Deliverable G: Prototype II and Customer Feedback

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Introduction

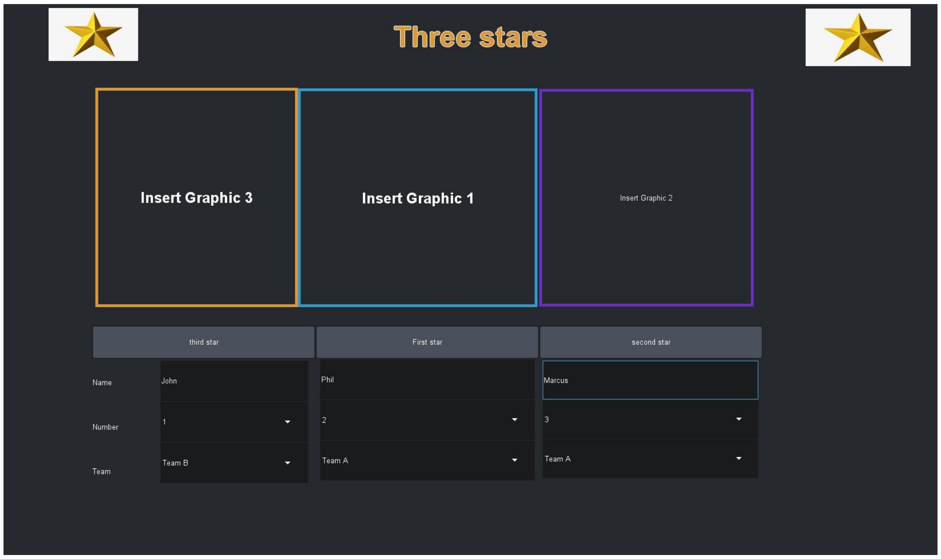
The Ross Video Design Challenge is a project assigned to students by the client Ross Video, in collaboration with the Ottawa Sports and Entertainment Group (OSEG). The goal is to design an innovative interface that controls the various graphical and auditory elements used during sporting events. This system is expected to be produced using Ross Video's very own program, Dashboard, which is built specifically for the purpose of modelling interfaces to be used in live events.

Work efficiency is extremely important for the production team at the TD Place Arena, this project will explore ways to optimize their control system's user interface to make the job smoother.

In the previous deliverable, prototype 1 was created and tested. This prototype focused on determining the feasibility of general concepts integral to the overall flow of the subsystems that make up the user interface. Tab switching, button functionality, and file upload were tested based on the why, what, how, and when of prototyping outlined in test plan 1. The results were recorded and analyzed once the stopping criteria was encountered. The objectives of each test were met, for the most part, and were determined to be feasible for use in the final product. In this deliverable, prototype 2 is being created and analyzed based on the test plan. This prototype centers on evaluating fundamental features crucial to the functionality of each subsystem. Many of the subsystems have common properties that will only need to be tested once and applied to the entire system. Based on the results of the testing, the bill of materials, detailed design, and target specifications will be adjusted accordingly. Finally, the test plan for prototype 3 will be outlined in preparation for the next deliverable. Prototyping allows for the verification of the practicality of design plans to ensure that the best final product possible will be produced.

