Business Technology Management Program

Ted Rogers School of Information Technology Management (TRSITM)

Ryerson University

Alternatives to iClicker

FINAL REPORT

<u>Team Members</u>

Jonathan Policelli

Alister Fernandes

Julien Bolosan

Radu Intuneric

Oshin D'Souza

Course: ITM 90B-031 Capstone Project

Client: Computing and Communications Services, Ryerson University

Facilitator: Professor Mahmoud Jahani

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Executive Summary

Objective

The objective of ITM90A/B is to identify possible business opportunities and problems that may arise when working with our client. Some of these opportunities could be developing new business processes or analyzing existing business processes. In order to identify the problems and opportunities within our client's business, our group needed to research and observe our client's existing business processes. Our client works in the Computing and Communications Services department at Ryerson University, and requires an improved solution to their current iClicker student response system. We were able to better understand the current system which helped us find the disadvantages of the system that were improved or eliminated in our proposed system. We researched the possible vendors that are appropriate replacements for our client's current system. Our goal was to find a vendor that can provide our client with a learning tool that reduces the cost for the students as well as increase the engagement level in classrooms. This goal would in turn eliminate the current iClicker student response system, therefore, providing a better business solution for Ryerson University. While researching more business models, we focused on Key Performance Indicators that are important to both professors and students to help improve the business model. After completing all the required research and speaking more to our client about their goals and ideas, we were able to assess possible improvements and the development of a new business solution.

Alternative to implementing the new student response system, we conducted research and created documents that our client could use in the future. As we were not authorized to send out our RFP to vendors, during the second half of the course our group focused on developing an RFP that our client will be able to utilize. Based on our client's request, we conducted professor and student surveys in Ryerson University. Our surveys will be used by our client in making a decision on a student response system replacement. We did however suggest a possible vendor for our client to work with by comparing the different vendors using KPIs. Overall, our objective in ITM90B was to help in the process of selecting a new student response system and the practicality of the proposed solutions.

The objective of this final report is to summarize the process, analysis and conclusions in identifying a new student response system for our client at CCS, which all took course over the past eight months. This report will outline the series of actions that resulted in our recommended solution to our client and the new developments that emerged throughout the duration of our course.

Scope

Our scope for this project was to learn about the various potential alternatives for our client and propose a feasible solution. We had various deliverables during the progress of our project. We needed to conduct a study of the various student response systems available. We did this by contacting these vendors to gain insight on their offerings and features suitable for our client. We also conducted our own research on the possible vendors through the Internet and by conducting a survey on the current and potential future student response system. Using the information that we gathered, we were able to compare their offerings among these vendors based on the Key Performance Indicators (KPIs) we have. We assigned a weighted score to each KPI based on our research and client's feedback. This helped us to have a better understanding of the needs required by students and Professors for the new student response system. By comparing each of the possible vendors using the weighted KPI scores, we were able to narrow down on the top alternative vendors as well as the most beneficial vendor for all the parties involved. Once we gathered enough research, we created an RFP that our client could possibly use as a reference for creating an official RFP for Ryerson University.

There were some limitations we encountered throughout our research in finding the best alternative vendor. One issue that we encountered was that vendors did not supply all of their information and features on their website such as their prices. This issue caused us to contact the vendors personally in hopes of finding more information that was not available on the websites. Contacting large companies might result in delayed responses or no response at all. This lack of information will make it difficult to compare the alternative vendors with one another. Communicating with our client might lead to another issue as their in-person availability may be limited, therefore our form of communication might be restricted to only online communication which can lead to delays and miscommunication. The last issue we encountered was the lack of authorization in sending out the RFP to the vendors. Our client's company is a publicly funded organization which requires the authorization from its board members including the CIO in order to send out an official RFP on behalf of Ryerson University. This prevented us from acquiring RFP responses from the vendors hindering the creation of an implementation plan for our client.

Major Findings

For our research we contacted several institutions that are using the various alternative solutions and gathered their feedback on these alternatives. From their responses we discovered some important KPIs and through further research we determined additional KPIs that aligned with our client's needs and requirements. We also discovered that the methods of payment can vary between students, Professors, departments or the University. Additionally, we discovered that the process for negotiating and implementing the new system will include scheduling a system demo prior to the initial implementation. From the results of the survey completed by the professors that are potential users of the new system, we found that most

preferred the new system to be a university-wide paid system. The survey results also showed that the preferred system is the Top Hat student response system.

List of some of our major findings:
- Professors are unwilling to have the cost towards students to pay for their own iClicker remotes.
- The professors also found transporting the iClicker base from class to class challenging, since they have to physically carry it.
- The previous system needed the students to connect to the same frequency as the iClicker base and the professors found this as a hassle which would consume class time.
- There was no way to monitor cheating in the classroom when the previous iClicker system was used.
- Some of the systems available that the professors prefer are Kahoot, Mentimeter, Top Hat, Socrative and iClicker.
- The features that professors would like to see in the new system are: easier setup of the system, easier process to deal with device problems, a feature on students' phones that blocks them from accessing anything else until they complete a quiz, the system's ability to enter free text questions and comments, ability to group all the students in the classroom into teams, ability for the new system to automatically integrate with D2L, a system that provides good reporting data and, integration with iPad based presentation software.

Key Conclusions

In conclusion, by focusing on our business objectives including analysing existing business processes and developing an improved process solution including interviewing and conducting surveys of students and Professors at Ryerson, we discovered some major KPIs that are important to the Professors, students and our client. Some important factors that we value would be a free learning tool for the students, D2L integration, ease of use, smooth implementation, and improving the overall learning experience. Throughout the process, we experienced many limitations such as vendor communication however, we found ways to cope with these constraints mainly by working together as a team and trying to get into contact with as many vendors to help increase our chances of a reply. With our attempts to research the alternative vendors, we learned more about the opportunities which will help us successfully build a detailed implementation plan for our client's approval.

Acknowledgements

This page is dedicated to the acknowledgements of those who have contributed to our Capstone Project throughout the ITM 90A/B semesters. We are very grateful for the cooperation of our clients Restiani Andriati and Dina Basseri as well as the added contributions by Adam Chaboryk, Professor Linying Dong and Professor Mahmoud Jahani.

Andriati is our primary client who presented our group with a business opportunity to work with Ryerson University, and in working together we searched for a potential vendor based on our proposed solution. Basseri has been very involved in our client meetings and online communications by assisting our group in making revisions and providing helpful suggestions to our deliverables. Both Andriati and Basseri also had significant roles in helping with the creation of our surveys intended for the Ryerson audience to best suit their requirements, and both have been eager to help with any of our project concerns. Chaboryk has helped immensely with our RFP that is intended to be sent out to potential vendors, by providing accurate IT Accessibility requirements such as following the AODA law/legislative act. Professor Dong has provided our group with professor and student contacts at Ryerson University to send our surveys to, in order to gain the input of the Ryerson community on a new student response system. As our instructor for this course, Professor Jahani guided us through the progress of our project and provided us with helpful feedback for all our deliverables during our bi-weekly meetings with him. Through his experience in the business industry, our team obtained valuable information on how the industry operates in terms of the various questions that needed to be asked and on understanding the etiquettes of corresponding with companies in order to acquire beneficial information.

We again are greatly appreciative of everyone involved in our project for their dedication and support throughout our Capstone Project, it truly has been a pleasure working together with all of them. The success of our Capstone Project would not have been possible without the continued commitment of these individuals.

Introduction

Our client and contact at Ryerson University is Restiani Andriati, the Digital Media Projects Manager for Computing and Communications Services (CCS). Throughout ITM90B we additionally worked with Dina Basseri who is the Instructional Technologist at CCS. The purpose of this report is to examine alternative solutions for the student response system for our client. In addition, the system requirements for the business process changes and feasibility of those possible solutions. The structure will include an executive summary, acknowledgements page, introduction, revision of our interim report including; existing process analysis, process design, IT solution supporting business process change, feasibility analysis of proposed solutions, implementation plan, and concluding remarks.

Revised Interim Report

I Existing Process Analysis

Company Profile

Ryerson University was established on September 16, 1948 in Toronto, Ontario which was then named the Ryerson Institute of Technology. It offered a two-year trades training program for World War II veterans and by 1950, Ryerson offered three-year programs as well. In 1993, Ryerson was officially recognized as a university which prompted the name change to Ryerson Polytechnic University. In 2001, the name was officially changed to Ryerson University and now offers 60 undergraduate programs, numerous graduate programs and continuing education through the Chang School, totaling to about 45,000 students enrolled at Ryerson University today.

They offer many opportunities that attract students such as their successful co-op programs, networking events, workshops and many helpful student advisors that will guide them toward a successful career. Ryerson University also consists of 2,700 faculty and staff that are instrumental to providing top-quality services and maintaining the world renowned reputation of the university. One major factor regarding their company is the prime real estate they have in downtown Toronto and how these beautiful buildings are in a great location and will only increase the amount of students that want to enroll every year, therefore, increasing their revenue. The main line of business for Ryerson is providing education as a service to students, by offering these services, Ryerson sees most of its revenues from student enrollment fees which totaled to about $792 million of revenue in April of 2019.

