Spreadsheet Reformatting Tool

Report #1

FHSU CSCI 441 Fall 2019

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Project Website: https://sites.google.com/view/csci441vaf19-hrisreportmanagem
Github: https://github.com/jepogue/HRIS-Report-Management

Individual Contributions Breakdown

Project Part		Project Category	Team Member			
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Responsibility %	1	Section 1a Customer Problem Statement	100%			
		Section 1b Glossary of Terms	100%			
		Section 2a Enumerated Functional Requirements		100%		
		Section 2b Enumerated Non-Functional Requirements			100%	
		Section 2c User Interface Requirements				100%
		Project Management	100%			
Responsibility %	2	Section 3.a Stakeholders	100%			
		Section 3.b Actors and Goals	100%			
		Section 3.c.i Use Cases - Casual Description	100%			
		Section 3.c.ii Use Cases - Use Case Diagram			100%	

		Section 3.c.iii Use Cases - Traceability Matrix		**100%**		
		Section 3.c.iv Use Cases - Fully Dressed Description		**100%**		
		Section 3.d - System Sequence Diagrams			**100%**	
		Section 4.a - User Interface Specification - Preliminary Design				**100%**
		Section 4.b - User Interface Specification - User Effort Estimation				**100%**
		Project Management	**100%**			
Responsibility %	3	**Section 5.a.1 - Concept Definitions**				**100%**
		Section 5.a.2 - Association Definitions				**100%**
		Section 5.a.3 - Attribute Definitions		**100%**		
		Section 5.a.4 - Traceability Matrix		**100%**		
		Section 5.b - System Operation Contracts	**33.3%**	**66.6%**		
		Section 6 - Project Size Estimation	**100%**			
		Section 7 - Plan of Work	**100%**			
		Project Management	**33%**	**33%**		**33%**

Contents

1. Customer Problem Statement

a. Problem Statement

We have a Human Resources department with hundreds of employees using various 3rd party software to administer the different programs in the employee life-cycle. Each one of these software has some reporting functionality. Some programs have limited capability, and produce reports that must be modified to meet the needs of the business. Other programs have very robust reporting tools within the platform, and require a great deal of working knowledge in order to completely format the report to what is needed for the business purpose. Additionally, many employees are using multiple programs each day and do not know the intricacies of each program's reporting capabilities. Often, what the end-user needs is not exactly what the given software will produce (or it would take a great deal of time and knowledge to produce the desired result). As a result, our end-user employees manually manipulate reports in Microsoft Excel in order to get what they need on a daily, weekly, monthly, or quarterly basis. Some of our employees have to manipulate a spreadsheet each day for their business needs.

Some programs, due to the complexity of reporting and the sensitivity of the underlying data, our business only allows a small number of people to create reports. For example, our HRIS program contains sensitive employee information and so we limit the reporting capabilities to just four individuals. Furthermore, the HRIS program is very capable of producing reports in a manner that will output in exactly the format the end-user requires, but the reporting tool is quite complex and the average end-user cannot be expected to possess this knowledge just for a few reporting needs (nor could we afford to train them or use their time in this manner). Due to the limited number of people that are given access to the HRIS reporting tool, the number of customization requests by individuals is necessarily limited. If a customer needs a basic customization, such as the removal of a field, or the filtering of certain employees, they are denied a custom report, and must do the formatting themselves.

As discussed, for various reasons we have employees using Microsoft Excel for final formatting needs. This is not usually a matter of just putting in new data and having a chart or table automatically update. Most commonly, the end-user needs to delete some columns, filter some columns based on some criteria, sort the data on other criteria, and so forth. And, the employees are doing this on a recurring basis, sometimes daily. This is quite a was of time for the employees, even if it is only a matter of minutes. Their job is not to spend time formatting Excel spreadsheets. Some of the very tech-savvy employees have managed to write Microsoft Excel “macros” in order to complete this repeated formatting automatically. We asked the employees if they could apply this method for others, but it is too complicated and time consuming to write one single macro (there is programming involved in the background of Excel), and cannot be easily taught to others. Additionally, even those employees with the Excel “macros” still need to download the reports and run their program in order to get the final formatting complete.

We have already partially eliminated one step in the process, the downloading of the report for the end-user. Previously, users would need to go into their respective programs on a recurring basis and either download a report already produced, or need to wait for a new report to generate and then download (as there is no scheduler in some systems). Some of our software allows us to schedule reports to be emailed or sent via FTP or retrieved via API. This has helped eliminate some of the time spent with the daily retrieval of reports from the various systems, as we have scheduled the applicable reports to be moved automatically to their respective network locations for end-user retrieval.

In summary thus far, we have end-users of reports retrieving reports in spreadsheet format from a centralized repository and completing manual formatting of the files in Microsoft Excel. They are completing the same tasks on a recurring basis, as frequently as daily. Due to barriers of knowledge, and restrictions of the time of our subject matter experts, we do not have a way to eliminate these repetitive tasks. As such, we are coming to market for a software solution to our problem.

What this company needs is a software that will perform the repetitive formatting tasks that each end-user needs, without necessitating a high degree of time or training. Ideally, the software will perform these tasks automatically, on whatever schedule the end-user dictates. The software should allow the user to save multiple “templates” of the required formatting, as oftentimes employees have

more than one special formatting need. This program must be as user-friendly as possible - we do not expect our employees to be able to do any sort of programming to setup these formatting tasks and schedules.

This is not a new problem for us. We have previously compiled a list of common tasks and ideal solutions from employees that are tasked with manually manipulating reports for formatting purposes.

For most applications, we foresee the reports in the centralized repository containing more fields/columns than are necessary. We will do this in order to minimize the maintenance and customization requirements for the applicable subject matter experts. Commonly, the employees that are experts in a specific reporting tool are asked to add or remove a field, which is not a good use of their time. However, we cannot, for various reasons discussed above, allow the end-user to modify or create reports themselves. We have had employees attempt to create basic Excel “macros” by using Excel’s built-in “macro recording” functionality. However, this fails if the report is ever modified. Adding or removing an additional column throws the whole thing off. We need the proposed software to dynamically delete a field/column based on the column name, and not simply on the location/ordering of the column within the spreadsheet. Furthermore, if this column name is changed or removed, we would expect the program to alert the end-user, and not simply skip the step or delete the wrong column (as was happening with our users home-grown “recorded macros”). We would like the user to be presented with a visual representation of the fields/columns that are in the report, and they should be able to deselect any fields they do not wish to have. A preview of the data within that field would also be nice to have. The program should delete those fields upon running.

Another common task employees perform is sorting and filtering. Different users care about different pieces of information, and different populations of people or things within that data that is contained in a large report. Our employees need to be able to filter the data by one or more fields/columns and subsequently sort that data by multiple columns. The output report should not contain the data that was “filtered out”.

Re-ordering the fields/columns in the report is something else our end-users find themselves doing on a regular basis. Frequently, there is a unique identifier located in one column that needs to be either the first column in the report or

some other specific column depending on the final usage. Additionally, users have reported that they often need to rename the column headers in order to import into a system or otherwise make them more readable for their particular audience. Furthermore, with users importing into other systems, they are always having to save the files as a ".csv" before importing, and would like to have that step eliminated. Some users prefer to save a copy of both the "csv" and the Excel file, while other users have no need for a copy in an excel format.

Continuing along the lines of importing and dealing with other systems: users have reported that they are often merging reports from two different systems. For example, we have a user that takes data from the HRIS platform, and matches it with data from the Learning Management system in order to see which newly hired employees have completed their training. They are currently doing this by using a "vlookup" in Excel based on a unique identifier that is shared between the two systems. They would like to be able to have a program perform this operation automatically and just have to indicate which files to merge and which fields contain the unique identifier.