1. Analytical, Numerical or Experimental Models

1.1. Three Stars Subsystem

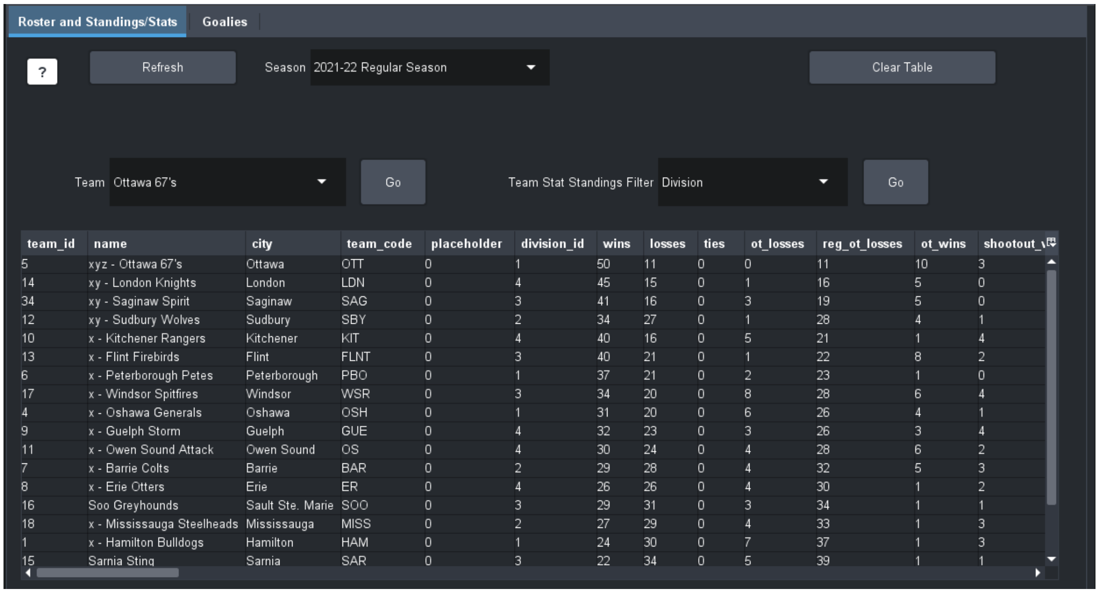


	third star	First star	second star
Name	John	Phil	Marcus
Number	1	2	3
Team	Team B	Team A	Team A

Figure 1. Three stars subsystem user interface prototype

The Three-Star subsystem includes three entries for each player that was picked for the top three players. In addition, the operator can input data through a dropdown menu or input the player's name, jersey number, and team. The subsystem further allows you to add the player's picture to show what star they got through Xpression.