In association with Ryerson University, our client is from the Department of Computing and Communications Services (CCS) which is also located in downtown Toronto. They take great pride in providing information technology services to all those in the Ryerson community. CCS takes care of all of Ryerson's technology services and ensures that they are up-to-date, protected and easily accessible.

Industry Competitive Analysis

The educational technology market was worth $17.7 billion in 2017 and will continue to grow rapidly with an expected market value of $40.9 billion by 2022. This market value will be achieved due to the innovation of technology, Big Data integration and the appeal of online learning/personalization to the younger audience. The implementation of technology in classrooms is constantly increasing as educators see a growth in class participation and enthusiasm in students.

After thoroughly researching the industry, we discovered that some of the competitors of iClicker are Acadly, Top Hat and Turning Point. Currently, Ryerson University uses the iClicker system as a per student paid product of about $60 while other competitors offer their product for free by expanding their services for use by the students through their personal devices. Most of the product differentiation is found in their features. Some of the competitors offer features such as automatic attendance which works when the students enter the classroom, as well as a live chat room that can help apprehensive students share their ideas with classmates. These features give a competitive advantage over the current iClicker system in place at Ryerson University.

Existing Process - Current Process Description

To best represent our client's current iClicker system, we are using an AS-IS BPMN diagram to clearly display the current state of the organization's process and capabilities. The diagram has four different lanes including the student, the professor, the school administration and the actual iClicker system alternative. Starting from the fourth lane which is the school administration, the trigger activity occurs when the class is assigned to the professor in the school administration lane. The process then flows to the professor lane to the activity 'Visiting the website'. The process flows to 'Register class' activity. This activity is associated with the 'Enroll in class' activity in the student lane. There is an information flow from 'Register class' activity to the database of the 'Student Registry Records'. Once class registration is complete, the process flows to the 'Create class frequency' activity, which then flows to the 'Announce frequency' activity. The process then moves to the student lane where the students 'Acquire frequency' activity occurs, after which there is an option of either 'Acquire iClicker' or 'Download App'. After the decision is made, the students register in the class. This information is stored in the 'Student Registry Records' database. The 'Configure frequency' activity is then performed. Now the process flows back to the professor lane where the 'Confirm student Registry' activity is performed by the professor. The process now flows to a decision gate, where either the 'Send Reminder' activity or 'Confirms system setup' activity is performed. If there is an issue with the' Confirm student registry' activity, the first option is taken, which is send reminder. This creates a loop back to the 'Register class' activity in the student lane. If the 'Send Reminder' activity is not required, the process flows to 'Confirm system Setup' activity. Next there is an exclusive OR gate where the professor has an option to either 'Make Quiz; or

'Use premade Quiz'. Once an option is chosen, the 'Start quiz' activity begins. The process then flows to the system lane, where the quiz is broadcast, after which there is an inclusive decision gate in the system lane. The process flows to the student lane where either one of the 'Appear on App' or 'Appear on projector' activities occurs or both happen at the same time. Then the process flows to the students joining and completing the quiz. If a quiz is completed, information flows to the 'Assignment Folders' database. The process then flows to the 'Check Responses' activity in the professor lane. There is also information flow to this activity from the 'Assignment Folders' database. After, the results are converted and returned to the students by the professor. Once these activities are carried out, the process ends in the student lane when the results are received.

AS-IS BPMN Activity Description
- Start
  - Start event: the process begins in the school administration lane
- Class is assigned
  - User task: the professor is assigned a class
- Visit website
  - User task: the professor visits the website using a browser
- Register class
  - User task: the professor registers his/her class on the app/website
  - Association to student user task: enroll in class
  - Information flow to student registry records database
- Enroll in class - data information flow
  - User task: in association to the 'register class', the student enrolls in a class
- Student Registry Records (database)
  - Storage/ database: stores the student and course information/activities
- Announce frequency
  - User task: the professor announces the frequency to students in d2l
- Acquire frequency
  - Receive (message) task: the student acquires the announced frequency for course
- Decision gate
  - Split decision: only one choice
- Acquire iClicker
  - User task: the student acquires physical iClicker from store/third party
- Download app
  - User task: the student can download the app on their mobile device to enroll in classes
- Decision gate

- ○ Split decision: join
- Register Class
  - ○ User task: the student registers into the class
  - ○ Information flow to student registry records database
- Student Registry Records (database)
  - ○ Storage/ database: stores the student registration information
- Configuring frequency
  - ○ User task: student configures the iClicker base frequency in their iClicker device
- Confirm student Registry
  - ○ Manual task: the professor confirms the student registration
  - ○ Information flow from student registry records database
- Decision gate
  - ○ Split decision: only one choice
- Send reminder (Loop)
  - ○ Send (message) task: if the student did not register, the professor will notify the student causing it to loop back to 'register class'
- Confirms system setup
  - ○ Manual task: after student registry is completed, the professor will setup the student response system for a quiz
- Decision gate
  - ○ Split decision: only one choice
- Make quiz
  - ○ User task: Professor makes a new quiz for students to complete
- Use premade quiz
  - ○ User task: Professor gives a premade quiz to students
- Decision gate
  - ○ Split decision: join
- Start quiz
  - ○ Manual task: Quiz is started
- Broadcast quiz
  - ○ Service task: Quiz appears on the broadcast network
- Decision gate
  - ○ Inclusive decision: either both activities occur or only one occurs
- Appear on App
  - ○ Receive (message) task: Students are able to see the quiz on the student response system application on either the website or a mobile device
- Appear on Projector
  - ○ Receive (message) task: Students are able to see the quiz on the student response system application on the projector

- Decision gate
  - Inclusive decision: join
- Join quiz
  - User task: Students can join the quiz
- Complete quiz
  - User task: Students can answer and complete the quiz
  - Information flow to assignment folder database in the system
- Assignment Folder (database)
  - Storage/ database: answers are stored in the assignment folder
  - Storage/ database: stores the students' quiz results
- Check responses
  - User task: Professor checks and make sure the quiz was successfully completed
  - Information flow from assignment folder database in the system
- Convert Results
  - Manual task: Professor converts the results of the quiz
- Return Results
  - Send (message) task: the results are returned to the students by the professor
- Results received (end event)
  - End event: Students receive the results

AS-IS BPMN iClicker Process Map
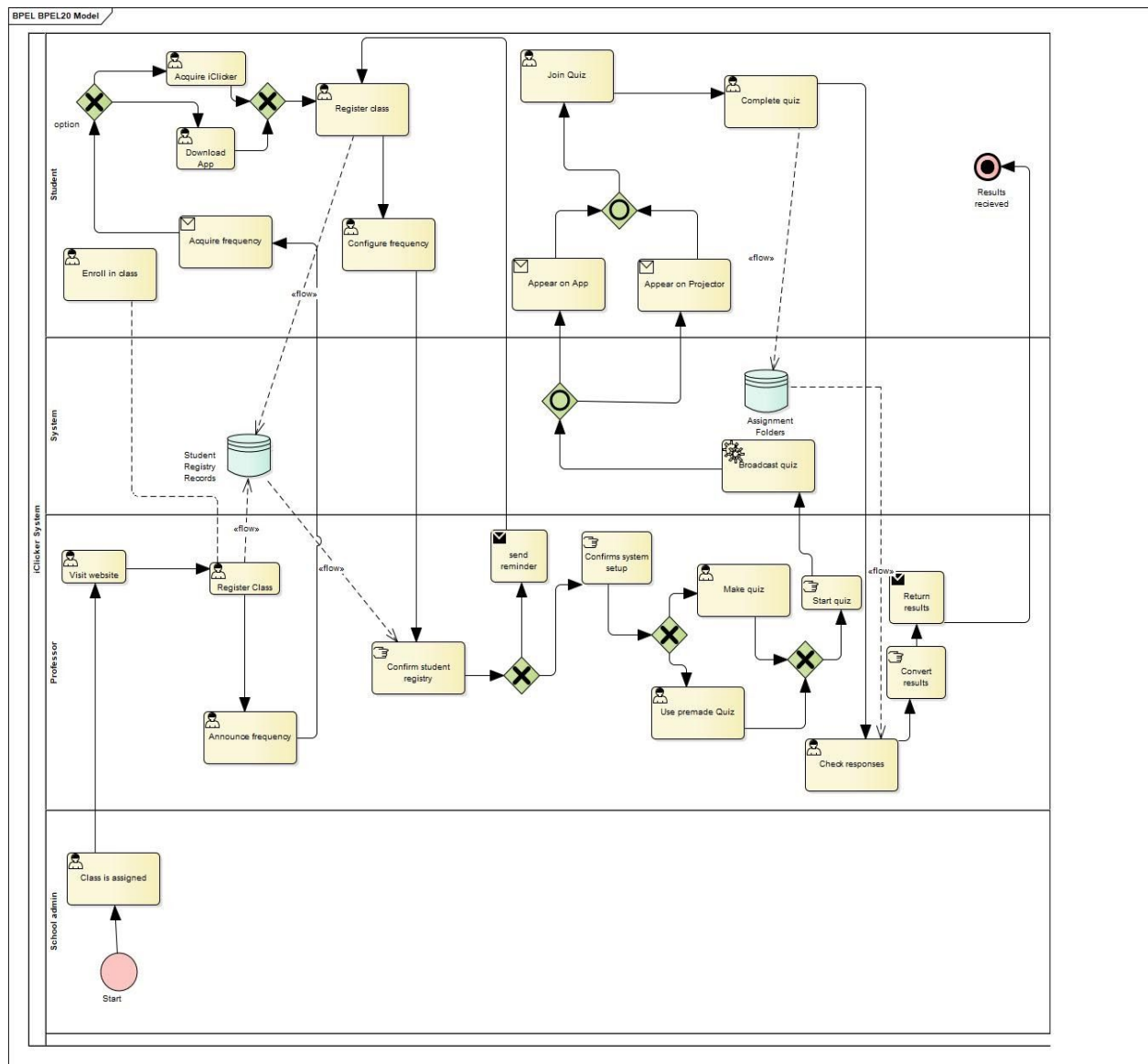
Performance Assessment

In regards to the IT behind the current iClicker system in place, CCS does a good job of providing and maintaining the infrastructure that is used to broadcast quizzes in Ryerson lectures. It allows the students to easily participate and complete class quizzes in a timely manner. The system also provides the professors the accessibility needed for obtaining student grades and returning the updated results to the students.

