words, or the refinement options do not support the specified user goals.</p> <p>+1 if interface displays user input, users can initiate a new search immediately, results include trigger words that set users' expectations about content, and users can refine results by meaningful criteria.</p> <p>+2 if as above, plus results display related searches that are meaningful to user's initial search query.</p>	<p>Search results are displayed in an easy-to-read format with the search term shown at the top of the page. However, the search terms themselves are not highlighted in the results. There is no function for sorting results or searching within results.</p>	-1

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Presentation	Score Criteria	Comments	Score
10	<b>Does site content use language that's easy to understand?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where language is difficult for the specified users to understand.</p> <p>-1 if there is one major instance (or several minor instances) where language is difficult for the specified users to understand.</p> <p>+1 if all language is easy for the specified users to understand.</p> <p>+2 if as above, plus short sentences and paragraphs aid comprehension.</p>	The navigation bar includes keywords relevant to all of the goals specified for this portion of the assessment.	-1
11	<b>Does the site use graphics, icons, and symbols that are easy to understand?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where graphics, icons, or symbols are difficult for the specified users to understand.</p> <p>-1 if there is one major instance (or several minor instances) where graphics, icons, or symbols are difficult for the specified users to understand.</p> <p>+1 if all graphics, icons, and symbols are easy for the specified users to understand.</p> <p>+2 if as above, plus the appearance of graphics, icons, and symbols saves space or time, or otherwise adds value to the display.</p>	Site graphics, icons, and symbols are easy to understand.	+2
12	<b>Is text legible?</b>	<p>-2 if there are several instances (or one major instance) where content required for the specified user goals is not easy to read.</p> <p>-1 if there is one instance where content required for the specified user goals is not</p>	Text is legible and scalable.	+2

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Presentation	Score Criteria	Comments	Score
		<p>easy to read.</p> <p>+1 if all content required for the specified user goals is easy to read.</p> <p>+2 if as above, plus the site allows users to change the text size.</p>		
13	<b>Do text formatting and layout support easy scanning?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where text formatting or layout does not support easy scanning.</p> <p>-1 if there is one major instance (or several minor instances) where text formatting or layout does not support easy scanning.</p> <p>+1 if text formatting and layout support easy scanning.</p> <p>+2 if as above, plus text formatting or layout focuses users' attention on the most relevant content.</p>	Text formatting and layout support easy scanning.	+1
14	<b>Do layouts use space effectively?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where content, functionality, or navigation required to complete the specified user goals is buried by nonessential site elements or wasted space.</p> <p>-1 if there is one major instance (or several minor instances) where content, functionality, or navigation required to complete the specified user goals is displaced by nonessential site elements or wasted space.</p> <p>+1 if content, functionality, and navigation required to complete the specified user goals are prioritized in the display.</p>	Content, functionality, and navigation are prioritized in the display. There are no obvious instances of wasted space.	+2

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Presentation	Score Criteria	Comments	Score
		+2 if as above, plus there is no instance of wasted space.		
15	<b>Are form fields and interactive elements placed logically in the display?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where related interactive elements or form fields are not grouped together or do not flow logically.</p> <p>-1 if there is one major instance (or several minor instances) where related interactive elements or form fields are not grouped together or do not flow logically.</p> <p>+1 if related interactive elements and form fields are grouped together and flow logically.</p> <p>+2 if as above, plus the display layout is free of unnecessary controls and graphics.</p>	Interactive elements are placed logically in the display—related items are grouped together and the layout is not cluttered with unnecessary buttons, icons, bars, or other graphic elements.	+2
16	<b>Are interactive elements easily recognizable?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where it's not clear which elements are interactive.</p> <p>-1 if there is one major instance (or several minor instances) where it's not clear which elements are interactive.</p> <p>+1 if all interactive elements are easily recognizable.</p> <p>+2 if as above, plus the placement and design of interactive elements is internally consistent.</p>	Interactive elements are easily recognized (i.e., clickable items look clickable). Their placement and design are internally consistent.	+2
17	<b>Do interactive elements behave as expected?</b>	-2 if there are two major instances (or one major instance and several minor instances) where interactive elements do not behave as expected.	Controls have good affordance. Buttons, icons, and links behave as expected.	+1

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Presentation	Score Criteria	Comments	Score
		<p>-1 if there is one major instance (or several minor instances) where interactive elements do not behave as expected.</p> <p>+1 if all interactive elements behave as expected.</p> <p>+2 if as above, plus the behavior of interactive elements exceeds users' expectations by saving time or otherwise adding value.</p>		
18	<p><b>Does the site accommodate users' range of hand-eye coordination?</b></p>	<p>-2 if interactive elements are small and tightly spaced, <i>and</i> require complicated mouse movements.</p> <p>-1 if interactive elements are small and tightly spaced, <i>or</i> require complicated mouse movements.</p> <p>+1 if interactive elements are large <i>or</i> well spaced and do not require complicated mouse movements.</p> <p>+2 if interactive elements are large, well spaced, <i>and</i> provide a visual cue when rolled over.</p>	<p>Links and other interactive items are arranged with appropriate spacing such that visitors can easily click on them without errors. No complex mouse movements are required. Links display destinations when rolled over and the mouse cursor display changes to a hand symbol.</p>	+2

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Trust	Score Criteria	Comments	Score
19	<b>Does the site present privacy and security policies in context?</b>	<p>-2 if links to clear privacy and security policies are not presented anywhere in the display when users are asked for personal data.</p> <p>-1 if links to clear privacy and security policies are not presented in context when users are asked for personal data.</p> <p>+1 if links to clear privacy and security policies are presented in context anywhere that users are asked for personal data.</p> <p>+2 if as above, plus a short summary of each policy is presented with the link.</p>	A link to NCI privacy and security policies appears in the footer on every page; however, the site does not request personal data from visitors.	NA
20	<b>Do location cues orient users?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where page titles or visual changes to navigation elements do not confirm that the correct page loaded.</p> <p>-1 if there is one major instance (or several minor instances) where a page title or a visual change to navigation elements does not confirm that the correct page loaded.</p> <p>+1 if page titles or visual changes to navigation elements clearly and consistently confirm that the correct page loaded.</p> <p>+2 if as above, plus pages consistently show their location relative to the entire site.</p>	Navigation elements and page titles consistently confirm that the correct page loaded.	+ 1
21	<b>Does site functionality provide clear feedback in response to users' actions?</b>	-2 if there are two major instances (or one major instance and several minor instances) where the site functionality	In general, the site clearly indicates the results of users' actions.	+ 1

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Trust	Score Criteria	Comments	Score
		<p>does not clearly indicate the results of users' actions.</p> <p>-1 if there is one major instance (or several minor instances) where the site functionality does not clearly indicate the results of users' actions.</p> <p>+1 if the site functionality clearly indicates the results of users' actions.</p> <p>+2 if as above, plus the site functionality sets expectations about what's needed to complete the process.</p>		
22	<b>Does the site allow users to reverse completed actions?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where the site does not allow users to easily undo completed actions.</p> <p>-1 if there is one major instance (or several minor instances) where the site does not allow users to easily undo completed actions.</p> <p>+1 if users can undo completed actions, or warnings precede actions that can't be undone.</p> <p>+2 if as above, plus users can undo individual parts of a multistep process without encountering extra steps.</p>	The site does not include multistep processes where the ability to reverse completed actions is relevant.	NA
23	<b>Is contextual help available where needed?</b>	<p>-2 if there are two major instances (or one major instance and several minor instances) where contextual, task-related help is not available.</p> <p>-1 if there is one major instance (or several minor instances) where contextual, task-related help is not</p>	The site does not include tasks where task-related help would be relevant.	NA

## Appendix B: Forrester Research® Website Review Scorecard Results

Number	Trust	Score Criteria	Comments	Score
		<p>available.</p> <p>+1 if contextual, task-related help is available where needed to support the specified user goals.</p> <p>+2 if as above, plus contact information for other channels like email, chat, or phone is available in context.</p>		
24	<b>Does the site help users avoid and recover from errors?</b>	<p>-2 if there are several instances (or one major instance) where required fields are not clearly indicated or an error message is not integrated into the display, does not describe what happened and why, or does not suggest how to fix the problem.</p> <p>-1 if there is one instance where required fields are not clearly indicated or an error message is not integrated into the display, does not describe what happened and why, or does not suggest how to fix the problem.</p> <p>+1 if required fields are clearly indicated, and error messages are integrated into the display, describe what happened and why, and suggest how to fix the problem.</p> <p>+2 if as above, plus error prevention techniques (such as input masks and data validation) help avoid common mistakes.</p>	<p>Aside from navigating through the site, there are no activities or tasks requiring visitors to provide any information, complete fields, or otherwise interact with a system. This question is not relevant.</p>	NA
25	<b>Does the site perform well?</b>	<p>-2 if there are two major system errors (or one major system error and several minor system errors) while completing the specified user goals.</p> <p>-1 if there is one major system error</p>	<p>Several page errors occur in the <i>Patients &amp; Providers</i> section of the website. The magnifying glass icons on the <i>Nuclear Imaging</i> page</p>	-1



## Appendix B: Forrester Research® Website Review Scorecard Results

---

Number	Trust	Score Criteria	Comments	Score
		<p>(or several minor system errors) while completing the specified user goals.</p> <p>+1 if there are no major system errors while completing the specified user goals.</p> <p>+2 if as above, plus all screens load without noticeable delay.</p>	<p>do not work; the links to magnified images of CT scans, ultrasound, and digital mammography are broken. Content on some pages fails to match the order shown on the relevant menu button drop-down list. At least one heading on a page is different from the menu button drop-down list and the secondary navigation box.</p>	

## Appendix B: Forrester Research® Website Review Scorecard Results

<b>Scoring Summary for CIP</b>	
<b>Value</b>	<b>Score</b>
1. Does the homepage provide evidence that the specified goals can be completed?	2
2. Is the content that's required to support the user goals available where needed?	2
3. Is the functionality that's required to support the site goals available where needed?	1
<b>Subtotal</b>	5
<b>Navigation</b>	<b>Score</b>
4. Are menu category and subcategory names clear and mutually exclusive?	2
5. Are content and functionality classified logically?	1
6. Is the wording in hyperlinks and controls clear and informative?	-1
7. Are task flows for the specified user goals efficient?	1
8. Are keyword-based searches comprehensive and precise?	-1
9. Are search results presented in a useful interface?	-1
<b>Subtotal</b>	1
<b>Presentation</b>	<b>Score</b>
10. Does site content use language that's easy to understand?	-1
11. Does the site use graphics, icons, and symbols that are easy to understand?	2
12. Is text legible?	2
13. Do text formatting and layout support easy scanning?	1
14. Do layouts use space effectively?	2
15. Are form fields and interactive elements placed logically in the display?	2
16. Are interactive elements easily recognizable?	2
17. Do interactive elements behave as expected?	1
18. Does the site accommodate users' range of hand-eye coordination?	2
<b>Subtotal</b>	13
<b>Trust</b>	<b>Score</b>
19. Does the site present privacy and security policies in context?	NA
20. Do location cues orient users?	1
21. Does site functionality provide clear feedback in response to users' actions?	1
22. Does the site allow users to reverse completed actions?	NA
23. Is contextual help available where needed?	NA
24. Does the site help users avoid and recover from errors?	NA
25. Does the site perform well?	-1
<b>Subtotal</b>	1

**APPENDIX D. USABILITY TESTING ROUND 1 REPORT**

# **Usability Test Report for the Cancer Imaging Program (CIP) Website**

Prepared by NOVA Research Company

May 2, 2013

## OVERVIEW

During February and March 2013, NOVA Research Company conducted usability testing of the National Cancer Institute’s Cancer Imaging Program (NCI/CIP) website.

Response to the website was generally positive. Test participants indicated that they liked the way the site looked and functioned.

Testers experienced some frustration with specific aspects of the CIP website. They had difficulty finding specific information, encountered some broken links and page errors, and perceived that some sections of the site were not up to date. Completion times for some tasks indicate that some information is not where test subjects expected to find it.

None of these issues appear to require major programming changes. Rather, most can be resolved with simple content changes and/or minor revisions to the site’s navigation scheme well within the project timeline.

### Methodology

Usability testing of the CIP website was conducted online. Participants accessed a private Adobe Connect session and then “shared” their computer desktops (i.e., allowed the NOVA facilitator to view what they were doing on their computers). Sessions were recorded via Adobe Connect and a digital audio recorder.

### Test Participants

Twelve participants were asked to spend up to one hour on the CIP website (Table 1). Half of the participants had visited the CIP website previously (experienced) and half had never visited the site before (naïve).