1.2. Standings/Stats Subsystem



Season 2021-22 Regular Season

Team Ottawa 67's

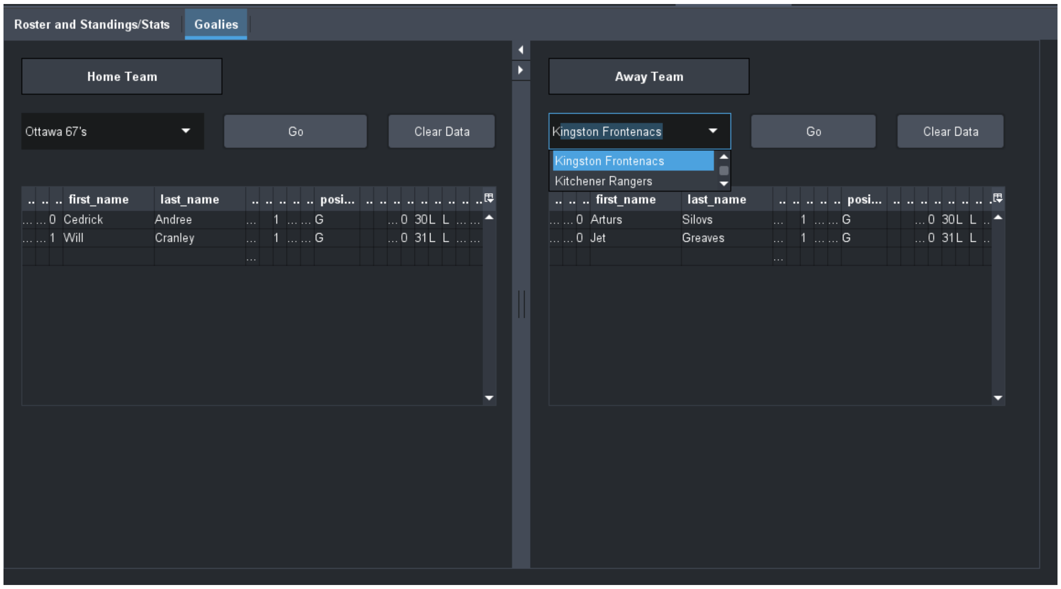
Team Stat Standings Filter Division

team_id	name	city	team_code	placeholder	division_id	wins	losses	ties	ot_losses	reg_ot_losses	ot_wins	shootout_
5	xyz - Ottawa 67's	Ottawa	OTT	0	1	50	11	0	0	11	10	3
14	xy - London Knights	London	LDN	0	4	45	15	0	1	16	5	0
34	xy - Saginaw Spirit	Saginaw	SAG	0	3	41	16	0	3	19	5	0
12	xy - Sudbury Wolves	Sudbury	SBY	0	2	34	27	0	1	28	4	1
10	x - Kitchener Rangers	Kitchener	KIT	0	4	40	16	0	5	21	1	4
13	x - Flint Firebirds	Flint	FLNT	0	3	40	21	0	1	22	8	2
6	x - Peterborough Petes	Peterborough	PBO	0	1	37	21	0	2	23	1	0
17	x - Windsor Spitfires	Windsor	WSR	0	3	34	20	0	8	28	6	4
4	x - Oshawa Generals	Oshawa	OSH	0	1	31	20	0	6	26	4	1
9	x - Guelph Storm	Guelph	GUE	0	4	32	23	0	3	26	3	4
11	x - Owen Sound Attack	Owen Sound	OS	0	4	30	24	0	4	28	6	2
7	x - Barrie Colts	Barrie	BAR	0	2	29	28	0	4	32	5	3
8	x - Erie Otters	Erie	ER	0	4	26	26	0	4	30	1	2
16	Soo Greyhounds	Sault Ste. Marie	SOO	0	3	29	31	0	3	34	1	1
18	x - Mississauga Steelheads	Mississauga	MISS	0	2	27	29	0	4	33	1	3
1	x - Hamilton Bulldogs	Hamilton	HAM	0	1	24	30	0	7	37	1	3
15	Sarnia Sting	Sarnia	SAR	0	3	22	34	0	5	39	1	1

Figure 2. Standings/Stats user interface prototype (*Tab 1*)

This prototype includes the ability to select a season as well as a division to show team standings for. The data then appears in the form of a table on the user interface, so that the user can see the data that has been accessed. The cells in the table can be edited, so it is possible to change any information manually if necessary (if the source of the data is incorrect for example). During testing, it was noted that the “Clear Data” button is the slowest element on the panel and often takes 2 seconds or more to respond. As such, it is likely that this button will not exist on the final product, since its main purpose was to make the coding for the panel easier (helps developers during the design process, not necessary for users).

1.3. Goalie Matchup Subsystem



Ottawa 67's

..	..	..	first_name	last_name	..	..	..	..	..	posi...	..	..	..	..	..	..	..	..	..
...	...	0	Cedrick	Andree	...		1	...	...	G			...	0	30	L	L	...	...
...	...	1	Will	Cranley	...		1	...	...	G			...	0	31	L	L	...	...

Kingston Frontenacs

Kingston Frontenacs
Kitchener Rangers

..	..	..	first_name	last_name	..	..	..	..	..	posi...	..	..	..	..	..	..	..	..	..
...	...	0	Arturs	Silovs	...		1	...	...	G			...	0	30	L	L	..	
...	...	0	Jet	Greaves	...		1	...	...	G			...	0	31	L	L	..	

Figure 3. Goalie Matchup user interface prototype (*Tab 2*), includes a tab split to show data for the two Home and Away teams.

The Goalie Matchup subsystem has a tab split in two by a tab divider which can be dragged across the screen, but is split in the middle by default. On either side of the divider, the user can access a dropdown menu to select the home and away teams and show their goalies. The data is shown for the same season as the one selected in the Standings/Stats tab, so the user does not need to reselect the season, only the teams.

Again, the Clear Data button isn’t really necessary for the user and may be changed or removed because it works slower than the rest of the system.