Fishbone Diagram
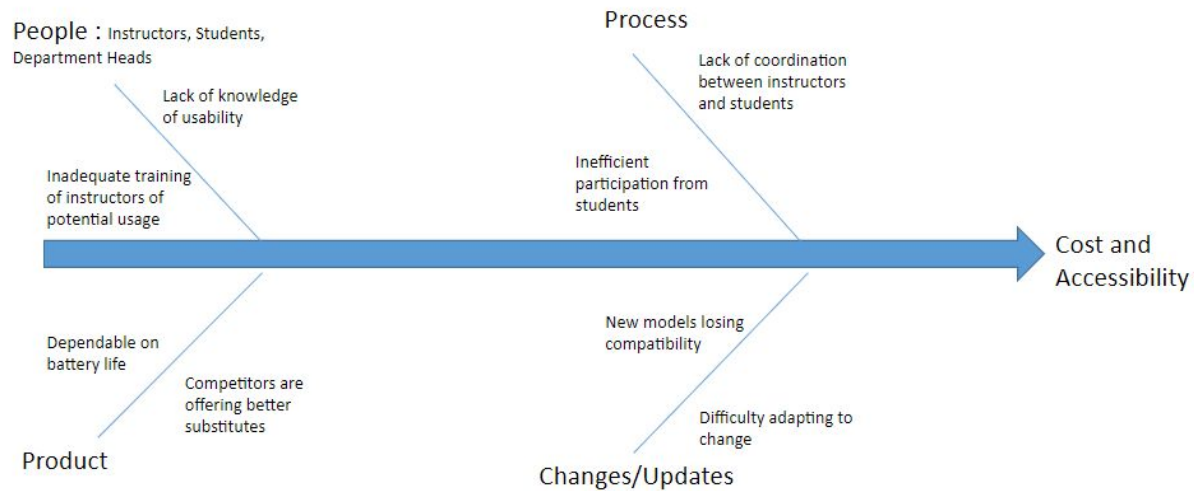
The issues we are focusing on solving are the "Cost and Accessibility" of the iClickers used as an educational tool in classes at Ryerson University. Some of the main categories that are affecting these issues are: people, which include the instructors, students and department heads; the process of using these iClickers; the product or iClicker itself; and the changes and updates related to the functionality of the iClicker system.

People

The instructors, students and the department heads may not have the necessary training and knowledge to use the iClicker system. Without the knowledge in using the system, the professors might be less inclined to integrate the iClicker system into their classrooms. The absence of the iClicker system in classrooms, will result in less student participation and undermine the learning experience.

Product

The cost for the physical iClicker remote is substantially high for a student, therefore, the students may be unwilling to purchase the product. The remotes also depend on battery life, posing an additional cost to the students to replace the batteries when they are no longer functioning. iClicker has many competitions that provide very similar educational tools that are more efficient and inexpensive. These products can easily be a substitute for the iClicker system by not only offering the same functions but additional useful features as well.

Process

Some students cannot participate in class if they do not purchase the iClicker remote, therefore, resulting in an incoordination between students and instructors. The learning experience of the students will be impacted due to the lack of full participation of students. This may affect the student's access to the necessary evaluations done through the iClicker system.

<u>Changes/Updates</u>

Changes and updates to the iClickers cause new models to lose compatibility with the present version of the system. This causes current students using the present version of the iClicker system to adapt to these updates and changes, leading them to purchase the newer version of the iClicker remote. By purchasing a new device, all the users such as the professors and students will then have to learn how to operate the new updated system, causing the difficulty to adapt to the new change. There may be resistance from the students in purchasing a second iClicker remote which will further decrease student participation.

Overall, the cost and accessibility of the iClicker remotes is caused by the reasons mentioned above. iClicker is not accessible to all as some students do not have the resources to purchase the remote. The expense of the physical remote influences the student's decision to participate in class, therefore, cannot take full advantage of what is taught in class. The cost and accessibility of the iClicker remotes hinder the student progress and learning capability.

Description and Assessment of Supporting Information Technologies

The following heat map in *Table 1* depicts the various activities of the AS-IS system and the technology used to support them. The technology used combines both software and hardware. The software we needed to demonstrate all the functions of the iClicker system are the "iClicker Website" and the "iClicker Cloud." The hardware needed for the system to properly function includes an "iClicker System Base," "iClicker Remote," "Personal devices," "Professors PC," as well as a "Projector" to display the questions/results. The level of sophistication of these technologies is portrayed in shades of blue as well as their level of support for various activities like "Registering the class" and "downloading app", are shown in shades of green. The level of support is defined with multiple shades of green, ranging from the lightest shade representing, "no support at all," to the darkest shade representing, "very effective support." The level of system sophistication is defined with multiple shades of blue, ranging from the lightest shade representing, "not sophisticated at all," to the darkest shade representing, "very sophisticated."

AS-IS Heat Map

INSERT HEAT MAP

II Process Design

Process Design (TO-BE)

To accurately represent the potential alternative system for our client, we created a TO-BE BPMN diagram to model the functionality of the new proposed system in accordance with the functional and non-functional requirements of our client. Similar to the AS-IS process, the TO-BE process displays four different lanes which are the student, the professor, the school administration and the iClicker system alternative. Starting from the fourth lane which is the school administration, the trigger activity occurs when the class is assigned to the professor. The process flows to the professor lane where an exclusive OR gate that consists of two possible outcomes; 'Visiting the website' or 'downloading the app.' Once a choice is made, the process flows to 'Register class' activity. This activity is associated with the 'Enroll in class' activity in the student lane. There is an information flow from 'Register class' activity to the database of the 'Student Registry Records'. Once class registration is complete, the System course ID is announced. The process then moves to the student lane where the students 'Acquire system course ID' activity occurs, after which there is an option of either 'Visit website' or 'Download App'. After the decision is made, the students register their information. This information is stored in the 'Student Registry Records' database. Now the process flows back to the professor lane where there is an inclusive OR for two options; 'Confirm student Registry' by the system or 'Confirm student Registry' by the professor. In this scenario, either both options can occur or only one can occur, and information is taken from the 'Student Registry Records'. The process now flows to the 'Professor checked Registry' activity, depending on the result of the previous activity, the process flows to the 'Send Reminder' activity resulting in a loop back to the 'Register Information' activity. If the 'Send Reminder' activity is not required, the process flows to 'Confirm system Setup' activity. Next there is an exclusive OR gate where the professor has an option to either 'Make Quiz; or 'Use premade Quiz'. Once an option is chosen, the 'Start quiz' activity begins. The process then flows to the system lane, where the quiz is broadcast which appears on the student's app, either on the website or on their mobile device, where the students can join and complete the quiz. If a quiz is completed, information flows to the 'Assignment Folders' database. The process then flows to the 'Check Responses' activity in the professor lane. There is also information flow to this activity from the 'Assignment Folders' database. After, the results are converted and returned to the students by the professor. Once these activities are carried out, the process ends in the student lane when the results are received.