Once the formatting is complete, many employees are creating graphs and/or PDFs of the report output. They have asked for the ability to dictate what type of graph they would like and what data is applicable within the report, and have the graph be created automatically and either output as an image or into a PDF document. The report (without any graphs) should also be available to be exported into PDF.

Almost always, all of the work done thus far is not just for the employee's personal use. It is to be shared with other employees. Users are sometimes emailing their report or saving a copy to a shared location, or both.

To put this all into context, the following is a specific example we received of one user's daily process which contains most of the company's needs with regard to the proposed software solution:

Every morning I need to produce a report of the new hires and what training is required of them. I login and go to the report repository to retrieve two different reports. One report is from our HRIS and one is from our LMS. The report from the LMS contains the employees hired yesterday that need training. It has specific information about training classes that our HRIS does not keep on file. However, it doesn't have the employee's location and manager email, which I

need in order to schedule training. That information is in a report from the HRIS, and so I need to merge the two files together in order to get a listing that I can send to the managers at the various locations.
First, I open up the HRIS report and delete all the columns except the Employee ID, Employee Name, Manager Name, Manager Email, and employee location. Then, I put the LMS report into the same Excel file, and use "vlookup" to bring the HRIS information into the LMS report. After that, I take the merged report, and filter out any people in two specific locations, as they don't need to go through the training in those locations. Finally, I sort by location and then manager, so the managers can easily find their employees.

Before sending out, I quickly create a chart showing the amount of people needing training at each location, and take a screenshot so I can use it in a report I put together. Lastly, I make sure a copy is in a specific directory for later reference, and then I print it to PDF and email it to all the managers at a group email listing.

b. Glossary of Terms

.csv - (abbr) a comma-separated values (CSV) file is a delimited text file that uses a comma to separate values. A CSV file stores tabular data (numbers and text) in plain text.

Employee life-cycle - an HR model that identifies the different stages a worker advances through in an organization and the role HR plays in optimizing that progress

HRIS program - a software or online solution that is used for data entry, data tracking and the data information requirements of an organization's human resources (HR) management, payroll and bookkeeping operations. A HRIS is usually offered as a database.

Learning Management system - a software application for the administration, documentation, tracking, reporting, and delivery of educational courses, training programs, or learning and development programs.

LMS - (abbr) Learning Management System

Macros - an automated input sequence that imitates keystrokes or mouse actions. A macro is typically used to replace a repetitive series of keyboard and mouse actions and are common in spreadsheet and word processing applications like MS Excel and MS Word.

Recorded macros - a macro created by a piece of software that records user actions for playback at a later time.

Subject Matter Experts - an individual with a deep understanding of a particular process, function, technology, machine, material or type of equipment.

Unique identifier - any identifier which is guaranteed to be unique among all identifiers used for those objects and for a specific purpose.

2. System Requirements

a. Enumerated Functional Requirements

Requirements	Priority	Description
REQ-1	5	User can create and save a template of formatting rules to be assigned to the chosen file
REQ-2	5	User can select a file for the system to import for reformatting.
REQ-3	5	User can delete columns
REQ-4	5	User can rename column headers
REQ-5	5	User can rearrange columns
REQ-6	5	User can choose to sort data by chosen criteria within a template before the report is reformatted.
REQ-7	5	User can filter the data based on one or more column values
REQ-8	5	User can merge two reports within the system based on a unique identifier
REQ-9	5	User can save formatted file to local drive
REQ-10	4	User can designate the output file after formatting has been run. This includes: name, save-location, and filetype.
REQ-11	4	User can schedule templates to be applied to reports automatically

REQ-12	3	User can group data by columns, similar to a “Pivot Table” in Microsoft Excel
REQ-13	3	The system will allow users to compare two reports formatted from the same template.
REQ-14	3	Formatted file can be emailed automatically upon completion by system
REQ-15	3	User can choose to keep a copy of the original, or save only the newly formatted report.
REQ-16	3	Formatted file can be exported to PDF by user.
REQ-17	3	User can schedule the templates to run on a recurring basis (i.e. everyday, every Monday, first of each month, etc.)
REQ-18	2	Saved templates should be allowed to be edited by user for single-use runs without being altered (template will remain as is after single-use edit)
REQ-19	2	User will receive a prompt to pick a template when opening a file.
REQ-20	1	The system should store information in a report after a user chooses to delete it, so it may be regained after a template has been run.
REQ-21	1	User can email their edited reports as a download link to other people or groups of people.
REQ-22	1	User can create visual charts and data representations in the template.

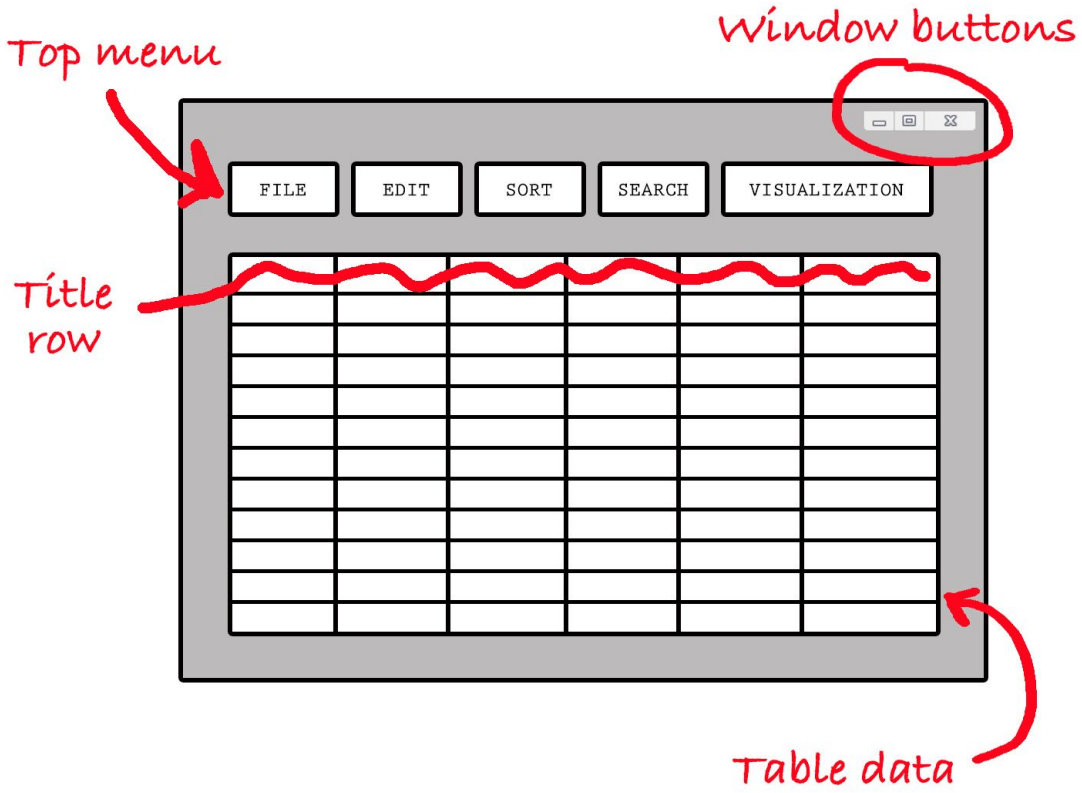
b. Enumerated Non-Functional Requirements

