

The Earth Life and Semantic Web Project Experiment GUI

Usability Study Report

Luis Antonio Garnica Chavira

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Introduction

The Earth, Life and Semantic Web (ELSEWeb) project integrates the NASA-funded Earth Data Analysis Center (EDAC) with an analytical Web Service platform, Lifemapper, which models potential future species distributions under scenarios of climate change. The integrated system provides climate change impact scientists streamlined mechanisms for discovering, accessing, understanding, and using Earth observation data to model future species projection scenarios. The ELSEWeb Experiment GUI provides the user a dynamic workflow visualization for the specification of Lifemapper experiments with the integration of EDAC datasets.

A usability test is intended to determine the extent an interface facilitates a user's ability to complete routine tasks. Typically the test is conducted with a group of potential users either in a usability lab, remotely (using e-meeting software and telephone connection), or on-site with portable equipment. Users are asked to complete a series of routine tasks. Sessions are recorded and analyzed to identify potential areas for improvement to the web platform.

ELSEWeb's interface developer conducted an onsite usability test using a live version of the ELSEWeb platform (<http://elseweb.cybershare.utep.edu/>) deployed into a web production server. The test administrator's laptop was used by the participants to perform the usability test. Screen interaction and participant audio was recorded with BB Flash Back Express Recorder software. The test administrator was present in the testing room, also acting as a data logger. The session captured participant's navigational choices, logger observations, task completion rates and post-test survey questions.

Executive Summary

ELSEWeb's interface developer conducted an onsite usability test at the University of Texas at El Paso, Computer Science Building, room 3.1202 D. Testing sessions took place between July 9th and July 21st 2015. The purpose of the test was to assess the usability of ELSEWeb's Experiment interface design, information flow and functionality.

Fifteen attendees participated during the previously mentioned time-lapse. Typically a minimum of eight participants are involved in a usability test to ensure stable results. Each individual session lasted approximately 15 minutes.

According to survey data, 60% of participants provided an "Excellent" rate level over the overall graphical interface, while 40% considered it as "Good". All of the participants involved have had some sort of higher level education level where the area of Computer Science made up 40% of the participants and 26.67% were from related areas of study (software and information technology). Geological and environmental science students constituted 26.67% of the participants and only 6.67% from an electrical engineering background.

In general all participants provided high scores on website interface, where 66% agree that the interface was easy to use most of the time and the remaining 34% strongly agree. There were user comments from the survey supporting this figures such as “it was very useful and friendly” and “was straight forward and easy to use”.

The test identified the following set of recurring problems for most of the users:

- The constant change in data availability notification disturbed the process of selecting a bounded region, due its effect of changing the position if the map widget.
- Lack of identifiable notifications when a user is missing data to move to the next step in the workflow.
- Bottom positioning of the workflow tabs were hard to locate by some users.
- Lack of experiment submission progress widget. Users find it meaningful to have some sense that something is happening in the background during waiting time.
- Lack of numbering system for workflow steps.
- Synchronization problems between the calendar widgets and tab enabling for the next workflow step (task 5).

This document contains the participant feedback, satisfaction rated, task completion rates, time on task, logger observations, critical and non-critical errors and recommendations for improvements. A copy of participants’ tasks and post-task surveys are included in the attachments section.

Methodology

Sessions

The project principal investigator contacted and recruited participants via publicly available e-mail of the Cybershare department students and staff at The University of Texas at El Paso (Cybershare-know@listserv.utep.edu). The project PI sent an email invitation including: goals for the study, onsite location, available dates, and time intervals from 10am - 12 pm and 1pm – 5pm. Each individual session lasted approximately 15 minutes. During the session the test administrator explained the test session, and asked the participant to read and sign the information and consent form before beginning the test (see Attachment A). Participant was then given a sheet with tasks to perform on the platform (see Attachment B).

Before starting the tasks, the test administrator enabled BB FlashBack Recorder software over the platform screen, and made available an additional tab on the web browser to fill an online survey (<https://www.surveymonkey.com/r/K768JTR>) after completing all assigned tasks.

