



# Flex Analysis

## System Proposal & Feasibility Analysis

For Blackboard Learn

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## Executive Summary

The University of Bridgeland requested an inquiry into learning management systems with the intent to upgrade from their current system Blackboard Learn 9.1. Andrew Riel, the primary stakeholder for this project requested the inquiry and provided information towards the system's key issues. Flex Analysis was tasked with the investigation of possible solutions that fulfill the functional requirements of the University of Bridgeland.

During its investigation Flex Analysis found that the current system had two main functional issues. The first is that managing grades and content is difficult and time consuming for instructors. The second is that functions such as adding or removing students from a course site, and publishing a course at the start of the semester are intricate, thus instructors often require support to perform these tasks.

Flex Analysis also found that their client has become amenable to cloud-hosted solutions. This allowed Flex Analysis to consider cloud-hosted alternatives in its investigation. This is important to note as cloud-hosted systems significantly reduce technical support efforts.

Flex Analysis considered four alternative solutions during its investigation, those alternative were Moodle, Blackboard Ultra, Desire2Learn's Brightspace, and Canvas.

Flex Analysis recommends that the University of Bridgeland implement the Canvas learning management system provided by Instructure as it meets the functional requirements, and provides the best economic value for the institution.

## Introduction

### Purpose of the document

This report is a detailed account of Flex Analysis' following efforts:

1. The assessment of the University of Bridgeland's current Blackboard Learn 9.1 system
2. Research into alternative solutions to the current system
3. A feasibility analysis of the candidate solutions

### Intended Audience

This document is intended for the administration staff at the University of Bridgeland. It is also intended for the staff of the Academic Development Centre at the university.

## **Organization of the Document**

In an effort to increase this report's comprehension a summary of the project is provided initially. A brief description of the University of Bridgeland is given to ascertain its environment and goals. The project's process is detailed to document the various efforts Flex Analysis undertook. The methods and content of the investigation is provided to give an account of the information the team used to reach their conclusion. The current system's participants, interfaces, and data narratives are presented to showcase its functionality. Flex Analysis' findings from the system investigation are then explained to provide insight into how the team judged candidate solutions. The alternative solutions are presented, after which a candidate is chosen and recommended. Finally the documents and research that Flex Analysis has created during this project are given to allow for completeness in the project's comprehension.

## **Project Overview**

See Appendix 1: Project Charter for the project overview.

## **Background**

LMS are used to facilitate the delivery of educational courses and training. The systems are typically used for the management and oversight of course activities, and student performance within those courses. Traditionally, these systems are created by vendors and the software is sold to institutions on a license-fee model. With the rise of cloud-hosted services, many new LMS vendors are creating cloud-hosted systems which are vendor managed. However, this is still a relatively new development, and most LMS are currently managed and supported by the purchasing-institution's IT staff with additional support being provided by the vendor.

The University of Bridgeland currently uses the Blackboard Learn 9.1 LMS. Around twelve thousand current users interface with the LMS. This system allows instructors to publish and share course materials, upload and track student grades, communicate with students enrolled in the course, add and remove students from courses sites within the LMS, and receive documents from students. The institution has integrated the LMS with the Ellucian Banner ERP software to create course sections and student records. The current LMS has a secondary integration with the University's Active Directory authentication server and Sharestream video sharing service. However, these secondary integrations are not critical to the implementation of the current or future LMS.

The institution does not believe that switching away from the current system is a necessity. However, there is the potential that within the projected life of the current system, the vendor will push the University of Bridgeland to upgrade to Blackboard's Ultra. A cloud-hosted LMS. Furthermore, within the institution, a change of perspective has taken place which has made the investigation and procurement of cloud-hosted solutions more viable.

## **Project Objectives**

The main objectives for this project are to assess alternative LMS, gain an understanding the core functions of the current system, and recommend an alternative solution which could perform those core functions in a way that was easier, faster, or functionally improved in comparison to the current system.

## **Scope**

Flex Analysis will assess alternative solutions to replace Blackboard Learn 9.1, the institution's current LMS, which is used by instructors, students and is supported by the Information Technology Services and Academic Development Center groups within the institution. During its assessment, Flex Analysis will not investigate core upgrades to other systems that will or could interact with the LMS. Finally, in its assessment and recommendation, Flex Analysis will not consider changing user workflows or processes.

## **Corporate Overview**

This section gives a description of the University of Bridgeland and the Academic Development Center.

### **The University of Bridgeland and the ADC**

The University of Bridgeland is an accredited Canadian university that has been offering higher education to students of diverse backgrounds since 1910. In 2008, the institution began to offer undergraduate programs in addition to its already established Continuing Education, Extension and Conservatory programs.

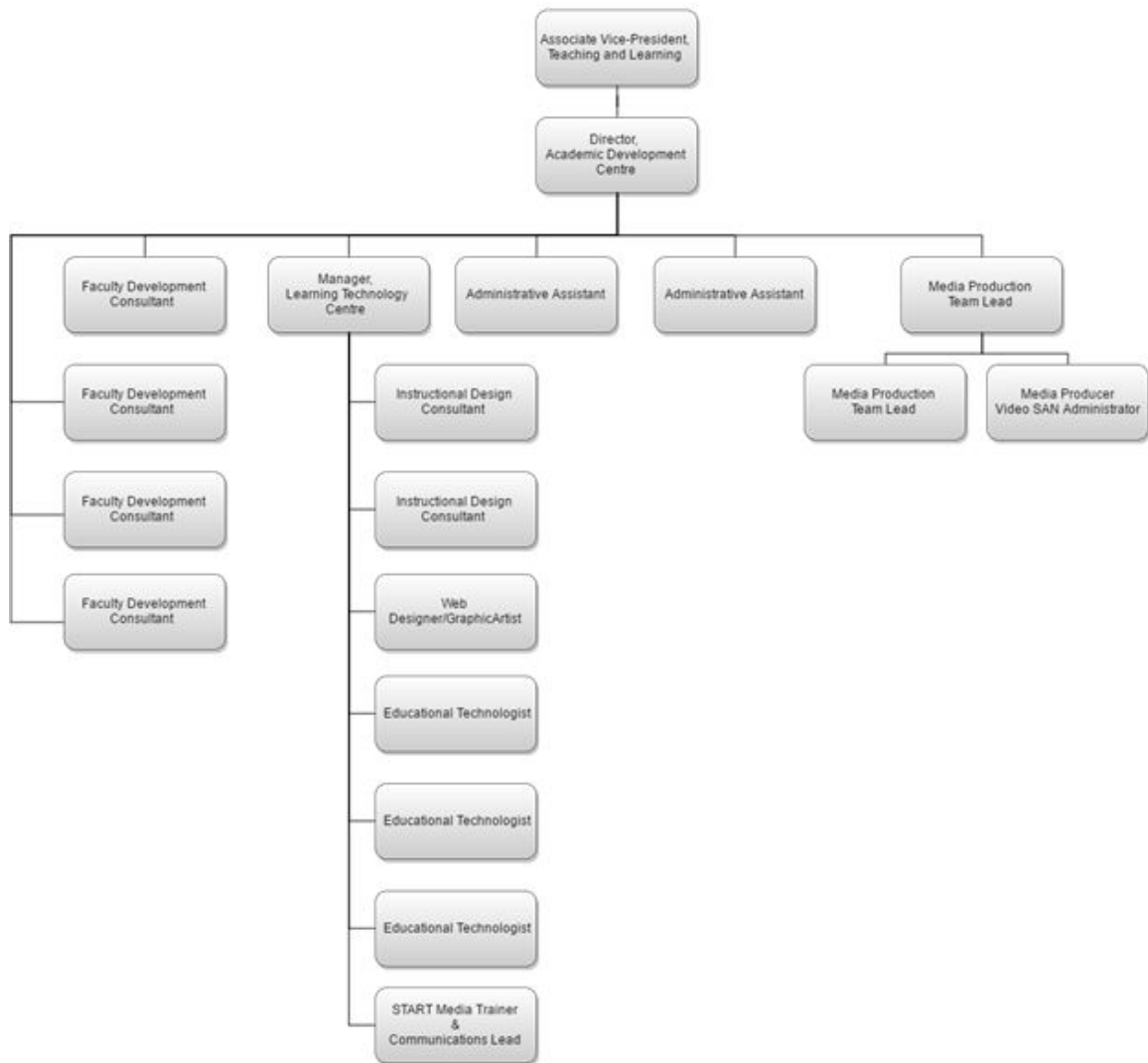
The institution continues to grow each year and is committed to its vision of creating an exceptional undergraduate experience by providing personalized experiential and outcome based learning to its students.