Requirements	Priority	Description
REQ-23	5	Program run time for templates should not exceed the amount of time it takes to manually perform the formatting
REQ-24	3	Program should be able to run while user is actively using other programs, and not substantially consume system resources
REQ-25	4	Program should be easy to install or access if a service
REQ-26	5	The average office employee should be able to operate the program without training
REQ-27	3	The program should be able to be serviced centrally or redeployed/updated as needed
REQ-28	5	Program should operate reliably, and without interruption to scheduling

c. User Interface Requirements

Requirements	Priority	Description
REQ-29	3	Initial screen features simple step-by-step instructions for how to use the application.
REQ-30	4	Help text should be available for all non-self-explanatory user interactions with the program
REQ-31	5	Program should guide the user through various steps (i.e. a “Wizard” type of program)
REQ-32	3	Preview of the file/data will be available to the user when setting up or modifying the template
REQ-33	3	Column headers can be renamed directly in the preview of the data/file
REQ-34	2	Filtering and sorting is done interactively via user interface, similar to Microsoft Excel
REQ-35	2	Columns can be dragged and dropped to re-order
REQ-36	5	The Visualization Wizard tool will allow for a preview of the visual before exporting the image/document
REQ-37	5	User should have a “template library” where they can view all their templates and the reports to which they apply

Interface Design Mock-Up



Notes regarding user interface requirements:

In speaking with the customer, it was clear they were concerned about usability from the standpoint of the average office employee. The customer expressed the desire to maintain similar interactivity with the program, similar to Microsoft Excel, as that is what the employees are using currently. In discussing further the range of capabilities with the customer, we noted that visual interactivity may not be essential as these tasks will no longer be repeated and thus the speed at which the user can setup the template is no longer such an important factor. The customer may be willing to sacrifice the similarity of interaction to Microsoft Excel in order to cut development time/costs. The overriding factor is that anyone that works in the company can easily use this program without extensive training.

3. Functional Requirements Specification

a. Stakeholders

End-User employee (EU):

Employees that do not have extensive knowledge of the reporting tools of the 3rd party software they use will need the program to reformat spreadsheets as needed

Reporting Subject-Matter Expert employee (SME):

Employees with extensive knowledge of reporting tools of 3rd party software that are responsible for providing End-User employees with custom reports will need this program in order to eliminate some of their workload while satisfying their internal customers' requests

Managerial employees:

Managers have an interest in the amount of time and effort the program can save their employees (both EU and SME employees)

b. Actors and Goals

End-User Employee (EU) - an initiating actor that has the goal of reformatting a spreadsheet

Template Storage - a participating actor that stores the user's saved templates

Temp File Storage - a participating actor that stores a temporary copy of the original report to be reformatted

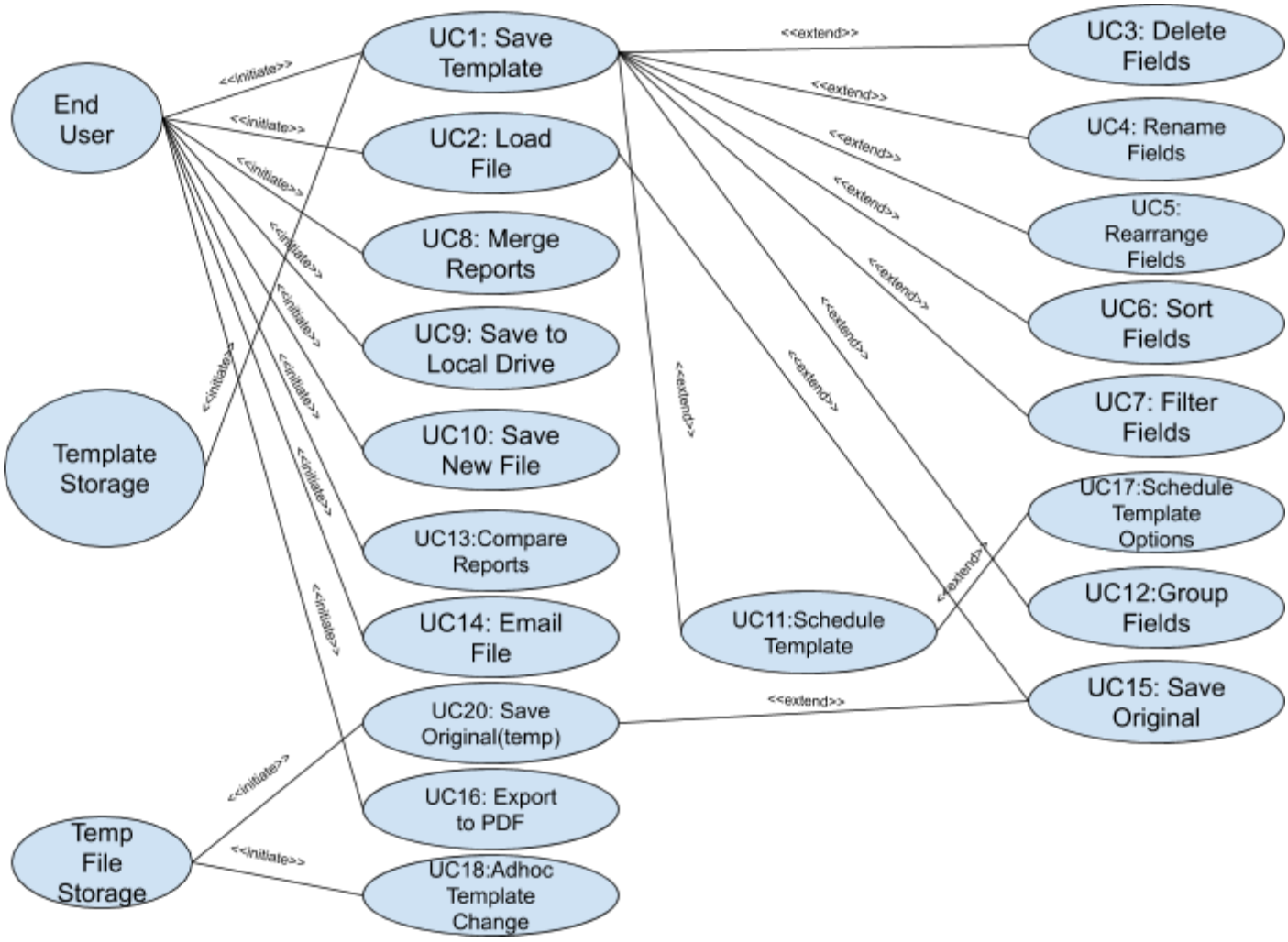
c. Use Cases

i. Casual Description

Use Case Identifier	Title	Casual Description
UC-1	Save Template	After setting up all reformatting, the user can save the settings as a template. The template can be assigned to a specific file name so it will always be applied to that file.
UC-2	Load File	User selects a file for reformatting from the file repository created by the company. The file is copied into the program and is ready for reformatting.
UC-3	Delete Fields	User can delete specific columns/fields.
UC-4	Rename Fields	User can rename column header(s).
UC-5	Rearrange Fields	User can rearrange column order.
UC-6	Sort Fields	User can sort data from one or more columns
UC-7	Filter Fields	User can filter data in one or more columns. The filtering will allow the user to select one or more of the values within that specific column, or allow the user to put in a partial search key. In example, a user wants to filter a field with job titles for anything that contains "sales". The user can enter in "sales" and filter for any records that contain that data, even if no job title is only marked as "sales"
UC-8	Merge Reports	User can merge two reports together by means of a unique key. They select the initial file and then another file with the same unique key. The user can merge the two datasets to either join them completely (includes all records regardless of a match), or only merge the matching records.
UC-9	Save to Local Drive	User can save their newly formatted file to their local user drive
UC-10	Save New File	After formatting of a file is complete, the user will choose where the newly formatted file should be saved, the filename and the file format
UC-11	Schedule Template	The saved templates can be scheduled to run automatically to reformat the reports to which they are assigned. The user will have no interaction after this is setup. The user would need to indicate