Participants

All fifteen participants were current or graduated students from the University of Texas at El Paso. Students attended at sporadic times between July 9th and 21st 2015. Participant age ranged between 24 and 39 years old. All participants had some kind of higher education level where 6.67% has completed 3 years of college, 33.33% graduated from college, 33.33% currently attending some graduate school and 26.67% completed graduate school.

Participant study areas distributed as shown on the following table:

Study Area

Computer Science	Information Technology	Electrical Engineering	Geological Sciences	Environmental Sciences	Software Engineering
6	1	1	3	1	3

Evaluation Tasks/Scenarios

Test participants attempted completion of the following tasks (see Attachment B for complete task details).

Evaluation Tasks

ID	Task
T1	Login to the website.
T2	Establish a boxed region for dataset availability.
T3	Select species occurrence set.
T4	Set filtering parameters for corresponding datasets
T5	Select Model algorithm and parameter values.
T6	Select datasets for experiment submission.
T7	Submit experiment specification.
T8	Consult experiment status.

Results

Task Completion Success Rate

All participants successfully completed tasks 1, 2, 3, 4, 6 with varied times and non-critical errors that could be corrected during workflow progress. Task 5 was not completed by one (6.66%) participant, task 8 could not be completed by two participants (13.33%) due to a processing error on experiment submission.

Task Completion Rates

Participant	Task 1	Task 2	Task 3	Task 4	Task 5	Task 6	Task 7	Task 8
1	✓	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	-	✓
3	✓	✓	✓	✓	✓	✓	✓	✓
4	✓	✓	✓	✓	✓	✓	✓	✓
5	✓	✓	✓	✓	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✓	✓
7	✓	✓	✓	✓	✓	✓	✓	✓
8	✓	✓	✓	✓	✓	✓	✓	✓
9	✓	✓	✓	✓	✓	✓	✓	✓
10	✓	✓	✓	✓	✓	✓	✓	✓
11	✓	✓	✓	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓	✓	-	✓
14	✓	✓	✓	✓	-	✓	✓	✓
15	✓	✓	✓	✓	✓	✓	✓	✓
Success	15	15	15	15	14	15	15	13
Completion Rates	100%	100%	100%	100%	93.33%	100%	100%	86.66%

Time on Task

The recording software took the time of overall interaction for each participant. Time for each task was extracted by analyzing each of the recordings. Some tasks were inherently more tedious to complete than others and is reflected by the average time on task. No recording is available for subjects 1 and 2 due to malfunction of the first recording software used (CamStudio). Aggregate values do not take into account first two subjects.

Task 1 required participants to login to the system and navigate to the experiment specification interface (mean = 53 sec). Completion times ranged from 34 seconds to 1 minute and 20 seconds.

Task 2 required participants to specify a boxed region using the google maps widget (mean = 1 min, 24 sec). Completion times ranged from 28 seconds to 2 minutes and 4 seconds.

Task 3 required participants to select a species occurrence set from a combo box populated with a list of species scientific names (mean = 47 sec). Completion times ranged from 19 seconds to 1 minute and 25 seconds.

Task 4 required participants to add one set of filtering parameter for fetching EDAC datasets. Each filter set consists of start date, end date, entity, characteristic and source (mean = 1 min and 13 sec). Completion times ranged from 38 seconds to 2 minutes and 15 seconds.

Task 5 required participants to select a modeling algorithm and leave parameter values as default (mean = 19 sec). Completion times ranged from 11 seconds to 45 seconds.

Task 6 required participants to select two EDAC datasets for experiment specification (mean = 21 sec). Completion times ranged from 12 seconds to 29 seconds.

Task 7 required participants to submit experiment specification and wait for the submission to be processed (mean = 37 sec). Completion times ranged from 19 seconds to 2 minutes and 12 seconds.

Task 8 required participants to navigate to the result page on the Lifemapper platform and consult experiment status (mean = 34 sec). Completion times ranged from 19 seconds to 1 minute and 8 seconds.