**Table 1: Test Participants by Target Group**

Total in Group	Target Group	Experienced	Naïve
4	Medical imaging investigators	2	2
4	Medically knowledgeable practitioners	2	2
4	General population/patients	2	2

All four imaging investigator test participants are conducting or have conducted research funded by NCI, two with funding directly from CIP. All four are from large academic institutions, as defined by the Carnegie Foundation, which uses number of full-time students enrolled as the basis for determining institution size.<sup>1</sup>

---

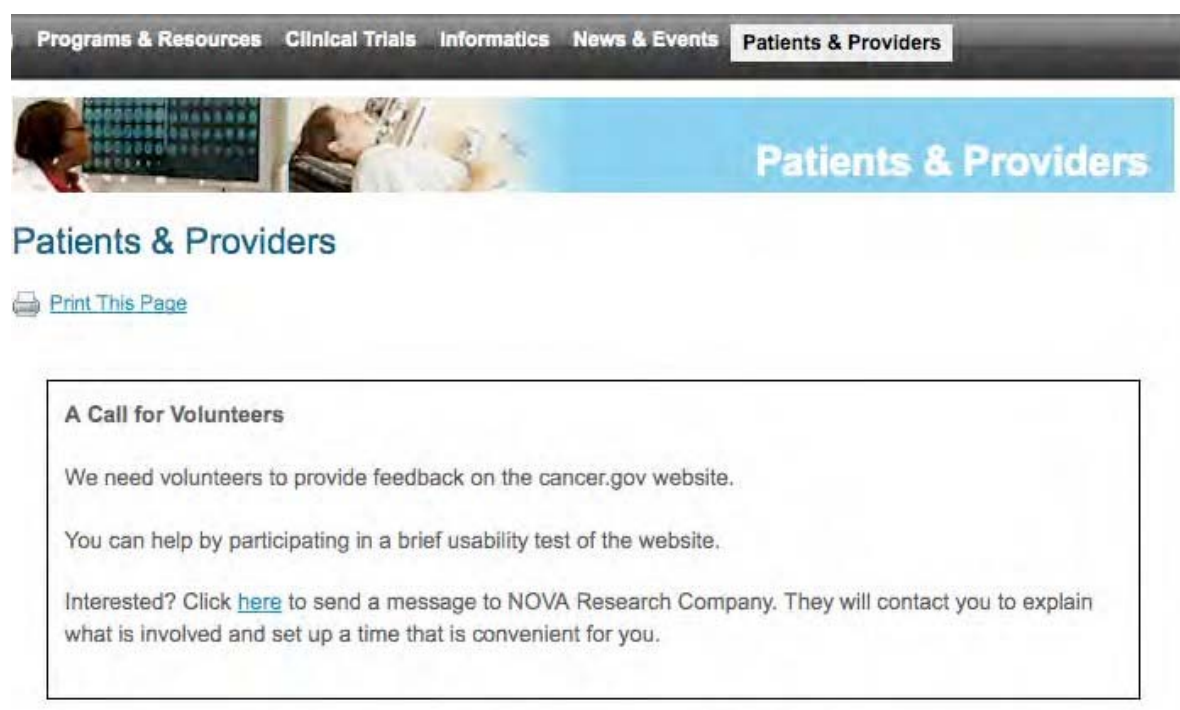
<sup>1</sup> Carnegie Foundation for the Advancement of Teaching. The Carnegie Classification of Institutions of Higher Education [Internet]. Washington (DC): the Foundation; [cited 2013 Apr 5]. Available from: <http://classifications.carnegiefoundation.org/>

Three of the four investigators were identified as junior investigators, as defined by the National Institutes of Health (NIH).<sup>2</sup>

**Medical Imaging Investigators.** To recruit the medical imaging investigators, NOVA conducted a search using NIH RePORTER to identify researchers with grants focused on cancer imaging. Those whose funding was administered by CIP were considered likely to have experience with the CIP website; those whose funding was from outside of NCI (e.g., the National Institute of Biomedical Imaging and Bioengineering) were considered likely to have little or no experience with the CIP website. NOVA sent e-mail invitations to persons on the list.

In addition, CIP posted a call for volunteers on researcher-relevant pages of the website (Figure 1). The call included a link that sent an automated expression of interest to NOVA staff. Individuals who responded to the call were assumed to have experience with the CIP website.

**Figure 1: Call for Volunteers**



**Medically Knowledgeable Practitioners.** To recruit medically knowledgeable practitioners, NOVA searched the NCI clinical trials database for clinical trials that involved cancer imaging. Trial staff (Principal Investigators and other staff) were invited to participate in the usability test via an e-mail message. In addition, CIP posted a call for volunteers on the main patients/providers page on the website (similar to the one targeted to investigators).

**General Population/Patients.** CIP posted a call for volunteers on the main patients/providers page on the website (similar to the one targeted to investigators). In addition, NOVA staff contacted a number of imaging societies and associations to request assistance in identifying patients and other members of the general population.

<sup>2</sup> National Institutes of Health. New and Early Stage Investigator Policies [Internet]. Bethesda (MD): NIH; [cited 2013 Apr 5]. Available from: [http://grants.nih.gov/grants/new\\_investigators/](http://grants.nih.gov/grants/new_investigators/)

Two of the twelve test participants (one investigator and one member of the general population/patient target group) were recruited via the website call for volunteers. The other 10 were recruited via direct solicitation.

All individuals who responded to CIP website calls for volunteers or to e-mail invitations were screened via telephone. Those who met target audience criteria were invited to participate and asked to complete and return a consent form. (The telephone screener and consent form are included in the Appendices of this report.)

Each participant received a \$40 Visa gift card as a token of appreciation.

### **Test Activities**

During the usability test, participants:

- Provided basic information about themselves to confirm that they represented the appropriate target audience
- Answered questions about initial impressions of the CIP website
- Performed real-world tasks using the website while thinking aloud
- Completed a System Usability Scale (SUS)
- Answered questions about their overall impressions of how the website looked and worked

The test script, including the SUS, is provided in the Appendices.

During the usability evaluation, participants were asked to complete scenarios or “real-life” tasks on the site. Five tasks were completed by participants in all three target groups (Table 2).

**Table 2: Tasks Assigned to All Participants**

<b>Task #</b>	<b>Task/Question</b>
1	What is the CIP’s mission statement?
2	Who is the Associate Director of the CIP?
3	What NCI division is the Cancer Imaging Program a part of?
4	Does the CIP website offer information specifically for patients?
5	How many branches does the CIP have?

Participants in the Investigator target group completed 11 additional tasks (Table 3).

**Table 3: Additional Tasks Assigned to Investigators**

<b>Task #</b>	<b>Task/Question</b>
I6	What is the name of the most recently released CIP funding initiative?
I7	Where was the Cancer Imaging Research Camp held in 2012?
I8	Find information about NIH funding mechanisms such as P20 exploratory grants.

Task #	Task/Question
I9	What is the expiration date for PAR-11-150?
I10	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?
I11	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?
I12	What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?
I13	Name two of the working groups in the Quantitative Imaging Network.
I14	Find one CIP publication that appeared in a peer-reviewed journal.
I15	What group is collaborating with the CIP in the Phase 2 N01 Program?
I16	Download a Frequently Asked Questions (FAQ) document for one of the Investigational New Drug (IND) applications CIP has created.

Participants in the Practitioners target group completed nine additional tasks (Table 4).

**Table 4: Additional Tasks Assigned to Practitioners**

Task #	Task/Question
P6	Where was the Cancer Imaging Research Camp held in 2012?
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?
P8	What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?
P9	What kinds of groups or organizations sponsor clinical imaging trials?
P10	Show me where you would look for an imaging clinical trial in which your patients might participate.
P11	How are imaging clinical trials and drug treatment trials different?
P12	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?
P13	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?
P14	What is the purpose of sentinel node mapping for breast cancer staging?



Participants in the General Population target group completed seven additional tasks (Table 5).

**Table 5: Additional Tasks Assigned to General Population Participants**

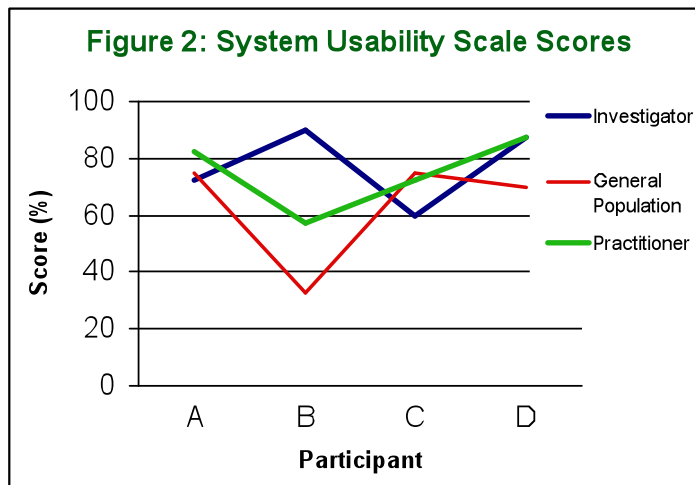
Task #	Task/Question
GP6	What are two of the five uses for cancer imaging described on the website?
GP7	How long does a virtual colonoscopy examination take to complete?
GP8	How is digital mammography different from conventional mammography?
GP9	Name one kind of nuclear imaging.
GP10	Can humans hear the sound waves that are used to perform an ultrasound?
GP11	Show me where you would look for help finding a clinical trial in which to participate.
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?

## Test Results

### Preference Metrics

The System Usability Scale was administered as a measure of satisfaction. Test participants indicated their agreement with each of 10 statements, using a scale from 1 to 5 where 1 equaled strongly disagree and 5 equaled strongly agree. (The SUS is included in the test script in the Appendices of this report.)

Statements in the SUS touch on site complexity, consistency, and user-friendliness.



The average score for all test participants was 81 percent.

As shown in Figure 2, investigators reported the highest level of satisfaction, with an average score of 78 percent (range: 60% to 90%), followed by medical practitioners, with an average score of 75 percent (range: 58% to 88%). Members of the general population were least satisfied with the site, with an average SUS score of 63 percent (range: 33% to 75%).

Because the total number of test participants in round 1 was low (n=12), results cannot be extrapolated to the wider population. That being said, it should be noted that one general population participant was inclined to assign low satisfaction scores to every question (total score 33); the other three participants in this target group had satisfaction scores in the 70 percent to 75 percent range.

## Performance Metrics

The following performance metrics were collected during the usability tests.

**Task Completion.** The task was considered completed when participants indicated they had obtained the data or achieved the goal (whether successfully or unsuccessfully) or when participants indicated they could not complete the task.

**Completion Rate.** The completion rate is the percentage of test participants who successfully complete the task without critical errors. This rate represents the percentage of participants who, when they were finished with the specified task, have an outcome or answer that is correct. A completion rate of 80 percent was the goal for each task in this usability test.

**Time on Task (TOT).** Time on Task is the time required to complete a task. It was measured from the time the person began the task to the time he/she signaled completion.

**Critical Errors.** Critical errors are unresolved errors that occur during the process of completing the task or errors that produce an incorrect outcome (answer). Participants may not be aware that the task goal is incorrect or incomplete. Independent completion of the scenario was a universal goal; if help was obtained from the facilitator, the task was scored as a critical error.

**Non-critical Errors.** Non-critical errors are “recoverable” errors such as taking a long or unexpected path to find an answer. Non-critical errors do not have an impact on the final task outcome but do reflect inefficiency. Participants may not detect non-critical errors, but they usually are frustrating to participants.

**Error-Free Rate.** Error-free rate is the percentage of test participants who complete the task without any critical or non-critical errors. An error-free rate of 75 percent was the goal for each task in this usability test.

Performance metrics for tasks assigned to all participants and to each target group are shown in Tables 6–9. Questions that failed to meet target completion and error-free rates were labeled as areas of concern/issues to be addressed.