1.4. Fan birthday subsystem

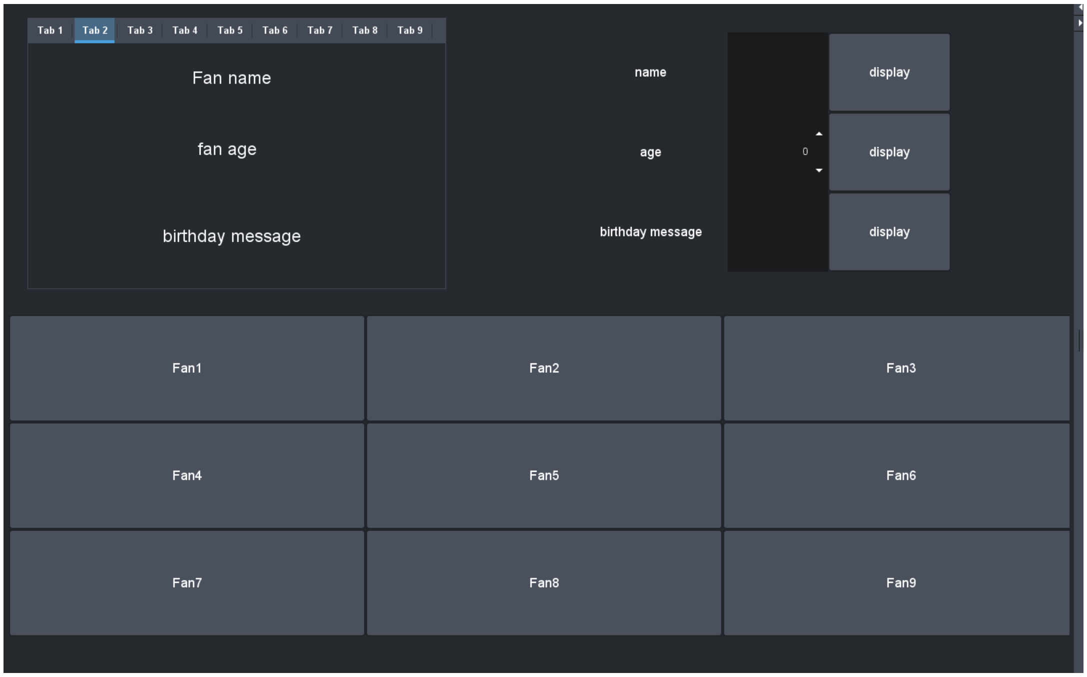


Figure 4. Fan birthday subsystem prototype 2

The fan birthday system contains three inputs on the right top corner. The operator can insert the Fan name, age and his/her birthday message before the start of the game. Then, it will appear on the tabs so the operator can show it on the screen during the game play.

2. Test Plan

The testing of prototype 2 will focus on assessing various features of each of the subsystems. Many of the subsystems share common characteristics which will only need to be tested once to verify their feasibility and be carried throughout the system.

Table 1. Overview of prototype 2 Test Plan

Test ID	Test Objective (Why)	Description of Prototype used and of Basic Test Method (What)	Description of Results to be Recorded and how these results will be used (How)	Estimated Test duration and planned start date (When)
1	Verify the speed and efficiency of	A more comprehensive prototype will be	Average time in seconds needed to switch tabs (tabs with	Test duration: 15 minutes

	the Standings/ Stats interface for the user.	used (a partial subsystem, missing some features which the team needs more time to build, but including everything we have ready). This will allow us to more accurately evaluate the performance of our product.	elements on them, unlike the first prototype). Results should not exceed 1 second, since in our previous prototype it was instant, this time we expect very small numbers.	Planned start date: November 7th, 2021
2	Evaluate user friendliness of the Standings/ Stats interface. (Also testing speed).	A fairly comprehensive prototype will be used again (missing some features which the team needs more time to build, but including everything we have ready). This test doesn't necessarily need a comprehensive prototype since it does not measure performance, only the user's interactions with it. However, we already have a comprehensive prototype intended to test performance in the previous step, which is why we will use the same prototype.	Number of mouse clicks needed for a user to display desired information on the Standings/Stats subsystem *(Tab 1).* At the same time, the process will be timed to get an idea of the minimum speed at which it can operate. This subsystem is currently fairly complex, so the goal is to take no more than 5 clicks on this screen in order to operate it.	Test duration: 15 minutes Planned start date: November 7th, 2021.