Within the University, the Academic Development Centre is a department which provides services and expert knowledge to both the staff and faculty of the University. The ADC focuses on teaching, the use of technology for learning, developing curriculum, scholarly support, media production, teleconferencing, and instructional design.

The ADC has many functions but its main goal is ensuring the success of the University of Bridgeland through its support of faculty and staff.



## Academic Development Centre Organization Chart



## Investigation Process

This section is intended to provide insight into the investigation methods that Flex Analysis undertook during its assessment of the current and alternative solutions. If an area or body of knowledge has been overlooked or misinterpreted, please notify the team immediately. Especially if these potential mistakes or omissions may invalidate the findings of Flex Analysis, or render them incomplete.

### Procedures

#### **Week Ending February 4<sup>th</sup>**

1. Jason, Connor, and Muhammad met with Andrew Riel of the ADC to discuss requirements for LMS
2. Team met to discuss requirements for the project
3. Jason, Muhammad, and Connor authored the Project Charter

#### **Week Ending February 11<sup>th</sup>**

1. Jason clarified Baseline Project Plan expectations with the Steering Committee
2. The team met to discuss and plan the Baseline Project Plan
3. Austin, and Muhammad authored the Problem and Opportunity Statement
4. Maxwell and Connor authored the Project Scope, Constraints and schedule
5. Jason and Jorge revised, edited and compiled the Baseline Project Plan

#### **Week Ending February 18<sup>th</sup>**

1. The team met to discuss alternative solution research
2. Alternative solution candidates were chosen based on their perceived viability and with direction from Andrew Riel
3. The team began researching alternative solutions

#### **Week Ending March 4<sup>th</sup>**

1. Muhammad continued research on the Blackboard Ultra alternative solution
2. Connor continued research on the Canvas alternative solution
3. Austin continued research on the Moodle alternative solution
4. Maxwell continued research on the D2L- Brightspace alternative solution
5. The team met to discuss economic feasibility and share their findings
6. The team began work on the alternative assessments and recommendation

**Week Ending March 11<sup>th</sup>**

1. Austin, Jorge, and Max met with Andrew to review the team's finding for alternative solutions
2. The team completed the alternative assessments
3. Jason authored the Alternative Solution Recommendation
4. Jorge revised and edited the alternative assessments and recommendation

**Week Ending March 18<sup>th</sup>**

1. The team discussed and authored the first draft of the Use Case Diagram for the current LMS
2. The team finalized the Use Case Diagram
3. Maxwell created a test instance of Blackboard Learn 9.1 and began gathering information on process and workflow for the current system

**Week Ending March 25<sup>th</sup>**

1. The team met to discuss the Data Flow Diagram for the current LMS
2. The team finalized the Data Flow Diagram
3. The team received feedback from the steering committee to direct the creation of Data Flow Diagram

**Week Ending April 1<sup>st</sup>**

1. Austin created the first draft of the ERD for the current system
2. The team revised and finalized the ERD

**Week Ending April 8<sup>th</sup>**

1. Team met to plan and create the presentation to the steering committee
2. The team finished the presentation
3. The team began work on System Proposal

**Week Ending April 15<sup>th</sup>**

1. The team presented its findings to the steering committee
2. The team submitted its system proposal to the steering committee

## **Documents and Forms Analyzed**

While the current system currently does not generate any physical forms or documentation, it does use web forms and interfaces to gather input from users. Those forms and interfaces were used in place of physical documentation.

Members of the team analyzed forms used within Blackboard Learn 9.1 to create courses, add students to classes, upload and publish content, and make announcements. To investigate the current system further, the team also looked at the help and tutorial documentations provided by the ADC for those same activities.

## **Analysis Methods**

Flex Analysis gathered information on the current and alternative solutions through the following methods:

1. Interviews with the Stakeholders

This allowed the team to gather requirements, understand the core functionality of the current system, and identify candidate solutions

2. Surveys of instructors and students

These surveys provided information concerning the time spent interacting with the system and highlighted areas to focus on for the candidate.

3. Information gathering

- a. The team compiled third-party research on the various candidate solutions.
- b. These data were business cases, implementation plans, user reviews, user satisfaction surveys, and system proposals for the candidates.

After gathering information Flex Analysis created a candidate solution matrix, cost benefit analyses for the four candidate solutions, and a feasibility analysis of the candidates to compare the solutions against each other and determine which solution should be recommended. These are included in the Baseline Project Plan.

## **Overview of Existing System Operations**

In this section Flex Analysis presents its understanding of the current system.

### **System Participants and Interested Parties**

To date, Flex Analysis has identified the following list of participants for Blackboard 9.1. Please inform the team of any omissions.

1. Faculty: The institution's faculty and academic support staff
2. Students: The student body
3. ITS: Information Technology support and administration
4. ADC: A group within the institution that provides user support for the system

### **System Interfaces Narrative**

There are four external entities that interact with the Blackboard system (see Appendix 4.1).

1. Active Directory, a non human authenticates a user when they login to Blackboard.
2. Banner stores courses, student records, and makes that information available to Blackboard.
3. Students access Blackboard to find all course sections they are enrolled in. They can upload assignments, view grades, and download course content. They can also communicate with other students within Blackboard.
4. Instructors can create courses, upload content, give weighted grades, add, and remove students. They can publish a course and its content, and can also communicate with the students in that course.

## **System Narrative**

Blackboard 9.1 is associated with four main external entities (see Appendix 4.1). These entities are Active Directory, Students, Instructors, and Banner. Before any actions can take place, users need to be authenticated by the system through the Active Directory. The credentials from a user are processed and the system returns an approved token for those who are authenticated within the system. An authenticated instructor can manage courses with their respective course materials. This includes adding and updating content and grades, as well as creating announcements for students in the class. Authenticated students have access to the classes they are enrolled in within the system. Students can view course material, their personal grades, and announcements. From our perspective, Banner works with Blackboard 9.1 by holding the courses and their ID's offered by the institution, as well as the final grades assigned to each student by the instructor. For additional information refer to appendix 4

## **System Data Narrative**

### **Entities**

There are a total of seven entities that are tracked within the Blackboard system (see Appendix 5).

In Blackboard 9.1 a student is defined by an identification number, they also have a first name, last name, and an email address. Sections are defined by a CRN and also have a title and a term they occur in. A student will achieve a grade once they have enrolled and participated in a section. Instructors are defined by an ID, they also have a first name, last name, and an email address. Content consists of a title, a data type, and a toggle for who can view it. Announcements contain a subject, message, and date. Discussions held on Blackboard contain a subject, a message, and a posting date.

### **Relationships**

Students can be enrolled in multiple sections, but do not have to be enrolled to be in the system. Students can submit different content to a section, students are not required to submit any content. A section can enroll many students, but is not required to have any students to be made. An Instructor can teach many different sections, but will not have to be teaching a section to be on the system.

Announcements are related to specific sections. A section has the option to send out multiple announcements. Discussions are posted onto a specific section. A section can have multiple discussions posted onto it, but not every section will use discussions.

## **Findings of the System Investigation**

Through the information gathered by means of interviews, a survey, research, and a test implementation of Blackboard 9.1, Flex Analysis was able to identify areas needing attention in the current LMS. The key requirements needing functional improvements include, but are not limited to: grade management and final grade submission, content management, one click course copy, mobile device implementation, and Canada based cloud deployment. These needs were expressed by Bridgeland University, as either currently non-existent, or tedious and time consuming tasks for faculty. When assessing the individual drawbacks to the functionalities outlined above, Flex Analysis obtained insight on the following criteria:

### **Grade management and submission**

Grade management includes the weighting of each assigned grade and is currently executed manually by the instructor. this process leads to an unnecessary amount of time spent by the instructor due to a process involving intricate steps.

Grade management also includes the final mark submission into Banner, which entails a manual process carried out by the instructor. The University of Bridgeland requires a solution that implements speed-grading technology including automatization of these manual tasks.