		the save location, filetype, and the original filename which is to be modified.
UC-12	Group Fields	User can group data by columns. For example, there are 12 employees with 3 different locations among them. The user can choose to group the employees by state, and count the result. This is similar to a "pivot table" in excel.
UC-13	Compare Reports	User can load two files of the same format and the system will determine if the reports are the same
UC-14	Email File	User can choose to email the newly formatted file in addition to just saving the file to their local drive. The email address(es) would be part of the template and scheduling that is saved.
UC-15	Save Original	User can choose to save a copy of the original file they copied for reformatting, in addition to the newly formatted file.
UC-16	Export to PDF	User can choose to export the reformatted report to PDF, and save to local drive and/or email
UC-17	Schedule Template Options	User can choose to schedule templates to run on various recurring bases. For example, weekly on Mondays, first of every month, last Friday of every month, etc.
UC-18	Adhoc Template Change	User can edit a saved template without saving the new changes. For example, the want an additional column deleted, but they do not want to effect their saved template.
UC-19	Template Prompt	User will be prompted to open a file for formatting before beginning the formatting "wizard". This is optional, as users could be opening the program to modify a template.
UC-20	Save Original (temp)	System will save the original file temporarily in the event that the user wants to revert to the original file. User will be given the option to revert back to the original file
UC-21	Download Link	User can choose to have an email sent containing a link to a downloadable file, rather than emailing the file directly.
UC-22	Create Graph	User can create a graph or chart from the data and have this be included in their export or email of result.

ii. Use Case Diagram



iii. Traceability Matrix

Req't	PW	UC-1	UC-2	UC-3	UC-4	UC-5	UC-6	UC-7	UC-8	UC-9	UC-10	UC-11	UC-12	UC-13	UC-14	UC-15	UC-16	UC-17	UC-18	UC-19	UC-20	UC-21	UC-22
REQ1	5	X																	X				
REQ2	5		X						X							X		X		X			
REQ3	5	X		X																			
REQ4	5	X			X	X																	
REQ5	5	X		X	X	X																	
REQ6	5	X					X																
REQ7	5							X															
REQ8	5								X														
REQ9	5									X		X											
REQ10	4	X									X												
REQ11	4	X					X					X						X					
REQ12	3												X										
REQ13	3													X									
REQ14	3														X								
REQ15	3	X	X													X							
REQ16	3																X						
REQ17	3	X	X									X						X					
REQ18	2	X																	X				
REQ19	2																			X			
REQ20	1															X					X		
REQ21	1																					X	
REQ22	1	X																					X
MAX PW		5	5	5	5	5	5	5	5	5	4	5	3	3	3	5	3	5	5	5	1	1	1
Total PW		42	11	10	10	10	9	5	10	5	4	12	3	3	3	9	3	12	7	7	1	1	1

iv. Fully-Dressed Description

Use Case UC-1:	USE CASE Save Template
Related Requirements:	REQ-1, REQ-3, REQ-4, REQ-5, REQ-6, REQ-10, REQ-11, REQ-15, REQ-17, REQ-18, REQ-22
Initiating Actors:	End-User Employee
Actor's Goals:	Create and Save a template for a spreadsheet to be reformatted
Participating Actor:	End-User Employee, Template Storage
Preconditions:	A spreadsheet has been loaded into the software
Postconditions:	The spreadsheet is formatted, and the template has been saved in the system.

Flow of Events for Main Success Scenario:

→ 1. User makes changes to the report brought into the system. Including rearranging columns, sorting columns, deleting column, and filtering columns. Visuals may be added to the report as well.

← 2. System displays changes in real-time.

→ 3. When finished with editing the report, the user tells the system to save the report and template.

← 4. System prompts user for formatted report name, extension, save location.

→ 5. User selects save settings continues as prompted.

← 6. System prompts user to save the template for future use.

→ 7. User selects a name to save the template under and saves template, otherwise chooses not to save the template.

← 8. System displays successful save message, and allows user to bring in another report if the user chooses.

Flow of Events for Extensions (Initial File Not Found):

→ 1. User selects incorrect file or enters a corrupted file name.

← 2. System displays an error message and prompts the user to choose a file (*UC-2)*.

Use Case UC - 17:	**USE CASE Schedule Template Options**
Related Requirements:	REQ-2, REQ-11, REQ-17
Initiating Actors:	End-User Employee
Actor's Goals:	Set up a scheduled run for a specific template
Participating Actor:	End-User Employee, Template Storage
Preconditions:	1. Template has been saved in template storage 2. Template's unformatted file is saved in a place accessible to the system.
Postconditions:	Formatted report is saved in a location known to End-User Employee, or emailed to employee(s)

Flow of Events for Main Success Scenario:

→ 1. User chooses to set up run from menu in system.

← 2. System displays a list of templates for user to choose from for the scheduled runs.

→ 3. User selects desired template.

← 4. System prompts for user settings regarding the run. This include: frequency, time of scheduled run, source file location, and output location.

→ 5. User selects save settings.

← 6. System runs the template at the desired time and creates output file as the user wishes.

Flow of Events for Extensions (Source File not Found):

← 1. System prompts reaches for the source file and cannot find it. The system will log this attempt and alert the user the next time the user opens the application.

Use Case UC - 14:	USE CASE Email File
Related Requirements:	REQ-14
Initiating Actors:	End User Employee
Actor's Goals:	Email a formatted file to himself/herself and/or other employees
Participating Actor:	End User Employee
Preconditions:	A formatted file has been created from a templated.
Postconditions:	The file is emailed to the destination users.

Flow of Events for Main Success Scenario:

→ 1. User chooses email formatted file from the menu.

← 2. System displays files from templates saved within the system.

→ 3. User selects desired file.

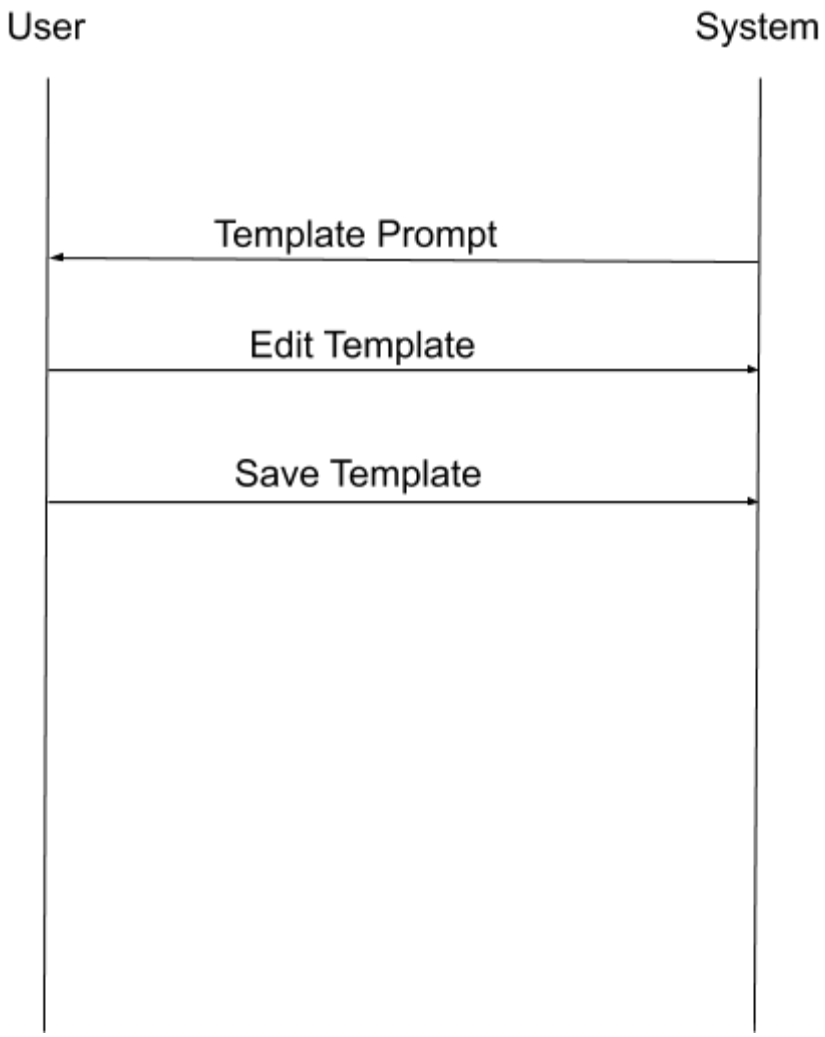
← 4. System prompts for email address(s)

