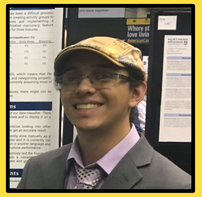
Summit: A Project Management System for Natural and Cultural Resources

Colton Nunley, Jasque Saydyk, Joseph Remy - ECOders

Mentors: Ana Paula Chaves Steinmacher, Dr. Eck Doerry

Client: Colorado Plateau Cooperative Ecosystem Studies Unit

James Allen, Dr. Todd Chaudhry, Laurie Thom



ECOders

Colorado Plateau cooperative ecosystem studies unit

Northern Arizona University — Established 1899

Mitigation of species and ecosystem loss requires active management and stewardship among the federal government and non-government partners. From planning new projects to completing the work, projects needs to be readily accessible and tracked. A new, centralized project management provides a user interface to this data, making it easy to access and use while decreasing work overhead.

Problem and Purpose

Our Client: Colorado Plateau Cooperative Ecosystem Studies Unit (CPCESU)

Background: Supporting the stewardship of natural, cultural, and social resources with active project management and their federal and non-federal partners for 20 years.

Problems:
- **Ad-hoc project management**
- **Only manual processes**
- **Difficulty with accurate reporting**
- **Four disconnected technologies**
- **Data fragmentation**
- **High human error (no validation)**

Solution: A centralized project management system as a web application

Abilities:
- **Better tracking of projects**
- **Cater to different user groups**
- **Scalable and long-term flexibility**
- **Limit manual data input**
- **Verify all data being entered**
- **Real-time database backend**

Client's Workflow, Our Approach

Project Workflow: Each project goes through the following steps (**Fig. 1**):

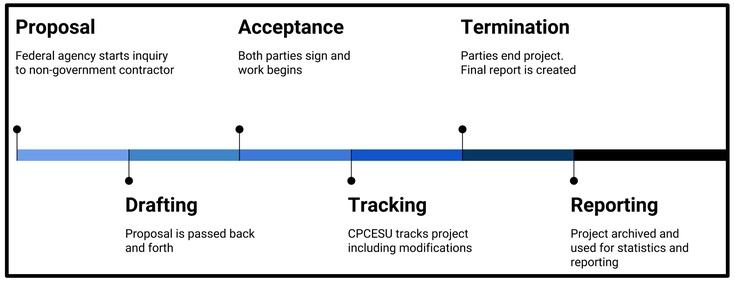


Figure 1: CPCESU Project Workflow, summarized

Current System: The current system for controlling project workflow relies on four separate systems. The biggest problem is tracking projects, especially modifications. This results in bad reporting and increases overhead and jeopardizes future projects.

Introduction as Senior Project: Seeking a better system that can address their problems, the CPCESU created a project proposal with Dr. Eck Doerry. After a bidding process, our team, ECOders, was tasked with creating this new system. We used software engineering principles and practices and worked constantly and directly with the CPCESU.

Approach: Our solution has been built from the ground up and followed these steps:

1. **Collect requirements**
2. **Prototype technologies**
3. **Create plans and design**
4. **Implement features**
5. **Conduct tests, refactor**
6. **Turn in deliverables**

Centralized, Functional Design: This system is comprised of five main aspects:
- **Project Management:** Area for completing all project tracking and support
- **Data Entry and Validation:** Projects can be easily imported and data quality is assured
- **Accessibility:** Project information is now accessible without requiring multiple tools
- **User Groups:** Application is tailored to each user using user groups and permissions
- **Robust Documentation:** Documentation will be accessible for both users and developers