Time on Task

(Values are presented in seconds)

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	Avg. TOT*
Task 1	n/a	n/a	80	54	38	51	63	34	46	84	37	42	40	70	55	53
Task 2	n/a	n/a	239	28	37	58	159	53	74	90	124	82	77	87	112	94
Task 3	n/a	n/a	85	45	19	27	58	39	31	45	54	74	50	47	43	47
Task 4	n/a	n/a	62	73	38	66	135	56	81	58	82	62	51	127	52	73
Task 5	n/a	n/a	17	11	11	14	19	12	24	19	34	21	11	45	12	19
Task 6	n/a	n/a	27	24	13	16	29	14	26	26	27	25	17	12	18	21
Task 7	n/a	n/a	56	19	35	22	18	21	25	20	25	35	132	23	55	37
Task 8	n/a	n/a	63	19	15	29	35	40	60	52	23	68	-	24	20	34

On average the longest task to complete was task 2 (bounding box specification) and the shortest was task 5 (algorithm selection).

Errors

The test administrator captured the number of errors participants by analyzing screen recordings.

A non-critical error is an error that does not prevent successful completion of the scenario. A critical error is considered either a user or system error that impedes successful completion of the overall workflow. Most non-critical errors were found during execution of task 2 (map bounding box), on the other hand task 6 and 7 presented no errors from the participants. Two system critical errors happened during experiment submission (task 7) and one user critical

error occurred (task 5) when a user accidentally changed the default parameter and could not remember what the value was (not available to reset or simply consult on the interface).

Non-Critical Errors

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	TOT
Task 1	n/a	n/a	0	0	0	2	1	0	0	0	0	0	0	0	0	3
Task 2	n/a	n/a	3	0	1	0	2	1	1	1	1	1	0	0	0	11
Task 3	n/a	n/a	1	1	1	0	2	0	1	0	0	1	0	0	0	7
Task 4	n/a	n/a	0	0	0	1	3	0	2	0	0	0	0	2	1	9
Task 5	n/a	n/a	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Task 6	n/a	n/a	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Task 7	n/a	n/a	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Task 8	n/a	n/a	1	1	1	0	1	0	0	1	0	1	0	0	0	6

Summary of Data

The table below displays a summary of the test data. Low completion rates, high errors and high time value on tasks are highlighted in red.

Summary of Completion, Errors, Time on Task

Task	Task Completion	Errors	Time on Task
1	15	3	53
2	15	11	94
3	15	7	47
4	15	9	73
5	14	0	19
6	15	0	21
7	15	0	37
8	13	6	34

Overall Metrics

Overall Ratings

After task session completion, participants rated the site for several overall measures through an online survey at <https://www.surveymonkey.com/r/K768JTR> (See Attachment C for full survey questions). These measures are divided in sections and include:

- Feelings after using the interface
- Aspects in the interface design
- Overall interface evaluation

According to survey data, 60% of participants provided an "Excellent" rate level over the overall graphical interface, while 40% considered it as "Good". In general all participants provided high scores on website interface design where 66% agree that the interface was easy to use most of the time and the remaining 34% strongly agree. Even though the ease of use of the interface

seems transparent there was a low percentage for users that felt in complete control when using the interface (46.67%).

Feelings after using the interface

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
The use of the interface was easy most of the time, i.e. there was no confusing instructions.	0.00% 0	0.00% 0	0.00% 0	66.67% 10	33.33% 5	15	4.33
I felt in control when using the ELSEWeb interface.	0.00% 0	13.33% 2	6.67% 1	33.33% 5	46.67% 7	15	4.13
The interface was user friendly.	0.00% 0	0.00% 0	6.67% 1	40.00% 6	53.33% 8	15	4.47
Instructions to create an experiment in ELSEWeb were specific.	0.00% 0	0.00% 0	13.33% 2	33.33% 5	53.33% 8	15	4.40

Aspects in the interface design

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total	Weighted Average
Names in menus and buttons are meaningful.	0.00% 0	0.00% 0	13.33% 2	33.33% 5	53.33% 8	15	4.40
Error and instruction messages were helpful and easy to understand.	0.00% 0	6.67% 1	20.00% 3	33.33% 5	40.00% 6	15	4.07
The established order of tasks are appropriate for understanding and completion of the overall goal.	0.00% 0	0.00% 0	13.33% 2	40.00% 6	46.67% 7	15	4.33

Final Evaluation: What would be your overall score for the graphical user interface?