→ 5. User enters appropriate email(s)

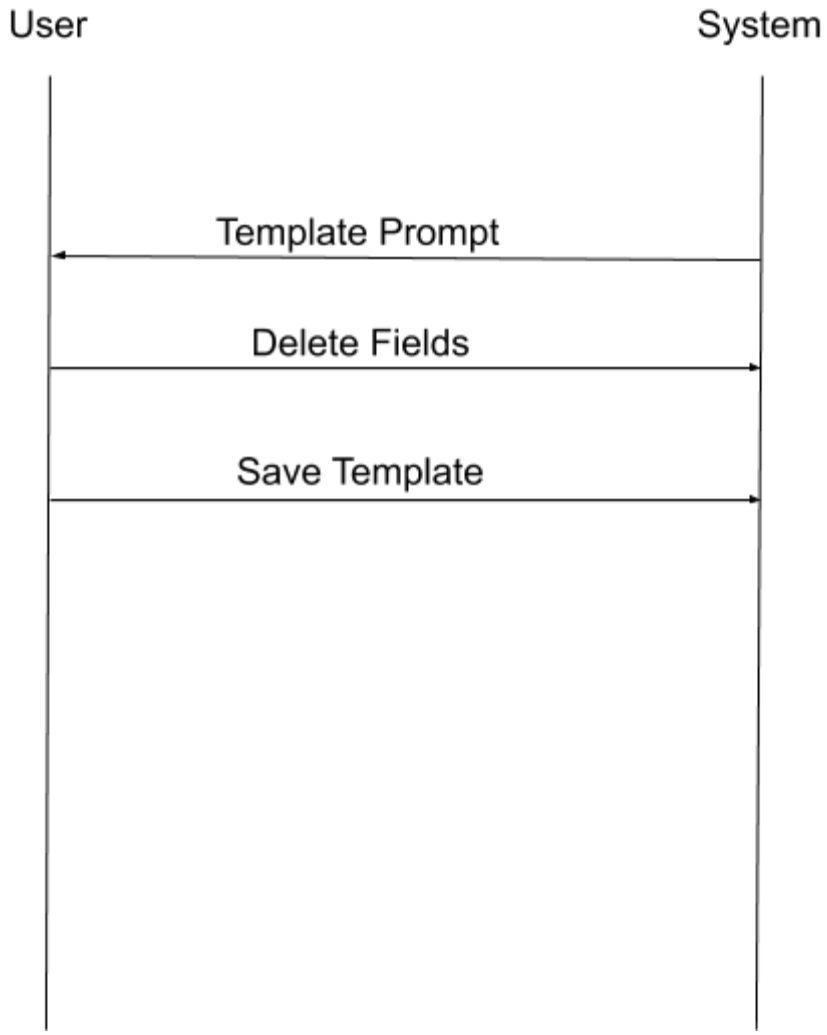
← 6. System sends emails containing the report.