Summit: the New Project Management System

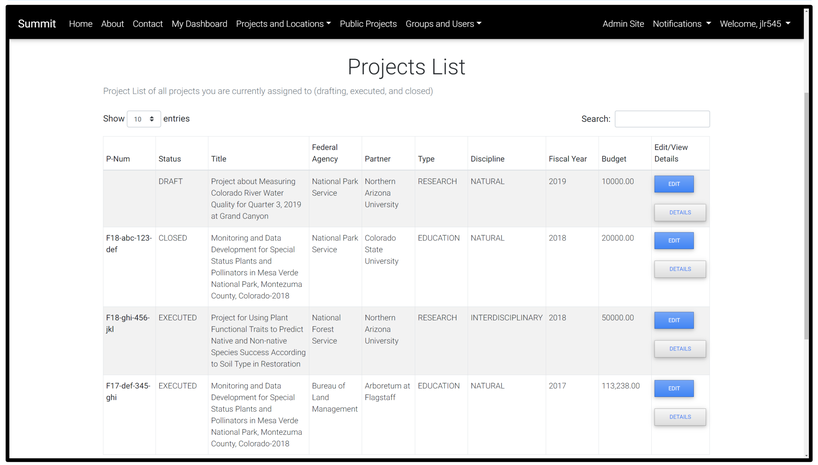


Figure 2: Project list page (beta version). One of the most important features, which includes real-time project searching using compound statements and sorting with less time, clicks, and tools than before.

Vast Improvements: To solve our client's problems, we created *Summit*, a web-application that handles projects through their six phases. The project includes various tools and views, such as the project list (**Fig. 2**). Other milestones we met include:
- **Structured project management**
- **Decreased human input**
- **Tailored user experiences**
- **One holistic system**
- **Real-time access and ease of use**
- **Accessibility regardless of device**

System Diagram

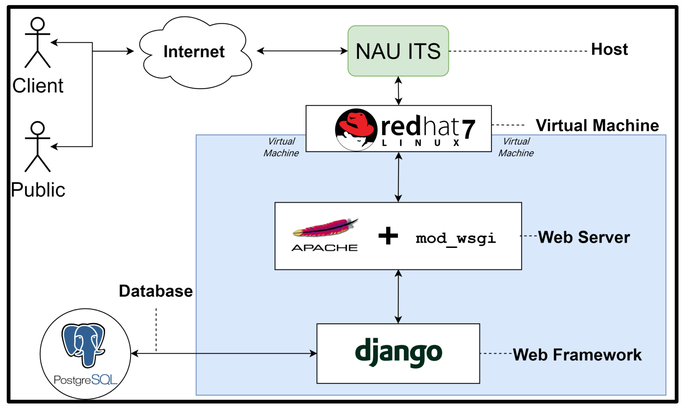


Figure 3: System architecture for our solution. NAU Information Technology Services (ITS) will host our client's new system . The main technologies are Django (web framework) and PostgreSQL (database).

Technologies

PostgreSQL · Tesseract OCR · redhat LINUX · MDB · django · CELERY · redis · Apache

Additional Problems Solved

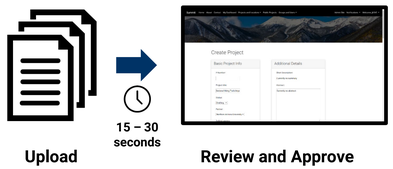


Figure 4a: Automatic Project Import Workflow

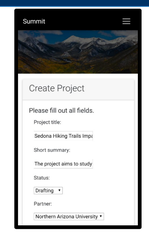


Figure 4b: Project Create Form on Mobile Device

Automated Project Import: Another important consideration for this project is the ability to do automated project importing. This feature takes in the project agreement and automatically fills in as many fields as possible. This allows for quick project creation and also facilitates bringing in decades-old project data (**Fig. 4a**).

Data Validation: This product uses web forms to control and validate what information is allowed and expected from the user. In Microsoft Access and Excel, there was little to no data validation, which caused inconsistencies. Our solution solves this by implementing restrictions on what data can be entered in the forms (field types and restrictions) (**Fig. 4b**).

User Groups, Permissions, and Views: To cater to the different user groups, we have created an authentication system to tailor user experiences based on user type.

Built-in, Formal Documentation: Previously, there was little to no documentation about the processes of the CPCESU. Now, with a formal system in place, there are documents for both the users and the future developers for this system, which are built-in and customizable.

Future Prospects

The system is currently functional and going through final validation for quality assurance. There is also potential for additional features and improvements.

Continued Capstone Work: Based off of our requirements acquisition, our client still has many features that could help improve their workflow and increase the usability of *Summit*. There is also a need for continued support by future software developers.

National Integration: This project can expand to the other units in the CESU national network and more development would be necessary to make this a reality. This includes making interfaces between the systems, rebranding and customization per unit, etc.