## **Management of course material**

Uploading or changing course material which was previously uploaded may require an unnecessary amount of time for the instructor. There is also a need for the ability to copy course material from a previous semester to the next, through a simplified option. The University of Bridgeland desires a solution that will reduce workload and steps taken by the instructor.

## **Self hosted system**

Blackboard is currently self hosted, requires costly hardware and support resources. This represents a large portion of costs associated with the current system which could potentially be reduced, or eliminated altogether, by upgrading to a cloud solution. With the current system, there is no uptime guarantee, and the organization is far more susceptible to data loss in the event of system failure. Lastly, upgrading and maintaining hardware has a significant cost over time. Bridgeland University has expressed the need to move to a cloud hosted solution, provided that the solution chosen includes the ability to host within Canada meeting required privacy concerns.

## **External Interactions with other systems**

Throughout the investigation, Flex Analysis determined that Blackboard currently interacts with the external systems, Banner, and Active Directory. The users of the current system are students and faculty and they interact with the system through many access channels. With a high demand for ease of use, Bridgeland university has requested a solution that provides an intuitive user interface, available on several platforms in attempt to lower training costs upon implementation.



## **Recommended Solution**

Flex Analysis presents its assessment of the alternative solutions in this section and provides information to show how the team determined the recommendation chosen.

### **Description of Candidate Solutions**

In order to meet the organization's functional requirements, the investigation of four different solutions was carried out by Flex Analysis. To assess the candidates, Flex Analysis constructed a candidate solution matrix to compare the four systems based on the needs of Bridgeland University. The criteria of the comparisons can be found in the Baseline Project Plan. The four systems that were reviewed were Blackboard Ultra, Moodle, D2L's Brightspace, and Canvas. Refer to appendix 2.3 for the Candidate Solution Matrix.

### **Feasibility Analysis of Candidate Solutions**

In order to further analyze the selected systems, a Feasibility Analysis was carried out to compare each system, and to assess the organization's ability to implement these chosen solutions. This analysis included the investigation into three main areas: operational feasibility, technical feasibility, and economic feasibility. The feasibility analysis carried out by Flex Analysis drew conclusions as to which system is most feasible, by assigning scores to criteria set by each section of the analysis (see Appendix 2.4). The following is a summary provided by our analysis, and helped Flex Analysis choose the most appropriate solution for the University of Bridgeland.

#### **Operational Feasibility**

Concludes that BlackBoard Ultra and Canvas were the most operationally feasible and both scored 18.5 out of a total possible score of 25.

#### **Technical Feasibility**

D2L and Canvas were shown to provide the highest technical feasibility, scoring 27.43 and 27 respectively, out of a total of 30 possible points.

### **Economic Feasibility**

Canvas proved to be the most economically feasible solution, with a break-even point of 1.16 years and an ROI of 49%. Canvas scored 36 out of 45 points. (see Appendix 2.4)

### **Recommended Approach**

The solution chosen by Flex analysis is an implementation of the Canvas LMS system. The team found that Canvas was the most economically, viable solution while still providing excellent operational and technical feasibility. An implementation of Canvas would fulfill the University of Bridgeland's requirements while providing significant cost savings for the institution. For these reasons, Flex Analysis recommends a transition to Instructure's Canvas LMS.

## Appendices

### Appendix 1: Project Charter

#### Project Overview

The system recommended will provide an improved ability for faculty and students to communicate with each other and participate in courses. Recommendations for deployment will be presented after considering the factors of functionality, implementation, maintenance and costs. The intent of this recommendation is to improve system performance, improve user experience, reduce support needs and provide an overall improvement in the performance of the learning management system area.

#### 1. Goals and Objectives

- 1.1. Faculty will have the ability to create and manage courses within the system.
- 1.2. Instructors will be able to assign grades.
- 1.3. instructors will be able to manipulate course grade structures. i.e: changing the weight and marks of assignments.
- 1.4. Professors will be able to create and share content such as course material and assignments.
- 1.5. Students will be able to upload assignments.
- 1.6. Students and faculty will be able to communicate with each other within the system.
- 1.7. The system and its functions need to be secure.
- 1.8. The system will be accessible by students and faculty through the web.
- 1.9. The system will need to be accessible via mobile apps.
- 1.10. The system will need to integrate with the institution's existing systems and infrastructure.
- 1.11. Course administrators will be able to add and remove students from courses.
- 1.12. The system will provide means to add or change functionality through means provided by the system.
- 1.13. Vendor support for the system needs to be available.
- 1.14. First response for incidents and service requests will be made by the vendor within 24 hours of the incident, or service request being made.
- 1.15. The system needs to be aesthetically customizable

## **2. High Level Scope**

The end result for Flex Analysis is to determine the best system for the client, while supporting integration with existing systems. The main goal of the project is to establish the specifics of the options available. Evaluation of the implementation, price, data transferring, and user training. Thereafter, the team from Flex Analysis will meet with the client, and present the candidate solutions with a recommendation.

## **3. Key Stakeholders**

- 3.1.** Customer Unit: Academic Development Center
- 3.2.** Customer Contact Person: Andrew Reil
- 3.3.** Project Manager Name: Jason Hutson
- 3.4.** Project Team Members: Connor Beauchamp, Maxwell Tyson, Austin Arndt, Jorge Castano, Muhammad Abdullah

## **4. User Groups Impacted:**

- 4.1.** Faculty: The institution's faculty and academic support staff
- 4.2.** Students: The student body
- 4.3.** ITS: Information Technology support and administration. A department of the institution
- 4.4.** ADC: A group within the institution which provides user support for the system

## **5. Project Milestones**

The anticipated duration of this project is dependant solely on the demand from the client on which solution is to be implemented. However, some tentative project completion dates are proposed:

- 5.1.** Start Date..... January 31st,2017
- 5.2.** First meeting with stakeholders ..... February 2nd, 2017
- 5.3.** Initial planning phase .....February 3rd to March 1st, 2017
- 5.4.** Initial design phase..... March 1st to April 1st, 2017
- 5.5.** Requirements finalized..... April 2nd, 2017
- 5.6.** Design invoice ..... April 5th, 2017
- 5.7.** Alternatives selected ..... April 3rd to April 30th 2017
- 5.8.** Solution selected ..... May 1st, 2017
- 5.9.** Solution presented ..... May 5th, 2017
- 5.10.** Invoice for solution ..... may 7th, 2017
- 5.11.** Solution implementation..... May 6th to November 1st, 2017
- 5.12.** Solution validation ..... November 2nd to December 1st, 2017
- 5.13.** System available to public ..... December 15, 2017

**5.14.** End Date .....January 31st,2018

## **6. Constraints, Key Assumptions, Risks and Dependencies**

### **6.1. Constraints**

- 6.1.1. The Institution's system identified as Banner must be able to integrate with the solution proposed.
- 6.1.2. All solutions must be capable of providing a self hosted option, or guarantee services hosted within Canada.
- 6.1.3. The project must be completed within the allocated budget.
- 6.1.4. One (1) year has been assigned to the completion of the project.
- 6.1.5. The project needs to be completed within the resources allocated.

### **6.2. Assumptions**

- 6.2.1. All options will be within the allocated budget.
- 6.2.2. Resources may be distributed as needed for the project's success.
- 6.2.3. Any systems considered are operating within legal restrictions.

### **6.3. Risks & Dependencies**

- 6.3.1. The current solution may be inadequate, and a new system may have to be implemented.
- 6.3.2. The Banner system may not be able to integrate with all solutions.
- 6.3.3. Transferring data to a new system may be prohibitively expensive or impractical.
- 6.3.4. Users may have difficulty adjusting to a new system which may reduce the return on investment.

