

# Usability Report

## GDOT Annotated Bibliography Project

Testing prepared and administered by  
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## Summary

GDOT seeks to make their repository of research more accessible to their employees. Thus far, the grant team for the Annotated Bibliography project has improved the searchability of the research database, added the ability to create annotated bibliographies, cataloged past projects correctly in the updated system, produced instructions for using the updated system, and tested the usability of the search and data entry functions. In this usability report, we detail the findings of a usability study of the updated system and instructions.

## Background

The Georgia Department of Transportation (GDOT) funds research and development initiatives, but the length of the resulting project reports and sheer number of projects prevent quick searching by GDOT decision makers and other personnel. Existing search tools are segmented and do not provide a comprehensive set of relevant, user-friendly search parameters. Thus, locating a specific project is cumbersome and difficult for GDOT personnel, from management to support staff. GDOT requests that an annotated bibliography be created of all archived research reports (at least back to the 1990s). Further, GDOT is seeking an integrated, easily-maintained, digital repository that can house such bibliographies and reports, while also providing relevant, reliable, and usable search functions that all GDOT employees can use to effectively locate and access the reports.

Members of the grant team have created a user-friendly, easily-maintained, digital repository for storing, searching, recalling, and preserving bibliographic entries that includes a customized taxonomy and the ability to create customized annotated bibliographies. In order to ensure that the newly customized system is usable for the audience, the grant team performed systematic usability assessment with GDOT personnel.

## Test Objectives

- Assess the usability of the search function and the associated instructions for the updated EOS GDOT database—both public facing (front end) and proprietary (back end)
- Assess the usability of the data entry function and the associated instructions for the updated EOS GDOT database (back end)
- Assess the use of the new taxonomy for searching (front and back ends)

## Methods

Data was collected via pre-test questionnaire (see Appendix A), testing (see Appendix B), post-test instructions usability scale (see Appendix C), post-test system usability scale (see Appendix D), and a brief final interview. Changes to the protocol were not made after the GDOT pilot, so pilot data is included in this analysis.

## Test Schedule and Participants

GDOT leaders run reports based on management queries and use reports to make new funding and research agenda decisions. GDOT managers and staff do data entry and data management. They are responsible for data accuracy, record classification, and searchability of records.

Participants were recruited for their representation in these groups and for their representation in various roles and departments at GDOT.

Testing was completed on January 30, 2019 at the Forest Park GDOT-OMAT office. The grant team tested seven participants on search (front end and back end) and/or data entry (back end) in the EOS system. See Table 1.

Table 1. Participants

P. Number	P. Name	P. Title	Tasks Assigned (see Appendix B for a list of tasks)
Participant 1 (pilot)	Brennan Roney	Research Engineer	1, 2, 3, 5
Participant 2	Ian Rish	State Pavement Engineer	1, 2, 3
Participant 3	Robert Carswell	Program Coordinator GATECH UTCs	1, 2, 3
Participant 4	Sarah Jones	Civil Engineer 3	4, 5
Participant 5	Binh Bui	Research Implementation Manager	4, 5
Participant 6	Sarah Lamothe	Transportation Planning Specialist	1, 2, 3
Participant 7	Amy Ramsey	Office Manager	4, 5

### Test Environment

Participants joined Pam Brewer and Jennifer Goode of Mercer University in the GDOT-OMAT conference room. They proceeded through the protocol that included questionnaires, usability testing, and an interview. The complete protocol took no more than 45 minutes per participant.

The full assessment was conducted using Zoom web conferencing software, provided by Mercer University. The test was run using PCs. Participants accessed Zoom through an internet connection, and the session recordings were archived. Audio, video, and text transcripts were captured as well as the participants' cursor movements on the screen.

### Findings

Overall, participants found the EOS system useful and usable; however, their responses indicated there is significant need for improvement. We present all useful findings below but wish to emphasize the following three issues as most important:

- The use of RB as a GDOT research report call number is not familiar or logical for participants.
- Identifying years of publication and searching a year range on the front end was difficult and often failed.
- More aids/instructions are needed online at the point of use in order to avoid less-than-successful searches.

Participants avoided using the printed instructions until pressed to do so either with task failure or prompting from the facilitator. When they reflected on use of the instructions, they indicated they would like for more of the instructions to appear on-screen in the system and would like for the instructions to be less complex and easier to use.