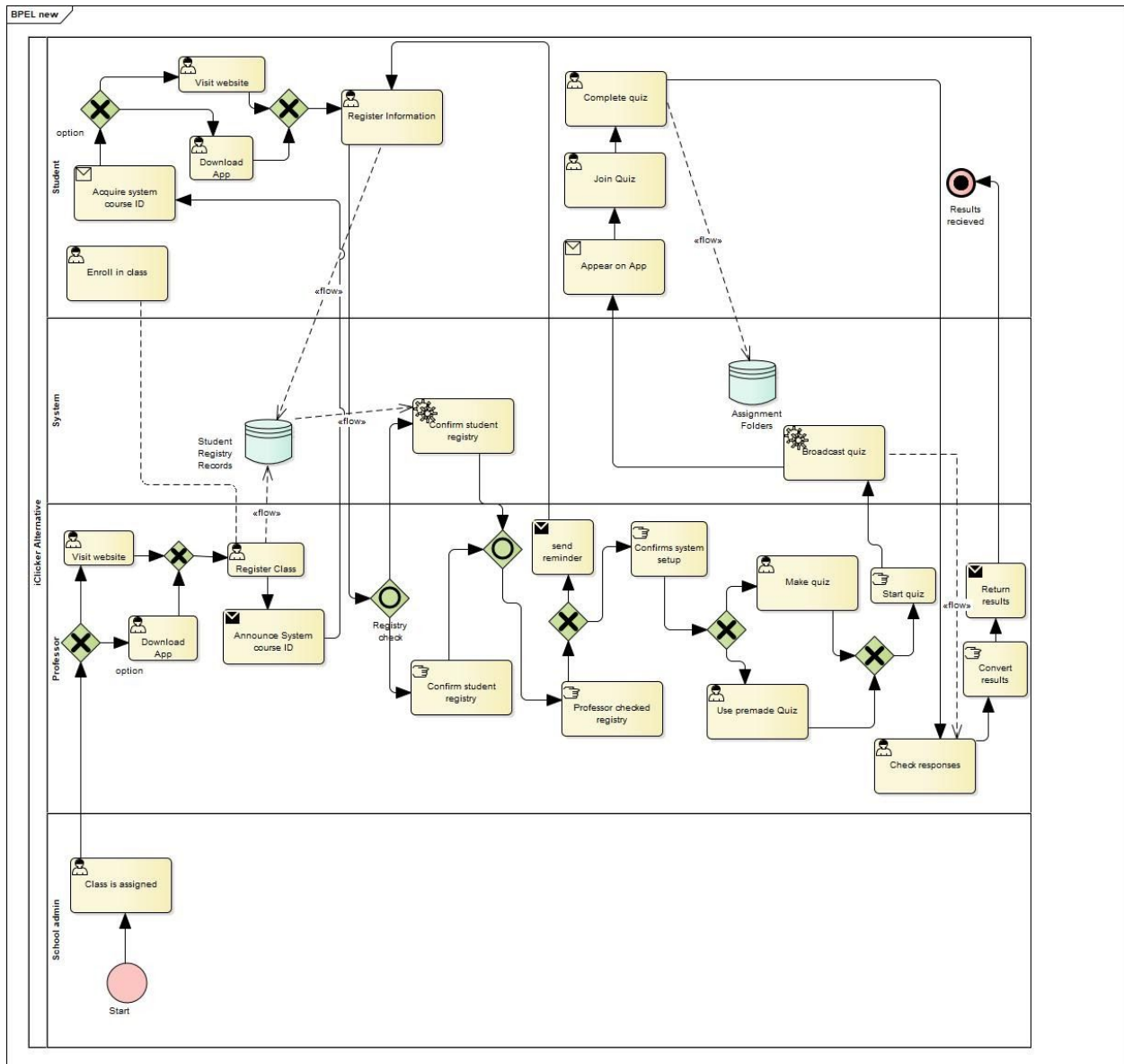**TO-BE BPMN Activity Description**
- Start
  - Start event: the process begins in the school administration lane
- Class is assigned

- - User task: the professor is assigned a class
- Decision gate
  - Split decision: only one choice
- Visit website
  - User task: the professor visits the website using a browser
- Download App
  - User task: the professor can download the app on their mobile device
- Decision gate
  - Split decision: join
- Register class
  - User task: the professor registers his/her class on the app/website
- Enroll in class
  - User task: in association to the 'register class', the student enrolls in a class
- Student Registry Records (database)
  - Storage/ database: stores the student and course information/activities
- Announce system course ID
  - Send (message) task: the professor announces the system course ID to the students
- Acquire system course ID
  - Receive (message) task: the student acquires the announced system course ID
- Decision gate
  - Split decision: only one choice
- Visit website
  - User task: the student can visit the website to enroll in classes
- Download app
  - User task: the student can download the app on their mobile device to enroll in classes
- Register Information
  - User task: the student registers their information (eg. full name, student ID number, course ID) on the student response system website/app
- Student Registry Records (database)
  - Storage/ database: stores the student registration information
- Decision gate (Registry check)
  - Inclusive OR gate: two activities will occur simultaneously
- Confirm student registry (system)
  - Service task: the system confirms the student registration
- Confirm student Registry (professor)
  - Manual task: the professor confirms the student registration
- Decision gate (Registry check)

- ○ Inclusive OR gate: join
- ● Professor checked registry
  - ○ Manual task: the professor checks registry to ensure all students are present
- ● Decision gate
  - ○ Split decision: only one choice
- ● Send reminder (Loop)
  - ○ Send (message) task: if the student did not register, the professor will notify the student causing it to loop back to 'register information'
- ● Confirms system setup
  - ○ Manual task: after student registry is completed, the professor will setup the student response system for a quiz
- ● Decision gate
  - ○ Split decision: only one choice
- ● Make quiz
  - ○ User task: Professor makes a new quiz for students to complete
- ● Use premade quiz
  - ○ User task: Professor gives a premade quiz to students
- ● Decision gate
  - ○ Split decision: join
- ● Start quiz
  - ○ Manual task: Quiz is started
- ● Broadcast quiz
  - ○ Service task: Quiz appears on the broadcast network
- ● Appear on App
  - ○ Receive (message) task: Students are able to see the quiz on the student response system application on either the website or a mobile device
- ● Join quiz
  - ○ User task: Students can join the quiz
- ● Complete quiz
  - ○ User task: Students can answer and complete the quiz
- ● Assignment Folder (database)
  - ○ Storage/ database, Answers are stored in the assignment folder
- ● Check responses
  - ○ User task: Professor checks and make sure the quiz was successfully completed
- ● Assignment Folder (database)
  - ○ Storage/ database: stores the students' quiz results
- ● Convert Results
  - ○ Manual task: Professor converts the results of the quiz
- ● Return Results

○ Receive (message) task: the results are returned to the students by the professor
● Results received (end event)
   ○ End event: Students receive the results

TO-BE BPMN Diagram

Gap Analysis

	AS-IS process	TO-BE process	Difference explained
Student	● Students purchase the iClicker remote ● Students had to look at the projector to access a quiz or activity	● Students either visit a website or install an app ● Students access the quiz or activity on their own personal devices	● No cost to students ● Better visibility for students as it is on their personal devices
System	● Frequency synchronization with students' iClicker remotes ● There is no automatic method of checking the student records registry ● No automatic attendance taken at the beginning of class	● Quizzes/participation performed and stored in the cloud ● The new system checks the student registry records automatically in conjunction with the professor ● Attendance is automatically recorded as students enter the classroom and sign in to the correct application	● Previously, students had to register an iClicker into a specific class and synchronize iClicker to the frequency of class. TO-BE process allows easy accessibility and use of a new system for participation and results. ● Having new system capabilities and being connected to the cloud improves professor efficiency ● In the previous system there is no real time attendance taken. In the new system as students sign in, their attendance is automatically recorded

Professor	● Professors needed to carry an iClicker system base for the iClicker remotes to be fully synchronized to work with students	● Only an Internet connection is required to access the student response system	● Eliminates the physical iClicker base, which simplifies the setup for the professor. In the previous setup, radio frequencies were used to connect iClicker remotes but now Wifi is used to access the application.
Rework	● 30% need to be reworked	● Reduced rework by 30%	● Reduce rework caused by changing student and professor requirements

Key Performance Indicators

       To find out what our new system should include we spoke to Professors, staff and students at Ryerson to get a better understanding of what functional and nonfunctional requirements they preferred in their previous student response system. As a group we then took this information and compared it to what the vendors were offering. We decided to use the information we gathered to create the functional and non functional requirements then measured these requirements based on the research we found of each vendor and compared them to find their final scores. We assigned the weighted total of each requirement out of 20 and the requirements that each system exhibited, we assigned the score out of 10. We also researched on the additional features provided by the various vendors.

Functional Requirements
- M/C Quizzes
    - Ability for professors/instructors to assess the students' work/performance
    - Examples: multiple choice, true or false
- Written Answers
    - Ability to test the students' ability to formulate their ideas into a short/ long answer format

- ○ Also allows the instructor to test students' ability to recall information/points and explain in their own words
  - ○ Examples: short answers, fill in the blank, essay questions
- ● Projection of Assessments
  - ○ A way for the professor to show the quizzes/assignments on the projector for students to interact with
- ● App based/website access
  - ○ Ability for the students to access the content on both mobile platforms through Apps or the traditional website
- ● Saving student responses
  - ○ This is a system based function
  - ○ When students solve a problem, answer a quiz or do a survey these responses are stored on the cloud by the system which can be later used by professors for analysis or to better im
  - ○ prove assessments that are used
- ● Uploading and downloading ability
  - ○ This feature is the ability for professor and students to upload/download documents from the site for later offline use
  - ○ In the students case they would download some documents from the site to study or to complete an assignment
- ● PowerPoint integration
  - ○ Ability for professors to integrate the response system into their PowerPoint presentations
- ● Instructor Feedback
  - ○ Allowing professors to provide quick feedback on work that is handed in, this is to allow students a way to understand any improvements that can be made in the future

Functional Requirement - (Extra Features)
- ● Attendance
  - ○ A way for the instructor to keep track of the class automatically by checking how many students are logged into the system when they check into the class online
- ● Surveys
  - ○ Ability for the professor to have polls/ surveys that can be used to get the students more involved in class, also these surveys can be used to gain feedback on learning/ teaching methods
- ● Group formation ability

- ○ When doing big projects usually groups are required to be made, having this ability integrated in the system is crucial for easy communication and sharing of information
- ● Webinars
  - ○ An online feature for the professors to hold class from anywhere they choose. This then can be accessed by students from anywhere as long as they have Internet access
  - ○ Extremely useful when there is inclement weather or if the professor cannot make it to class physically
- ● User monitoring capability
  - ○ The ability for the professor to view their students online footprint on the website
  - ○ Shows the professor data on how many times the student has visited the site, if a topic has been viewed and to see if groups are made, etc.