## 7. Project Budget

Table 1.1 Tentative budget projections Blackboard Project

Phase	Unit Cost	Total Cost of phase
Planning	\$130,000	\$130,000
Design	\$40,000	\$40,000
Implementation	\$2,300,000	\$2,300,000
Net		\$2,470,000

*Note: all figures are estimated. Currency in CAD.*

## Appendix 2: Baseline Project Plan

### 2.1 Problem opportunity statement

<b>Department Unit:</b> Flex Analysis Project Charter	<b>Project Team Name:</b> Flex Analysis	
<b>External Contact Person:</b> Andrew Reil	<b>Team Members:</b>	
	Jason Hutson	Austin Arndt
<b>Date:</b> February 14th, 2017	Connor Beauchamp	Jorge Castano
	Muhammad Abdullah	Maxwell Tyson

CAUSE AND EFFECT ANALYSIS	
Problems	Causes and Effects
1. Lack of Ability to copy course content and rules from one semester to another.	1. Cause: <ul style="list-style-type: none"> <li>a. Technical glitch caused exponential growth of data when attempting to copy courses, prompting the removal of the feature.</li> </ul> 2. Effects: <ul style="list-style-type: none"> <li>a. Instructors have to spend time recreating course content.</li> <li>b. Instructors may miss course material.</li> <li>c. Making courses is a long and cumbersome process.</li> </ul>
2. Lack of specific and useful training material.	1. Cause: <ul style="list-style-type: none"> <li>a. The generic training material which is provided does not appropriately reflect the university's customized interface.</li> </ul> 2. Effects: <ul style="list-style-type: none"> <li>a. Users cannot rectify their issues by following the provided training material.</li> </ul>

	<ul style="list-style-type: none"> <li>b. Users reach out to support staff for solutions exhausting resources.</li> <li>c. Resources are not used effectively and are spent on repetitive issues.</li> </ul>
3. The system lacks the ability to publish grades to the University's credit registration system.	<p>3. Cause:</p> <ul style="list-style-type: none"> <li>a. The current system either lacks the functionality, or the integration has not been configured.</li> </ul> <p>4. Effects:</p> <ul style="list-style-type: none"> <li>a. Administrative overhead and ineffective use of resources as potential errors in student records are investigated and amended.</li> </ul>

CAUSE AND EFFECT ANALYSIS	
Opportunities	Effects
1. More control over developing system functions.	Easier to add needed functionality to the system.
2. Functional App	Added platforms may increase user engagement.
3. Gmail integration	Direct integration may make using Bridgeland emails easier with the system. As of now, Blackboard does not have direct integration with Google.
4. Host data on Bridgeland servers.	Direct control over security, and content control.



## **2.2 Project Scope Constraints and Schedule**

### **Overview**

#### **1. Project Background and Description**

The main goal of the project is to determine whether Blackboard LMS should be upgraded, or replaced. Flex Analysis will analyze potential changes which may improve on the current learning management system experience, and conduct research into the potential solutions available. Once a conclusion has been reached, the Flex Analysis team will propose a solution which meets the needs of the institution and users.

#### **2. Project Scope**

To evaluate and recommend a learning management system which accommodates the needs as currently stated by the University of Bridgeland. Said system should allow creation, deletion and modification of classes, the management of students including addition and removal of students, the management of student grades, the management of content related to the classes, communication between the users, and the integration with the systems currently implemented such as Banner and Active directory. In addition, the system must implement an intuitive mobile platform to allow ease of use. The scope does not include the implementation of the recommended system, nor evaluation, making any changes to other systems utilized by the University of Bridgeland, or replacing, upgrading any other systems than the current learning management system.

### **3. High-Level Requirements**

- 3.1.** The system must allow faculty to create and manage courses within the system and have the ability to copy information from one course to another with ease.
- 3.2.** The system must allow faculty to assign grades to students.
- 3.3.** The system must allow faculty to manipulate course grade structures, such as changing the weight and marks of assignments.
- 3.4.** The system must allow instructors to create and share content such as course material and assignments.
- 3.5.** The system must provide the ability for students to upload assignments.
- 3.6.** The system must provide the ability for students and faculty to communicate with each other.
- 3.7.** The system must be accessible by students and faculty through the web.
- 3.8.** The system must allow for access through mobile platforms either by a native mobile application or mobile friendly website.
- 3.9.** The system needs to integrate with the institutions existing systems and infrastructure.
- 3.10.** The system must allow course administrators to add and remove students from courses.
- 3.11.** The system should provide means to add or change functionality of the system.
- 3.12.** The system should offer a variety of training and support resources for faculty and students.
- 3.13.** The system must accommodate the ability to respond to incident and service requests within 24 hours of the incident or service request being made.
- 3.14.** The system needs to allow for aesthetic customization.
- 3.15.** The system must allow for all data stored in Canada, if an option for the institution to host the system itself does not exist.
- 3.16.** The system must maintain a high level of security so as to protect the data of students and faculty.

#### **4. Project Deliverables**

##### **4.1. Baseline Project plan**

- 4.1.1. A plan detailing project scope, alternative solutions, and economic feasibility will be created.

##### **4.2. Data flow diagrams**

- 4.2.1. Flex Analysis will deliver a diagram depicting the flow of data through the current system and how business processes interact within the organization.

##### **4.3. Data Model**

- 4.3.1. Flex analysis will provide a model representing how data in the current system is processed and stored.
- 4.3.2. This model will show how data is connected within the system for the purpose of proper assessment of any issues or redundancies.

##### **4.4. Invoice**

- 4.4.1. Flex analysis will deliver an invoice for the cost determined for the entirety of the project.

##### **4.5. Presentation of solution**

- 4.5.1. A report and presentation will show the professional analysis and solution as found by Flex Analysis towards resolving the current functionality issues existing within Blackboard.

#### **5. Affected Parties**

##### **5.1. Students**

- 5.1.1. The student body may have to adapt to a new system.

##### **5.2. Faculty**

- 5.2.1. The institutions faculty and academic support staff may have to adapt to a new system.
- 5.2.2. The process for transferring old content to the new system may be manual thus faculty may have to take on that process themselves.

##### **5.3. Support Staff**

- 5.3.1. Information Technology support and administration staff must be capable of undertaking the task of a system change.
- 5.3.2. Staff will also be tasked with frontline support for faculty

##### **5.4. Academic Development Centre**

- 5.4.1. Must have in depth knowledge of the implemented system in order to respond effectively and efficiently to the affected parties.

## **6. Affected Business Processes or Systems**

- 6.1.** The institution's Banner system must integrate with the new system.
- 6.2.** Active Directory Federated Services may integrate with the new system for authentication.
- 6.3.** University's email system must be able to receive emails from the new system.
- 6.4.** MyUniversityOfBridgeland must be able to forward students to the new system.

## **7. Specific Exclusions from Scope**

- 7.1.** Making substantive changes to the Institution's current network.
- 7.2.** Changing or reconfiguring hardware that does not support the current system.
- 7.3.** New functions that affect any of the Institution's other services which are not tasked with academic course management.
- 7.4.** Changes to the core functionality of any of the institution's other services.
- 7.5.** Systems which provide core functionality that is not associated with the management of academic courses.

## **8. High-Level Timeline/Schedule (Estimated Duration)**

Flex Analysis has been allocated one year to complete the project. The project will begin in January 2017. A total of four phases will be implemented.

### **9. Planning phase: January 2017 - February 2017**

- 9.1.** This phase involves gathering all the requirements and information needed to assess the current system accurately. The same phase involves developing a project charter and project baseline plan.
- 9.2.** The duration of this phase is estimated at two months.

### **10. Analysis phase: February 2017 - April 2017**

- 10.1.** The analysis phase includes the investigation of the current system and its functionality as a base to compare with other potential system solutions.
- 10.2.** This phase is estimated to be three months and will include a compilation of assessments on new systems.

### **11. Presentation and Acquisition phase: April 2017 – May 2017**

- 11.1.** A solution will be presented based on Flex Analysis' findings.
- 11.2.** The required hardware software and other resources will be acquired during this phase.

### **12. Implementation phase: May 2017 - October 2017**

- 12.1.** Derived from the solution chosen from the team's analysis, this phase

will have varying attributes.

- 12.2.** A five-month period is allotted for an implementation of the recommended solution to ensure there is sufficient time for proper implementation, training, and data transfers.

**13. Maintenance Phase: October 2017- January 2017**

- 13.1.** The maintenance phase is estimated at three months and will vary based on the solution implemented, its specific requirements, and any needs still unmet.

**Approval**

The Flex Analysis team approves the project as described above.