Answer Choices	Responses
Excellent	60.00% 9
Good	40.00% 6
Average	0.00% 0
Fair	0.00% 0
Poor	0.00% 0
Total	15

Positive Comments, Problems and Participant Recommendations

Upon completion of the tasks, participants provided comments and recommendations the experiment interface.

Positive Comments

The following comments capture participant positive comments:

- "Interface was very useful and friendly."
- "Overall, the site worked perfectly fine, was straight forward, and easy to use."
- "Relatively good interface, but some names are unfamiliar to me which makes selecting for instance an algorithm a bit confusing."

Participant Problems

The following comments capture where the participants has problems or frustrations with the interface:

- "It was frustrating not knowing that an option must be modified and reconfigured in order to prepare the Environmental Data Filters section."
- "The Run an experiment button is too bright and kind of makes it difficult to read the text on the button."
- "The found data set pop up became a little annoying after a while."
- "User to press the next tab can be slightly overlooked as I was unaware each tab represented a new workflow requiring a next step".
- "I had a hard time at the beginning to figure out where the tabs where, I had to scroll down to figure out there were at the bottom."

Recommendations for Improvement

- Decrease waiting duration.
- Maybe add numbers on top of the step buttons. That way the users know that they are part of a workflow process, and the steps are clearly annotated.
- On first use it is not 100% clear when the next tab is available (at first I didn't notice it) maybe an animation or bubble when it becomes available might help.
- Fix automatic search in the map control (task 2).
- Include a dropdown menu that allows a user to type words (task 3).
- Enabling the use of the word next to progress to the next section would have been equally, if not more useful and straight forward than clicking on the next tab.
- Need loading or in-progress please wait message for the map bounding box section.
- The tabs for each state of the process need to be located better visibly.
- Error message at the end ends quickly and cannot read as fast.
- The GUI could use a progress bar -- something interactive that could hint the user that something is happening (GIF).
- The summary could have a different color as updates are being made. For instance, as I pick a date, the summary could have the update in a color visible to the user.
- The GUI should provide an error message telling the user what's missing.

Data Logger Observations

Subject	Observations
s1	T2 - User is struggling on specifying a granular boxed region. The change in data availability disturbs the process of selecting a bounded region due to movement of the map box. T4 - Mistake when selecting the date, user forgets to select day at the end on the calendar widget. Calendar widgets do not synchronize after selecting the date, only after moving to the next combo box selection widget.
s2	T2 - The map widget seems tedious for the user to use. Maybe there should be a layer to let the user know what regions of data are available. T7 - The user asked: How long do I have to wait for the experiment to be submitted? There was an error on execution on the first try. T8 - User struggled to find the execution status on Lifemapper. Error messages were too short, not enough time to know what was going on.
s3	No observations
s4	No observations
s5	No observations
s6	No observations
s7	T2 - Data availability notice causes frustration and trouble for the user to select a boxed region. T3 - A type ahead widget was recommended by the user for the species selection widget.
s8	No observations
s9	T2 - User struggled to select the boxed region. (Same issue as other users).
s10	T2 - Long time to load the experiment section.
s11	Tabs were hard to find for the user, also struggled to locate the species name.
s12	No observations
s13	No observations
s14	T4 - User struggled with the calendar widget by not selecting the day at the end. T5 - User changed the parameter value by mistake and could not go back to see the default value.
s15	No observations

Recommendations

The recommendations section provides recommended changes and justifications driven by the participant success rate and comments. Each recommendation includes a severity rating. The following recommendations will improve the overall ease of use and address the areas where participants experienced problems or found the interface/information architecture unclear.

Establish a boxed region for dataset availability. (Task 2)

Task 2 requires participants to specify a boxed region using the google maps widget where a box is manipulated over the map to specify the boxed region.