Non-Functional Requirements
- ● Implementation (Software & Hardware)
  - ○ Availability of having the response system on android devices, iOS devices and a website
  - ○ Necessity of needing an external physical device for the system to function
- ● Visibility of results
  - ○ Accessibility of the quiz, polling, participation and attendance results to the professor
- ● Integration with D2L
  - ○ Integrate the student response system to D2L
  - ○ Automatic transferring of student grades to D2L
- ● Security
  - ○ Guarantees the safety and security of the professors' and students' information
- ● Maintenance and support
  - ○ The ease of access to maintenance and technical support (eg. call center, email, live chat)
- ● Popularity with Professors
  - ○ Previously used by current professors and their experience with the student response system

TO-BE Heat Map Description

In this new updated heat map, we are portraying the various requirements of the TO-BE system. In this map, we are depicting the new system's levels of support as well as how each feature corresponds in terms of importance. We compare all the different potential vendors that we have researched that will fit into the requirements that our client has asked for. Depending on feedback given from what the new system should have, we have devised the importance of the main features that the new updated system must have. We formulated eight main features that are most important to our client and then depicted their ranking based on the requirements from our client. We ranked these features from "very important" being the highest (score 17-20), to "not important at all" representing the lowest ranking which includes scores between (0-4). In terms of the vendors, we researched each vendor in order to find what they excel in and then we ranked them based on the colour scheme depending on whether they had "no support at all" (score 10) or was "very effective" (score 0) in delivering that feature. Based on our findings from our client and other sources such as professors/students, we determined that some extra features also had some importance when it came to the final decision of choosing an appropriate vendor. After completing the heat map and shading the appropriate sections, we would come to a more informed decision on the appropriate vendor for our client, while fulfilling all necessary requirements.

TO-BE Heat Map

*** INSERT VENDOR HEAT MAP ***

Client Requirement

The client would like a vendor that could offer us a student response system that will improve student participation in classrooms. For the system to meet the client's requirements it will have to be proficient in M/C quizzes, projection of assessments, app/website access, while also allowing the instructor to provide feedback to the students. The new model will also have to be an improvement over the iClicker system in: displaying and allowing for written answers; saving student responses to the university's databases; and giving the professor the ability to upload and download while also including PowerPoint integration. Some extra features that the client would prefer to have are: automatic attendance; ability to create surveys and send to students; and allowing the students/professor to create student groups while possibly providing access to webinars and user monitoring. We will compare all of the possible vendors to identify the student response system that can satisfy most, if not all of our client's requirements.

3D Framework for Change Management

We used the 3D Framework for Change Management as discussed in our lectures to assess the change management process of our project. Once an alternative student response system is implemented, the structure in the classroom will be slightly impacted. Previously, the use of iClicker remotes guaranteed a cost for the students, however, with the new student response system the cost for physical remotes would be eliminated. By eliminating the cost for physical remotes, the students will be more inclined to participate in classroom quizzes and activities. Professors would previously carry an iClicker system base for connecting the students iClicker remotes through a frequency. With the iClicker alternative, the setup time will be reduced significantly, as a result of the Internet based student response system. With less set up time and ease of use for both the professors and students, more time can be put into learning. Having new technology will involve the need for training on how to implement and use the software. Training will initially be time consuming for both the professors and students during class, however it will be more beneficial in the long run. By eliminating the current iClicker system, individuals would need to collect all iClicker equipment from all professors in order to smoothly transition into the new student response system. Overall, a new student response system will increase student participation, improve efficiency and enhance learning. Using the 3D Framework we assessed the various phases into diagnose, design, deliver and evaluate.

Phase 1: Diagnose

Why is change needed?

To assess the need for change, we used Leavitt's Diamond Framework.

Changes	Explanation	Degree of the change (e.g High, Moderate, Low)
Technology	The new system can be accessed from the cloud through an internet connection. Therefore, student assessments can be conducted by accessing them via students mobile devices.	Moderate
People	The users of the new system like professors and students, will have to learn how to use the system.	High
Task	Carrying out tasks in the new system like student evaluations, will be done through students' mobile devices instead of the iClicker remote from the previous system used. Professors would not require to physically carry the iClicker base to classes as needed by the previous system.	Moderate
Structure	The job role/structure in a group would not be intensely impacted.	Low

Performance Gap

The current student response system fails to provide many features that the new system could offer. In the previous system, there is no real time attendance taken. In the new system, as students sign in, their attendance would be automatically recorded. Previously, professors needed to carry an iClicker system base for the iClicker remotes to be fully synchronized to work with students. The students also had to register an iClicker remote to a specific class and synchronize their remote to the frequency of each class. The new system

would allow all users to access all of the system's features and capabilities through their own personal devices. By eliminating both the physical iClicker base and the remotes, it would simplify the setup for the professors and students. Having new system capabilities, including the connection to the cloud, would improve both professor and student efficiency, as well as the overall performance.

Opportunity Gap

The new system's opportunity in contrast to the previous system would be allowing students to access the student response system on their personal mobile devices and allow students with poor eyesight to see the questions and answers in a timely manner. As most students already carry a mobile device or laptop on their person, this is an opportunity to utilize these devices to benefit the students' performance. Additionally, Ryerson has a strong WiFi internet connection that was not utilized with the previous system, as radio frequency was being used instead, and now the new system is able to take advantage of this efficient WiFi connection. The new system allows the professors the ability to use the podiums in the classrooms to project and display the various quizzes, presentations and evaluations to assess their students, allowing the opportunity for a better learning experience. The opportunities that Ryerson has with the new system, can be seen to be a valuable replacement for the current system.

Phase 2: Design

What is the change?

There will be an alternative Student Response System implemented in place of the current iClicker system being used by students and faculty. The currently used iClicker system has a cost to the students to buy the physical iClicker remotes. Presently, professors have to physically carry the physical iClicker system base and set it up in the classroom for students to connect to the system with their iClicker remote. The new system will eliminate the cost to the students by being either an app or website based system; also eliminating the need for professors to physically carry the iClicker system base. With the absence of physical remotes, students are obligated to bring their personal devices to school, devices such as smartphones, tablets, and laptops. The set-up time will be significantly reduced giving the professors and students more time for teaching and learning. By eliminating the cost for the physical clickers, the students will be more likely to participate thereby improving the learning experience. Implementing a new system may require software installations on all participants' devices as well as the need for training users to operate the system correctly.

Scope: The change that we will be proposing to our client is incremental as the change will be implemented departmentally and later spanning to the entire university.

Origin: The change that we are proposing to our client as the change is bottom up since it emerges from requirements collected from primary research and feedback from potential users of the system, which will be used to present a solution to higher levels of management.

Type of Change: Change type is evolutionary change as our ideas are suggested to our client, and may be applicable only to specific departments of the university.

Phase 3: Deliver

Roll out: The roll out of the new student response system proposed to our client would initially be a localized system. Once it has been localized in a few number of departments of the university, the system can be transitioned to a more system-wide university-wide approach.

Timing: The timing to implement the new system would be continuous over several months as the system is slowly rolled out as system-wide.

Lewin's three step model:

1. **Unfreezing**

    The initial step taken before implementing a change was to conduct research on the current student response system. Through the use of surveys, the users' opinion had a significant role in the collective decision of implementing a new system. As to prevent the resistance in the change, the users will be informed of the issues present in the current system, and recognize the necessary development. Communicating the benefits of the new system will additionally prevent resistance from the users, allowing a smooth transition into the new student response system.

2. **Moving**

    The moving phase will be the transition from the previous student response system to the new proposed system. This will include the implementation of the system into the university and will initially be used in select departments to adjust to this new change, followed by the use throughout the entire university. All the adjustments needed for the system, including the technology and related, will be applied within the university. Both employees from the university and the vendor will be active during this phase in order to administer the change.

3. **Refreeze**

    In the refreezing phase, once the new student response system has been implemented, this system will be used by professors and students. The professors and students will have to get adjusted to the new system and the required actions need to

be done to effectively use the new system. With the previous student response system, the professors were forced to carry the physical iClicker base from class to class and students needed to purchase an iClicker remote that had to be synced to the class frequency. Using the new system, the iClicker base and remote will be eliminated and the new system can be operated through the use of a computer/smartphone with internet connection as the system will be available through the cloud. The new student response system requirements will allow ease of use and a better learning experience for students.

How to communicate the change?