## 2.3 Candidate System Matrix

Characteristics	BlackBoard Ultra	Canvas	Moodle	Desire 2 Learn
<p><b>Portion of the system computerized:</b> Provide a brief description of the portion of the system that would be computerized in this candidate.?</p>	<p>Blackboard Ultra, like its predecessor Blackboard 9.1, is completely computerised.</p>	<p>Canvas is completely computerized with most of the information being accessed and stored on AWS servers.</p>	<p>Moodle is entirely digital. All core functionalities of the system are executed through software hosted on hardware maintained by the institution.</p>	<p>The system runs completely on computers. All key functionality and data is stored and executed on server computers.</p>
<p><b>Benefits:</b> Brief description of the business benefits that would be realized from this candidate</p>	<p>The system's new design and implementation allows for a significant reduction in maintenance costs while eliminating a large portion of hardware costs and maintenance. An upgraded user interface will allow the business to operate more efficiently and potentially save on labour.</p>	<p>This system is hosted and maintained by the vendor which allows the institution to reduce costs for system maintenance and hardware procurement. Additionally, the institution will be able to operate more efficiently by allowing instructors to save time and work effort through its many features.</p>	<p>This system will be able to reduce support costs and time by allowing the institution to customize the interface be more intuitive, make documentation more easily accessible, and by reducing redundant work effort</p>	<p>This solution will be able to reduce costs for the institution by significantly reducing system support costs. Its intuitive interface offers a reduction in training costs; while the features of the interface offer significant increases in efficiency.</p>

Characteristics	BlackBoard Ultra	Canvas	Moodle	Desire 2 Learn
<b>Servers and Workstations:</b> A description of the servers and workstations needed to support this candidate	Blackboard Ultra is a cloud based platform, as such no servers are needed to support this system.	Canvas is a cloud based LMS. No new hardware, or existing hardware from the Blackboard system will be needed.	Moodle requires a modern web server to support the system. However, no special hardware is required so a commodity server may be used.	This system uses servers hosted and maintained by the vendor; therefore no new hardware is required.
<b>Software tools needed:</b> The software tools (e.g. DBMS, programming suites, etc) needed for the system. Not necessary if pre-packaged software are to be purchased	The institution's current workstations are able to access this system. No new tools are needed.	The institution's current workstations are able to access this system. No new tools are needed.	This system requires database software such as MySQL or Oracle DBMS. It also requires the the Apache Web Server software suite.	The institution's current workstations are able to access this system. No new tools are needed.
<b>Application Software:</b> A description of the software to be purchased, built, accessed, or some combination of these techniques.	The application software is purchased on a per-user subscription basis, a yearly recurring fee is required. An integration with the institution's current system (Banner) would need to be configured.	The application software is dependant on the purchase of a yearly subscription based on a student population. An integration between the system and the institution's Banner system would require configuration.	The Moodle software package would need to be downloaded along with themes and plugins necessary for the institution. In addition database, and operating system software is needed. An integration with the Banner system would also need to be configured.	Access to the software for this solution is granted on user subscription model. Further integration with Banner system required.



Characteristics	BlackBoard Ultra	Canvas	Moodle	Desire 2 Learn
Input devices: A description of input devices that would be used	Any computer with the Chrome, Firefox, Internet Explorer, Safari, or Edge web browsers, at least Adobe Flash version 17 and is connected to the internet can be used for input. The institution's current workstations can be used to access the system.	A computer with either Internet Explorer, Safari, Edge or Firefox browser and an internet connection is required for input.	A laptop or desktop computer with the latest or penultimate version of Chrome, Firefox, Internet Explorer, or Safari and an internet connection is required.	Workstations must be able to access the internet and use any browser with the exception of Internet Explorer 9 or earlier and Safari 5.1 and earlier.



Characteristics	BlackBoard Ultra	Canvas	Moodle	Desire 2 Learn
<b>Storage requirements: A brief description of what would be stored, what data would be accessed from existing stores, what storage media would be used, how much storage capacity would be needed, and how data would be organized.</b>	<p>Data storage will be located in Canada and hosted by the vendor. Storage capacity is included in the license agreement with the vendor. Student names, email addresses, and grades are among the information to be stored. Instructor names and email addresses would also be stored. Course content such as assignments and syllabi are also stored on the system.</p>	<p>The following types of data: courses, associated media, grades, student names, student email addresses and instructor email addresses, will be stored in array located in Canada and managed by the vendor. The storage is scalable and included in the subscription fee. There will be no extra fees if storage needs do increase.</p>	<p>Two terabytes of storage is calculated to be required to adequately handle system and user files. Student and instructor data along with course content will be contained in a database in a storage array.</p>	<p>Storage is provided through the license agreement. the data that will be stored in this system includes but is not limited to: courses/course templates, student grades, documents of students and professors, instructor and student information, emails of students and instructors, schedules/calendars of students courses, assignments, and tests, instant message conversations between end users, and MS SQL database logs.</p>

## 2.4 Feasibility Analysis Matrix

Feasibility Criteria		Blackboard Ultra		Canvas		Moodle		Desire 2 Learn	
<i>Operational Feasibility</i>	Weight	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score
▪ <b>Management support for the system</b>	25 %	Management has shown some interest in upgrading to this system.	6	Management has shown strong support for switching to Canvas.	7	Management does not have strong support for Moodle.	2	Support is lacking due to a perception that D2L may provide more than necessary.	4
▪ <b>End-users feeling about their role in the new system</b>		Blackboard Ultra is similar to the current version of blackboard allowing quick adaptation with minimal impact	8	Canvas offers an easy to use system that leaves users feeling empowered to accomplish tasks.	8	Moodle can be difficult to master for new users, but allows for low restrictions on content management.	7	Desire 2 Learn offers a lot of opportunities for both students and instructors to be more engaged in learning.	8
▪ <b>End user resistance to the system</b>		Little to no user resistance exists as this system is very similar to the old system	8	Users have generally responded positively to Canvas.	6	Users often have no strong feelings over the use of Moodle.	5	Professors and students have a strong desire to switch to the system.	8
▪ <b>Ease of use</b>		BlackBoard Ultra provides a streamlined UI in comparison to the old system. However other platforms perform better	6	Canvas has built a reputation as an extremely easy platform to use.	8	Although Moodle offers a somewhat outdated UI, this can be modified during development.	5	Desire 2 learn features an easy to use interface, however it's many features can be confusing.	7
▪ <b>Ease of learning</b>		The system is very similar to the past system leading to a minimal learning curve.	9	Canvas provides a clean UI that is easy to use.	8	Basic features are known to be somewhat complex, these could be changed in development.	4	The system is easy to learn due to a user centric design and a library of help resources.	8
<b>Weighted Score (out of 25)</b>		18.5		18.5		11.5		17.5	

Feasibility Criteria		Blackboard Ultra		Canvas		Moodle		Desire 2 Learn	
<i>Technical Feasibility</i>	Weight	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score
▪ <b>Availability of required equipment or ease of acquisition if not available.</b>	30%	The system is hosted by Blackboard leading to minimal equipment required.	10	No new equipment is required for this system due to it's cloud hosted nature.	10	The system requires both hardware and software but it is easy to acquire.	8	The system is cloud based and hosted by D2L so minimal equipment is required.	10
▪ <b>Availability of required technical expertise or ease of acquisition if not available.</b>		Support is provided by the vendor and no new expertise is required.	10	The system is supported by the vendor. No additional expertise is required.	10	Expertise will need to be acquired for the system but it can be easily acquired.	6	The vendor provides the bulk of support for the system. No new expertise needs to be sourced.	10
▪ <b>Adequacy of capacity of proposed equipment</b>		The capacity of the system is guaranteed by the vendor and will be able to handle the institution's needs.	10	The system is more than able to offer enough capacity to the university.	10	The proposed configuration allows for the system to handle a growing user base.	10	The vendor supports the required capacity and the institution will be able to support the system sufficiently.	10
▪ <b>Ability to handle future transaction volume and company growth</b>		The system should be able to handle further growth by the institution without need for upgrades.	8	The system can scale well past the projected growth and will not need to be upgraded.	8	The system is only designed to handle projected 5 year growth. It will likely need to be upgraded.	3	The design of the system is such that almost all types of growth can be handled without need for major upgrades.	8