Change	Justification	Severity
<ul style="list-style-type: none"> Fix data availability notifications so that it does not affect position of the map widget. Improve the way to establish a bounded region. 	<p>Participant comments also included fixing data availability notifications under a boxed region. They also commented on their frustration due to the amount of notification changes during this process.</p> <p>This task contributed to the highest level of user errors and average completion times.</p>	High (1)

Set filtering parameters for EDAC datasets. (Task 3)

Task 3 requires participants to select a species occurrence set from a combo box populated with a list of species scientific names.

Change	Justification	Severity
<ul style="list-style-type: none"> Incorporate type-ahead functionality for the selection list widget. 	<p>This task resulted as the third highest level of errors found due to users having difficulty to locate a target species efficiently.</p> <p>Participant comments include adding typing functionality to the search widget.</p>	Low (3)

Select Species Occurrence set. (Task 4)

Task 4 Required participants to add one set of filtering parameter for fetching EDAC datasets. Each filter set consists of start date, end date, entity, characteristic and source.

Change	Justification	Severity
<ul style="list-style-type: none"> Fix calendar widget synchronization problems. Provide bubble type errors to identify missing data to enable the next step. 	<p>This task resulted as the second highest level of errors found due to users having difficulty to set the first calendar values and synchronization problems to enable the next tab even after all data was selected.</p>	Moderate (2)

Submit Experiment Specification. (Task 7)

Task 4 Required participants to add one set of filtering parameter for fetching EDAC datasets. Each filter set consists of start date, end date, entity, characteristic and source.

Change	Justification	Severity
<ul style="list-style-type: none"> • Add a progress bar or animation during experiment submission process. • Increase notification timings or enable user to close notification after experiment submission for both error and success states. 	<p>Participants felt the need to know how long the experiment submission was going to take.</p> <p>A participant recommended that "the GUI could use a progress bar -- something interactive that could hint the user that something is happening (GIF)".</p> <p>It was hard for the participants to read notifications after experiment submission due to the quick timing it takes to disappear.</p> <p>Only 40% of participants strongly agreed that current error messages were meaningful in the interfaces.</p>	High (1)

Overall Experiment Interface. (All Tasks)

The overall experiment interface requires that participants navigate through automatically enabled tabs to move into the next step on the workflow. The tabs are currently located on the bottom of the interface.

Change	Justification	Severity
<ul style="list-style-type: none"> • Move experiment workflow tabs to the top of the interface. • Add a numbering mechanism. • Add bubble notifications when a tab is not enabled to identify missing data. 	<p>During testing s few participants had a hard time initially identifying the location of the workflow tabs.</p> <p>Some users suggest changing the placement of the tabs and adding a numbering mechanism to identify that the process is part of a sequential workflow.</p> <p>The interface attempts for a guided workflow, but there was a lack of notifications for moving into the next step in the workflow, causing the users to lose a sense of control as depicted in the survey.</p>	High (1)

Conclusion

Most of the participants found the ELSEWeb Experiment Interface to be easy to use and straight forward, never the less it still depicts behaviors that provoke user frustration and lack of control. Among the main misguided behaviors are the constant notifications when selecting bound box region on task 2.

Participants needed a full sense of why they could not advance into the next step in the workflow. An identification mechanism is needed to let the user know what inputs have not been selected to move into the next step.

On step 7 the participants are required to wait for an indefinite amount of time for the experiment specification to be submitted. Participants commented on having the need to know that a process is taking place on the background either though some kind of animation or progress identifier.

Finally the location of widgets for efficient navigation on a system is essential. In this case we identified that the step navigation tabs are not accurately located for efficient use. Some users did not immediately identify workflow tabs and also suggested to add a numbering mechanism to the workflow.

Implementing the recommendations and continuing to work with users will ensure a continued user-centered interface for establishing scientific workflows.

Attachment A – Information and Consent Form

The Earth Life and Semantic Web Project Experiment GUI

Information and Consent Form

Introduction:

This research study is being conducted by Luis Garnica, a Software Engineering graduate student at the University of Texas at El Paso under the supervision of Dr. Natalia Villanueva and Dr. Deana Pennington, faculty members part of Cyber-ShARE, Center of Excellence. Please read this form and ask questions before you agree to form part of the research activities.