**Table 6: Performance Metrics for Tasks Assigned to All Participants**

Task #	Task/Question	Completion Rate (%)	Error-Free Rate (%)
1	What is the CIP's mission statement?	92	75
2	Who is the Associate Director of the CIP?	100	83
3	What NCI Division is the Cancer Imaging Program a part of?	100	92
4	Does the CIP website offer information specifically for patients?	100	92
5	How many branches does the CIP have?	83	75

**Table 7: Performance Metrics for Additional Tasks Assigned to Investigators**

<b>Task #</b>	<b>Task/Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
I6	What is the name of the most recently released CIP funding initiative?	100	75
I7	Where was the Cancer Imaging Research Camp held in 2012?	100	75
I8	Find information about NIH funding mechanisms such as P20 exploratory grants.	100	75
I9	What is the expiration date for PAR-11-150?	100	100
I10	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	100	75
I11	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?	100	75
I12	What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?	75	75
I13	Name two of the working groups in the Quantitative Imaging Network.	100	75
I14	Find one CIP publication that appeared in a peer-reviewed journal.	50	0
I15	What group is collaborating with the CIP in the Phase 2 N01 Program?	25	0
I16	Download a Frequently Asked Questions (FAQ) document for one of the Investigational New Drug (IND) applications CIP has created.	50	50

**Table 8: Performance Metrics for Additional Tasks Assigned to Practitioners**

<b>Task #</b>	<b>Task/Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
P6	Where was the Cancer Imaging Research Camp held in 2012?	100	75
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	75	75
P8	What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?	75	75
P9	What kinds of groups or organizations sponsor clinical imaging trials?	50	0
P10	Show me where you would look for an imaging clinical trial in which your patients might participate.	50	0
P11	How are imaging clinical trials and drug treatment trials different?	50	50
P12	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?	75	75

Task #	Task/Question	Completion Rate (%)	Error-Free Rate (%)
P13	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?	100	75
P14	What is the purpose of sentinel node mapping for breast cancer staging?	100	50

**Table 9: Performance Metrics for Additional Tasks Assigned to General Population**

Task #	Task/Question	Completion Rate (%)	Error-Free Rate (%)
GP6	What are two of the five uses for cancer imaging described on the website?	75	75
GP7	How long does a virtual colonoscopy examination take to complete?	75	50
GP8	How is digital mammography different from conventional mammography?	75	75
GP9	Name one kind of nuclear imaging.	75	75
GP10	Can humans hear the sound waves that are used to perform an ultrasound?	75	50
GP11	Show me where you would look for help finding a clinical trial in which to participate.	75	0
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?	25	25

### Initial Impressions

At the beginning of each test session, participants were given several minutes to explore the website on their own and then asked to describe their initial impressions. Initial impressions were generally positive.

Several participants noted that the content displayed on the homepage (e.g., contact information) was appropriate and useful.

- *I like that they have contact information right there so you don't have to search around for that. — Practitioner*
- *Having News and Announcements so big right in front of you, without having to click through another screen to get there, I think is very good as well. — General Population*

Participants responded positively to the web page layout.

- *It's got a nice search, decent-sized search button at the top. — Practitioner*
- *Having a search function at the top ... I mean I think that's essential. That tends to be a great starting point, especially if I'm trying to do something new that I haven't done before with the website. — Practitioner*

- *The font looks nice and clean. It doesn't look too busy. — General Population*

One practitioner appreciated the speed of the site and that page loads were not slowed by “fancy” technology.

- *I think the website is fast. It doesn't take a while to load. Some websites get too bogged down with different technologies that ... for clinicians having a website that's fast is best. — Practitioner*

One investigator commented on the convenience of viewing the list of funding opportunities on the site.

- *Most of my research is cancer imaging, so I believe it would be very good for me not to go through the NIH funding, but I can go directly to Cancer Imaging Program and see what is the funding level and the opportunity for me. —Investigator*

Others praised the quality of the images on the site.

- *It was appropriate for an imaging program to have high-quality images on the homepage. — Investigator*

One investigator felt that the site should provide additional information about the images. Another investigator felt that the images on the site seemed “oriented toward nuclear medicine,” but added that nuclear medicine is “a common imagining modality used for cancer.” Another suggested that the site could benefit from having more images.

- *I feel like some of these pages are a little image light and text heavy. — Investigator*

One investigator uncovered an internal server error when he selected the P01 guidelines link on the Research Funding/Mechanism page (<http://deainfo.nci.nih.gov/awards>).

### **Exit Questions/User Impressions**

At the close of each session, participants were asked six questions to solicit their final impressions of the site. Questions focused on website layout, function, expected content, and currency of content.

Overall, final impressions remained generally positive. Participants described the website as easy to use, well-organized, and attractive.

- *It's laid out very well. It's clean. — Investigator*
- *A lot of websites from companies and places that you go have like things moving around and there wasn't any of that here, so that was good. —Practitioner*
- *I like the intuitive layout and the graphic across the top. It shows an example of images. It shows an example of a professional looking at images. I think it does a nice job of looking at people and patients that are involved in imaging. —General Population*
- *I like the color scheme, that it wasn't too bright. —General Population*

Several participants expressed surprise about the depth and breadth of the information available on the site.

- *When you think of the imaging site, you don't really realize how complex that can be and how much information could be there. The volume of information that was available—that surprised me. —General Population*
- *[The website] had more information and more information nicely organized than I would have expected. —General Population*
- *I think it [the site] has the ability to serve a lot of diverse groups. —Practitioner*
- *[The site] is very informative for patients who are nervous about procedures they're going to have done that they're worried might be cancer. —Practitioner*
- *I did not expect to see ... the criteria for clinical trials. I never expected that it would be there. It's a very good surprise for me. — Investigator*
- *Yeah, I thought this was great ... that it had an archive of digital images.... If I had to show a family member or patient what it's supposed to look like ... I mean that's great. — Practitioner*
- *I happened to look at that demo of the virtual colonoscopy when I was perusing. I thought that was fascinating. A lot of this imaging stuff was very fascinating—the how things are done and the ways that the different imaging processes and techniques. — General Population*

Participants described some concerns about the function and content of the site:

- *The ... link to the Imaging Archive didn't work on the first click. That ... was a little clunky. —General Population*
- *Some of the headings didn't seem to be as exaggerated ... you know how normally you'll do a heading in a darker, bigger, bolder font? —General Population*

Several participants felt the site was not entirely up to date.

- *I definitely noticed when I searched for publications that the first publication that came up ... was from 2003, so that definitely kind of gave me the impression that it might not be up to date. — Investigator*
- *I saw a lot of stuff from 2009, 2010 .... Like when I went to the meetings, they had meetings from 2009 up there. I mean that was the first thing I saw. I'd think you'd have all stuff from 2012 and maybe 2013 first.—Practitioner*

## Findings

The CIP website contains information that test participants value. For the most part, participants were able to navigate through the site in order to complete assigned tasks. However, some participants followed long, inefficient pathways to find specific information or gave up the search in frustration.

### Issues and Recommendations

Specific issues and recommended corrective actions are outlined below. For purposes of this report, we identified issues based on performance scores—failure to meet target completion (80%) and/or error-free (75%) rates—and problem areas identified by the test participants themselves.

## **Specialized Initiatives (Question I15)**

Investigators struggled to find information about the Phase 2 N01 Program, which is described on the specialized initiatives page under Programs & Resources (<http://imaging.cancer.gov/programsandresources/specializedinitiatives>). Every investigator started on the Programs and Resources page, which lists six of the seven specialized initiatives—only the Phase 2 N01 program is not listed. Three investigators tried the Search function, but searches for “Phase 2,” “Phase II,” and combinations including “N01” produced a list of past CIP newsletters. One investigator searched under “Clinical Trials” and scanned the Phase I/II page for information about this initiative.

### **Recommendation**

- Add the Phase 2 N01 program to the list of specialized initiatives on the Programs and Resources page.

## **Investigational New Drug Application (Question I16)**

Two of the four investigators failed to find an FAQ for an IND application. One spent nearly three minutes searching before giving up; the other “surrendered” after slightly more than two minutes. These FAQs are available at <http://imaging.cancer.gov/programsandresources/cancer-tracer-synthesis-resources>. Searches for “IND” or “investigational new drug” or “new drug application” would have yielded the correct page as the third result; searching for “investigational” would have yielded the correct page as the eighth result. Although both investigators used the search function, neither spotted the desired page in the results. Neither seemed familiar with IND application terminology or processes.

It should be noted that the two investigators who successfully completed the question were naïve users (had never visited the CIP site before) and required less than 30 seconds each to find the correct page. It appears that this question as worded in the script required special knowledge of this type of research and should not be included in future usability tests.

### **Recommendation**

- Eliminate this question from the second round of usability testing.

## **General Public Uses of The Cancer Imaging Archive (Question GP12)**

Three out of four general population participants failed to identify how the general population can use The Cancer Imaging Archive (TCIA). Two of the three used the homepage link to go directly into the archive itself (<http://cancerimagingarchive.net/>); the landing page suggests that the archive is for researchers. One participant eventually found the descriptive CIP webpage (<http://imaging.cancer.gov/informatics/thecancerimagingarchive>) but overlooked the bolded text “The general public” in the bulleted list near the center of the page.

### **Recommendations**

- Change the homepage link so that it goes to the descriptive page on the CIP site rather than directly to TCIA.
- Revise the landing page for TCIA to include some information for the general public.

## Patients & Providers Section (Questions P9, P10, P11, P14; GP7, GP10, GP11; participant comments)

During the tests, we observed that practitioners and general population participants tended to ignore the Patients & Providers section, even after hovering over or clicking on the Patients & Providers menu button and seeing the two subtopics: Cancer Imaging and Clinical Trials. Because the entire site is devoted to cancer imaging, the Cancer Imaging subtopic is too general. Several participants commented that the entry page to the Patients & Providers section gives the impression that there is not much material available there.

- *I struggled with the patient part because it looks like when you go there there's not a lot of information, but then it took me a minute to dig into it and find that there was more on the left-hand side than I think I realized at first. —Practitioner*
- *But then when you open that up, you can see that there's a lot more right here on this website for you to see. And it's good information, too ... the virtual colonoscopy stuff and all is right there. —Practitioner*

One general population participant stated that most people would use the Clinical Trials button on the main navigation bar instead of the one under Patients & Providers.

- *So I'm thinking if I were a patient and I was looking for a clinical trial, that's where I would go [the main menu item] before I'd go to the Patients section.*

Several practitioners explained that they did not search the Patients & Providers section for answers to their assigned questions because it was intended for patients.

- *I imagine it's for the physician, but I think the physicians are going to get more information from some of the other tabs. I mean, a provider wouldn't need to see that. You know what I mean .... 'What are imaging and clinical trials and why are they important?'—that's for patients.*
- *Well, here's the thing. Patients and providers ... I mean patients might be trying to look something up. They're laypeople and need stuff in lay terms. But ... when you go to a spot that has patients and providers and they've lumped everything together ... are you getting stuff for the provider or for the patients? You know what I mean? They would be two totally different things because the provider is an educated person who knows all the terms that they use. He doesn't need to have them spelled out and stuff. Patients need it on a very basic level. Providers just want to cut to the chase.*

### Recommendations

- On level-three pages (e.g., the Cancer Imaging page under Patients & Providers, <http://imaging.cancer.gov/patientsandproviders/cancerimaging>), include links to subtopics in the center of the page as well as in the left menu bar. This practice is exemplified on the Funding Opportunities page at <http://imaging.cancer.gov/researchfunding/fundingopportunities>.
- Rename “Cancer Imaging” under Patients & Providers. Calling it “Cancer Imaging Basics” will help distinguish this content from the main topic of the entire site.
- Rename “Clinical Trials” under Patients & Providers: “Clinical Trials Basics.”



- Guide patients to the patient version of clinical trial information by adding a link under the main Clinical Trials drop-down menu. Call it “Clinical Trials Basics (for Patients).”
- Repair the broken link to Learning About Clinical Trials (<http://www.cancer.gov/clinicaltrials/learning>) in the Clinical Trials section.
- Consider renaming the Patients & Providers section, calling it “For Patients.” There is a precedent for this approach on the NCI website; for example, PDQ is offered in both patient and health professional versions that are marked accordingly.

### Reports and Publications (Question I14, participant comments)

Several investigators perceived a lack of timely publications in the Reports & Publications section under Programs & Resources. Seeing the descriptive statement on the Publications page—“CIP publications that appeared in peer-reviewed journals...”—led some to expect publications that resulted from NCI-funded cancer imaging research projects.

If CIP wishes to use its website to highlight research advances in cancer imaging, a striking number of peer-reviewed journal articles are readily available. A PubMed search produced an impressive list of 5,314 free, full-text journal articles on NCI-supported research relevant to imaging; the list includes 428 published in 2012 and 871 published in 2011. A search of the NIH RePORT database revealed a number of recent publications listed under the Results tab of NCI-funded cancer imaging research grants. For example, one grant entry ([http://projectreporter.nih.gov/project\\_info\\_results.cfm?aid=8250461&icde=16076055](http://projectreporter.nih.gov/project_info_results.cfm?aid=8250461&icde=16076055)) listed ten publications since 2010.

### Recommendations

- Periodically compile and publish a list of journal articles that result from CIP-administered research; include links to the abstracts on PubMed.
- Include a link to a PubMed list of free, full-text journal articles on NCI-supported research relevant to imaging.

The first option enables CIP to feature cancer imaging research supported by grants administered specifically by CIP. This activity requires an ongoing investment of staff time to prepare the initial list and periodically update it.

The second option offers ease of maintenance and can be structured so that the most recent publications will always appear first. However, the list will include work supported by all of NCI, not just grants administered by CIP.