In this section, you will find the results of the usability study of the EOS system updates and associated instructions, beginning with some participant characteristics. The findings have been categorized as follows:

- Strengths
- Weaknesses categorized as follows
  - Data Entry
  - Error Reporting
  - Labeling
  - Navigation
  - Searching and Taxonomy
  - Other

### Participants

As you would expect, participants use EOS to share information with outside research agencies, find research for presenting to manufacturers, search for past research to create plans for new research, enter data, and catalog research. You can see basic participant use information in Figures 1 and 2.

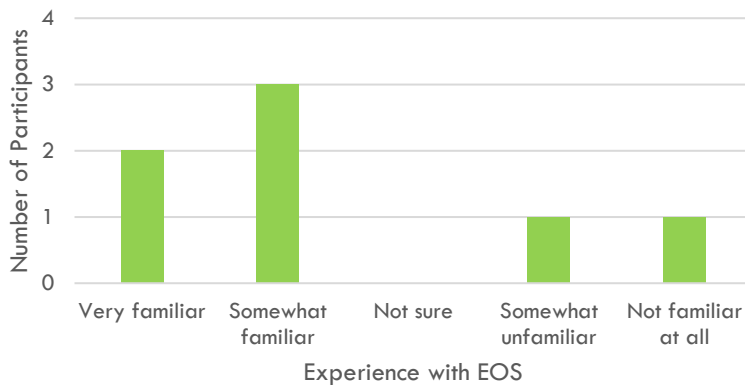


Figure 1. Participant Experience with EOS System

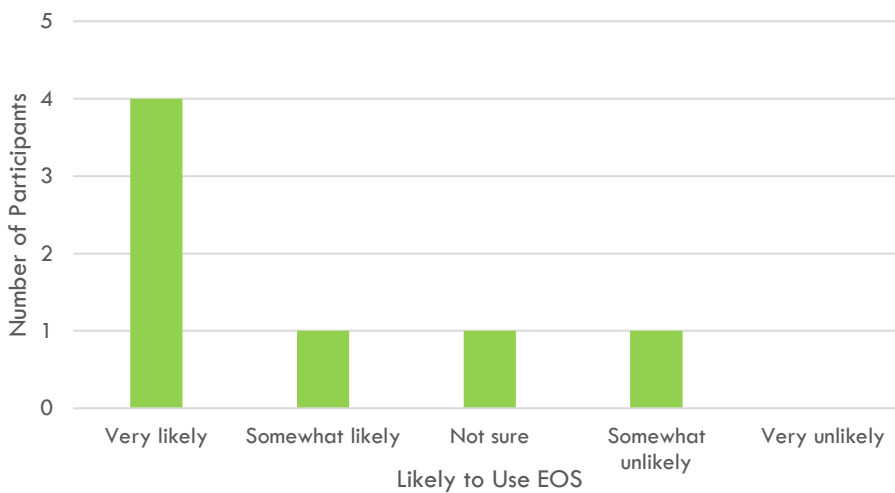


Figure 2. Participant Use of EOS System

## Areas of Strength

Participants identified the following strengths of the system and instructions:

- The **Words** field can now be used to search abstracts as well as other information in a record.
- Search categories in the taxonomy correlate with GDOT departments.
- Rollovers aid navigation.

## Areas of Weakness

Areas that need improvement in the system and instructions are categorized as follows:

- Data Entry
- Error Reporting
- Labeling
- Navigation
- Searching and Taxonomy
- Other

Detailed findings for each category are described below.

### Data Entry

- Entering a single record took participants 22 to 32 minutes.
- There is a lot of room for error during data entry, including spelling and coding errors. Participants often misspelled while working in the system.
- Participants first entered names in the wrong order as they didn't see the author format in the instructions.
- Participants wondered about the information they were skipping as they followed the instructions for data entry.

### Error Reporting

- At the end of the data entry task (task 5), all participants received error messages. The message codes varied among participants, but the system provided no information on what the error codes meant or how to fix them.

### Labeling

- The RB call number for GDOT research reports was not familiar to participants unless they had worked with data entry in the past. In other words, it was not a logical designation for participants. They are familiar with the RP designation for GDOT research.
- The year in which a report was published appears in the **Published** field and not in a field of its own. This was not obvious to participants.
- Participants questioned whether the year of publication is based on the annual or the fiscal year.
- Participants tried to search for reports that were published in a range of years by using the **Year** field.
- Participants thought that the asterisk used in the instructions was part of a search string.
- Some participants did not equate "words" with "keywords" for searching.
- Participants did not understand why "select all" and "view all" did not result in viewing all records at the same time.
- The meaning of "place under serial control" was unclear during data entry.
- The meaning of "source not specified" was unclear during data entry.

### Navigation

- The RB call number for research reports caused task failure for all but experienced staff. See the labeling section for more information.