Once we have gathered the necessary information, we will propose the decided alternative student response system to our client from the Computing and Communications Services (CCS) department. After an agreement has been made between our group and our client, the CCS department will then request Ryerson University for this desired change. If Ryerson University decides to undertake the proposal, CCS will use our RFP as reference to communicate and obtain information with the potential vendors. Once a vendor is chosen, CCS will coordinate with the vendor to organize and schedule the implementation process. Upon implementing the new system, CCS in collaboration with Ryerson University will inform all the faculty and students of the new system.

Phase 4: Evaluate

Who is being impacted?

The individuals that are impacted by this system change are the students, professors and Ryerson University. The students will no longer need to purchase a physical remote and the change will enhance the learning experience. The professors' teaching methods will become more efficient and effective. Ryerson University will have to eliminate their contract with the iClicker company and establish a new contract with the alternative student response system vendor.

How to assist impacted areas to accept the change?

The current physical iClicker system bases will be collected from the professors in preparation for a smooth implementation of the new system. Once the implementation is successful, the new vendor will provide training to those who require it, as well as the user manuals which could be accessed through a physical print copy or online. If any further questions and support is needed by any of the users, the vendors can be of assistance through a call centre, e-mail or an online chat.

What type of resistance would you expect and how to manage it?

Since the current iClicker system has been integrated in Ryerson University for many years, the professors might be reluctant to learn a new system. By providing a straightforward

guide to help navigate the new system, while also highlighting the new benefits, the professors will then be more willing to integrate the new system into their classrooms. As previously stated, iClickers have been around for many years and as such, there are already many students who have made the purchase of the iClicker remotes. Eliminating the physical remotes might result in some resistance from the current users. By focusing on the new features and ease of use, the older students may be able to see the benefits of using their personal devices to participate in their classes, therefore we will be able to reduce the resistance. We could alternatively manage the resistance by allowing the older students to keep using the iClickers as there is no cost for Ryerson University to maintain the current iClicker system. Through this option we would have to phase the new system in slowly starting with the first year students and then implement the new system in all the classes in the following years. By then, all the older students would have graduated, thus completely phasing out the iClicker system and allowing the new system to be implemented in the entire university.

III IT Solution Supporting Business Process Change: System Requirements (Option one)

A. Functional Requirements

The overall functionality of the future system provides the same capabilities that were essential in the current system, with the added capabilities necessary for an improved system. The communication functionality in the new system must allow professors to assess student performance through quizzes that could either be graded or ungraded, with the added capability of providing feedback to students. The participation/account management functionality provides the requirements that the new system must have with regards to the various account privileges of the users and administrators of the new system along with their authorized actions. This includes the student, professor and department head account privileges. The ability for automatic attendance is another requirement under this functionality. The application requirements functionality provides the requirements for the new system to have: real time features; ability to connect to internet networks; and automatic log out capabilities for accounts within a period of inactivity. The information analysis functionality provides the requirements for the new system to be compatible with Ryerson in saving answers to the cloud and use of storage, and grades uploading to the learning management system. Additionally, instructors need the capability to access and manage user responses and analytical reports. The integration functionality represents the various required features that the new system must possess that are related to its integration with Ryerson's Learning Management System (LMS), PowerPoint integration and connection ability to an external projector.

B. Non-Functional Requirements

The future system requires numerous non-functional features to assist in implementing a new system equipped to handle frequent usage in classrooms throughout the entire campus. The hardware and operating system component section requires the new system to be able to operate as a mobile app on android and iOS devices, as well as a website on Microsoft Windows, macOS, and Linux systems for both laptops and desktops. The capacity component of the non-functional requirement section states that the system must be able to store a large amount of data and user accounts and, have the ability to expand if need be. This can include the system to be able to span and hold at least 50,000 user accounts and store their data. The new system must allow all of its users to easily navigate through the system, and its features. This should include accessibility features to support all individuals with any type of disability. Lastly, the security component of the non-functional requirements in the new system can be cyber and physical which provides the approval of only authorized users to have access to the system.

C. Request for Proposal/Information (RFP/I) **[Place Complete RFP in Appendix]**

In order to acquire sufficient information from all of the possible vendors, we require them to fill out various sections of our RFP including, the technical requirements, management requirements, vendor section, and the pricing section. In the technical requirements section, it contains requirements of the new system, describing how the system should work and what the system should do. The vendor must be able to complete this section stating which functionalities their system can and cannot provide. These requirements are given a high, medium and low priority based on their importance, and a weighted score is attached to each priority to further differentiate between the levels. The weighted scores and level of priority was determined by our product research as well as our client's wants and needs. Management requirements contain specifications that our vendor requires from our client and what our vendor requires of themselves in addition to what they are able to offer. A few of the requirements include staffing, implementation, delivery, and training, among others. The vendor section outlines some questions that the vendor has to fill out: information related to their company; questions associated with the software and hardware needed for the implementation of the new system; and pricing related inquiries. In the pricing section, the vendor is to provide a detailed cost structure and pricing list available for their system including upfront costs and on-going costs with regards to the various features listed. By acquiring all of these valuable information from the vendors, we are able to determine which vendor is the most suitable for our client.

IV Feasibility Analysis of Proposed Solutions (Option one)

A. Vendor Profiles

Our client works for Ryerson University, which is a publicly funded organization, therefore, the process of sending out an RFP on their behalf would require the involvement of the university's board members. Given the circumstances and the complexity of our project, our client informed us that we would not be able to send out our RFP to potential vendors. Therefore, the following sections are based solely on our research that we have carried out on potential vendors of the new system we are proposing to our client.

The top three vendors that we have chosen and recommend to our client include: Tophat, with a score of 2338 out of 2450; TurningPoint, with a score of 2311 out of 2450; and Pearson Learning Catalytics, with a score of 2099 out of 2450. The criteria for functional requirements includes areas of M/C quizzes, written answers, projection of assessments, and saving student responses. The criteria for extra features includes attendance, surveys, group formation ability, and webinars. The criteria for non-functional requirements includes visibility of results, integration with D2L, security, and popularity with professors. The criteria has been selected based on the suggestion of our client and through our own conducted research. These are only a few of the criteria used to evaluate several potential vendors before having rated each vendor and selecting the best three.

Top Hat was founded in 2009 with their main office situated in Toronto, Ontario at 151 Bloor Street West and with an additional office in Sydney, Australia at 5 Martin Place. Top Hat currently employs 400 people and is ranked second in its top 10 competitors. Top Hat's products motivate every student to participate in class discussions by allowing students to participate anonymously in between slides, while also earning points along the way. Students are provided with interactive features that allow them to vote on answers. This voting system can help the professor to see some common viewpoints of the students and explain anything the majority might be misunderstanding. The classroom product also has an attendance feature that automatically awards students for attendance and participation. Their other products include online textbooks, assignments and tests. These three tools are all fully customizable allowing the tools to be fully customizable to the teachers' preferences. Top Hat has already generated $35 million in revenue and with investors from Gerogian Partners and Union Square Ventures, the company's funding totals to $105.6 million.

TurningPoint was founded in 2002 in Youngstown Ohio as a startup with only three employees and has now grown as a global organization with an international office in Belfast, United Kingdom. Their mission is "to enable engaging and interactive experiences that improve learning." The company provides tools that are being used in 187 countries around the world and is also a member of the British Educational Suppliers Association (BESA). TurningPoint software is being used by more than half of the Fortune 500 companies. Their technology is also being used in all branches of the U.S. military. In the U.S., around 1,900 higher education

organizations have TurningPoint instructors. Some of the offerings of TurningPoint include an audience participation platform, live polling and interactive homework capabilities as well as unlimited surveys for students. TurningPoint offers a simple interface and the ability for users to respond using a cellphone, tablet or computer. The software integrates with the top Learning Management Systems, allowing teachers to save time uploading grades and information of students. The TurningPoint web offering allows users to send results automatically to the web while enhancing PowerPoint presentations and an ability to easily poll online. It also offers a feature to schedule surveys and assessments as well as instantly poll over a particular application. Through the TurningPoint mobile app, participants can use any internet enabled device to view and respond to questions in real time. TurningPoint has successfully developed from a startup, to a company with about 153 employees and an estimated annual revenue of $28 million.

Pearson Learning Catalytics (PLC) - Pearson was started in the 1840s as a construction business and made the switch to publishing in the 1920s. Pearson has maintained a publishing company that provides learning materials, education technologies and assessment tools for teachers and students. Pearson's international office is located in London and has offices around Europe, Asia and South America while also having Pearson North America located in New York City. It was previously the largest book publisher in the world and in 2020, Pearson reported to have a total of 32,719 employees. Pearson is a publicly traded company that has acquired a total funding of $50 million and now generates an annual revenue of $5.2 billion. PLC is a branch off of Pearson that was developed in 2013 by Eric Mazur, Gary King and Brian Lukoff at Harvard University, and is now fully integrated with all of Pearson Mastering and many Mylab Products. Learning Catalytics features the ability to add questions, multiple choice and upload images that helps encourage collaboration and teamwork among students in a team based and group learning environment. The Learning Catalytics also gives professors the option to monitor student responses and keep notes on what students are understanding successfully and what they are having trouble with. PLC helps students and professors have a better classroom experience by providing them with the tools that can make learning more enjoyable and informative.