Feasibility Criteria		Blackboard Ultra		Canvas		Moodle		Desire 2 Learn	
<i>Technical Feasibility (continued)</i>	Weight	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	
▪ <b>Ability of the proposed system to handle projected growth over five years.</b>	45%	The system has been designed to adequately handle the projected growth.	10	The system is guaranteed to support the projected growth of the institution.	10	The proposed system specifications have been designed to meet the demands of growth over 5 years.	10	The proposed solution will be able to handle projected growth over its lifecycle.	10
▪ <b>Integration with present and future company's information systems</b>		Blackboard provides integration with the institution. However the institution cannot expand on the existing API.	7	The solution provides a means to expand the solution but those means cannot be expanded.	7	The system can be made to integrate with any system, however great effort is likely required.	6	The vendor provides many solutions for integrations but the possibilities are limited to integrations supported by the vendor.	8
▪ <b>Interface properly with external systems operated by customers and suppliers</b>		The system can interface with external systems but the overall experience is not well regarded.	7	Interfacing with the system through external means is very easy for customers.	8	External systems can interface with the system but may be frustrating.	3	External systems can interface with the solution and do so very well.	8
Weighted Score (out of 30)		26.57		27.00		19.71		27.43	

Feasibility Criteria		Blackboard Ultra		Canvas		Moodle		Desire 2 Learn	
<i>Economic Feasibility</i>	weight	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score	Descriptive Evaluation	Score
▪ <b>Cost to develop system</b>	45%	\$1,799,543.32	6	\$1,266,794.63	9	\$1,167,756.00	12	\$2,288,521.00	3
▪ <b>Net Present Value (NPV):</b>		\$683,683.25	3	\$673,206.83	3	\$173,528.69	9	\$94,2315.98	12
▪ <b>Return on Investment (ROI)</b>		41%	9	49%	12	16%	3	45%	9
▪ <b>Break-Even Analysis (BEA) or Payback Period</b>		1.70	6	1.16	12	2.06	3	1.42	9
<b>Weighted Score (out of 45)</b>		24		36		27		33	
<b>Overall Weight/Ranking (100%)</b>		69.07%		81.5%		58.21%		77.93%	

## **2.5 Solution Recommendation**

Flex Analysis conducted research on several alternative learning management systems. After looking at the requirements stated by the institution, four best in market candidates were chosen. Tangible and intangible benefits were considered in the decision, including the consideration of the current system in place.

The process of data gathering led the Flex Analysis team to meet with key stakeholders, interview system users, and compile data from different candidate vendors including credible third party sources.

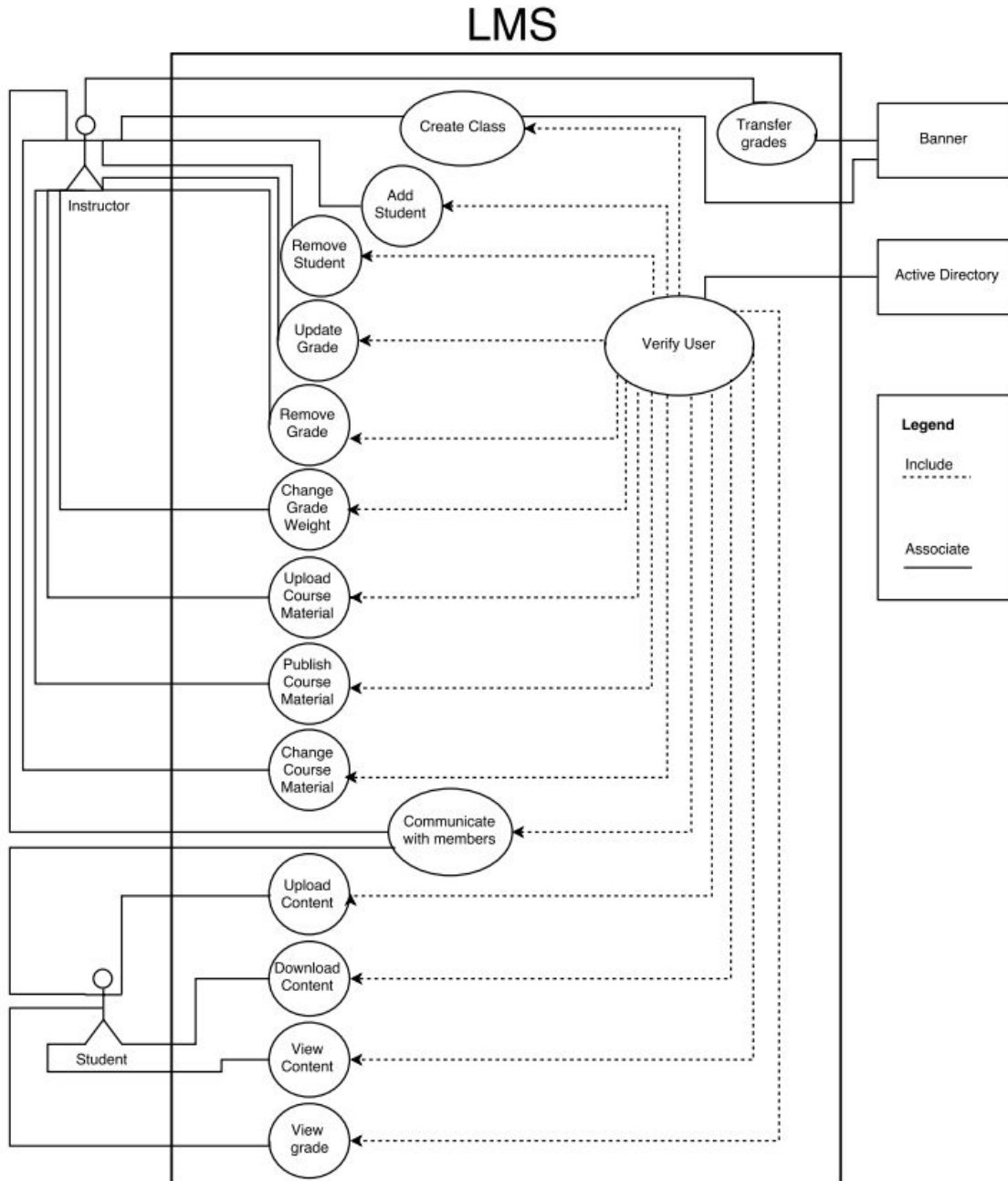
Among the evaluated candidate solutions, Instructure's Canvas system is the most appropriate solution based on the needs stated by the institution. Canvas offers a range of features while providing a significant cost saving solution for the institution. Due to its cloud base implementation, Canvas can scale easily to meet demand as the University grows. The license agreement proposed by Instructure's Canvas would also guarantee the system's uptime and availability. As the university would no longer be burdened by supporting the system infrastructure in house, support costs will be greatly reduced.

Canvas offers additional advantages for the user as well. The system's interface is much easier to use than the current system. Canvas also offers greater functionality compared to the legacy system and most of its competitors. The Increased functionality should allow the users of Canvas to save time, and reduce work efforts thereby leading to fewer mistakes from interacting with the system. These two factors alone should lead to a reduction in user support and once the users get comfortable with the new solution, a greater productivity rate as found by additional research.

Drawing from the data it has gathered, the Flex Analysis team recommends that the institution switches to Instructure's Canvas learning management system.

## Appendix 3: Use Cases

### 3.1 Use Case Diagram



### 3.2 Actors definition

<b>Client Name:</b>	University of Bridgeland
<b>Author:</b>	Flex Analysis
<b>Date Created:</b>	March 18, 2017
<b>Date Updated:</b>	March 18, 2017
<b>Updated By:</b>	Team Flex Analysis, April 9, 2017

Actor	Description
<b>Instructor</b>	An Instructor is a human actor. An instructor is any person employed by the institution with the role of instructor. The instructor may perform the following actions communicate with students using the system, to upload or remove grades, change the grade weight of a student, upload, publish, and change course material on Blackboard.
<b>Student</b>	A student is a human actor. A student is any person enrolled in courses at the university. Students are able to upload, download, and view content through the system, as well as communicate with members.
<b>Banner</b>	Banner is a non human actor. Banner provides course listings and personnel records to the system. .
<b>Active Directory</b>	Active Directory is a non human actor. It verifies user accounts (Student or Instructor) to grant access to the system.