### Miscellaneous Issue (Participant Comment)

- *I found one grammatical error, so I would want to be sure that ... if it were my website ... that the text was free of spelling and grammatical errors. —General Population*

### Recommendation

- Correct the typographical error in “The general public can see how cancer appears in diagnostic images and learn about the instruments doctor uses to...” (<http://imaging.cancer.gov/informatics/thecancerimagingarchive>). [Change *doctor uses* to *doctors use*.]

## CONCLUSION

The CIP website contains a wealth of useful information about cancer imaging that some test participants described as “fascinating.” Participants were surprised by the depth and breadth of the content available and liked the look and feel of the site, especially the clean page layout and use of color. However, participants struggled to complete some tasks because they could not find specific information and others felt that some portions of the site were not up to date.

Implementing recommended changes to address some of these issues will require minimal programming and content changes that can be completed within the project timeline. Others, such as posting updated lists of journal articles, will require ongoing investment of CIP staff time and resources.

Improved preference and performance scores obtained during the final round of usability testing should demonstrate whether implementing recommended changes helped accomplish the goal of increased usability of the website.

## Appendices

**A. CIP Usability Test Subject Telephone Screener**

**B. CIP Usability Test Subject Consent Form**

**C. CIP Usability Test Script**

## Appendix A: CIP Usability Test Subject Telephone Screener

### Recruitment Screener Telephone Call Script

OMB No.: 0925-0642

Expiration Date: 9/30/2014

Collection of this information is authorized by The Public Health Service Act, Section 411 (42 USC 285a). Rights of study participants are protected by The Privacy Act of 1974. Participation is voluntary, and there are no penalties for not participating or withdrawing from the study at any time. Refusal to participate will not affect your benefits in any way. The information collected in this study will be kept private under the Privacy Act. Names and other identifiers will not appear in any report of the study. Information provided will be combined for all study participants and reported as summaries. You are being contacted by telephone to complete this instrument so that we can improve the website.

Public reporting burden for this collection of information is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. **An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.** Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: NIH, Project Clearance Branch, 6705 Rockledge Drive, MSC 7974, Bethesda, MD 20892-7974, ATTN: PRA (0925-0642). Do not return the completed form to this address.

Group B. I received your name and contact information from a search of ClinicalTrials.gov to identify medical practitioners with an interest in medical imaging.

Group C. I received your name and contact information from the [redacted] organization, who helped us by identifying patients and members of the public with an interest in health care.

Group D. I received your name and contact information when you responded to a Call for Volunteers that was posted on the CIP Web site.

The NCI is interested in finding out whether their Web site is easy to use and whether it is achieving key objectives of providing information about its programs, research funding opportunities, etc. to medical researchers, medical professionals, patients and the general public.

We would like to ask you to participate in a Web site testing session via the Internet and telephone. We will ask you to carry out basic tasks on the Web site, such as clicking on certain links. Your feedback will help make the Web site better for everyone who uses it. Should you qualify, you will receive a \$40 Visa gift card as a token of our appreciation for your participation. Note: If you are employed by the U.S.

Federal government, you are not eligible to receive the incentive.

Your participation is voluntary. We will not share information about you with anyone outside of this study. The computer and telephone session should take about one hour.

If you have any questions about the study or need more information, you may email [KSedgwick@novaresearch.com](mailto:KSedgwick@novaresearch.com) or call 301-986-1891. Would you be willing to participate?

IF YES: Thank you very much. First, I need to ask you a few questions to see if you qualify.

IF NO: Thank you. Ask for recommendation of an alternate name and contact information.

**1. Would you be comfortable participating in the Web site test and discussing it entirely in English?**

- No - THANK YOU AND ASK FOR AN ALTERNATE NAME.
- Yes – IF PARTICIPANT IS KNOWN TO HAVE USED THE CIP WEB SITE, SKIP TO QUESTION 4; OTHERWISE, PROCEED TO QUESTION 2.

**2. Have you ever visited the National Cancer Institute (NCI) Web site at cancer.gov?**

- No - PROCEED TO QUESTION 4.
- Yes - PROCEED TO QUESTION 3.

**3. Have you ever visited the Cancer Imaging Program Web site within cancer.gov?**

- No
- Yes

**4. Are you now or have you ever received funding from the National Cancer Institute or worked on a research project that was funded by the National Cancer Institute?**

- No
- Yes

**5. Are you an imaging medical investigator or researcher, medical practitioner, patient, or member of the public? [RECRUIT 4 NEVER-VISITED AND 4 HAVE-VISITED FOR EACH GROUP BELOW.]**

- Imaging medical investigator or researcher. IF YES, PROCEED TO QUESTION 6.
- Medical practitioner
- Patient
- Member of the public

**6. Are you a Federal employee?**

- No
- Yes [IF YES: I'm sorry. As a Federal employee, you are not eligible to receive an incentive for participating in this study. Are you still interested in participating? It's entirely up to you.]

**7. RECRUIT: We would like to invite you to participate.**

**8. What is your email?**

**9. When is the best day and time to complete the usability test?**

TEST DATE & TIME:

NAME:	
BEST PHONE TO USE AT THAT TIME:	
ALTERNATE PHONE:	
EMAIL:	

We will send you an email with details about the date and time. Please put this on your calendar right away! Thank you.

## Appendix B. Informed Consent Form

# NCI Cancer Imaging Program (CIP)

## Informed Consent to Participate in website Usability Testing

You are being asked to participate in usability testing of the National Cancer Institute's Cancer Imaging Program (CIP) website. The National Cancer Institute is part of the National Institutes of Health, a federal agency within the U.S. Department of Health and Human Services. The purpose of this usability testing is to help ensure that the CIP website achieves its objectives of providing information about CIP programs, research funding opportunities, etc. for medical researchers, medical professionals, patients and the general public.

We are with NOVA Research Company (NOVA). NOVA is an independent evaluator contracted by the National Cancer Institute to assess the CIP Web site.

A usability test is a test of the Web site, not the user! It is intended to show whether the site is easy for people to use and fulfilling its purpose. We will ask you to carry out basic tasks and activities on the CIP Web site such as clicking on certain links. The information collected during the test can help make the CIP site better for everyone who uses it.

The usability testing will last about 1 hour. A trained person will lead it. Please ask the person who is leading the usability testing any questions you might have before you agree to participate. If you agree, we will record your usability test. NOVA staff will use transcripts of this recording to remember what you said. We will keep these electronic recordings in a secure location. The National Cancer Institute will retain ownership of all data collected. When these data are submitted to the CIP, no identifying information will be included.

NOVA will use transcripts to summarize your experiences and opinions. The transcripts and reports will NOT include your name or other identifying information. All data in reports will be in aggregate form, and no links to individuals will be kept.

We will keep what you say private unless we are required by law to disclose it. We will take extra steps to protect your privacy. You will be asked not to discuss any information shared during the test with persons who did not participate in the testing.

If you do not like or feel uncomfortable with any questions, you can choose not to answer them. You can stop participating in the test at any time. Participating in the usability test or interview does not cost you anything.

Your participation is voluntary. You are free to choose not to participate in the usability test. Choosing not to participate will in no way affect your relationship with the National Cancer Institute or the CIP.

Should you qualify, we are offering a \$40 Visa gift card for your participation. (Note: If you are employed by the U.S. Federal government, you are not eligible to receive the incentive.)

If you have any questions about this usability test, please contact one of the individuals below.

Dan Eckstein  
Kathy Sedgwick

**Address:** NOVA Research Company  
4600 East-West Highway, Suite 700  
Bethesda, Maryland 20814

**Telephone:** 301-986-1891

To participate, please read and sign the form below. We will give you a copy of this signed form at your request.

### *SIGNATURES*

By signing, you indicate that you have read this form and that you understand what you are consenting to

and your rights as a research participant.  
I agree to take part in a usability test of the CIP website.  
I consent to be audio-recorded during this usability testing.  
\_\_\_\_ Yes      \_\_\_\_ No (but I still want to be part of the usability testing)

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@  
1BSUJDJQBOU`T 1SJOUFE /BNF  
Thank you for your time!

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@  
1BSUJDJQBOU`T 4JHOBUSF

@@@@@@@@@@@@@@@@@@@@  
%BUF



## Appendix C. CIP Usability Test Script

### Facilitator's Script for Usability Test

#### Introduction and Warm Up

Thank you, [REDACTED], for agreeing to be a part of this study.

I'd like you to know that Rodrigo Ibacache is on the call today to take notes. He'll observe while you and I work together. With your permission, we'll also record our session, just to make sure that Rod and I don't miss anything you say. Is that okay? [Wait for response]

[REDACTED]

As was mentioned when Rod scheduled this appointment with you, we expect the process will take between 30 minutes and an hour.

Today we'll be looking at a website that was created for the Cancer Imaging Program, which is part of the National Cancer Institute. I'm going to ask you to explore this website and then try to do some tasks on the site.

As we go through the site, please keep in mind that we are testing the website and not you—there are no right answers or procedures. If you can't find certain information or don't know how to do something, it isn't your fault. The website is supposed to be easy to use. If it isn't easy for you to use, that tells us that we need to fix something on the website.

I want you to know that our company was not involved in the development of this website or its content, so don't worry that anything you say might hurt my feelings or offend in any way. Any comments you have, either positive or negative, will be useful, so please feel free to tell me what you think.

After we've finished the various tasks, I'll give you some time to ask me anything you'd like. Do you have any questions for me now?

#### Preliminary Demographics/Confirm "Bucket"

We have invited people from different backgrounds to help us usability test the website, so I'd like you to ask you a little bit about yourself.

1. Where do you work? [If an academic institution, we will determine size (using the Carnegie Classification of Institutions of Higher Education, which is based on *full-time equivalent (FTE)* enrollment.)]
2. What is your role there?
  - a. If researcher/medical practitioner/clinician: Are you currently or have you ever received any Federal funding for research?
  - b. If so, are you receiving or have you ever received any funding from the National Institutes of Health (NIH)?

- c. Are you receiving or have you ever received any funding from the National Cancer Institute (NCI)?
    - i. If yes, have you ever received funding from the Cancer Imaging Program?
      - 1. If yes, are you currently funded by CIP?
  - d. Are you a new or “junior” investigator?
    - i. If unsure, ask: Have you ever been the PI on a project that competed successfully for an NIH-supported research grant?
      - If not, then junior investigator.
      - If yes, what type of mechanism? (If F, K, L, R00, R03, R15, R21, R25, R34, R36, R41, R43, R55, R56, R90, RL5, RL9, SC2, SC3, T, or X01, then junior investigator. Otherwise, not junior investigator.)
3. Have you used the CIP website to find information in the past?
- a. If no, skip to Setting Up the Usability Tasks.
  - b. If yes, what did you look for on the site?
    - i. Have you visited the site more than once?
      - 1. If yes: would you say you visit the site rarely (two or three times total), occasionally (every few months), or on a regular basis?
        - a. If regularly, once a month? Once a week?
  - c. If current or former CIP grantee, did you use the site when first applying for a CIP-administered grant?

### **Setting Up the Usability Tasks – Adobe Connect**

OK, so we’re ready to look at the website now. We will be able to see what is on your computer desktop, so please close or minimize any personal or unrelated tasks that you have open there. [Pause] Okay.

Are you ready?

I have sent a request for you to share your desktop screen with me. Do you see a notice in the upper right hand corner of your screen? Yes? Please click on Start. [pause for response] Thank you.

Now you should see a menu for sharing options. Please choose Desktop and then click on Share. Thank you.

Ok. Let’s begin the test.

## Findability of the Site

- Please go to the NCI Cancer Imaging Program (CIP) website. [Record process used, including search engine and key words.]
  - If not successful, direct them to cancer.gov and ask them to find it from there.
  - If still not successful, direct them to <http://dctd.cancer.gov/> and ask them to find it from there.

## Initial Impression

I'm going to give you a few minutes to poke around on the site on your own so you can become familiar with it. Feel free to ask any questions or make comments while you do that.

[Observe and record where they go first. Observe what they do for about 3 minutes or until they seem to be ready to move on.]

- What is your impression of the CIP homepage?
- What prompted you to go to [the first page they visited]?

## Tasks

Now I'm going to ask you to use the site to answer some questions. Please note that we will be measuring time-on-task and number of clicks you make for each task. This will help us measure how much work it takes to complete each task. From this point forward, please avoid "exploring" the site beyond what is necessary for each specific task. OK?

It is important that you think aloud while you work. Your thoughts and reactions will help us know whether the site is working well and identify any possible problem spots.

If you feel lost or cannot answer a question, please let me know. Although I won't be able to give you any suggestions or hints, I can repeat the question.

Let's begin with the first task. [Make sure they start at the homepage.]

## RESEARCHER TASKS:

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. What is the name of the most recently released CIP funding initiative?