d. System Sequence Diagram

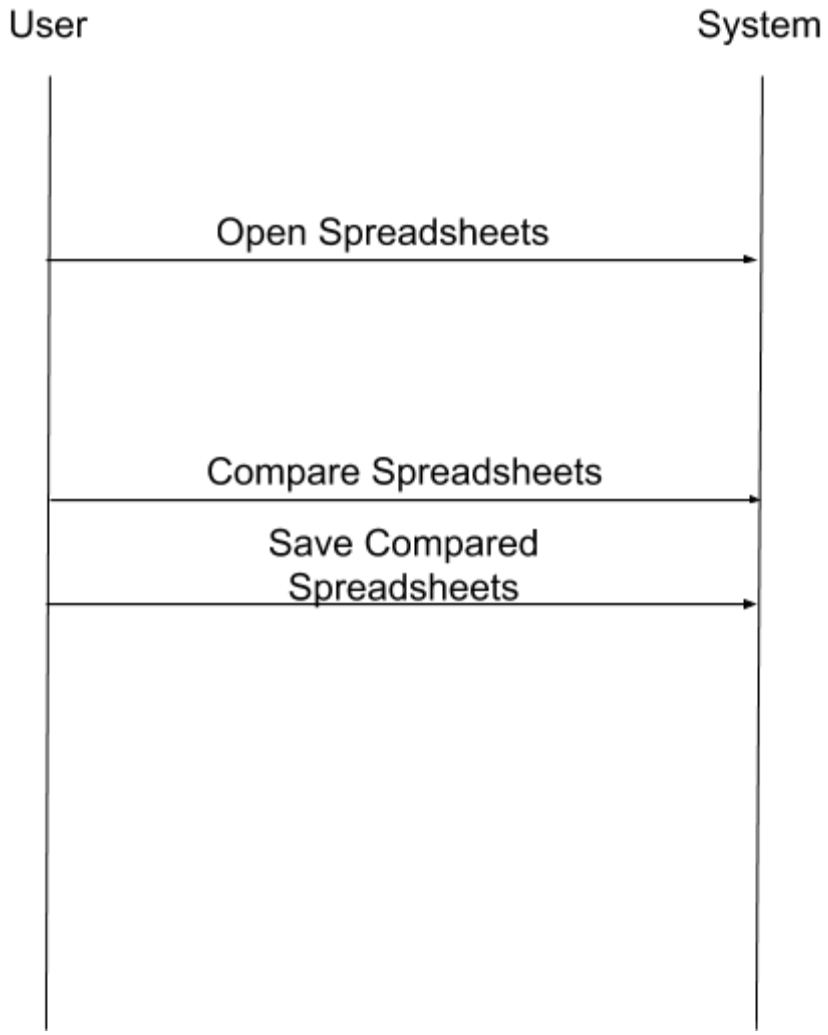
1. Save Template


User
System
Template Prompt
Edit Template
Save Template

2. Delete Fields



3. Compare Reports

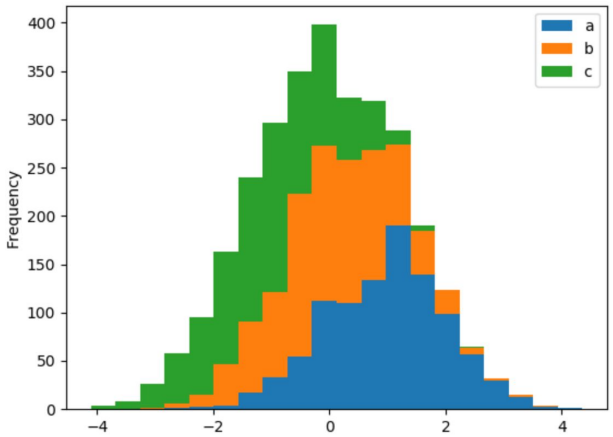


4. User Interface Specification

a. Preliminary Design

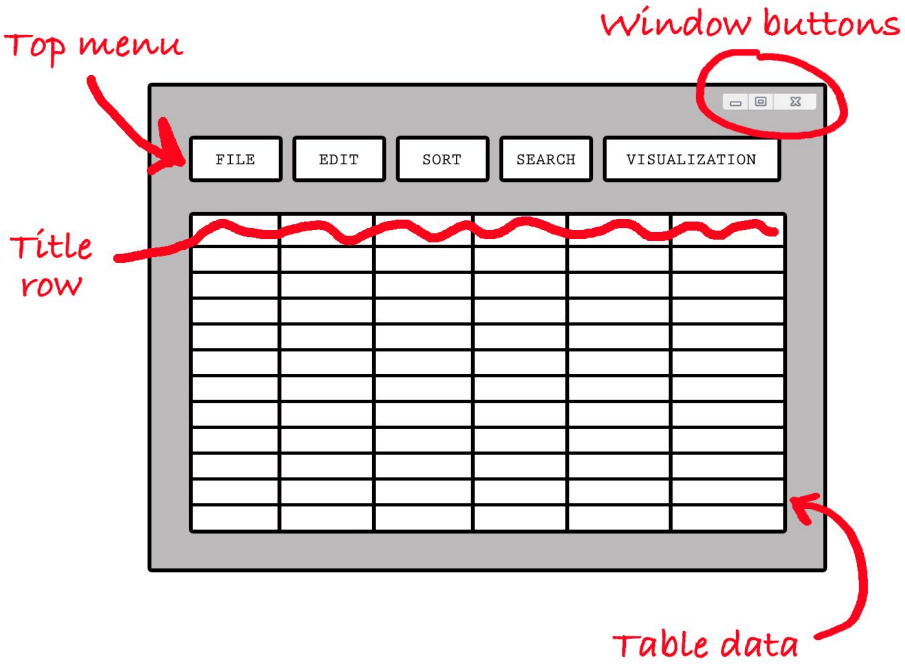
- Initial screen features simple step-by-step instructions for how to use the application.
- The user's first action will be to select the "import" option.
- A file selection window will then open, allowing the user to browse their local machine for a file to import.

- Once imported, the spreadsheet's data will be ready for modification. The data will be searchable, organizable by column, and able to be deleted, copied or manipulated from within the interface.
- After the spreadsheet has been organized to the user's liking, a variety of chart visualization options will be selectable.
- The final product will then be exportable, with an option to either save the file locally or email it as an attachment.
- Sample data visualization:



b. User Effort Estimation

- In top menu, click **File -> Import** OR Click the IMPORT button on the home screen, then browse local computer for csv or xls file to import
- Once a database cell has been selected, clicking **Edit** from the top menu to drop down the list of available actions (listed below)
- With a column selected, click the **Sort** button in the top menu to see a list of sorting options from the dropdown
- From the top menu, click the **Search** button to look for instances of a value in the database
- With a selection of columns or cells highlighted, click **Visualization** from the top menu to open the Chart Wizard tool, which will list visualization options including pie charts, line graphs, bar graphs, etc.
- In the top menu, click **File -> Export -> Save As** to save a copy of the report to the local machine as a PDF
- Alternatively, click **File -> Export -> Email File** to send a copy of the report to an email address
- In the top menu, click **File -> Close** OR click the "x" button in the top right corner to close the application

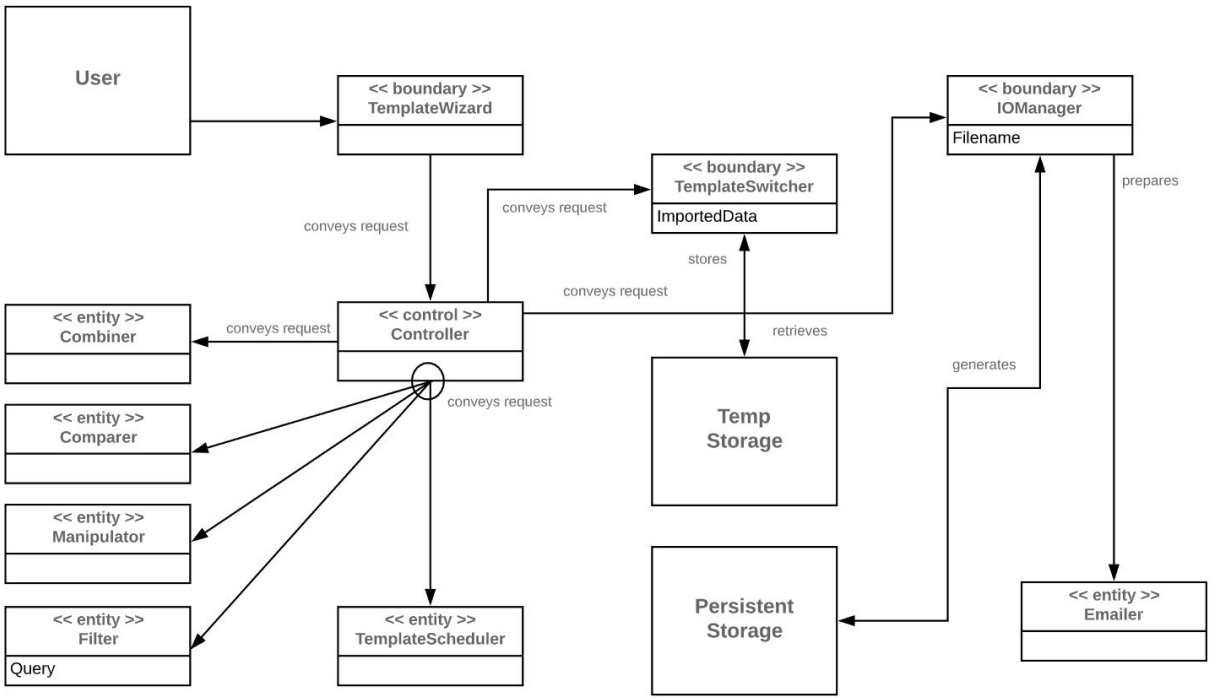


c. Data Manipulation

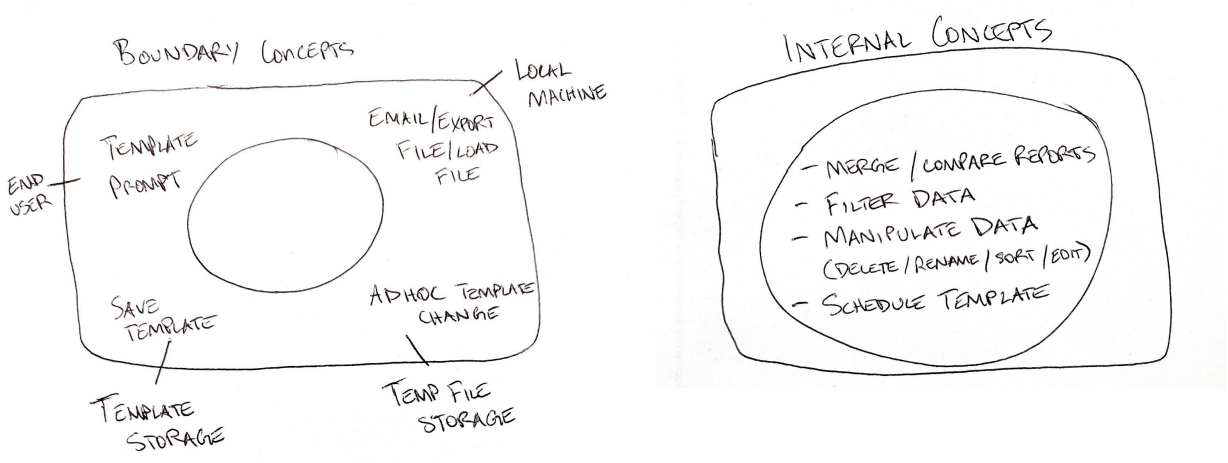
- Once the imported file has been loaded, right-click the database cell to be manipulated, then from the dropdown menu, select from the available options to edit, format, cut, copy, paste, or delete.
- Alternatively, drag and drop columns to reorganize their order
- Select the column's name cell to select the entire column for dragging, sorting, deletion or cutting/copying
- Double-click a table cell to modify its contents

5. Domain Analysis

a. Domain Model



i. The domain model was first derived by drawing concept diagrams to determine boundary and internal concepts. From there, concept definitions were determined, followed by their respective associations. Below are the hand-drawn concept diagrams that preceded the following tables. These were merely the initial brainstorming terms, and are improved upon in the subsequent definitions.



