

DOE Feasibility Report

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CSC-450/650

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1. Client Information

Our client is (cascading down):

United States Department of Energy (DOE)
Office of Energy Efficiency and Renewable Energy (EERE)
Building Energy Research & Development
Building Technology Office

For succinctness, the client is referred to as “the client” or “DOE” in the rest of this document.

DOE Contacts:

Dr. Wyatt Merrill
Email: wyatt.merrill@ee.doe.gov
Company: Department of Energy Building Technologies Office
Website: <https://www.energy.gov/eere/buildings/building-technologies-office>

2. Team Member Information

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3. Product Vision:

Project Name: Spectra Search SPD Database.

Client: Department of Energy Building Technologies Office

Need: a searchable database of spectral power distributions (SPD) from commercial LEDs that has the ability to derive lighting qualities (TM30, CRI, color temperature, etc.) directly from the SPD and the ability to export the data unlike private sector firms and general energy companies or Databases technology firms who might charge too much for such a product. The product should undergo user testing to ensure import/export capabilities as well as correct and accurate SPD calculations.

Solution: Spectrasearch SPD database product is a searchable database for which the customer can access data and analytical information regarding lighting mechanism sources and filter them accordingly.

Approach: The product will meet the needs of the customer by taking a direct implementation to creating the database for spectral power distributions. The product overall will be a less generalised product in terms of databases. In terms of benefits for the specific customer the product will be suited and specialized toward the Department of Energy. This product will aim to satisfy the need in the lighting industry that is the lack of information and searchable databases for lighting companies. The client emphasized there is no readily available database like this, our product aims to fill that need.

Competitive Alternative: Unlike any other private sector firms and general energy companies or Databases technology firms who might charge too much for such a project or require a database that can risk the danger of exposing sensitive data or with such factorial risks highlighted later in this document. This product aims to be accurate and efficient in terms of SPD calculations and data availability.

Differentiation: The product created by our team will be supervised under the department of energy's guidance(The client). The system proposed by the AU team will apply the latest technology taught in databases and in accordance with what is latest in the database industry as well as topics such as ease of data collection, search and efficient data storing.

Our Product will tackle the generality, the unfinished part of the database, improve it, create a more census and efficient database to keep it short/sweet. Filter option and optimization can be added upon the client's discretion and view.

While there are not any direct competitors for databases and web applications that provide this lighting information The Spectrasearch product will be one of the first web tools for companies to upload user data, run calculations on the data to output desired metrics and provide a database of information for the user to then export for visualization.

4. Preliminary Requirements:

The designed database that is already implemented will be enhanced accordingly to create a more efficient experience that reflects a solid backend communication between the data and the analytical information that will be showcased in the front end. This will visualize a better understanding to both the professionals and academics who are interested in the field and getting involved in the related lighting metrics/topics. Ease of data collection, uploading and organization is something that the team will strive for. The product currently lacks user testing capabilities so we want to be able to supply user capabilities like data inputting, SPD calculation capabilities and outputting the correct metrics and overall giving the user a very specialized in depth database of desired lighting information. Optional statistical analysis features can be implemented upon the request of the client by jumping into topics such as data science and big data visualization; stemming from the users requests we feel an end goal for this product will be implementing data exporting capabilities to visualization programs like tableau to further visualize and display the various lighting spectrums and information.

The intended use of this database is assumed to be among lighting and energy professionals, more specifically aimed for organizations such as the Department of Energy for large dataset searchability functions that can cover governmental and commercial grounds.

The preliminary requirement blueprint suggested above is subject to change as we are still awaiting information from the client on DOE data breakdown and database requirements. It is not clear on whether or not the site is to be run on the DOE website (energy.gov), but it seems more likely that it will be distributed to similar webpages.

The database is currently built using SQL but requires refinement in terms of data quality and the connection of the tables they fall under. It appears the current code has many data values stored in the database using hard coding so we will aim to create a method for the user to input their own information into the database. Our place currently is to update the database and code to run a more cleaner version of the data collection, storage and be able to fill in gaps in the code where data is missing. Client suggestions put us in the direction to work on giving the user the option to upload their own data that can be manipulated for calculations within the web app. Additional specifications and goals for the database also included specific aspects such as the

inclusion of multiple action spectrums that will provide the specified information for the specified category: I.E light on plants vs light on the human eye.