7. Where was the Cancer Imaging Research Camp held in 2012?
8. Find information about NIH funding mechanisms such as P20 exploratory grants.
9. What is the expiration date for PAR-11-150?
10. CIP provides imaging guidelines for clinical trials on the web site. How were these guidelines developed?
11. What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?
12. What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?
13. Name two of the working groups in the Quantitative Imaging Network.
14. Find one CIP publication that appeared in a peer-reviewed journal.
15. What group is collaborating with the CIP in the Phase 2 N01 Program?
16. Download a Frequently Asked Questions (FAQ) document for one of the Investigational New Drug Applications (INDs) that CIP has created.

#### **MEDICAL PRACTITIONER TASKS:**

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. Where was the Cancer Imaging Research Camp held in 2012?
7. CIP provides imaging guidelines for clinical trials on the web site. How were these guidelines developed?
8. What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?
9. What kinds of groups or organizations sponsor clinical imaging trials?
10. Show me where you would look for an imaging clinical trial in which your patients might participate.
11. How are imaging clinical trials and drug treatment trials different?

12. What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?
13. How long does a virtual colonoscopy examination take to complete compared to a conventional colonoscopy?
14. What is the purpose of sentinel node mapping for breast cancer staging?

### **PUBLIC/PATIENT TASKS:**

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. What are two of the five uses for cancer imaging described on the website?
7. How long does a virtual colonoscopy examination take to complete?
8. How is digital mammography different from conventional mammography?
9. Name one kind of nuclear imaging.
10. Can humans hear the sound waves that are used to perform an ultrasound?
11. Show me where you would look for help finding a clinical trials in which to participate.
12. What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?

### **System Usability Scale**

Thank you. That completes the portion of the test where we are looking at your screen. I'm now going to take charge of the meeting session display again. [Revoke sharing. Display SUS scale.] Tell me what you see on the screen now. [Pause for response]

I'd like to collect a bit of information from you using a standardized survey before we discuss your experience. I'm going to read a statement and ask you whether you agree or disagree, using a scale from 1 to 5 where 1 equals strongly disagree and 5 equals strongly agree. OK?

1. I think that I would like to use this website frequently.
2. I found the website unnecessarily complex.
3. I thought the website was easy to use.

4. I think that I would need the support of a technical person to be able to use this website.
5. I found the various functions in this website were well integrated.
6. I thought there was too much inconsistency in this website.
7. I would imagine that most people would learn to use this website very quickly.
8. I found the website very cumbersome to use.
9. I felt very confident using the website.
10. I needed to learn a lot of things before I could get going with this website.

## **Final Impressions**

Now I'd like to ask you a few specific questions about your impressions of the CIP site.

1. When you think about how the CIP is laid out and how it works, what is your overall impression of the site?
2. What did you like most about the way the website looks and works?
3. What did you like least about the way the website looks and works?
4. Was anything missing from the site that you expected to see? [Probe: content, features, functions]
5. Was there anything on the site that you did not expect to see? [Probe: links, pages]
6. Do you feel this site is current? Why/why not?

## **Wrap up**

OK, we've finished the usability testing. Do you have any further questions or comments?

We're going to turn off the recorder now.



Thank you again for your participation.

**APPENDIX E. USABILITY TESTING ROUND 2 REPORT**

**Usability Test Report  
for the  
National Cancer Institute (NCI)  
Cancer Imaging Program (CIP)  
Website  
Round 2**

Prepared by NOVA Research Company

August 15, 2013



## OVERVIEW

During June 2013, NOVA Research Company conducted usability testing of a revised Cancer Imaging Program (CIP) website. This was a second round of testing designed to detect whether changes implemented after the first round of testing had improved user satisfaction and website performance. This report describes Round 2 methodology, participant feedback, findings, and recommendations.

Responses to the site during this second round were generally positive. Test participants were impressed by the depth and breadth of content available on the site and the clean page layouts.

However, responses to several questions indicated that testers had difficulty finding the information they wanted due to the complexity of the site structure and poor performance of the search function. These and other issues identified during the test are detailed in this report. Recommendations for addressing them are provided in the Issues and Recommendations section.

## ROUND 2 METHODS

Usability testing of the CIP website was conducted via telephone and Internet connection. Participants accessed a private Adobe Connect session and then “shared” their computer desktops (i.e., allowed the NOVA facilitator to view what they were doing on their computers). Sessions were recorded via Adobe Connect and a backup audio recorder.

### Test Participants

Twelve participants were asked to spend up to one hour on the CIP website: four medical imaging investigators, four medically knowledgeable practitioners, and four members of the general population. All of the investigators had received funding from the National Cancer Institute (NCI); one is a junior investigator. Half of all test participants had visited the CIP website at least once prior to the usability test session (referred to as “experienced” versus “naïve” test subjects who had never visited the site before).

To recruit test participants for Round 2, NOVA repeated activities employed for Round 1 recruitment. This included sending e-mail invitations to individuals identified from a search of NIH RePORT and contacting local resources for medical practitioners and general population participants. Several participants who had responded too late to participate in Round 1 were recontacted and scheduled for Round 2. Although the Call for Volunteers (originally posted for Round 1 recruitment) remained on the CIP website during Round 2 recruitment, none of the 12 Round 2 participants were recruited via this method.

Individuals who responded to the e-mail invitations were screened via telephone, and those who were willing to participate were asked to complete and return a consent form. (The screener and consent form were provided in the Appendices of the Round 1 usability test report.)

Each participant received a \$40 Visa gift card as a token of appreciation.

### Test Activities

During the usability test, participants:

- Provided basic information about themselves to confirm they represent the target audience
- Answered questions about initial site impressions

- Performed real-world tasks using the website while thinking aloud
- Completed a System Usability Scale (SUS)
- Answered questions about their overall impressions of how the website worked.

During the usability evaluation, participants were asked to complete scenarios or “real-life” tasks on the site. Participants in all target groups completed five tasks (Table 1).

**Table 1: Tasks Assigned to All Participants**

<b>Task #</b>	<b>Task/Question</b>
1	What is the CIP’s mission statement?
2	Who is the Associate Director of the CIP?
3	What NCI division is the Cancer Imaging Program a part of?
4	Does the CIP website offer information specifically for patients?
5	How many branches does the CIP have?

Participants in the Investigator target group completed 10 additional tasks (Table 2).

**Table 2: Additional Tasks Assigned to Investigators**

<b>Task #</b>	<b>Task/Question</b>
I6	What is the name of the most recently released CIP funding initiative?
I7	Where was the Cancer Imaging Research Camp held in 2012?
I8	Find information about NIH funding mechanisms such as P20 exploratory grants.
I9	What is the expiration date for PAR-11-150?
I10	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?
I11	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?
I12	What were the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?
I13	Name two of the working groups in the Quantitative Imaging Network.
I14	Find one CIP publication that appeared in a peer-reviewed journal.
I15	What group is collaborating with the CIP in the Phase 2 N01 Program?

Participants in the Medical Practitioners target group completed eight additional tasks (Table 3).

**Table 3: Additional Tasks Assigned to Medical Practitioners**

<b>Task #</b>	<b>Task/Question</b>
P6	Where was the Cancer Imaging Research Camp held in 2012?
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?
P8	What kinds of groups or organizations sponsor clinical imaging trials?
P9	Show me where you would look for an imaging clinical trial in which your patients might participate.
P10	How are imaging clinical trials and drug treatment trials different?
P11	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?
P12	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?
P13	What is the purpose of sentinel node mapping for breast cancer staging?

Participants in the General Population target group completed seven additional tasks (Table 4).

**Table 4: Additional Tasks Assigned to General Population Participants**

<b>Task #</b>	<b>Task/Question</b>
GP6	What are two of the five uses for cancer imaging described on the website?
GP7	How long does a virtual colonoscopy examination take to complete?
GP8	How is digital mammography different from conventional mammography?
GP9	Name one kind of nuclear imaging.
GP10	Can humans hear the sound waves that are used to perform an ultrasound?
GP11	Show me where you would look for help finding a clinical trial in which to participate.
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?

### **Script Revisions**

Website changes made after Round 1 testing made it necessary to revise the usability test script for Round 2. Two items from the Round 1 script were excluded from the Round 2 script:

- (1) Download a Frequently Asked Questions (FAQ) document for one of the Investigational New Drug (IND) applications CIP has created.

(2) What are the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?

The Round 2 test script is provided as Appendix A.

## ROUND 2 PARTICIPANT FEEDBACK

### Initial Impressions

After taking a few minutes to explore the CIP website on their own, test subjects were asked to describe their initial impressions of the homepage and other pages they had viewed. Comments were generally positive.

- *It looks good to me. It looks like I would be able to find what I was looking for, with the various links. — Medical Practitioner (Naive)*
- *It's showing people interacting. It's showing imaging. I think it kind of grabs people's attention. — General Population (Experienced)*
- *I like the way it's laid out. Everything looks sharp and I like the way everything is bulleted and things are done to make it easy to read. — Medical Practitioner (Naive)*

Participants commented that the content seemed relevant to them.

- *I'm mostly interested in funding opportunities ... and I'm looking at Current CIP Initiatives, and I click on it again and it is telling me that there is a program on drug delivery in cancer, released May 14, 2013. So that's interesting; I think I will be using that one to apply for a grant. — Investigator (Experienced)*
- *This is interesting to me. They offer different reports and publications. And this is all information that I am familiar with [such as] different tracers that are used in the PET scans that we do. — Medical Practitioner (Experienced)*

Several participants noted that they had encountered broken links.

- *I would like to be able to see the larger images, but for whatever reason they are not available. — Medical Practitioner (Naive)*
- *Oh, PET image quantitation! Okay, page not found. — Medical Practitioner (Experienced)*

### Exit Questions/User Impressions

At the end of each session, participants were asked seven questions to solicit their final impressions of the website.

- When you think about how the website works, what is your overall impression?
- What did you like most about the way the website works?
- What did you like least about the way the website works?
- Was anything missing from the website that you expected to see?
- Think about the tables and figures on the website. Were they clearly and completely labeled?
- Was there anything about the Data Explorer that surprised you? Does it do anything that you did not expect?
- Do you feel this website is useful? Why/why not?

Overall, final impressions were generally positive. Participants commented on the depth and breadth of website content as well as availability of information for professionals and the general public.

- *I didn't know they had very specific clinical trials based on different imaging modalities. ... I thought I was really familiar with the current funding opportunities, but it seems there are a lot more than I'm aware of. — Investigator (Experienced)*
- *It's a pretty comprehensive website. — General Population (Naive)*
- *I can click on those links and then there's some more resources... a wealth of information here. Okay, wow! — Medical Practitioner (Naive)*

Several noted that the site offers information for multiple audiences.

- *I like the fact that both professionals and patients can go to one website and get information and/or links to where they need to go. — Medical Practitioner (Experienced)*
- *I like that it offers both sides of the coin, for the professional and also the patient. And it offered things on this website that I haven't really come across. — Medical Practitioner (Experienced)*

Participants complimented the information provided in the Patient Information section, noting that it answers basic questions the general public would ask and is written at a level appropriate for the general public.

- *I thought that maybe the Patient Information would give me something more I could understand. And [it] was telling me what imaging would do for me. — General Population (Experienced)*
- *They [referring to Clinical Trials Basics submenu] are the basic questions that people would want to know. — General Population (Experienced)*
- *It was more down to earth so that most people could understand. — General Population (Experienced)*

Although most participants indicated that the site seems current, several felt that the presence of older information gives the impression the site is out of date.

- *Some of the stuff I clicked on was going back to 2002. I think some people would think, well, wow, this is 2013. Why do I want to see that? It should have more up-to-date results, I think. — General Population (Experienced)*
- *The funding opportunities on the homepage weren't that new. There was newer stuff [referring to funding announcements] elsewhere on the site. — Medical Practitioner (Experienced)*

A number of test participants remarked that the site seems too complex, due at least in part to the numerous menu options. One participant reported exiting other complex websites because they were too complicated.

- *There are so many choices that it's hard to know where I should look first. I've come to other websites where I've looked at it and it was like too much information; I couldn't narrow it down to what I wanted and so I left the website. — General Population (Naive)*

Participants offered the following suggestions:

- *Is it possible under the Clinical Trials to put an extra drop-down box that would point them there [referring to the Clinical Trials Basics section]? — General Population (Experienced)*
- *Make the images bigger. You really can't appreciate the image when it's small. Especially x-rays—you want to see x-rays big because when you do an x-ray [it's] the same size as the person you took the x-ray of. And although ultrasound images are smaller, you still need to get some detail. You really can't appreciate that detail in the tissue harmonics when a picture is 2 by 2. — Medical Practitioner (Naive)*

Several participants reported that they didn't realize that the For Patients section is for the general public. They recommended renaming this menu option:

- *Well, don't call it the section for people who aren't smart or something like that! (laughter) But patient information sounds like you already know you're sick. Maybe Public Information or For the Public would be better. — Medical Practitioner (Naive)*

## FINDINGS

This report section covers Round 2 preference and performance metrics and compares Round 1 and Round 2 results. In addition, changes made after Round 1 and their impact on Round 2 performance are discussed.