3	Evaluate user friendliness of the Goalie Matchup interface.	This test will use the same prototype as the one used in Test 2, since this will save time and effort (resources) for the team.	Number of mouse clicks needed for a user to display desired information on *Tab 2*. Time taken will also be recorded once again, to get an idea of the speed at which it can be operated.	Test duration: 15 minutes Planned start date: November 7th, 2021.
4	Test the efficiency of the Fan Birthday subsystem	A more comprehensive prototype compared to prototype 1 will be used. It has multiple tabs and is capable of inserting different fan names so that they appear on a tab.	Average time in seconds required to parse 3 sets of data (name, age and message) into the system. Average time in seconds required to display parsed information.	Test duration: 10 minutes Planned start date: November 7th, 2021
5	Assess the speed and practicality of the three stars user interface in order to gauge its efficiency.	A focused prototype with greater capabilities for processing specific forms of information such as player names, team and jersey number. This will allow us to analyze the efficiency of this subsystem for the user.	The average time in seconds required for the user to enter the information into the interface as well as the amount of time required for the interface to respond to the user input, will be observed. Desired results are ~1-2s for parsing information into the system and another ~1-2 seconds for the system to respond.	Test duration: 15 minutes Planned start date: November 7th, 2021

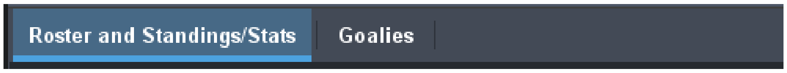
A prototype of medium fidelity is acceptable based on the objectives of this test phase. Prototype 2 will need to have more detail than prototype 1 and will be closer to the final design but will still be missing some key elements. The objectives for the tests of prototype 2 focus on testing key features in subsystems, including features shared across multiple subsystems. This means that not every subsystem will need to be fully formed and functional in its entirety. For example, the drop down list is common to subsystems A and B and will only need to be prototyped and tested once. For these reasons, a prototype of medium fidelity will be used.

The stopping criteria is when enough data has been gathered for the team to decide what needs to be changed or improved, or once the team decides the results meet the criteria set and the prototype indicates success in meeting the design criteria.

3. Test Results and Analysis

3.1. Standings/Stats Subsystem

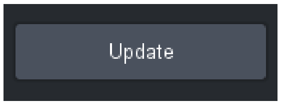
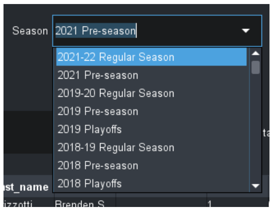
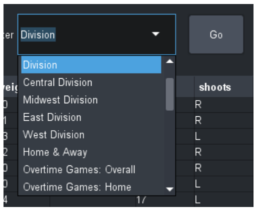
3.1.1. Test 1 Procedure:



Switching tabs is a very quick process which takes only one mouse click, so it should take only a few milliseconds. Our prototype shows that it does fulfill this criteria even when there are panel elements on each tab, examples being the Standings/Stats, and Goalie Matchup subsystems.

3.1.2. Test 2 Procedure:

Maximum number of clicks: 6

 1 click	 Season 2021 Pre-season 2021-22 Regular Season 2021 Pre-season 2019-20 Regular Season 2019 Pre-season 2019 Playoffs 2018-19 Regular Season 2018 Pre-season 2018 Playoffs 2 clicks	 Division Go Division Central Division Midwest Division East Division West Division Home & Away Overtime Games: Overall Overtime Games: Home shoots 3 clicks

The maximum number of clicks is needed to display team standings for a given division upon first starting up the system. The user needs to click the “Update” button to make sure all the data in the system is up to date. They would then click twice to select a season from the first dropdown menu, after which they would need another two clicks to select the desired division from the second dropdown menu. Finally, they would click the “Go” button to actually display the data in the table below.

The tests showed that it took over a second to load data onto the screen. However, it is likely that on professional equipment (or even just a new laptop) it will not take as long. The tests were run on a laptop that also takes several seconds to complete Google searches, so this must be kept in mind. Nonetheless, the team will keep the operating speed of the system in mind when designing our product, since speed is essential for our client.