Database system architecture design where the team will use tools such as Mysql and React to view, edit and fix the database accordingly. In addition, We aim to use Python to parse the data inputted into the web app, collect it and make sure that the integrity is met with the highest quality as needed. The team will provide the client with information content of the database by defining the set of entities and appropriate attributes for the each respective entity, define the set of relationships that exist, define a more broad E-R diagram, define a relational schema with programs such as (Visual Paradigm or Viso) and finally test with on local machine with providing screen shots.

Deliverables:

- Sep 11: Project Feasibility Report & Survey report 1
- Oct 06: Presentation 1
- Oct 08: Interim Report 1 & Survey report 2
- Nov 03: Presentation 2
- Nov 06: Interim Report 2 & Survey report 3
- Nov 13: Team assessment report
- Dec 08: Final Presentation, Final Reports & Survey report 4

Communication Plan:

How will you keep in contact with the client and report progress? How often, and how, will you meet?

Thomas Horgan will contact the client regarding the software product at least once a week as needed over the email and ensure to update him of our progress milestones. Meetings with the client will be scheduled in advance via email so that the team and the client will be able to run tests and spot errors together.

How will you communicate among your team? How often, and how, will you meet?

We will have weekly scrum meetings on Saturday 10 AM to 12PM on AU Zoom. We will keep track of tasks throughout Github Basic Kanbin management tool. We will communicate as

needed via Slack. We will push our code as needed in the github repo. We will work together on documentation in Google Drive.

5. Rough Milestone Plan & Process:

Outline of the Plan:

Pre-Sprint Scrum 1 (Sep 3, 2020)

What we did:

Went over the customer and project requirements. Took needed actions on the feasibility report draft where we added the sections that we were going to fill in the gaps later. Talked about next steps to find more about what the old AU team did with the same client.

What we will do before the next meeting: Get more information from the client or the professor regarding the project scope and what the team did so far.

Pre-Sprint Scrum 2 (Sep 6, 2020)

What we did:

Deciding on the main course of action for the product (further updating and improving the database), we also decided on what softwares and back end strategies we will look to use including Python, SQL, Visual Paradigm and Visio. Updated our goals regarding the overall feasibility draft report, product and backend structure. Decided on how we will be in contact with the client.

What we will do before our next meeting:

Have the feasibility draft complete and contact the client with draft for feedback.

Things we/someone need(s) help on:

Clarification of several things with client

Client meeting scheduling and proposal questions. What is the preliminary design that the client wanted, what is the timing they desire us to contact them during the week? What is the time expectation with the software proposal.

Pre-Sprint Scrum 3 (Sep 9, 2020)

What we did: Met with the client (Wyatt) and worked out what we should prioritize in terms of front end and back end development prior to our first sprint deadline. He emphasized having user testing capabilities available for the end of the first sprint going into our second sprint so we can test and go from there in terms of what Wyatt will be looking for to improve upon. Ease of data uploading and exporting and accurate calculations are user testing capabilities Wyatt emphasized to have ready to try following our first sprint. Overall we gained knowledge of what front end items to prioritize and what back end items we need to prioritize.

What we will do before our next meeting:

We are to review what was given by Wyatt, and modify the Team Feasibility draft in order to meet Wyatt's demands. Also, to meet the deadlines and goals that we've set for ourselves as a team.

Post-feasibility study; Begin Sprints 1 and 2

Sprints 1 and 2 (Start September 3rd)

Sprint 1:(Ends September 29)

During Sprint 1 Scrum 1 (Sep 12, 2020)

During Sprint 1 Scrum 2 (Sep 19, 2020)

Sprint 2:(Ends October 10th)

During Sprint 2 Scrum 1 (Sep 26, 2020)

During Sprint 2 Scrum 2 (Oct 03, 2020)

Presentation 1 (Oct 06, 2020)

Interim Report 1 & Survey report 2 (Oct 08, 2020)

Sprint 3 and 4 (Start October 10th)

Sprint 3:(Ends October 24th)

During Sprint 3 Scrum 1 (Oct 10, 2020)

During Sprint 3 Scrum 2 (Oct 17, 2020)

Sprint 4:(Ends November 6)

During Sprint 4 Scrum 1 (Oct 24, 2020)

During Sprint 4 Scrum 2 (Oct 31, 2020)

Presentation 2 (Nov 03, 2020)

Interim Report 2 & Survey report 3 (Nov 06, 2020)

Sprint 5 (Start November 6th)

Sprint 5:(Ends November 28th)

During Sprint 5 Scrum 1 (Nov 07, 2020)

Team assessment report (Nov 13, 2020)

During Sprint 5 Scrum 2 (Nov 14, 2020)