### 3.3 Add Grades Use Case

**Author: Flex Analysis**

**Date: March 18,2017**

<b>CASE NAME:</b>	Add Grades	
<b>ACTOR(S):</b>	Professor, Student	
<b>DESCRIPTION:</b>	This use case describes the steps that the professor takes to add grades for an offline exam.	
<b>REFERENCES</b>	Blackboard FAQ	
<b>PRE-CONDITION</b>	The professor is logged in and is on the Control Panel page	
<b>POST-CONDITION</b>	The students are notified that a grade has been added by their professor	
<b>ASSUMPTIONS</b>	Blackboard is online. Students are members of the class. Students have notifications on. The exam was held in classroom and needs to be entered manually	
<b>TYPICAL COURSE OF EVENTS:</b>	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> This use case is initiated when the professor selects the “Grade Center” button from the assessment section of the control center	
		<b>Step 2:</b> The system displays the grade center page.
	<b>Step 3:</b> The professor selects “Add Grade Column”.	
		<b>Step 4:</b> The system loads the column information page
	<b>Step 5:</b> The professor inputs a column name, the amount of points possible, due date, and clicks on submit button	
		<b>Step 6:</b> The system processes the inputs and creates a new grade column for the class.
	<b>Step 7:</b> The professor manually inputs grades into the new column for each student.	
	<b>Step 8:</b> The professor visually reviews the grades clicks “OK”.	
		<b>Step 10:</b> The system saves the

		grades.
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Add grades case continued		
		<b>Step 11:</b> The system sends a notification to the students that a new grade has been added.
	<b>Step 12:</b> This use case concludes when the student receives a notification that a new grade has been added for them.	
<b>ALTERNATE COURSES:</b>		
	<b>Step 7a:</b> The professor wishes to add a comment to the grade. The professor selects that dialog box on the students' grade, inputs a comment and then selects "Submit".	
	<b>Step 8a:</b> The professor notices an error on grade input mistake. Updates grade accordingly by re-entering grade in the box.	
	<b>Step 11a:</b> The system sends a notification as an email to students that choose to receive them via email.	

### 3.4 Create Class Use Case

**Author: Flex Analysis**

**Date: March, 18 2017**

<b>USE CASE NAME:</b>	Create Class	
<b>ACTOR(S):</b>	Instructor, Banner	
<b>DESCRIPTION:</b>	The Create Class use case will describe the steps the instructor will take to create a class and add students to the newly created class.	
<b>REFERENCES</b>	User Manual, Blackboard Tutorials	
<b>TYPICAL COURSE OF EVENTS:</b>	<b>Actor Action</b>	<b>System Response</b>
	<b>Step 1:</b> This case is initiated when the instructor clicks on the “create course” link in the instructor tools section/module of their blackboard home page.	
		<b>Step 2:</b> The system prompts the user to import course package, or create new course
	<b>Step 3:</b> The instructor clicks “Create New Course”.	
		<b>Step 4:</b> The system prompts the instructor for the course name, course ID, and course description.
	<b>Step 5:</b> The instructor inputs the course name, course ID, course description, clicks the instructor led enrollment checkbox, and clicks on “Save and continue”.	
		<b>Step 6:</b> The system verifies course information is valid and displays the “invite students” dialog box.
		<b>Step 7:</b> The system displays the links to the tutorials relating to enrolling students and then prompts the instructor to “Customize Course”

Create class case continued		
	<b>Step 8:</b> The instructor clicks on the Customize Course button.	
		<b>Step 9:</b> The system displays the course information to verify the information is correct
	<b>Step 10:</b> The instructor clicks on step 2- “Create Course Structure”.	
		<b>Step 11:</b> The system displays the default course structure and provides options for customization for the instructor to choose from.
	<b>Step 12:</b> The Instructor selects customized options if desired and clicks on step 3- “Choose Course Theme”.	
		<b>Step 13:</b> The System displays available themes for the instructor to choose from.
	<b>Step 14:</b> The instructor clicks on their desired theme.	
		<b>Step 15:</b> The System highlights the selected theme and prompts the user to click on “Apply Changes.”
	<b>Step 16:</b> The instructor clicks on apply changes.	
		<b>Step 17:</b> The system applies changes to the new course and then displays the new courses home page.
	<b>Step 18:</b> The instructor navigates to the course management toolbar and clicks on “users and groups” drop down menu	

Create class case continued		
		<b>Step 19:</b> The system displays the “User and groups” menu
	<b>Step 20:</b> The instructor clicks on “users”	
		<b>Step 21:</b> The system loads and displays the user management page.
	<b>Step 22:</b> The instructor retrieves the class list from the banner system which holds the student’s usernames.	
	<b>Step 23:</b> The instructor clicks on the enroll drop down menu in their course home page.	
		<b>Step 24:</b> The system displays the enroll user options.
	<b>Step 25:</b> Instructor clicks on “Existing Users” in the enroll drop down menu.	
		<b>Step 26:</b> The system loads and displays the add user page.
	<b>Step 27:</b> The instructor enters in the username they wish to add to the class from the class list provided through banner.	
	<b>Step 28:</b> The instructor clicks on “Browse” to search for the user	
		<b>Step 29:</b> The system locates the inputted user and displays the found username on the screen.
	<b>Step 30:</b> The Instructor clicks on the select user check box next to the username	
	<b>Step 31:</b> The instructor clicks on submit to add enroll the student into their class.	
	<b>Step 32:</b> The instructor repeats steps 27 through 31 to add all the students into the class.	

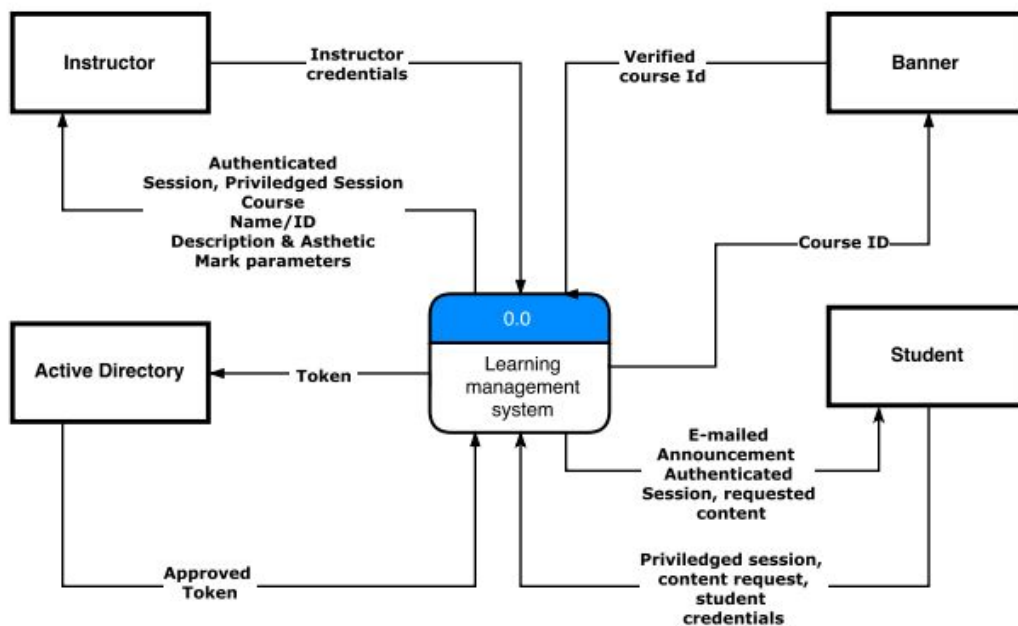
Create class case continued		
	<b>Step 33:</b> This use case concludes when the course has been created and the students/users have been enrolled in the course.	
<b>ALTERNATE COURSES:</b>	Step 6a: The instructor has entered parameters which already exist as a class and the system prompts the instructor of the error. Go back to step 5 and re-enter information	
	Step 11a: the user selects import course package and selects the course package they wish to import.	
	Step 27a: The instructor enters an incorrect username. The system informs the instructor they have entered an incorrect username; the instructor corrects their input.	
<b>PRE-CONDITION:</b>	The instructor has been assigned to teach a class and has been verified by the system.	
<b>POST-CONDITION:</b>	The instructor has created the course and has added students to it, and is now ready to be published	
<b>ASSUMPTIONS:</b>	The instructor has privileges to create a course. The computer, networks and databases are working properly and won't fail.	