Minimum number of clicks: 3

In the situation where the system is already up to date (for example the button was already clicked), the Reset button does not need to be clicked every time the tab is opened. The default season is preset to be the latest season. In total, these things may reduce the number of clicks down to 3.

Table 2. Summary of test results for Standings/Stats prototype.

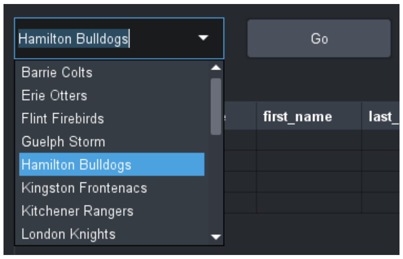
ID	Test	Results	Comments
2	Average time in seconds needed to switch tabs (tabs with elements on them, unlike the first prototype)	< 1 second (too short to accurately record with a timer)	Using tabs in the system, even when more complex elements are implemented is expected to remain very efficient.
3	Number of mouse clicks needed for a user to display desired information on *Tab 1*	**Max** 6 clicks (~5 seconds for user to click, 2 additional seconds for data to load) **Min** 3 clicks (~2 seconds for user, 2 seconds to load data)	This system may be further simplified if possible in the next steps, but it's not a grossly unacceptable result.

3.2. Goalie Matchup Subsystem

3.2.1. Test 3 Procedure:

The Goalie Matchup subsystem has two dropdown menus, however, by default, the home team is set to the Ottawa 67's so that one likely will not need to be edited.

The away team needs to be selected from the second dropdown menu, which takes 2 clicks. Then the user needs to click the "Go" button in order to show the data for the selected team's goalies. In total, it takes about 3 clicks. It takes about 2 seconds to load the data, but this is expected to be much shorter on a newer/better device.



However, the "Clear Data" button takes anywhere between 2 seconds and 20 seconds to respond so it will likely need to be changed or removed altogether. Removing it isn't a huge concern though, since it was mainly there for the design team when coding the system to simplify the script in order to copy it to another panel. It's not necessary for the user.

Table 3. Summary of test results for Goalie Matchup prototype.

ID	Test	Results	Comments
4	Number of mouse clicks needed for a user to display desired information on *Tab 2*	3 clicks (~3 seconds for user to click, loading data takes about 2 seconds)	This system is fairly efficient, and its design can be used as is if needed in our final product.

3.3. Fan birthday subsystem

3.3.1. Test 4 Procedure:

The user will need to insert three parts (Fan name, age, and birthday message). Then, the user will need to click three 'display' buttons to update the information on the corresponding tab. The approximate time depends on the length of the birthday messages, which can take from 30 seconds to a minute. Each birthday information needs two minute in total to update before the game starts. Then, the operator will take around two seconds to display the fan's information on the screen.

Table 4. Summary of test results for Fan Birthdays prototype.

ID	Test	Results	Comments
4.1	Average time in seconds required to parse 3 sets of data (name, age and message) into the system.	Depending on the length of the birthday message, time to parse can range from 30-60s. Averaging at ~45s.	Considering the amount of information that must be displayed. The system is generally efficient, however a faster processing time would be beneficial.
4.2	Average time in seconds required to display parsed information.	Displaying a message takes ~2s.	The displaying of the message can be done with a single button press and is almost instantaneous. Very efficient.

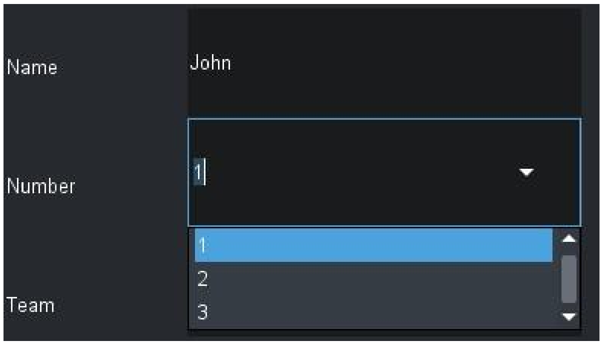
3.4. Three-star subsystem

3.4.1. Test 5 Procedure:

The three-star subsystem allows you to display the player's name, team, and jersey number. The test is to see the efficiency of the three-star subsystem. The test helps show easily the operator can input the player's name, player's jersey number, and player's team. The subsystem includes a drop-down menu to choose the jersey number or team of the player with the star. Furthermore, these parameters can also be inputted by typing on the keyboard. The operator can choose from the list to make it easier rather than typing.