1. Concept definitions

Responsibility Description	**Type**	**Concept Name**
Coordinate actions of all concepts associated with a use case, a logical grouping of use cases, or the entire system and delegate the work to other concepts.	D	Controller
Guide the user through various steps (Template prompt → Merge/Compare Reports OR Sort/Filter/Modify Fields OR Schedule Template → Save Template AND/OR Export/Send File).	D	TemplateWizard
Schedule saved templates to automatically reformat the reports to which they are assigned. The user must first indicate the save location, filetype, and the original filename which is to be modified.	D	TemplateScheduler
Container for temporary data storage of template being modified by user.	K	TempStorage
Compare contents of selected reports and output the differences discovered, line-by-line.	D	Comparer
Combine contents of selected reports and output the union of both data sets.	D	Combiner
Display relevant data based on user's filtering query (ie: cells containing specific string of characters, upper/lower boundary numeric values, or other conditional logic to be determined by user's needs).	D	Filter
Accommodate the manipulation of data contained in the imported table cells of reports. Actions include: modify, sort, delete, rename, cut, copy	D	Manipulator

and paste.		
Manages file input/output between the program and the local machine. This will facilitate the importing of reports, exporting of reports as files in various formats, and storing of temporary data.	D	IOManager
Handles the sending of reports via email to designated address(es) once they have been modified to the user's needs.	D	Emailer
Supports the ad-hoc changing of templates for a data set to display the data in a different, predefined way depending on the selected template's configuration.	D	TemplateSwitcher

2. Association definitions

Concept Pair	**Association Description**	**Association Name**
TemplateWizard ←→ Controller	TemplateWizard passes requests to the Controller	Conveys requests
Controller ←→ Comparer	Controller passes comparison requests to Comparer	Conveys requests
Controller ←→ Combiner	Controller passes combine requests to Combiner	Conveys requests
Controller ←→ Filter	Controller passes filter requests to Filter	Conveys requests
Controller ←→ Manipulator	Controller passes modification requests to Manipulator	Conveys requests
Controller ←→ TemplateScheduler	Controller passes scheduling requests to TemplateScheduler	Conveys requests
Controller ←→ TemplateSwitcher	Controller passes data re-configuration requests to TemplateSwitcher	Conveys requests
TemplateSwitcher ←→ TempStorage	TemplateSwitcher stores data in TempStorage for ad-hoc changes to template, then retrieves it	Stores and retrieves data
Controller ←→ IOManager	Controller passes file I/O requests to IOManager, which imports data or generates a file export	Generates
IOManager ←→ Emailer	IOManager prepares file for sending via the Emailer	Prepares

3. Attribute definitions

4.

Concept	Attributes	Attribute Description
Filter	Query	A given set of data for the Filter to drill down and focus on.
Template Switcher	ImportedData	Data brought into the template switcher to temporarily be formatted bases upon the templates ad hoc settings.
IOManager	Filename	The name and path of the file to both attach to an email or save into persistant storage.

5. Traceability matrix

		Domain Concepts										
Use Case	PW	Controller	TemplateWizard	TemplateScheduler	TempStorage	Comparer	Combiner	Filter	Manipulator	IOManager	Emailer	TempateSwitcher
UC1	42	X	X	X					X	X	X	
UC2	11	X	X						X			
UC3	10	X	X						X			
UC4	10	X	X						X			
UC5	10	X	X						X			
UC6	9	X	X						X			
UC7	5	X	X					X				
UC8	10	X	X				X					
UC9	5	X	X							X		
UC10	4	X	X							X		
UC11	12	X	X	X								
UC12	3	X	X						X			
UC13	32	X	X			X						
UC14	3	X	X							X		
UC15	9	X	X							X		
UC16	3	X	X							X		
UC17	12	X	X	X								
UC18	7	X	X									X
UC19	7	X	X									
UC20	1	X	X									
UC21	1	X	X							X	X	
UC22	1	X	X						X			

b. System Operation Contracts

UC-1 Save Template

Operation: Template Prompt
Preconditions: · User has begun program
Postconditions: · User has chosen a template to edit · Use has chosen to create a template

Operation: Edit Template
Preconditions: · User has selected a template to edit or is creating a new template · User has a report or spreadsheet to import into the program
Postconditions: · User has created a custom template using settings allowed by system

Operation:
Save Template
Preconditions: · User has created a custom template using settings allowed by system · User has given this template a unique identifier (A name)
Postconditions: · Program stores template settings within persistent storage.

UC-14 Email File

Operation:
Email File
Preconditions: Program is running and has produced a formatted file Formatted file is still in memory (does not need to be retrieved) Local Machine is connected to email program to which program has access User has provided email address of recipient (or it is saved in template)
Postconditions: Formatted file is emailed to recipient via Local Machine’s access to email server

UC-17 Schedule Template Options

Operation: Choose Template
Preconditions: · User has at a template he or she would like to create schedule time to run
Postconditions: · The template is chosen and brought to the TemplateScheduler

Operation: Choose Schedule Settings
Preconditions: · A template has been chosen and passed to TemplateScheduler
Postconditions: · User has chosen scheduled settings · Settings around the scheduled run are saved within the system

Operation: Perform Scheduled Run
Preconditions: · User has defined and saved a specific timeframe for the scheduled run · The time matches user's defined timeframe · The input file is located by the program
Postconditions: · The output report is created and saved in the user-designated location by the system

6. Project Size Estimation

Unadjusted Actor Weight breakdown:

Actor	Description	Complexity	Weight
User	Interacts with system via GUI	Complex	3
Template Storage	Gives and takes input from system	Average	2
Temporary File Storage	Holds file in case user needs it restored	Simple	1

Unadjusted Actor Weight (UAW)= 6 = 1*2 + 1*3 + 1*1

Unadjusted Use Case Weight breakdown:

Use Case Identifier	Title	User Interface Complexity	Steps for Success	Number of Participating actors	Category	Weight
UC-1	Save Template	Simple	1	3 - User, Template Storage, Local Machine	Average	10
UC-2	Load File	Simple	1	1 - User	Simple	5
UC-3	Delete Fields	Simple	1	1 - User	Simple	5
UC-4	Rename Fields	Simple	1	1 - User	Simple	5
UC-5	Rearrange Fields	Complex	1	1 - User	Complex	15
UC-6	Sort Fields	Average	1	1 - User	Average	10
UC-7	Filter Fields	Complex	1	1 - User	Average	10
UC-8	Merge Reports	Average	3	1 - User	Average	10
UC-9	Save to Local Drive	Simple	1	1 - User	Simple	5
UC-10	Save New File	Simple	1	1 - User	Simple	5
UC-11	Schedule Template	Average	>7	3 - User, Template Storage, Local Machine	Complex	15

UC-12	Group Fields	Simple	1	1 - User	Simple	5
UC-13	Compare Reports	Complex	1	1 - User	Complex	15
UC-14	Email File	Average	2	2 - User and Local Machine	Complex	15
UC-15	Save Original	Simple	1	2 - User and Local Machine	Simple	5
UC-16	Export to PDF	Simple	3	1 - User	Average	10
UC-17	Schedule Template Options	Average	3	3 - User, Template Storage, Local Machine	Complex	15
UC-18	Adhoc Template Change	Simple	1	2 - User and Template Storage	Simple	5
UC-19	Template Prompt	Simple	1	1 - User	Simple	5
UC-20	Save Original (temp)	n/a	1	0	Simple	5
UC-21	Download Link	Simple	3	2 - User and Local Machine	Complex	15
UC-22	Create Graph	Complex	3	1 - User	Complex	15

Unadjusted Use-case Weight (UUCW) = 205 = 10*5 + 5*10 + 7*15

Unadjusted Use-Case Points (UUCP) = 211 = 6+205

7. Plan of Work

Beginning 9/24/19 - All weeks end on Monday, and all items are to be accomplished by end of week.