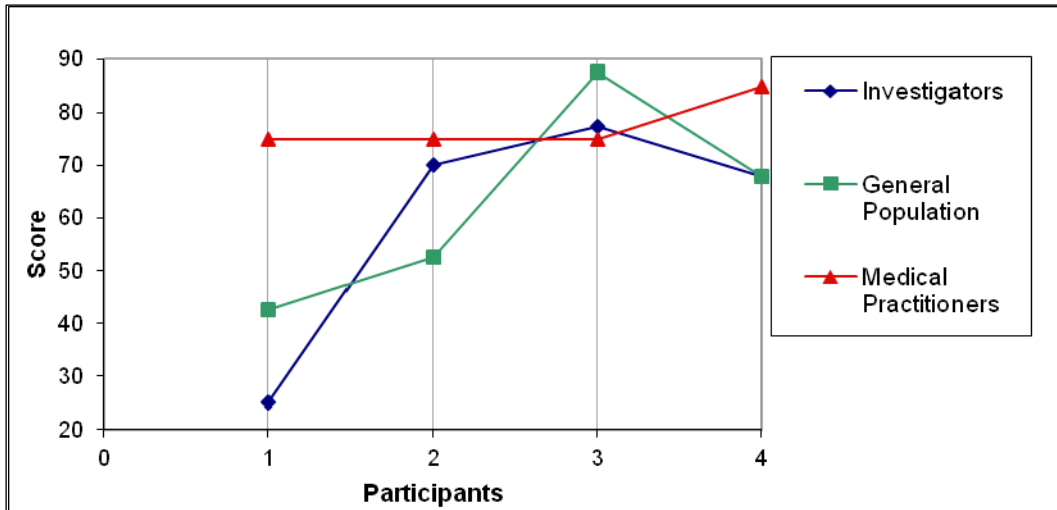
### Preference Metrics

The SUS was administered as a measure of satisfaction of website usability in both test rounds. The average score for all participants in Round 2 was 70 percent (Figure 1).

Medical Practitioners reported the highest level of satisfaction (average 78%; range = 25 to 78), followed by participants from the General Population (average 63%; range = 43 to 88). Investigators reported the lowest level of satisfaction (average 60%; range = 25 to 78).

Because the total number of test participants in Round 2 was low (n=12), results cannot be extrapolated to the wider population. That being said, it should be noted that one investigator was inclined to assign low satisfaction scores to every question (total score 25); scores of the other three investigators averaged 72 percent.

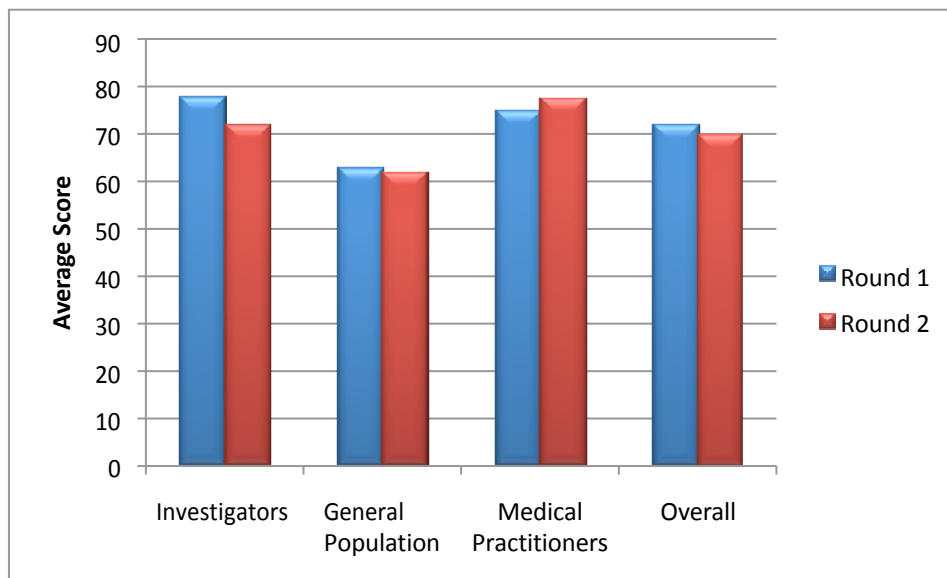
**Figure 1: System Usability Scores, Round 2**



These scores point to a shift from Round 1, where Investigators had the highest average level of satisfaction, followed by Medical Practitioners (Figure 2). In Round 2, average satisfaction increased for Medical Practitioners but decreased for Investigators and General Population participants.

Overall, average satisfaction scores dropped slightly (5 points) from Round 1 to Round 2. Median satisfaction scores varied only slightly between the two rounds: a 1.25-point difference; if lowest satisfaction scores from both rounds are excluded, the median scores are equal: 75 points for both rounds.

**Figure 2: System Usability Scores, Round 1 Versus Round 2**



### Performance Metrics

The following performance metrics were collected during Round 1 and 2 usability tests: time on task, completion rate, and error-free rate. (Definitions of performance metrics are provided in

Appendix B of this report.) Performance goals for each task in the usability test were a completion rate of 80 percent and an error-free rate of 75 percent.

Round 2 performance metrics for tasks assigned to all participants and to each target group are shown in Tables 5–8. Questions for which test subjects failed to meet target completion rates are labeled as “Issues to Address.”

No performance issues were identified for the five tasks assigned to all participants. In fact, completion and error-free rate goals were exceeded for all of these tasks (Table 5).

**Table 5: Performance on Tasks Assigned to All Participants, Round 2**

<b>Task #</b>	<b>Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
1	What is the CIP’s mission statement?	100	92
2	Who is the Associate Director of the CIP?	100	100
3	What NCI division is the Cancer Imaging Program a part of?	100	83
4	Does the CIP website offer information specifically for patients?	100	92
5	How many branches does the CIP have?	83	83

Investigator tasks I7, I10, and I12–I15 were identified as performance issues to address (Table 6). These tasks are discussed in the Performance Issues and Recommendations section of this report.

**Table 6: Performance on Additional Tasks Assigned to Investigators, Round 2**

<b>Task #</b>	<b>Task/Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
I6	What is the name of the most recently released CIP funding initiative?	100	75
I7	Where was the Cancer Imaging Research Camp held in 2012?	<b>75</b>	<b>50</b>
I8	Find information about NIH funding mechanisms such as P20 exploratory grants.	100	100
I9	What is the expiration date for PAR-11-150?	100	75
I10	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	<b>75</b>	75
I11	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?	100	100
I12	What were the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?	<b>75</b>	<b>75</b>
I13	Name two of the working groups in the Quantitative Imaging Network.	<b>75</b>	<b>50</b>
I14	Find one CIP publication that appeared in a peer-reviewed journal.	<b>75</b>	<b>75</b>
I15	What group is collaborating with the CIP in the Phase 2 N01 Program?	<b>75</b>	<b>25</b>



Medical Practitioner tasks P6–P11 were identified as performance issues to address (Table 7). These tasks are discussed in the Performance Issues and Recommendations section of this report.

**Table 7: Performance on Additional Tasks Assigned to Medical Practitioners, Round 2**

<b>Task #</b>	<b>Task/Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
P6	Where was the Cancer Imaging Research Camp held in 2012?	50	25
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	75	75
P8	What kinds of groups or organizations sponsor clinical imaging trials?	0	0
P9	Show me where you would look for an imaging clinical trial in which your patients might participate.	75	75
P10	How are imaging clinical trials and drug treatment trials different?	75	50
P11	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?	75	50
P12	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?	100	100
P13	What is the purpose of sentinel node mapping for breast cancer staging?	100	100

General Public tasks GP6–GP8 were identified as performance issues to address (Table 8). These tasks are discussed in the Performance Issues and Recommendations section of this report.

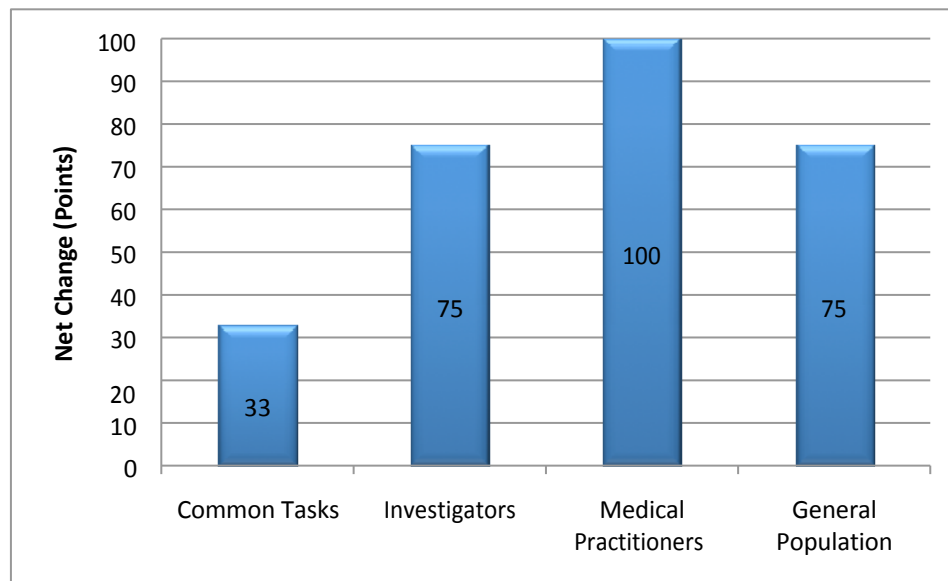
**Table 8: Performance on Additional Tasks Assigned to General Population Participants, Round 2**

<b>Task #</b>	<b>Task/Question</b>	<b>Completion Rate (%)</b>	<b>Error-Free Rate (%)</b>
GP6	What are two of the five uses for cancer imaging described on the website?	0	0
GP7	How long does a virtual colonoscopy examination take to complete?	75	25
GP8	How is digital mammography different from conventional mammography?	75	75
GP9	Name one kind of nuclear imaging.	100	100
GP10	Can humans hear the sound waves that are used to perform an ultrasound?	100	100
GP11	Show me where you would look for help finding a clinical trial in which to participate.	100	50
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?	100	75

## Impact of Website Revisions

It was hypothesized that website improvements would have a measurable, positive impact on test performance during Round 2. In general, performance rates increased during Round 2 compared with Round 1. In fact, error-free rates changed in a positive direction for all target groups (Figure 3), with Medical Practitioners showing the greatest improvement. As noted previously, this group also reported the highest level of satisfaction with the site during Round 2.

**Figure 3: Changes in Error-Free Rates Between Round 1 and Round 2**



Two website changes that were implemented between Round 1 and Round 2 can be linked to performance improvements:

- Adding the Phase 2 N01 program to the list of specialized initiatives on the Programs and Resources page resulted in a 50-point completion rate gain and a 25-point error-free rate gain (I15).
- Changing “Clinical Trials” under Patients & Providers to “Clinical Trials Basics” improved net completion rates by 25 points and error-free rates by 125 points (P8, P9, P10, and GP11).

Two other website changes produced mixed results:

- Changing the Patients & Providers section to “For Patients” resulted in a net error-free rate gain of 175 points (P8, P9, P10, P12, P13, GP6, GP7, GP8, GP9, GP10, GP11). However, rates dropped for several tasks where improvements were expected: P8, GP6, and GP7.
- Changing “Cancer Imaging” under Patients & Providers to “Cancer Imaging Basics” was expected to help distinguish this content from the main topic of the site. Error-free rates showed a net improvement of 50 points (P12, P13, GP6, GP7, GP8, GP9, GP10), despite losing points for tasks GP6 and GP7.

Table 9 displays performance rates (completion and error-free) and inter-round changes for every question included in both rounds. (Note: Some tasks were renumbered due to adjustments in the Round 2 script. Round 1 scores were mapped to Round 2 task numbers for comparisons shown in Table 9.)