Table 5. Summary of test results for Three-star prototype.

ID	Test	Results	Comments
5.1	Average time in seconds required to input 3 sets of data (name, jersey number and team) into the system.	The average time it takes to input three sets of data is roughly around 3 seconds.	The name option requires you to input the name manually, other than that you can use the parameters to select your jersey number and team easily.
5.2	Number of clicks required to show the information on the interface	Max two clicks for the jersey number and team name.	The process seems fairly efficient because the number of clicks is less than 3.

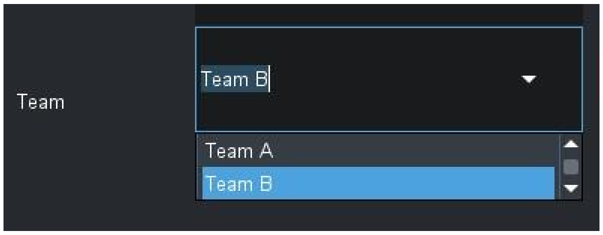


Name John

Number 1

Team

Dropdown menu for jersey number



Team Team B

Dropdown menu for Team name

4. Updated Design Information

4.1. Target Specifications

Table 6. Current Design Criteria

Rank	Criteria/Metric	Measurement	Ideal Value	Acceptable Values
1	Uses Dashboard software	yes/no	yes	yes
2	Displays a combination of graphics and text	yes/no	yes	yes
3	Configurable display	yes/no	yes	yes
4	Simple and user friendly. Time needed to modify one element (find buttons + input text)	Seconds	10	< 30
5	Device set-up time	Seconds	30	< 60
6	Cost	$ (CAD)	0	0
7	User perception of aesthetics, average rating out of 10.	Average n/10	10/10	>5/10

There have been no changes made to the target specifications since the previous deliverable. So far, the design criteria has been successfully implemented into prototype 2 and there is no need for many modifications. The testing has proven all of these metrics to be feasible. The only change is that the last criteria about screen aspect ratio has been removed because it is not applicable to our project.

In deliverable F, two main changes were made to the target specifications. The design specifications for an aesthetic appearance once displayed is replaced by appearance of the user interface (does it look cluttered, does it look sleek and well designed, etc). The goal is to get a majoritarily positive response from our users, peers, etc. However, this criteria will be considered later once our subsystems have been finished.

5. Prototype 3 Test Plan

This prototype aims to refine user experience in order to create the most effective user interface possible that allows the user to find, understand, and use controls quickly and easily. Prototype 1 and 2 focused on determining the feasibility of and in integrating many functional aspects of the final design. Prototype 3 will center around the aesthetics and the layout of these aspects to ensure that they optimize efficiency and clarity for the user.

Table 7. Prototype 3 Test Plan

Test ID	***Test Objective (Why)***	***Description of Prototype used and of Basic Test Method (What)***	***Description of Results to be Recorded and how these results will be used (How)***	***Estimated Test duration and planned start date (When)***
1	Find out how easy to use users perceive the system to be at a glance and briefly after using it. This is important because a customer's first impression of a product can greatly impact how much they want to use said product.	Multiple people, ideally who are unfamiliar with the design but who have a general idea of the purpose of the product (people who watch hockey games but don't know programming for example), will be asked to briefly interact with the system. They will be asked to complete a simple task like "upload an image of a goalie that is in the Pictures folder of this computer onto the Dashboard."	Users will be asked to navigate from the Home Screen to the Standings/Stats page (currently the most complicated one), and access the data for a certain division. They will then be asked how difficult they felt the system was to use on a scale from 1 to 10 (10 being very difficult). Ideally, a user unfamiliar with Dashboard should respond a number 7 or lower since the task they will be asked to perform will be a very simple one, so their perception of difficulty or simplicity will be based on how the user interface has been designed.	Test duration: 20mins. Planning start date: November 13th, 2021
2	Users will be timed (not necessarily with their knowledge), and then			