Background Information:

The goal of this study is evaluate an experiment graphical user interface for The Earth, Life and Semantic Web Project. The evaluated interface forms part of the project website at <http://elseweb.cybershare.utep.edu/>. The goals of usability testing include establishing a baseline of user performance, establishing and validating user performance measures, and identifying potential design concerns to be addressed in order to improve the efficiency, productivity, and end-user satisfaction.

The usability test objectives are:

- To determine design inconsistencies and usability problem areas within the user interface and content areas. Potential sources of error may include:
 - Navigation errors – failure to locate functions, failure to follow recommended experiment workflow.
 - Presentation errors – failure to locate and properly act upon desired information in screens, selection errors due to labeling ambiguities.
 - Control usage problems – improper toolbar or entry field usage.
- Exercise the ELSEWeb experiment interface under controlled test conditions with representative users. Data will be used to access whether usability goals regarding an effective, efficient, and well-received user interface have been achieved.
- Establish baseline user performance and user-satisfaction levels of the user interface for future usability evaluations.

Procedures:

As a participant you will complete a set of assigned tasks as efficient and timely a manner as possible, and provide feedback regarding the usability and acceptability of the interface. You will be directed to provide honest opinions regarding the usability of the application, and to participate in post-session subjective survey.

A Windows laptop computer with the Web application and supporting software will be assigned to you in a typical research environment. Your interaction with the Web application will be monitored by the facilitator seated in the same room. An application called BB Flashback Recorder will be used to record screen interaction and your audio comments during task development. Your face will not be recorded for the purpose of this study. The purpose of this study is on evaluating the application, rather than the facilitator evaluating you.

Risks and Benefits:

There is no risk associated with individual's participation during this research.

Compensation:

There is no compensation associated with this research.

Confidentiality:

Your participation in this research will be confidential. In any written reports or publications, no one will be identified or identifiable and only group data will be presented. Your name will not be recorded in any document. Only three demographic questions will be considered in the post-test survey: age, education level and area of study.

Voluntary Nature of the Research:

Although participation in activities is encouraged by all members of the team, it remains completely voluntary. Your decision whether or not to participate will not affect your future relations with Cyber-ShARE in any way.

Contacts and Questions:

If you have any questions, please feel free to contact me, Luis Garnica, at **lagarnicachavira@miners.utep.edu**. You may ask questions now, or if you have any additional questions later, we will be happy to answer them.

You may keep a copy of this form for your records

Statement of Consent:

You are making a decision whether or not to participate on activities during the usability study session of the ELSEWeb experiment platform. Your initials indicate that you have read this information and your questions have been answered. Even after signing this form, please know that you may withdraw from the research at any time.

I consent to participate in the research.

Participant Initials

Date

Signature of Researcher

Date



Attachment B – Participant Tasks

The Earth Life and Semantic Web Project Experiment GUI

User Goals and Methodology

The following is set of goals and methodology to achieve them. The set of tasks are to be performed on the ELSEWeb experiment graphical user interface as part of the project website available at <http://elseweb.cybershare.utep.edu/>.

1. Login to the website
 - Step 1 – Move the pointer to the upper-right side of the site.
 - Step 2 – Click the login dropdown button.
 - Step 3 – Enter the following credentials user: **guest** password: **guest**
 - Step 4 – Click the login button.
 - Step 5 – Once logged in click on the Experiments section on the main menu.
 - Step 6 – Click on the Run Experiment button.
2. Establishing a boxed region for dataset availability.
 - Step 1 – Locate yourself in the Environmental Data Region section of the Experiment GUI
 - Step 2 – Hover over the pre-established boxed region and manipulate and move box for datasets available the North American region.
 - Step 3 – Hover over the box and make sure data is available for the established boxed region.
 - Step 4 – Move to the next enabled tab.
3. Selecting species occurrence set.
 - Step 1 – Locate yourself on the Lifemapper Species Occurrence Sets dropdown menu.
 - Step 2 – Look for the species occurrence with the name of “Cosmos Sulphureus Cav.”.
 - Step 3 – Select the previously mentioned species as part of the specification.
 - Step 4 – Move to the next enabled tab.
4. Setting filtering parameters for corresponding datasets.
 - Step 1 – Locate yourself on the Environmental Data Filters section.
 - Step 2 – Click on the + Add data set button to add a new filter set.
 - Step 3 – Select a start date of January 1st 1980.
 - Step 4 – Select as the end date to the current date.
 - Step 5 – Select the surface-layer entity.
 - Step 6 – Select the temperature characteristic.
 - Step 7 – Select the MODIS source.
 - Step 8 – Move to the next enabled tab.
5. Selecting model algorithm and parameter values.
 - Step 1 – Locate yourself on the Algorithm selection section.
 - Step 2 – Select the Bioclim algorithm.
 - Step 3 – Leave parameters as default and move to the next section.
6. Dataset selection according to previous filters.