B. Requirements Assessment

As we were unable to send out our RFP to vendors, we did not acquire any proposed solutions, therefore, we are also unable to assess the vendor's offerings. In replacement of the assessment, we have completed the management requirements of our RFP Document and have written it as a made-up vendor. We have provided below a list of functional and non-functional requirements from our RFP. To review complete details please see Appendix A.

Functional Requirements List:

FR-1 Communication

FR-2 Participant/Account Management

FR-3 The Application Requirements

FR-4 Information Analysis

FR-5 Integration

Non-Functional Requirements List:

NFR-6 Performance/Response Time

NFR-7 Capacity, Current and Forecast

NFR-8 Security (Cyber and Physical)

NFR-9 Scalability (Horizontal, Vertical)

NFR-10 Accessibility

NFR-11 Software, Tools, Standards, etc. Compatibility

NFR-12 Backup and Recovery

NFR-13 Availability

NFR-14 Reliability

NFR-15 Compliance

NFR-16 Privacy (Compliance to Privacy Laws)

NFR-17 Supportability

NFR-18 Quality

NFR-19 Maintainability

NFR-20 Interoperability

NFR-21 Documentation

NFR-22 Usability (Human Factors) by target community

NFR-23 Stability

NFR-24 Adaptability

NFR-25 Modifiability

NFR-26 Internationalization and Localization

NFR-27 Portability

NFR-28 Reusability

NFR-29 Integrity

NFR-30 Assessment Feedback

C. Cost Benefit Analysis (CBA) - N/A

The "Cost Benefit Analysis (CBA)" section is not applicable to our project as we have contacted the various vendors to determine costs and they were either unable to respond or they were unable to provide a sufficient response. As previously mentioned, our situation with

our client's company has also prohibited us from sending out an RFP, therefore, we could not receive any information regarding the potential vendors' costs.

D. Risk Assessment

The rating provided for all three vendors in the "Competition" section, is a "High" potential effect and a "Medium" likelihood. Due to the numerous competitors in the market offering very similar products and services, along with limited competitive advantage, the effect on the company would be high as they may lose potential customers. Since many of the companies' offerings are similar, the likelihood of a company being replaced with a competitor is a "Medium," given that there are still some features that differ from other systems.

In regards to the "Finance," the potential effect for all three vendors is rated a "High" because the complexity of the systems and its features could result in a low financial flexibility. Given the various features that each company has to offer, there will be inevitable costs to creating these systems, therefore, the likelihood of this affecting them is "High" as well.

The rating provided for "Infrastructure" for all the listed companies is "High" in terms of potential the effect and "Low" in regards to the likelihood of the effect actually occurring. From all of the companies mentioned such as Top Hat, Turning Point and Pearson Catalytics we can see that they rely on cloud-based teaching for students and professors. Each of the companies are using some type of online student learning solution to provide learning materials for students and assessment tools for professors or even solutions to businesses. If any of these online platforms were to get affected or disrupted that would cause a huge impact to their clients, but the likelihood of their infrastructure systems going down is extremely low as measures are put into place to avoid those potential effects.

The rating provided for "Operation" for all the listed companies is "Low" in terms of the potential effect and "Low" in regards to the likelihood of the effect actually occurring. All of the mentioned companies have different numbers of employees when it comes to operating and functioning of each business. However, all three companies have substantial experience with numerous other academic establishments, therefore, they will be able to implement the new system with limited issues.

The "Security" risk area for all these companies has a "Medium" potential effect with a likelihood of being "Low". Companies like Top Hat, Turning Point and Pearson Catalytics are well established companies in their industry, so the effect of a security situation has a medium effect on their enterprise. The likelihood of this occurring is low since all of these companies take security seriously and ensure that they have the proper precautions in place.

Top Hat's Assessment

Risk Area	Considerations	Potential Effect	Likelihood
Competition	● iClicker, Blackboard, Moodle ● There are numerous other student response systems that offer similar services and features	High	Medium
Finance	● $35 million dollars in revenue annually ● There will be inevitable costs when the new system is implemented ● Due to the system's features and complexity, the financial flexibility is low	High	High
Infrastructure	● Top Hat is a cloud-based teaching platform that offers student engagement solutions for professors	High	Low
Operation	● Top Hat operates with over 400 employees ● They currently provide their services to over 750 campuses	Low	Low
Security	● Top Hat values the security of its users ● It provides numerous technical and operational means to protect its users data	Medium	Low

TurningPoint's Assessment

Risk Area	Considerations	Potential Effect	Likelihood
Competition	● Socrative, Top Hat, Nearpod ● TurningPoint offers a similar product to most student response systems, with limited competitive advantage	High	Medium
Finance	● $28 million dollars in revenue annually ● The company offers customers with sophisticated products, therefore, the flexibility regarding costs is low	High	High
Infrastructure	● TurningPoint is an online platform that provides learning engagement and assessment solutions for k-12 schools, universities and businesses	High	Low
Operation	● TurningPoint has over 150 employees ● 1900 U.S. higher education organizations have active TurningPoint instructors	Low	Low
Security	● Technology is safe and secure ● Technology currently being used in all branches of the U.S military	Medium	Low

Pearson Learning Catalytics' Assessment

Risk Area	Considerations	Potential Effect	Likelihood
Competition	● Cengage, McGraw-Hill, Houghton Mifflin Harcourt	High	Medium
Finance	● $5.2 billion dollars in annual revenue	High	High
Infrastructure	● Pearson is a publishing company that provides learning materials, education technologies and assessment tools for teachers and students	High	Low
Operation	● Pearson has 32,719 employees ● Integrated with Mylab and Mastering	Low	Low
Security	● Pearson takes security very seriously and ensures that the technology is secure and properly supported	Medium	Low

E. Recommendation

After completing this feasibility assessment and doing our research we would recommend Top Hat to be Ryerson University's new student response system. Top Hat had a perfect score when it came to the functional requirements and rose themselves above the competition. In the extra features section, Top Hat was able to provide various minor features such as automatic attendance and group formation that will be very helpful to the students and professors. Top Hat had a perfect score in two of the primary non-functional requirements requested from our client, integration with D2L and security, which we have found that other companies on average did not score as high in. Another reason why we believe Top Hat would be a good option for Ryerson was due to our research, as we found that many of our professors at Ryerson are familiar with the system and are very satisfied with the system and its features. Conclusively, we have found that Top Hat would be a great addition to Ryerson University and the institution would see vast benefits as a result of implementing the new student response system.

Note: Table 1 "Assessment of vendor solution" is not applicable (N/A) as mentioned by our professor since we did not send out our RFP.

V Implementation Plan

The implementation of the proposed solution should be approached using the Waterfall method. The Waterfall methodology consists of at least five to seven phases. The phases include planning, installation and conversion, testing, training and documentation. These phases are carried out in a linear fashion. Each phase must be completed before the next phase can begin and phases are not repeated. Each phase exists in isolation. With the waterfall method, planning of the project is simple and clear since project requirements are stated and agreed upon in the first phase i.e. planning. The timeline and schedule laid out beforehand, can accurately give estimates related to costs and resources. Measuring progress can be easily carried out through the phases while accomplishing milestones.

The planning phase includes what system development is required and the signing of documentations, as well as the feasibility assessment will all take around two weeks. This phase is critical to the development of the new system as it gathers the requirements of the system being developed. The installation and conversion phase comprises of conducting meetings with Ryerson's CCS department, having related discussions with Ryerson's board members, and creation and signing off the analysis document. This phase is important as it determines how the needs of the new system will be met while fulfilling the requirements of our client. The duration of this phase will be carried out approximately in nine weeks. In the testing phase there will be various checks done that will ensure the system is running properly and smoothly. This is essential as to maintain system reliability and accessibility at all times. The tests that will be run include finding issues or errors with the system and checking whether the new product is properly integrated and running in normal parameters. In this phase all requirements have to be met and must comply with any aforementioned restrictions set by the client. Also at this point the system will be tested by actual users and any defects found will be stored and necessary changes will be made. The whole testing phase should last around five weeks to have the system fully optimized. The training phase involves the training of users to properly use the new system with Ryerson's University's system once the university is properly equipped. Additionally, the next training is for users to be able to operate the system within classrooms once they are integrated with the new system. This entire phase will take approximately five weeks in total. The documentation phase consists of upgrades and updates to the system, provides support for users and all the necessary details to successfully resolve any upcoming issues with the system. This phase is critical to ensuring that users have the appropriate assistance when using the system, and will be completed following the training phase with ongoing support.

The outcome of the implementation plan would be that the system will have full and successful integration with Ryerson University's Learning Management System, including any related software and hardware. The system will have the capability of being accessed by faculty and students in classrooms and from personal devices from anywhere, to be used for its intended application. We believe that using the Waterfall method for planning the project will

be simple and clear as all the project requirements are established in the initial planning phase. Our client and vendor can precisely lay out the costs and resources required since the timeline and schedule were previously examined. The progress of the implementation can be easily measured while accomplishing major milestones.