During Sprint 5 Scrum 3 (Nov 21, 2020)

Additional Feature Time (Nov 28, 2020 - Dec 05, 2020)

Additional Feature Time:(Ends December 5th)

During Additional Feature Time Scrum 1 (Nov 28, 2020)

During Additional Feature Time Scrum 2 (Dec 05, 2020)

Final Reports & Survey report 4 (Dec 08, 2020)

Outline Process:

The team will follow the agile methodology in the application of this project. This will lead the team to have a milestone sprint to aim for as they progress. The milestone will serve as a phase that the client desires to reach within their product. Scrum meetings will occur every Saturday starting from Sep 12, 2020 to Dec 05 2020. All Team members are required to attend the meeting and showcase the progress they have made so far and what they are planning to work on during/before the next meeting. All Team members are expected to make suggestions and comments on other members' work, if changes are needed the team will work together on breaking down the change and assist when needed. Communication with the team members will be on a daily basis and with the stakeholder will be made occasionally on a weekly basis to update and ensure quality of service regarding the product. Code will be pushed and maintained in the team Github repository. The team agrees that its members will not merge its branches back into the master branch without testing and full team approval. The Github management board that contains the tasks will be updated accordingly and if a bottleneck is found the team will have to pull the 'Andon cord' as they see fit.

6. Business Considerations:

In accordance and based on AU Fall 2019 client's requirements and legal concerns, the software product team takes the following business considerations into account:

- (1) This product will be considered as an open-source software that can be freely used, modified, and shared;
- (2) Once delivered, our team will be hands off regarding warranty for this product and will not be liable for its maintenance, security, distribution and performance
- (3) (Restrictive) GNU General Public License, version 3 (GPLv3) will be in effect:
 - (a) All source code must be public;
 - (b) Modifications of the software must be released under the same license;
 - (c) Changes to the source code must be documented;
 - (d) This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version. This program is distributed

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7. Risk analysis:

A. Issue: Communication issues due to pandemic and social distancing

Fallback: With increased mandates pushing social distancing due to the Coronavirus pandemic mostly all of group communication and client communication is now digital. With this in mind group members must work harder and smarter to increase communication to decrease loss of efficiency and communication errors that may come with this issue. Weekly meetings and deadlines as showcased above will be set up at least a week ahead of time and contact with clients will also be set up in a timely manner to ensure nothing is lost in digital communication.

B. Issue: Loss of support and findings towards the DOE

Fallback: With increased attention and funding toward other government organizations focused on coronavirus efforts the DOE may see decreased funding and therefore support for this project. The solution here will be for our group to work with what resources and progress the project currently has and hope to not see decreased support and resources from the DOE. If we see decreased support from the governmental organizations we will have to work to make a more generalised database product that could work for other non governmental agencies.

C. Issue: Technical Integration with in the DOE infrastructure

Fallback: Technical issues may be raised during the implementation of our project into the DOE infrastructure. This might be either due to incompatibility with the tools and services they have or that they are not ready for such an integration.

D. Issue: Team issues

Fallback: If problems arise either with team members not being able to finish their part before the next sprint or team members are falling behind in keeping up with project work we will, as a group all work together to help the group member catch up and finish their part because the team cannot be successful if we are all at different points in our progress. This may include issues in pushing/pulling new code, solving code problems or other issues regarding team communication and progress. These problems will all be addressed as a team and solved as a team. If a team member leaves the team or does not come to any meetings all work from their end will be redistributed among the rest of the current team members

E. Issue: Time zone issues

Fallback: With multiple group members being in various time zones we will always implement strict but reasonable timelines for submitting work to keep progress on track and set meetings ahead of time.

F. Issue: Software issues such as lost code or slow runtimes

Fallback: If any code is lost we will have the last updated piece of code from github as all of our progress will be continually updated through their, if any slow run times are found with the code we will work as a group to either determine if the problem is with the hardware it is run on or if its a bug in the code itself.

8. Probable Technical Requirements:

Organization Tools:

Email: AU email service

Slack - official communication

Github Management Tool - kanban board

Google Drive - proposal, documents and documentation

GitHub - share that hot code

Zoom: Group meetings with both the client and group

Development Tools:

Database - SQL

Diagram Designs: Visual Paradigm or Visio, Tableau possibly for exporting and visualizing light data

Front End - Mysql and React for calls to backend and database view

Backend - Python and related script to parse the data, collect it and make sure that the integrity is met. JavaScript and implementation of JavaFX applications for the overall user interface tools.