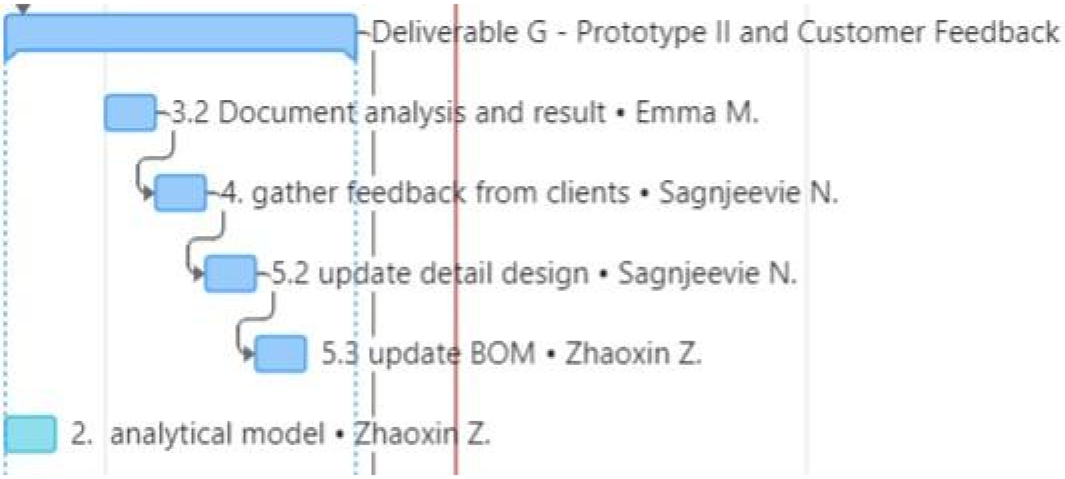
3	Testing user perceptions of aesthetics	Various people (friends/family/ classmates)will be shown screenshots of different subsystems and asked if they would feel good looking at the control panel every day at work. They will be asked to give a rating from 1-10 (10 being beautiful) and then explain how they felt.	If the average rating is lower than 5, the team will make modifications to the user interface based on feedback.	Test duration: 20mins. Planning start date: November, 13th, 2021
4	Final Test system performance.	Each team member will download the prototype 3 Dashboard panel to make sure it works on different devices and operating systems. Test 2 will then be repeated by each member and times will be compared to see how much the device affects performance.	If there is a major gap in time taken to complete the task (5 seconds or more), it indicates that the quality of the device used plays a major role in the product's performance. This means a device requirement may need to be specified in the product's user manual.	Test duration: 1hrs. Planning start date: November, 13th, 2021

The stopping criteria for the prototype 3 test plan will be once feedback has been obtained from various unfamiliar users after they have either performed a simple task or viewed screenshots of the system. The test can be stopped once enough feedback has been received such that a unanimous solution can be made for the refinement of the user interface. A prototype of high fidelity is acceptable for carrying out this test plan. This is because in order to test the effectiveness of the user interface, most of it will need to be functional. The final layout of all of the buttons, tables, and tabs will be very similar to that of the final product. Since the general layout of the entire system will be in line with that of the final solution, a prototype of high fidelity will be used.

Conclusion

Prototype 2 has been used to test both performance and user friendliness (from the designer's point of view). This was done by assessing the overall efficiency of the stats and standings system as well as the fan birthdays system. Furthermore, the ease of use of the stats and standings system as well as the goalie matchup system was also tested. From conducting these tests, it was concluded that the various systems in prototype two functioned very effectively with the time for activation averaging at approximately 1 second. Similarly, the simplicity of the system allowed for a very short learning curve, thereby achieving the desired results. Goals for the future are to finalize the functional aspects of each system and integrate them together so that the final tests of the entire system including all sub-systems working in tandem can be tested and user perceptions regarding its functionality can be observed and utilized to make and final improvements.

Appendix 1



Gantt chart for deliverable G