A. Planning

The planning phase of the implementation begins with identifying the student response system needing development, and the appropriate replacement for the existing system. The individuals involved in the decision-making process include our group, our client from CCS, and Ryerson University's board members. To make an appropriate decision, many factors have to be taken in consideration, such as the vendor's reputation, the system's features, as well as the price. These factors would all be weighted by its importance to Ryerson, and this would also have an impact in the final decision which is estimated to be made within one week. Once a definite decision has been made on the system replacement, the vendor and Ryerson University must legally be in agreement in implementing the new student response system, which can be done through contract signing. The signing of contracts is estimated to be completed within two days. Then, a feasibility assessment must be completed by analyzing the project's relevant factors, such as the timeframe, system customization, and technical capabilities. Additional factors to consider are the risks mentioned in the "Risk Assessment" section of this report, which included the vendor's competition, finance, infrastructure, operation and security. In this part of the planning phase, the vendor's Project Manager, Business Administrators, and System Developers would work with Ryerson to establish a clear plan prior to the beginning of implementation, which should be completed in a week. Once the assessment is complete, and a clear schedule is agreed upon, implementation can begin. The change in systems would affect the majority of faculty and students in Ryerson, therefore, preceding the implementation of the new system, the change must be clearly communicated to all impacted individuals. These individuals would be reassured by informing them of the benefits and the needed development of the existing system, as well as assist them with the new system, through training. The individuals involved in the implementation of the new system will include employees from both parties, the vendor and Ryerson University. Ryerson is expected to provide faculty from the Technology and Systems department, which include but not limited to IT Technicians, and Security Software Development. Individuals in these departments will collaborate with the vendor to ensure that the implementation of the new system is in accordance with Ryerson's technological system. In addition, the vendor is expected to provide numerous staff including, IT Technicians, Network Administrator and Quality Assurance Analysts. These staff members would have the majority of the responsibility in implementing the new system, and assuring that all components of the system are functioning as planned. After an estimated 23 weeks of planning, analysis, development, testing, and deployment is completed, the outcome should be a new system that is successfully

integrated with Ryerson's technological system, including their Learning Management System. The system should function smoothly and provide excellent quality service to all faculty and students from anywhere on their personal device.

B. Installation and Conversion

The installation and conversion phase comprises of conducting meetings with Ryerson's CCS department, having related discussions with Ryerson's board members, as well as creating and signing off on the analysis document. This phase is important as it determines how the needs of the new system will be met while fulfilling the requirements of our client. The duration of this phase will be carried out over approximately nine weeks. To install the system for Ryerson, the first part involves a thorough analysis conducted between vendor and client. The vendor will arrange an initial meeting with Ryerson to discuss an overview of how the implementation will be carried out, which will take approximately one day to complete. Discussion between the vendor and the Ryerson University Board of Directors will take longer because there may be concerns and issues that arise over time, and this is a process that must not be rushed. Board discussions may take place for up to two weeks. The second part of installation involves the vendor gaining the assistance of qualified Ryerson staff who can help with ensuring compatibility between the new system and Ryerson's system(s). This part is useful for making certain that the new system is able to follow all legal regulations. A timeframe is utilized to cover when Ryerson wants to proceed with the system implementation including the specification of dates. Overall, the installation process is a time sensitive project that requires attention to detail, high level organization skills, and management of skilled employees in order to successfully implement the vendor's student response system in Ryerson University. To convert the system for Ryerson, it is necessary to quantify with as much detail the amount of students and departments in the university who will be using and interacting with the system. The system will be supporting a minimum of 50,000 users, and a continuous addition of more users may become necessary in the future. It is crucial to have the system converted to meet scalable needs for now and in the future. Documentation gives the client the opportunity to request the exclusion of features, and how the system's data will be stored (database/cloud) for Ryerson, in addition to data collection preference. Conversion will ensure that all the university data is securely stored. In order to ensure entire system support, the use of system backup and safety nets will be a crucial and integral part in the case of system failure in any aspect. Overall, the conversion component is fundamental to system implementation because it provides Ryerson the opportunity to request changes to the system, and how to best integrate it within the university's systems. Additionally, it allows the university to plan for how the system can operate for years to come.

C. Testing

The testing phase of implementation will be completed by client and users to make certain that the system is able to meet users' and client satisfaction by going through real simulations of using the system. The testing phase will occur after the installation and conversion phase. The criteria will be to ensure that the system meets all the extra features found within the functional requirements in addition to all non-functional requirements. Responsibility for the system's successful functionality will be on the employees assigned by our vendor to support testing. Any issues with the system should be reported to and resolved by the vendor's assigned employees. Demo testing will have a cost of approximately $1000 - $5000 CAD. Overall, testing will ensure that the system is operational to standards, UAT tests can be performed, and there is a sign-off.

D. Training

The training phase has the objective of educating primary users of the system including but not limited to; Ryerson students, instructors, admins and department. Training will comprise of the typical usage of the system, how to handle and report problems with the system, and in general the best way to apply the system in the university. On-site training should be available once the system is installed within the university, and additional on-site, or virtual training if necessary, will be accessible upon request and must be scheduled. Initial training will be alloted up to five weeks of time for the university to become familiar with the system and address any questions. The vendor will provide 24/7 support, an open line, to help assist university students and staff if any issues arise. The training will be provided by vendor employees who are well equipped with IT technical support, and may extend Network Administration and Quality Assurance. The vendor's online website will have modules and manuals explaining various aspects of the student response system. The training phase is a vital component in implementing the new system into Ryerson University and should be given a long duration time frame. This ensures that all intended users or other interactors of the system are provided the essential support from the beginning before application of the system.

E. Documentation

The documentation that will be provided with regards to the new system will span across various implementation documentations, product documentations and user documentations like manuals. The implementation and process documentation comprising the features that need to be included or excluded, will be provided through physical print prepared by our client and vendor. The vendor will also provide the technical system documentation including source code, testing and programmers' documentation in physical print format. The requirements analysis and design documentation of the new system will be provided by our client to the vendor. Maintenance documentation will also be provided via physical copy by the vendor. The end-user, system administrator and support staff documentation like manuals including troubleshooting assistance, will be provided by the vendor to our client in print and

online format that will assist users in efficiently carrying out activities in the new system.

VI Concluding Remarks

To conclude the work that was required to complete the Capstone Project through semesters 90A and 90B this section is dedicated to our final remarks. This page will include our project accomplishments, key findings, our recommendations, and the benefits of our project.

As a group we have accomplished a great deal in this project with great achievement and exceeding our own expectations. One aspect is that we were able to develop through a BPMN diagram a newly designed student response system, which would accurately fulfill the requirements of our client and promise a strong new systematic approach to recording student responses in Ryerson University. A second aspect is that we were able to gain responses from Ryerson faculty, through the use of online surveys, we were able to better understand what instructors expected from the new system. Additionally, their thoughts on the currently used system(s) which will in turn help with making informed decisions in the future. A third aspect is that as a group we were able to conduct thoughtful research on potential vendors and contact a select amount of our potential vendors, this therefore helps with giving our client the opportunity to get into contact with them.

In the various months that our group attempted to identify the most viable solution to the existing student response system, we have concluded with two key findings. Our first key finding was discovered through our professor surveys which revealed that the majority of Ryerson's faculty is already adopting other student response systems, despite Ryerson administering the iClicker system. This further proved the required development of the existing system, as the majority of users are not satisfied with its intended purpose. The existing system is incapable of satisfying all features demanded by its users, for example, the disfavored cost to students, and the requirement for physical remotes. Most professors in Ryerson are currently using Top Hat's system in replacement of the iClicker, and after thorough research into the other numerous student response systems, we have concluded with our second key finding, that Top Hat is the most suitable vendor for our client. Top Hat allows both faculty and students to utilize its services and features without the need to purchase a physical remote, alternately all users can operate the system through their own personal devices. The new system would eliminate the cost to students, as well as offer numerous additional features that iClicker is unable to provide. Top Hat already has a recognized presence in Ryerson University, and by implementing the system campus wide, it will eliminate eminent issues within the current system, and provide satisfaction to all users within Ryerson.

There are various aspects we have benefitted through these eight months of working on this capstone project. We have gained experience of working with a real client and how the actual process of providing a solution to a client is carried out. We have successfully applied our project management skills and proposed a viable vendor solution to our client where we have recommended Top Hat. During our months of working together as a group we have been faced with many issues such as (contacting vendors, conducting surveys) that we were able to overcome by working together. We came together as a team to identify and appreciate a wide

variety of ideas and operate effectively in order to complete a common goal with our capstone project.

Though our team will not have a role in the next phases, which include the actual RFP posting and choosing of vendors, we believe that the research done in the past eight months will be extremely valuable for CCS when making any future decisions. Throughout the year, our team has gathered an immense amount of information from various companies, other universities and actual vendors regarding other student response systems. We have used this research to create an RFP and surveys that will be a key factor in any future actions taken by CCS. Finally, when Ryerson University acquires the appropriate funding and approval from higher management, our team hopes that our findings will be used as a foundation and template to successfully find and implement a new student response system.

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Appendices

Appendices must be numbered sequentially and follow the references. Each appendix must be given a letter identifier (e.g. Appendix A, Appendix B) and start on a new page. Where appropriate, a separate divider sheet should be inserted; this is especially helpful when trying to organize vendor responses.

Appendix A

Please be advised:

Refer to the professor as some required sections are missing due to our situation with the client. The professor is aware and has made various changes in some deliverables to fulfill course requirements.

Thank you.