**Table 9: Comparison of Round 1 and 2 Performance Rates**

Task #	Question	Completion Rate			Error-Free Rate		
		R1 (%)	R2 (%)	Change	R1 (%)	R2 (%)	Change
1	What is the CIP's mission statement?	92	100	+8	75	92	+17
2	Who is the Associate Director of the CIP?	100	100	0	83	100	+17
3	What NCI division is the Cancer Imaging Program a part of?	100	100	0	92	83	-9
4	Does the CIP website offer information specifically for patients?	100	100	0	92	92	0
5	How many branches does the CIP have?	83	83	0	75	83	+8
16	What is the name of the most recently released CIP funding initiative?	100	100	0	75	75	0
17	Where was the Cancer Imaging Research Camp held in 2012?	100	75	-25	75	50	-25
18	Find information about NIH funding mechanisms such as P20 exploratory grants.	100	100	0	75	100	+25
19	What is the expiration date for PAR-11-150?	100	100	0	100	75	-25
110	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	100	75	-25	75	75	0
111	What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?	100	100	0	75	100	+25
112	What were the dates and location for the 2013 midwinter meeting of the Society of Nuclear Medicine?	75	75	0	75	75	0
113	Name two of the working groups in the Quantitative Imaging Network.	100	75	-25	75	50	-25
114	Find one CIP publication that appeared in a peer-reviewed journal.	50	75	+25	0	75	+75
115	What group is collaborating with the CIP in the Phase 2 N01 Program?	25	75	+50	0	25	+25
P6	Where was the Cancer Imaging Research Camp held in 2012?	100	50	-50	75	25	-25
P7	CIP provides imaging guidelines for clinical trials on the website. How were these guidelines developed?	75	75	0	75	75	0
P8	What kinds of groups or organizations sponsor clinical imaging trials?	50	0	-50	0	0	0
P9	Show me where you would look for an imaging clinical trial in which your patients might participate.	50	75	+25	0	75	+75
P10	How are imaging clinical trials and drug treatment trials different?	50	75	+25	50	50	0
P11	What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?	75	75	0	75	50	-25

Task #	Question	Completion Rate			Error-Free Rate		
		R1 (%)	R2 (%)	Change	R1 (%)	R2 (%)	Change
P12	How long does a virtual colonoscopy examination take to complete compared with a conventional colonoscopy?	100	100	0	75	100	+25
P13	What is the purpose of sentinel node mapping for breast cancer staging?	100	100	0	50	100	+50
GP6	What are two of the five uses for cancer imaging described on the website?	75	0	-75	75	0	-75
GP7	How long does a virtual colonoscopy examination take to complete?	75	75	0	50	25	-25
GP8	How is digital mammography different from conventional mammography?	75	75	0	75	75	0
GP9	Name one kind of nuclear imaging.	75	100	+25	75	100	+25
GP10	Can humans hear the sound waves that are used to perform an ultrasound?	75	100	+25	50	100	+50
GP11	Show me where you would look for help finding a clinical trial in which to participate.	75	100	+25	0	50	+50
GP12	What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?	25	100	+75	25	75	+50

## ISSUES AND RECOMMENDATIONS

For purposes of this report, tasks for which subjects failed to meet the target completion rate (80%) were identified as “issues to address.” Specific issues and recommended corrective actions are outlined below.

### Issue: Clinical Trials

Medical Practitioners had trouble answering three questions about clinical trials (P8, P9, P10). Answers to these questions are available within the Cancer Imaging Clinical Trials section of Patient Information. Most test subjects who could not answer the question spent their time searching through the pages under the Clinical Trials main menu item.

#### Recommendation:

- Guide patients to the patient version of clinical trial information by adding a link under the main Clinical Trials drop-down menu. Call it “Clinical Trials Basics (for Patients).”

Investigators and Medical Practitioners had difficulty finding out how imaging guidelines for clinical trials were developed (I10, P7). Some participants found the page that contained this information (<http://imaging.cancer.gov/clinicaltrials/guidelines>) but were unable to use the content there to answer the question.

#### Recommendation:

- Add an introductory statement explaining how imaging guidelines for clinical trials are developed.

## Issue: Patient Information/Cancer Imaging Basics

General Public test participants failed to complete three tasks that relate to content in the Imaging Basics section under Patient Information (GP6, GP7, GP8). As noted in the Participant Feedback section of this report, some participants expected the Patient Information section to include information for current cancer patients rather than the general public. One participant reported thinking that this section might include appointment scheduling tools or information on where to go for therapy.

This navigation menu item was changed from “Patients and Providers” to “Patient Information” after Round 1 testing. The change was recommended based on observations that test participants overlooked or did not explore this area of the site. The term *Patient Information* was selected based on its use throughout the NCI website to distinguish between Provider and Patient versions (e.g., PDQ, Clinical Trials). This recommendation did not address the problem. Ideally, card sort activities would have been used to identify terms that better match mental models of the General Public visitor. However, such activities were beyond the scope of the evaluation task order.

### Recommendation:

- Conduct card sort activities with members of the general public to identify the terms that best match their expectations.
- Change the menu item from “Patient Information” to “Introduction to Cancer Imaging.”

## Issue: Events

Investigators and Medical Practitioners could not find information about specific events listed in the Events section under News & Events (I7, I12, P6). In each case, the events had occurred in the past and could only be viewed if the test participant selected “2” or “Next” at the bottom of the page.

### Recommendation:

- Format event dates and times consistently; the current format employs multiple font sizes.
- Simplify event entries by including event title, event date (omit times), and event location.
- Make the event listings easier to scan by including annual separators (i.e., 2013, 2012, 2011) in a larger font.

## Issue: Phase 2 N01 Program

Some Investigators were unable to complete a task (I15) related to the Phase 2 N01 Program. This task was identified as an issue during Round 1, and CIP implemented the recommendation to add the Phase 2 N01 program to the list of specialized initiatives on the Programs and Resources page. Performance scores on this question improved during Round 2 but still failed to meet the target completion score.

Round 2 Investigators who could not complete this task tried using Search to find information about this initiative; however, search results did not include the correct CIP page. It appears, however, that some improvements to the Search function have occurred since Round 2 testing concluded; a search for Phase 2 N01 conducted August 12 was successful. It should be noted that a search for Phase 2 NO1 (using the letter *O* instead of the number *0*) failed.

**Recommendation:**

- Work with NCI web staff to include the N01 Program in search results for the term “NO1” as this is likely to be a common search error.

**Issue: CIP Publication**

Investigators overlooked Reports & Publications under the Programs & Resources menu item.

**Recommendation:**

- None

**Issue: The Cancer Imaging Archive (TCIA)**

Two Medical Practitioners could not identify how cancer researchers or members of the public can use the data in TCIA (P11). The question is answered on the CIP descriptive page under the Informatics main menu item as well as on the TCIA About Us page. However, these participants followed a link on the CIP homepage that took them directly to the TCIA itself and then tried to log into the Archive. (Facilitators noted that few test participants explored the Informatics section of the CIP site.)

**Recommendation:**

- Change the TCIA link on the homepage so that it goes to the descriptive page on the CIP site rather than directly to TCIA.

**Issue: Quantitative Imaging Network (QIN) Working Groups**

When asked to identify one of the five QIN working groups (I13), two Investigators named QIN sites (e.g., Iowa, Pittsburgh) rather than selecting the Working Groups link.

**Recommendation:**

- Consider adding a level 3 QIN Site link to the left-side navigation bar, shifting the individual site links to level 4.

**CONCLUSION**

Test participants value the depth and breadth of the content available on the CIP website. Medical Practitioners, in particular, were enthusiastic about the comprehensiveness of the site. Most participants reported that the page layout and key design elements (e.g., use of color, font formatting, images) are attractive and helped make it easier to find key information they needed to complete tasks during the usability test.

Changes made to the site after Round 1 led to improved test participant performance. Overall, error-free rates increased for all three test participant groups. However, performance scores indicate that some problem areas remain. It is believed that implementing recommended changes provided in this report would further improve site performance and reduce visitor errors.

## **APPENDIXES**

**Appendix A. Round 2 Usability Test Script**

**Appendix B. Definitions of Performance Metrics**

## Appendix A. Round 2 Usability Test Script

### Introduction and Warm Up

Thank you, [name], for agreeing to be a part of this study.

I'd like you to know that <observer name> is on the call today to take notes. He'll observe while you and I work together. With your permission, we'll also record our session, just to make sure that Rod and I don't miss anything you say. Is that okay? [Wait for response]

#### **[BEGIN RECORDING SESSION & SESSION AUDIO NOW]**

As was mentioned when Rod scheduled this appointment with you, we expect the process will take between 30 minutes and an hour.

Today we'll be looking at a website that was created for the Cancer Imaging Program, which is part of the National Cancer Institute. I'm going to ask you to explore this website and then try to do some tasks on the site.

As we go through the site, please keep in mind that we are testing the website and not you—there are no right answers or procedures. If you can't find certain information or don't know how to do something, it isn't your fault. The website is supposed to be easy to use. If it isn't easy for you to use, that tells us that we need to fix something on the website.

I want you to know that our company was not involved in the development of this website or its content, so don't worry that anything you say might hurt my feelings or offend in any way. Any comments you have, either positive or negative, will be useful, so please feel free to tell me what you think.

After we've finished the various tasks, I'll give you some time to ask me anything you'd like. Do you have any questions for me now?

### **Preliminary Demographics/Confirm "Bucket"**

We have invited people from different backgrounds to help us usability test the website, so I'd like you to ask you a little bit about yourself.

1. Where do you work? [If an academic institution, we will determine size (using the Carnegie Classification of Institutions of Higher Education, which is based on full-time equivalent (FTE) enrollment.)]
2. What is your role there?
  - If researcher/medical practitioner/clinician: Are you currently or have you ever received any Federal funding for research?
  - If so, are you receiving or have you ever received any funding from the National Institutes of Health (NIH)?
  - Are you receiving or have you ever received any funding from the National Cancer Institute (NCI)?
    - If yes, have you ever received funding from the Cancer Imaging Program?
    - If yes, are you currently funded by CIP?



- Are you a new or “junior” investigator?
    - If unsure, ask: Have you ever been the PI on a project that competed successfully for an NIH-supported research grant? [If not, then junior investigator.]
      - If yes, what type of mechanism? (If F, K, L, R00, R03, R15, R21, R25, R34, R36, R41, R43, R55, R56, R90, RL5, RL9, SC2, SC3, T, or X01, then junior investigator. Otherwise, not junior investigator.)
3. Have you used the CIP website to find information in the past?
- If no, skip to Setting Up the Usability Tasks.
  - If yes, what did you look for on the site?
    - Have you visited the site more than once?
      - If yes: would you say you visit the site rarely (two or three times total), occasionally (every few months), or on a regular basis?
      - If regularly, once a month? Once a week?
  - If current or former CIP grantee, did you use the site when first applying for a CIP-administered grant?

### **Setting Up the Usability Tasks – Adobe Connect**

OK, so we’re ready to look at the website now. We will be able to see what is on your computer desktop, so please close or minimize any personal or unrelated tasks that you have open there. [Pause] Okay. Are you ready?

I have sent a request for you to share your desktop screen with me. Do you see a notice in the upper right hand corner of your screen? Yes? Please click on Start. [pause for response] Thank you.

Now you should see a menu for sharing options. Please choose Desktop and then click on Share. Thank you.

Ok. Let’s begin the test.

### **Findability of the Site**

Please go to the NCI Cancer Imaging Program (CIP) website. [Record process used, including search engine and key words.]

- If not successful, direct them to cancer.gov and ask them to find it from there.
- If still not successful, direct them to <http://dctd.cancer.gov/> and ask them to find it from there.

### **Initial Impression**

I’m going to give you a few minutes to poke around on the site on your own so you can become familiar with it. Feel free to ask any questions or make comments while you do that.

[Observe and record where they go first. Observe what they do for about 3 minutes or until they seem to be ready to move on.]

- What is your impression of the CIP homepage?
- What prompted you to go to [the first page they visited]?

## Tasks

Now I'm going to ask you to use the site to answer some questions. Please note that we will be measuring time-on-task and number of clicks you make for each task. This will help us measure how much work it takes to complete each task. From this point forward, please avoid "exploring" the site beyond what is necessary for each specific task. OK?

It is important that you think aloud while you work. Your thoughts and reactions will help us know whether the site is working well and identify any possible problem spots.

If you feel lost or cannot answer a question, please let me know. Although I won't be able to give you any suggestions or hints, I can repeat the question.

Let's begin with the first task. [Make sure they start at the homepage.]

### INVESTIGATOR TASKS:

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. What is the name of the most recently released CIP funding initiative?
7. Where was the Cancer Research Imaging Camp held in 2012?
8. Find information about NIH funding mechanisms such as P20 exploratory grants.
9. What is the expiration date for PAR-11-150?
10. CIP provides imaging guidelines for clinical trials on the web site. How were these guidelines developed?
11. What is one way that cancer researchers can use the data in The Cancer Imaging Archive (TCIA)?
12. What were the dates and location of the Quantitative Imaging Network Annual Meeting in 2013?
13. Name one of the five working groups in the Quantitative Imaging Network.
14. Find one CIP publication that appeared in a peer-reviewed journal.
15. What NCI program is collaborating with the CIP in the Phase 2 N01 Program?

### MEDICAL PRACTITIONER TASKS:

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. Where was the Cancer Imaging Research Camp held in 2012?