Week 1: Interaction Diagrams

Interaction diagrams will be created to describe the interactions of the actors and the system for the main use cases. This will begin the architecture of the components comprising the system. The interaction diagrams will be created by the respective product owners (listed below in “Product Ownership”. Where overlap occurs, product owners will work together.

Week 2: User Interface Design and Design of Tests

Design framework of user interface and create test scenarios to properly address all use-cases. First, we will create a framework for all the interactive pieces, and then product owners will design their own portions within that framework. Where products overlap in the user interface (where multiple functionalities reside in one interface “area”), product owners will combine interface designs in order to create a cohesive and standardized interface.

Week 3: Build Core Functionality

Create a minimum viable product consisting of these features. The proximal features will not be addressed until these core features are operating. Items 1 and 5 are reused throughout all other features. Items 2-4 are standalone, but comprise the most base functionality, and without these features the system will not fulfill the customer’s needs.

Saving a template is critical functionality, and so it will be demonstrated in Demo 1. However, there are many settings that will eventually be applicable to the template. Therefore, the most basic functionality will be created and then the template functionality will be applied to these most basic settings before moving to higher-level functionality.

1. Import File
2. Delete Fields
3. Sort Data
4. Group by Fields
5. Save new report
6. Save these settings to a template

Time permitting, move on to Core+ Functionality

Week 4: Build Core+ Functionality

Expanded basic features

1. Filter Data

2. Rename Column Headers
3. Merge two reports
4. Rearrange columns
5. Create visuals
6. Export to PDF
7. Add these Core+ features to the template save feature

Time permitting, move on to Final Functionality (week 7)

Week 5: Complete Testing

Complete test cases covering Core and Core+ functionalities above

Week 6: Revise Report for all changes

Review and edit documentation to align with all changes taken place

Week 7: Design Patterns, Object Constraint Language Contract

Complete design patterns and OCL contract

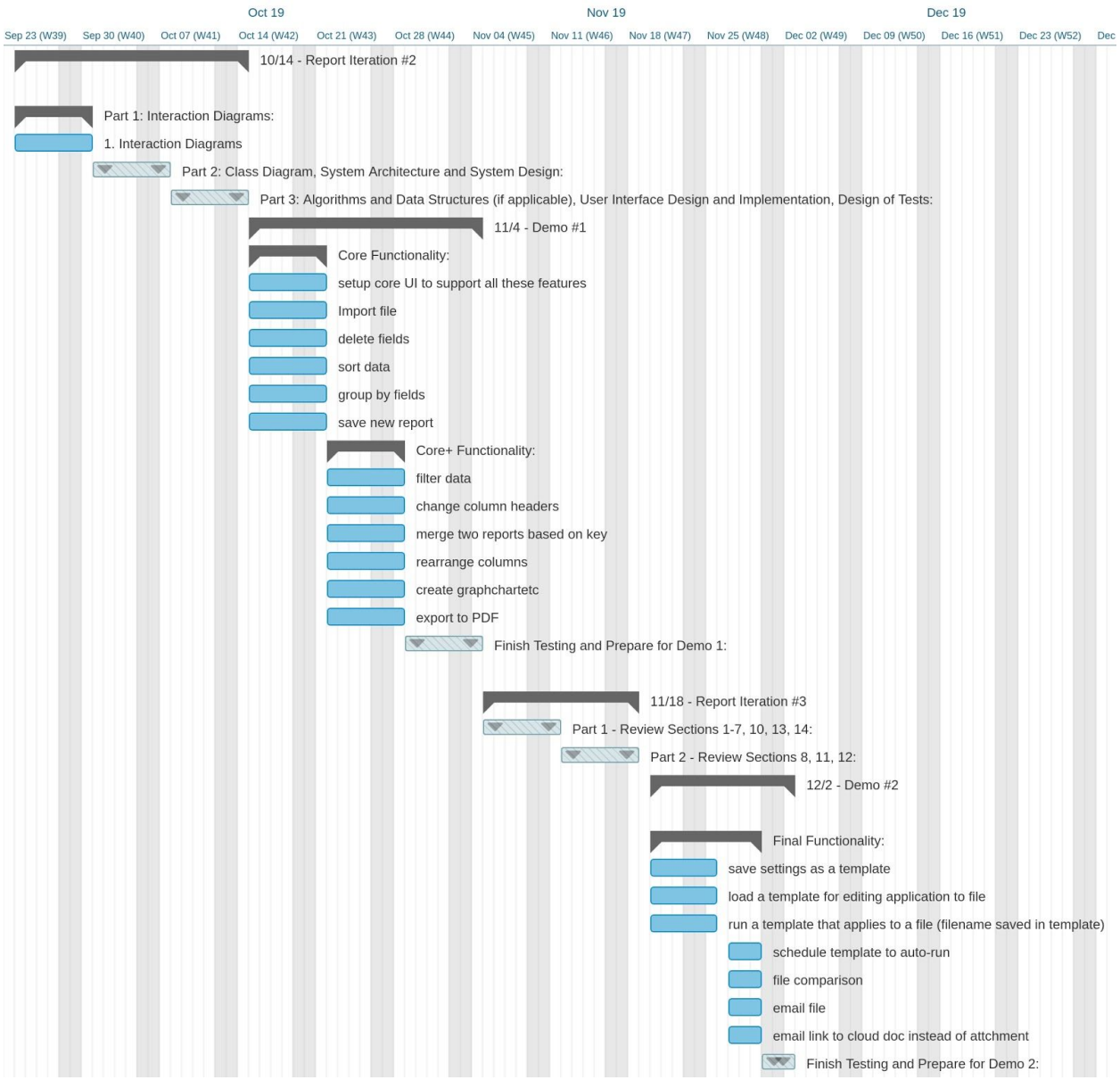
Start work on the final pieces of functionality

1. Including all features into the template
2. Loading a template for editing
3. Applying a template to a file
4. Comparing two files for differences
5. Emailing a file
6. Generating a download link to be emailed

Week 8: Final Functionality

Complete and test the following features in preparation for Demo 2

1. Including all features into the template
2. Loading a template for editing
3. Applying a template to a file
4. Comparing two files for differences
5. Emailing a file
6. Generating a download link to be emailed



Product Ownership

The following list describes the product/feature ownership of this project. Each member will own that specific aspect of the project.

1. **Select a file from the repository** - Jeremy Pogue
2. **Save a template** - John Mullane
3. **Merge with another file** - Taylor Zwiebel

4. **Delete Fields** - Jeremy Pogue
5. **Compare to prior report** - Taylor Zwiebel
6. **Schedule Auto-Run** - Taylor Zwiebel
7. **Email to myself or others -** Josh Lewis
8. **Specify the output name of the file** - John Mullane
9. **Save in a desired location** - Jeremy Pogue
10. **Create a chart** - Josh Lewis
11. **Export report/Chart, etc. to PDF** - Josh Lewis
12. **Change file format to .csv or otherwise** - Jeremy Pogue
13. **"Group By" / Pivot** - John Mullane