Step 1 – Locate yourself at the environmental dataset selection section.

Step 2 – Select two dataset options.

7. Submitting experiment specification.

Step 1- Click the Submit tab.

8. Consulting experiment status.

Step 1 – Wait for experiment submission to conclude.

Step 2 – Navigate to the URL result provided by the interface.

Step 3 – Consult experiment execution status.



Attachment C – Post-Test Survey

The Earth Life and Semantic Web Project Experiment GUI

Usability Study Survey

Survey Hosted at: <https://www.surveymonkey.com/r/K768JTR>

Demographics

1. Age:

2. Education Level:

3. Area of Study:

Background

On a scale of 1 to 5, 1 being "Strongly Disagree" and 5 being "Strongly Agree", provide an agreement level for the following statement:

4. I am very confident when it comes to the use of computers.

☒ 1- Strongly Disagree

☐ 2 - Disagree

☐ 3 - Neutral

☐ 4 - Agree

☐ 5 - Strongly Agree

5. Did you have formal or self-training?

Feelings after using the interface

On a scale of 1 to 5, 1 being "Strongly Disagree" and 5 being "Strongly Agree", provide an agreement level for the following statements:

6. The use of the interface was easy most of the time, i.e. there was no confusing instructions.
 - ☐ 1- Strongly Disagree
 - ☐ 2 - Disagree
 - ☐ 3 - Neutral
 - ☐ 4 - Agree
 - ☐ 5 - Strongly Agree
7. I felt in control when using the ELSEWeb interface.
 - ☐ 1- Strongly Disagree
 - ☐ 2 - Disagree
 - ☐ 3 - Neutral
 - ☐ 4 - Agree
 - ☐ 5 - Strongly Agree
8. The interface was user friendly.
 - ☐ 1- Strongly Disagree
 - ☐ 2 - Disagree
 - ☐ 3 - Neutral
 - ☐ 4 - Agree
 - ☐ 5 - Strongly Agree
9. Instructions to create an experiment in ELSEWeb were specific
 - ☐ 1- Strongly Disagree
 - ☐ 2 - Disagree
 - ☐ 3 - Neutral
 - ☐ 4 - Agree
 - ☐ 5 - Strongly Agree

Aspects in the interface design

On a scale of 1 to 5, 1 being "Strongly Disagree" and 5 being "Strongly Agree", provide an agreement level for the following statements:

10. Names in menus and buttons are meaningful.

- ☐ 1- Strongly Disagree
- ☐ 2 - Disagree
- ☐ 3 - Neutral
- ☐ 4 - Agree
- ☐ 5 - Strongly Agree

11. Error and instruction messages were helpful and easy to understand.

- ☐ 1- Strongly Disagree
- ☐ 2 - Disagree
- ☐ 3 - Neutral
- ☐ 4 - Agree
- ☐ 5 - Strongly Agree

12. The established order of tasks are appropriate for understanding and completion of the overall goal.

- ☐ 1- Strongly Disagree
- ☐ 2 - Disagree
- ☐ 3 - Neutral
- ☐ 4 - Agree
- ☐ 5 - Strongly Agree

Final Evaluation

13. What would be your overall score for the graphical user interface?

- ☐ Excellent
- ☐ Good
- ☐ Average
- ☐ Fair
- ☐ Poor

14. Suggestions for improvement.