7. CIP provides imaging guidelines for clinical trials on the web site. How were these guidelines developed?
8. What kinds of groups or organizations sponsor clinical imaging trials?
9. Show me where you would look for an imaging clinical trial in which your patients might participate?
10. How are imaging clinical trials and drug treatment trials different?
11. What is one way that cancer researchers or members of the public can use the data in The Cancer Imaging Archive (TCIA)?
12. How long does a virtual colonoscopy examination take to complete compared to a conventional colonoscopy?
13. What is the purpose of sentinel node mapping for breast cancer staging?

### **GENERAL PUBLIC TASKS:**

1. What is the CIP's mission statement?
2. Who is the Associate Director of the CIP?
3. What NCI division is the Cancer Imaging Program a part of?
4. Does the CIP website offer information specifically for patients?
5. How many branches does the CIP have?
6. What are two of the five uses for cancer imaging described on the website?
7. How long does a virtual colonoscopy examination take to complete?
8. How is digital mammography different from conventional mammography?
9. Name one kind of nuclear imaging.
10. Can humans hear the sound waves that are used to perform an ultrasound?
11. Show me where you would look for help finding a clinical trials in which to participate.
12. What is one way that patients and members of the general public can use the data in The Cancer Imaging Archive (TCIA)?

### **Standard Usability Scale**

Thank you. That completes the portion of the test where we are looking at your screen. I'm now going to take charge of the meeting session display again. [Revoke sharing. Display SUS scale.] Tell me what you see on the screen now. [Pause for response]

I'd like to collect a bit of information from you using a standardized survey before we discuss your experience. I'm going to read a statement and ask you whether you agree or disagree, using a scale from 1 to 5 where 1 equals strongly disagree and 5 equals strongly agree. OK?

1. I think that I would like to use this website frequently.
2. I found the website unnecessarily complex.
3. I thought the website was easy to use.
4. I think that I would need the support of a technical person to be able to use this website.
5. I found the various functions in this website were well integrated.

6. I thought there was too much inconsistency in this website.
7. I would imagine that most people would learn to use this website very quickly.
8. I found the website very cumbersome to use.
9. I felt very confident using the website.
10. I needed to learn a lot of things before I could get going with this website.

### **Final Impressions**

Now I'd like to ask you a few specific questions about your impressions of the CIP site.

1. When you think about how the CIP is laid out and how it works, what is your overall impression of the site?
2. What did you like most about the way the website looks and works?
3. What did you like least about the way the website looks and works?
4. Was anything missing from the site that you expected to see? [Probe: content, features, functions]
5. Was there anything on the site that you did not expect to see? [Probe: links, pages]
6. Do you feel this site is current? Why/why not?

### **Wrap up**

OK, we've finished the usability testing. Do you have any further questions or comments?

We're going to turn off the recorder now.

[Stop session recording and audio recording. Collect mailing address for incentive.]

Thank you again for your participation.

## **Appendix B. Definitions of Performance Metrics**

### **Task Completion**

Each task will require the participant to obtain specific data that would be used in course of a typical task. The task is completed when the participant indicates that he/she has obtained the goal (whether successfully or unsuccessfully) or the participant requests and receives sufficient guidance as to warrant scoring the scenario as a critical error.

### **Critical Errors**

In general, critical errors are unresolved errors during the process of completing the task or errors that produce an incorrect outcome (answer).

A participant may or may not be aware that the task goal is incorrect or incomplete.

Independent completion of the scenario is a universal goal; help obtained from the facilitator is cause to score the scenario a critical error.

Critical errors also can be assigned when the participant initiates (or attempts to initiate) an action that will make it impossible to attain the goal.

### **Non-critical Errors**

Non-critical errors are errors from which the participant can recover (e.g., taking a long or unexpected path to find an answer; excessive steps or keystrokes). Non-critical errors do not have an impact on the final task output but do result in the task being completed less efficiently.

Exploratory behavior, such as opening the wrong menu, will be coded as a non-critical error.

A participant may not detect a non-critical error, but when detected, they are generally frustrating to the participant.

### **Completion Rate**

Completion rate is the percentage of test participants who successfully complete the task without critical errors. This rate represents the percentage of participants who, when they are finished with the specified task, have an "output" that is correct. Note: If a participant requires assistance in order to achieve a correct output, the task will be scored as a critical error and the overall completion rate for the task will be affected.

A completion rate of 80 percent is the goal for each task in this usability test.

### **Error-Free Rate**

Error-free rate is the percentage of test participants who complete the task without any critical or non-critical errors.

An error-free rate of 75 percent is the goal for each task in this usability test.

### **Time on Task (TOT)**

Time on Task is the time to complete a task. It is measured from the time the person begins the task to the time he/she signals completion.

## APPENDIX F. 508 SOFTWARE COMPARISON REPORT

# **Review of Commercial Software for Semi-Automated 508 Compliance Testing and Repair**

Prepared by NOVA Research Company

July 12, 2013

## OVERVIEW

NOVA Research Company reviewed commercially available software programs that enable 508 compliance testing and file repair. At contract initiation, Cancer Imaging Program (CIP) staff recently had begun to use CommonLook software to make Microsoft Word files and PDFs compliant with Section 508 requirements. CIP was interested in determining whether other programs could perform these tasks more efficiently.

## Methodology

### Interview with Brenda Fevrier-Sullivan

To clarify characteristics of the 508-compliance work routinely performed by CIP staff and commonly encountered compliance issues, NOVA conducted a telephone interview with Ms. Brenda Fevrier-Sullivan, the individual CIP staffer most involved in 508 compliance work. Ms. Fevrier-Sullivan had completed a two-day CommonLook training in June 2012. Previously, she used Adobe Acrobat Pro.

Most 508 compliance tasks involve testing PDFs for compliance and addressing issues to make them compliant. Ms. Fevrier-Sullivan reported that she occasionally converts Word files to PDFs but has not been asked to test Excel or PowerPoint files or to make files in these formats 508 compliant.

Typical compliance issues include untagged images and no language specified. In addition, many files contain signatures that must be removed. Some documents have been formatted as tables that should be standard text; table lines must be removed from these documents.

Based on this interview, the following review criteria were established:

1. Identify errors (Required).
2. Provide an exportable error/issue report (Required).
3. Display errors on page of occurrence.
4. Enable users to click on each error to view point(s) of occurrence.
5. Allow error-by-error rechecks to confirm that a problem has been resolved.
6. Provide error-specific correction tips.
7. Allow individual artifact correction.
8. Enable selection of specific components on a page to be read aloud.
9. Offer script feature to automate common actions (e.g., correction of specific artifacts, specification of language, identification of punctuation that should not be read).

These criteria were compiled into a review form. A sample form is included as Appendix A of this report.

### Identification of Software for Review and Testing

NOVA searched the Internet for available 508 compliance testing and repair software. In addition to CommonLook (the software currently used by CIP staff), NOVA identified a number of software programs for potential testing. After further review, it was discovered that several programs were intended primarily for testing HTML pages; deemed unsuitable for CIP use these programs were removed from consideration. NOVA recommended and received approval from CIP to proceed with testing of the following software programs: 3-Heights PDF Validator, Accessibility Management Platform, Acrobat Pro XI, and CommonLook.



## Review and Testing Methods

NOVA assigned software review to an in-house 508 compliance specialist. The NOVA reviewer used each program to test two pre-compliant sample documents and recorded results of these tests on a software review form. The reviewer explored user guides and other available software documentation to determine whether the program met specific criteria and recorded findings on the software review form. The reviewer then completed a software usability scale.

## TEST RESULTS

### Performance

Test results were analyzed and each program was scored using two performance measures: pass-fail rate and preference rate.

#### Pass Rate

The pass rate is the percentage of the required criteria (items 1–2 on page 2) that the software passed. To pass criterion 1, the software must have had zero compliance issue identification failures. An *issue identification failure* is defined as any type of compliance issue the software failed to identify and did not report that a manual check was required.

Both Acrobat Pro and CommonLook earned a 100 percent pass rate.

#### Preference Rate

The preference rate is the percentage of seven preference criteria (items 3–9 on page 2) possessed by the software. CommonLook had the highest preference rate (86%), followed by Acrobat Pro.

Performance metrics for tasks are shown in Table 1 below.

**Table 1: Performance Scores**

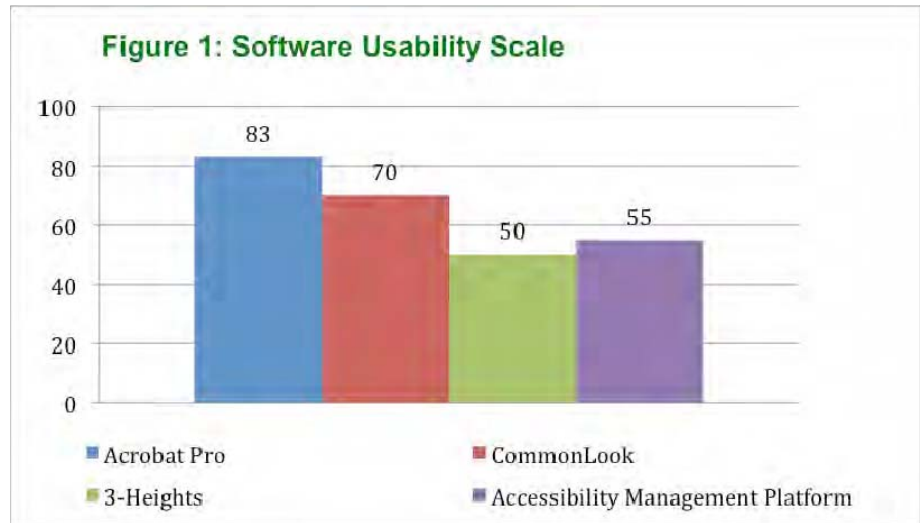
Software	Pass-Fail Rate (%)	Preference Rate (%)
Acrobat Pro XI	100	71
CommonLook	100	86
Accessibility Management Platform	0	14
3-Heights PDF Validator	50	0

## User Satisfaction

The Software Usability Scale (SUS) was used to measure user satisfaction with each software program. Statements in the SUS touch on software complexity, consistency, and user-friendliness.

The NOVA reviewer indicated her agreement with each of 10 statements, using a scale from 1 to 5 where 1 equaled strongly disagree and 5 equaled strongly agree. (The SUS is included as Appendix B of this report.)

As shown in Figure 1, the reviewer reported the highest level of satisfaction (83%) with Acrobat Pro software, followed by CommonLook (70%). It should be noted that the NOVA reviewer had several years of experience using an earlier version of Adobe Acrobat Pro (version IX) prior to this software review; her familiarity with the earlier version of this product likely influenced her higher level of satisfaction with Acrobat Pro XI.



## CONCLUSION

CommonLook software appears to be the best choice for CIP.

- CommonLook received the highest performance score of all four products included in the test.
- CommonLook received the second highest user satisfaction score of all four products included in the test.
- The CIP expert user (Ms. Fevrier-Sullivan) expressed a high level of satisfaction with the product compared with her previous experience using Adobe Acrobat Pro.

NOVA recommends that CIP staff check for availability of CommonLook software upgrades on at least an annual basis. It is possible future versions will incorporate some of the preferred features and functions the current version lacks.

## APPENDIX A. 508 Compliance Software Review Form

[SOFTWARE NAME]

### Use the software to test two sample documents.

1. Does the software identify all errors?  Yes  No
2. If not, what errors/types of errors were missed?
3. What errors must be checked manually?

### Error/Issue Reporting and Correction

4. How does the software display errors?
  - On page of occurrence
  - In a report
  - In report with links to page of occurrence
  - Other
5. Can error reports be exported?  Yes  No
6. Is the error list clickable?  Yes  No
7. Does software provide error-specific correction tips?  Yes  No  
If yes, describe:
8. Can you recheck error-by-error to see whether your “fix” resolved the problem?  Yes  No

### Correcting Specific Types of Errors

9. Does the software allow individual artifact correction?  Yes  No

### Readaloud

10. Can you select specific components on a page to be read aloud?  Yes  No

### Automation

11. Can software scripts be set up to automatically correct specific artifacts, specify language, identify sets of punctuation to NOT read, etc., rather than having to do these separately?  Yes  No

If yes, describe:

### General Comments:

What did you like about the software?

What did you NOT like about the software?

## APPENDIX B. 508 Compliance Software Usability Scale

<b>Strongly Disagree</b> 1	<b>2</b>	<b>3</b>	<b>4</b>	<b>Strongly Agree</b> 5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Indicate whether you agree or disagree with each statement, using the scale above where 1 equals strongly disagree and 5 equals strongly agree.

1. I think that I would like to use this software frequently.
2. I found the software unnecessarily complex.
3. I thought the software was easy to use.
4. I think that I would need the support of a technical person to be able to use this software.
5. I found the various functions of this software were well integrated.
6. I thought there was too much inconsistency in this software.
7. I would imagine that most people would learn to use this software very quickly.
8. I found the software very cumbersome to use.
9. I felt very confident using the software.
10. I needed to learn a lot of things before I could get going with this software.