- Participants said that there is no help for searching online in the EOS system. One example provided is that the instructions beneath the “show search” options don’t make action clear.
- Participants spent some time finding the PDF versions of reports. They eventually found them at the bottom of the screen.
- Participants could not find the year range fields. Several tried to enter individual years into the **Year** field. This was a problem on the front-end interface but not on the back end where the range fields are more accessible.

### Search and Taxonomy

- In general, the use of the taxonomy for searching was a failure. Participants either didn’t notice it or couldn’t figure out how to use it. However, when they reflected on the test, they thought that the taxonomy has the potential to be useful if some on-screen prompts help them use it. The following list represents some of the test behavior:
  - Only went to instructions as last resort
  - Did not connect the taxonomy instructions on the front page of the instructions with those on the back
  - Entered several topics in the **Subject** field that didn’t work
  - Did not see the year in the search results
- Multiple participants requested that search help be provided online in the form of tips and suggested keywords for searching. Essentially, they want help for non-experts to conduct effective searches using the system.

### Other

- A participant found one research report that is not coded as RB (by Wang).
- The drop-down menu on **Location** didn’t work.
- The website looks dated.

## Recommendations

We prioritize resolving the disconnect with RB labels, making the year range visible on the front-end search, putting more instructions on screen, cautioning users to use the instructions carefully, and training users on the system as the highest priority recommendations. As a minimum, linked PDF copy of instructions would help with navigation. The instructions could be presented in a single PDF or in smaller PDF “modules” at the points of need. See Figure 3.

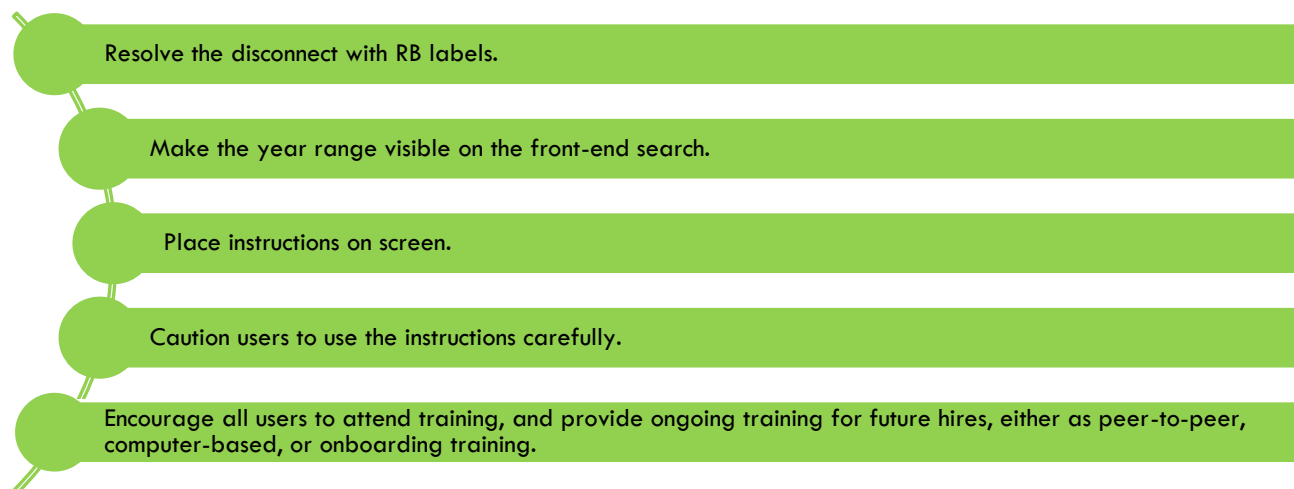


Figure 3. Five most significant recommendations of usability assessment

People tend to use instructions as a last resort unless the pieces they need are readily available during tasks. In order to ensure effective searching and accurate data entry, the system design needs to accommodate for this behavior.

For detailed recommendations, refer to the sections and tables below.

## Data Entry

The data entry process is tedious and must be accurate; otherwise, searches will not yield reliable results. See recommendations in Table 2.

Table 2. Data Entry Recommendations

Data Entry Recommendations	Action
2.1 Fields that contain standard information should be automatically filled during both data entry of the original record and during searches.	Implementable but out of scope
2.2 Include authors' professional titles as a standard requirement of data entry.	Not implementable due to system configuration
2.3 Provide information on word limit for abstracts.	Implementable and in scope
2.4 Include pictures of icons in the instructions to aid recognition on the screen.	Implementable and in scope
2.5 Explain why participants may skip some fields while entering data.	Implementable and in scope
2.6 Include instruction on maximum number of author-provided keywords allowed during data entry for a single record.	Implementable and in scope

## Error Reporting

Table 3. Error Reporting Recommendations

Error Reporting Recommendations	Action
3.1 Provide on-screen and printed instructions on the meaning of and fixes for error codes received during data entry. Error codes received during testing were 040, 050, 245, and 650.	Implementable but out of scope

## Labeling

Table 4. Labeling Recommendations

Labeling Recommendations	Action
4.1 Without context, we cannot make a recommendation about the call number RB as compared to the more familiar RP within GDOT. However, addressing this problem is important. If GDOT continues to use RB, this standard will need to be emphasized in the instructions and online navigation.	Implementable but out of scope
4.2 Create a new field for the year of publication.	Implementable but out of scope

4.3 Indicate whether the year of publication is based on the annual or the fiscal year for both data entry and search.	Implementable and in scope
4.4 Do not use the asterisk in the instructions.	Implementable and in scope
4.5 Relabel the <b>Words</b> search field as the more familiar <b>Keywords</b> .	Implementable but out of scope
4.6 Use a word more familiar to the audience than “taxonomy.”	Implementable and in scope

## Navigation

Table 5. Navigation Recommendations

Navigation Recommendations	Action
5.1 Participants would like an online list that helps them know what search words to use. The taxonomy list is a beginning for this, but it should be expanded and provided online as a search aid.	Implementable but out of scope
5.2 Place the most used search fields ( <b>Words</b> , <b>Title</b> , and <b>Author</b> ) at the beginning of the search options.	Implementable but out of scope
5.3 Move the link to the PDF of full reports up on the screen so that finding it does not require scrolling.	Implementable but out of scope
5.4 On the front-end interface, make the year range fields more visible.	Implementable but out of scope
5.5 Make the linked media icon more visible.	Implementable but out of scope
5.6 Add graphics that reflect the website to the instructions (for example, the MARC Detail icon).	Implementable and in scope

## Search and Taxonomy

Table 6. Search and Taxonomy Recommendations

Search and Taxonomy Recommendations	Action
6.1 Integrate the taxonomy into an overall search strategy, and communicate this to users. Simplify the instructions on this topic and provide them both on-screen and in print. Also communicate the value of using the taxonomy terms. For example, what is the benefit of the taxonomy search using the Subject field versus the Words field?	Implementable and in scope
6.2 Communicate how the taxonomy might be useful to participants and consider renaming it with a more user-friendly term.	Implementable and in scope
6.3 Make it clear that terms entered in the <b>Subject</b> field must come exactly from the taxonomy table.	Implementable and in scope



## Other

Table 7. Other Recommendations

Other Recommendations	Action
7.1 Add a link where people can quickly and easily report any errors in the online library. For example, perhaps the RB designation is missing from a research report. A simple <b>mailto</b> command can allow a user to notify the data entry administrator.	Implementable but out of scope
7.2 Clearly note all databases that are linked or searched through this system (for example, NCHRP).	Implementable but out of scope
7.3 Consider moving tip box for the subject search up in the order.	Implementable but out of scope

## Conclusion

The grant team has established a new search taxonomy and reliable search process, updated GDOT research report records to librarian cataloging standards, made abstract content searchable, created instructions for supporting use of the front-end and back-end EOS system, and usability tested all of these elements with current GDOT employees. We find that the EOS system is a robust cataloging system that has expansive cataloging features and integrative capabilities with other library systems across the nation. However, the system is primarily designed for use by librarians. Popular search tools, like Google, have impacted how users expect search applications to perform. While EOS holds great promise for archiving valuable research artifacts, GDOT employees must be trained on specific data functions within EOS to make their search efforts fruitful. The team's instructional tools and initial training will help with this educational endeavor, but some elements of the EOS system design and functionality may persist and frustrate users over time. We recommend that GDOT remain committed to the new standards and processes for data entry and maintenance within EOS, while also considering user experience moving forward. If the EOS system design and interface cause more confusion in spite of ongoing training, GDOT should consider seeking assistance with further customization of the tool's interface.

**Appendix A**  
**GDOT EOS.Web Usability Assessment**  
**Pre-Test Questionnaire Findings**

Name

How familiar are you with the EOS system that contains past GDOT research?

1 <b>xx</b>	2 <b>xxx</b>	3	4 <b>x</b>	5 <b>x</b>
Very familiar	Somewhat familiar	Not sure	Somewhat unfamiliar	Not familiar at all

If you are familiar with the EOS system, how would you describe its usability?

1	2 <b>xxxx</b>	3 <b>xx</b>	4 <b>x</b>	5
Very easy	Somewhat easy	Neither easy nor difficult	Somewhat difficult	Very difficult

How likely are you to interact with the updated EOS system in the future?

1 <b>xxxx</b>	2 <b>x</b>	3 <b>x</b>	4 <b>x</b>	5
Very likely	Somewhat likely	Not sure	Somewhat unlikely	Very unlikely

If you are likely to interact with the updated EOS system in the future, how are you likely to use it?

## Appendix B

### GDOT EOS.Web Usability Assessment

### Scenarios/Tasks

Which web browser does the participant usually use? Record browser chosen for testing.

**For the following tasks, use the EOS.Web Front-End User Guide.**

#### Task 1

Feel free to review the instructions briefly to get an idea of content.

1. Using the Front-End User Guide, go to the Roy Flynt Memorial Library home page.
2. You are part of a GDOT project to assess the effects of stormwater on Georgia roads. Using the public access link (front end) for the EOS.Web system and the instructions, find information on your topic.
3. How many research reports are identified?
4. View the PDF of one of the research reports

#### Task 2

1. Go to the Roy Flynt Memorial Library home page.
2. Your team is going to prepare a report about bridge safety in the Atlanta area. You have been asked to brief your team on research that GDOT has already completed. Use the EOS.Web to complete this task.
  - How many results do you get?
3. Narrow your search to the past 3 years only.
  - How many results do you get?
  - How many are GDOT research reports?

#### Task 3

1. Go to the Roy Flynt Memorial Library home page.
2. GDOT has a new search taxonomy to aid consistency in searching (in case keywords don't find all related material). Use the subject taxonomy to find information on public transportation.
  - a. What types of information do you see?

**For the following tasks, use the EOS.Web Back-End User Guide:**

#### Task 4

Feel free to review the instructions briefly to get an idea of content.

1. Using the Back-End User Guide, go to the Roy Flynt Memorial Library home page.
2. Log in.
3. Your team is going to prepare a report about erosion. You have been asked to brief your team on research GDOT has already completed with regard to erosion. Use EOS.Web to complete this research.
  - How many results do you get?
4. Narrow your search to the past 5 years only.
  - How many results do you get?
  - How many are GDOT research reports?
  - View the PDF of one of the research reports.

#### Task 5

1. Go to the Roy Flynt Memorial Library home page.  
Some new reports have come in and need to be put into EOS. Here is the information on one of them. Enter it into the system. Use the name "Usability Test X" for the title.

**Appendix C**  
**GDOT EOS.Web Usability Assessment**  
**Post-Test Instruction Findings**

1. I think that I would like to use these instructions frequently.

Strongly Disagree		Strongly Agree		
1	2	3xx	4xx	5xxx

2. I found the instructions unnecessarily complex.

Strongly Disagree		Strongly Agree		
1x	2xxx	3x	4xx	5

3. I thought the instructions were easy to use.

Strongly Disagree		Strongly Agree		
1	2	3xxx	4xxx	5x

4. I thought there was too much inconsistency in the instructions.

Strongly Disagree		Strongly Agree		
1xxx	2x	3xx	4	5

5. I would imagine that most people would learn to use these instructions very quickly.

Strongly Disagree		Strongly Agree		
1	2x	3x	4xxx	5xx

6. I found the instructions very cumbersome to use.

Strongly Disagree		Strongly Agree		
1xx	2xxx	3x	4x	5

7. I felt confident using the instructions.

Strongly Disagree		Strongly Agree		
1	2	3xxxx	4xx	5x

## Appendix D

### GDOT EOS.Web Usability Assessment

# Post-Test System Usability Scale Findings

Name

1. I think that I would like to use this system frequently.

Strongly Disagree

Strongly Agree

1	2	3xxx	4xx	5xx
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2. I found the system unnecessarily complex.

Strongly Disagree

Strongly Agree

1xx	2xx	3xx	4x	5
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3. I thought the system was easy to use.

Strongly Disagree

Strongly Agree

1	2	3xxx	4xxx	5x
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4. I think I would need the support of a technical person to be able to use this system.

Strongly Disagree

Strongly Agree

1x	2xxx	3xxx	4	5
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5. I found the various functions in this system were well integrated.

Strongly Disagree

Strongly Agree

1	2x	3xxxxx	4x	5
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6. I thought there was too much inconsistency in this system.

Strongly Disagree

Strongly Agree

1xx	2xxx	3x	4	5
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7. I would imagine that most people would learn to use this system very quickly.

Strongly Disagree

Strongly Agree

1	2x	3xx	4x	5xx
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