## Appendix 4: Data Flow Diagrams

### 4.1 Context Level Data Flow Diagram

#### Learning Management System DFD Context Level

for University of Bridgeland



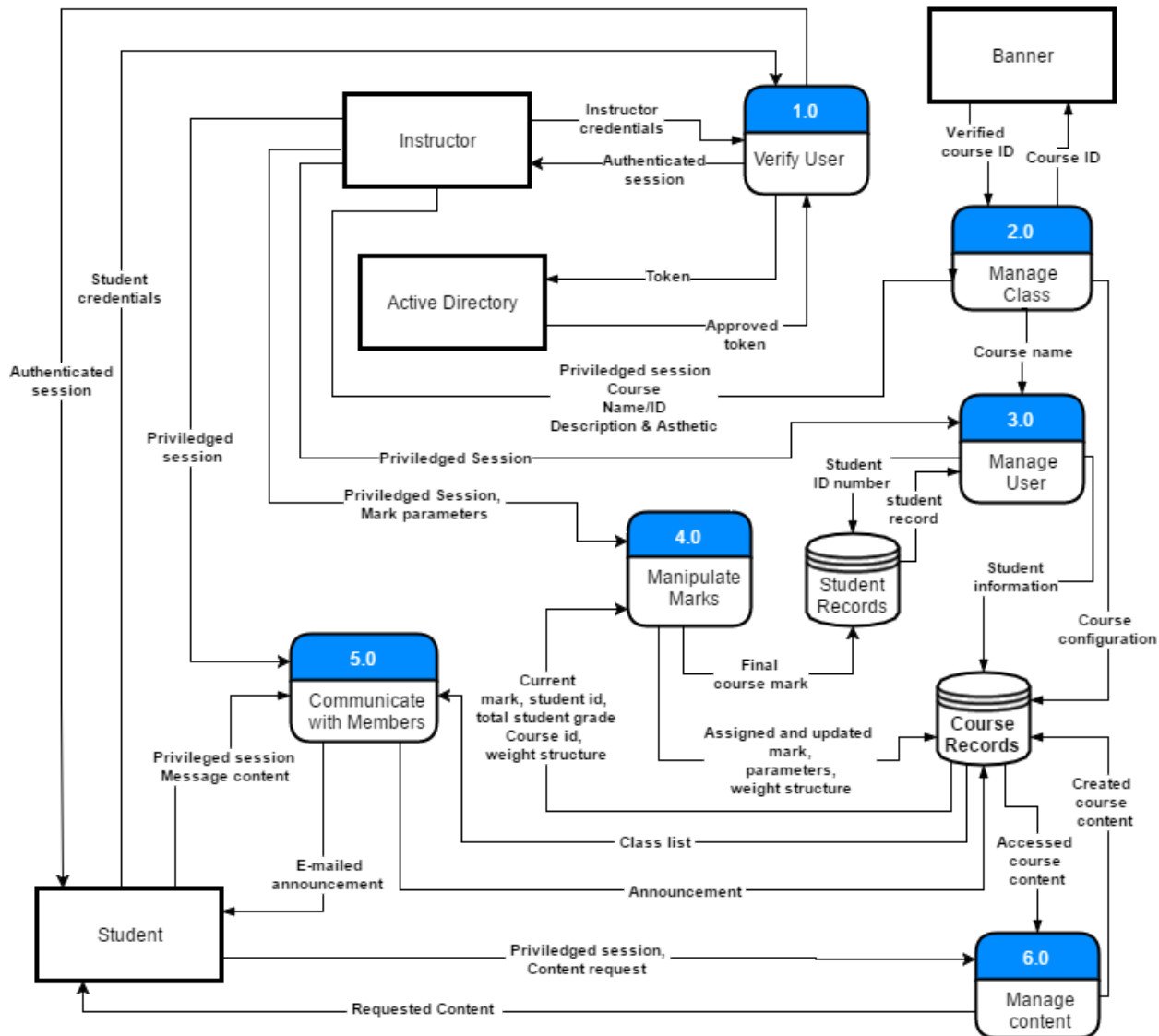
## 4.2 Level 1 Data Flow Diagram

# Learning Management System DFD

### 1.0

for: University of Bridgeland

Authored by: Flex Analytics



#### Definitions

**Mark parameters:** Data pertaining to student marks, assigning totals, and final student grades,

**Student records:** Files that contain the classes the student is in and the student personal information

**Course Records:** Files, folders, or other repositories of data that contain information on both the content and configuration of the course.

#### Assumptions

1. Communicate with members holds all communication activities within the system.

2. Each iteration of a course receives its own course record.

3. Student records are independent of the Institution's separate student records.



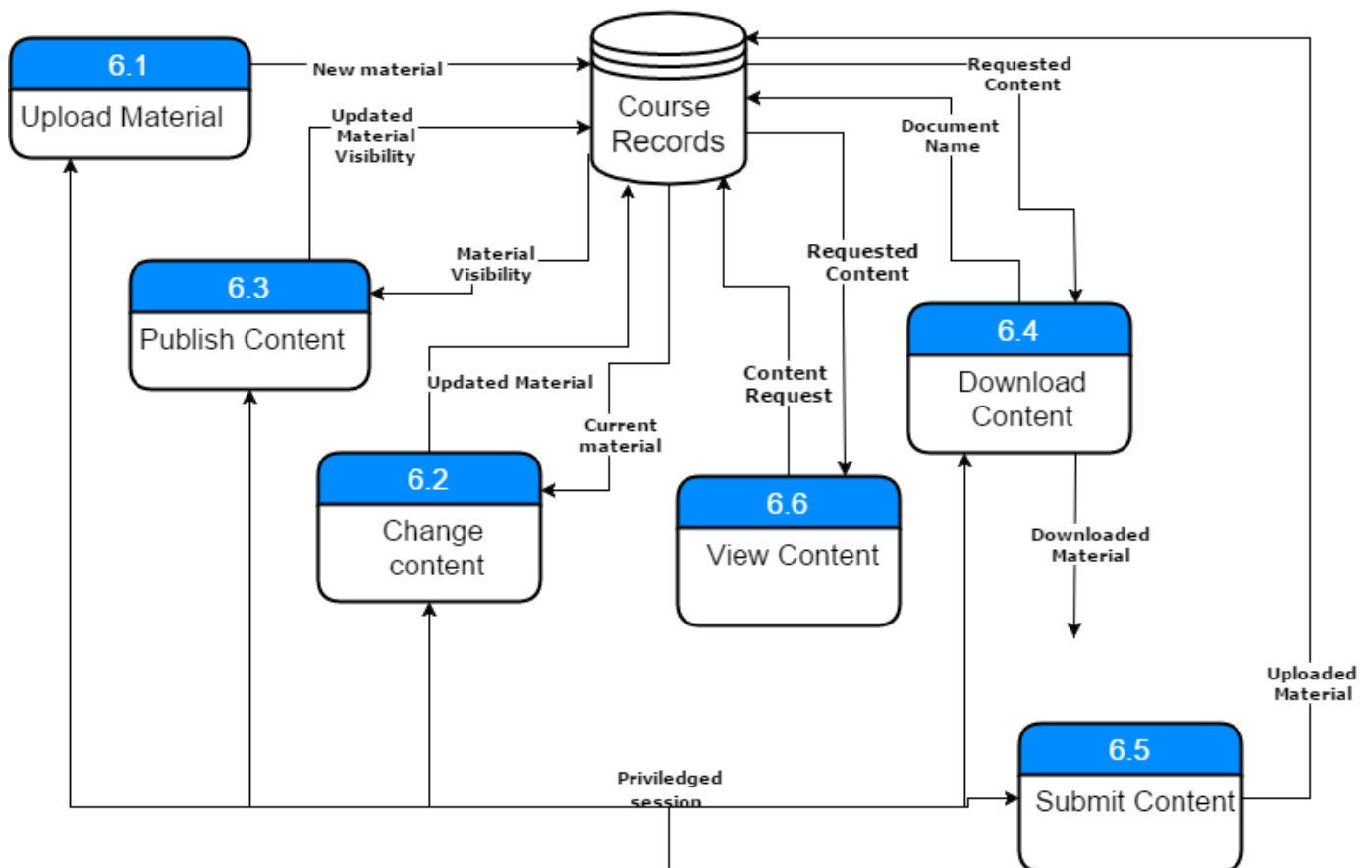
#### 4.3 Level 2, Process 6 Data Flow Diagram

### Learning Management System DFD

#### level 2 for process 6

#### Manage content

for: University of Bridgeland



#### Definitions:

**Course content:** Assignments, readings, course outlines, discussion board posts, media, quizzes and other course material

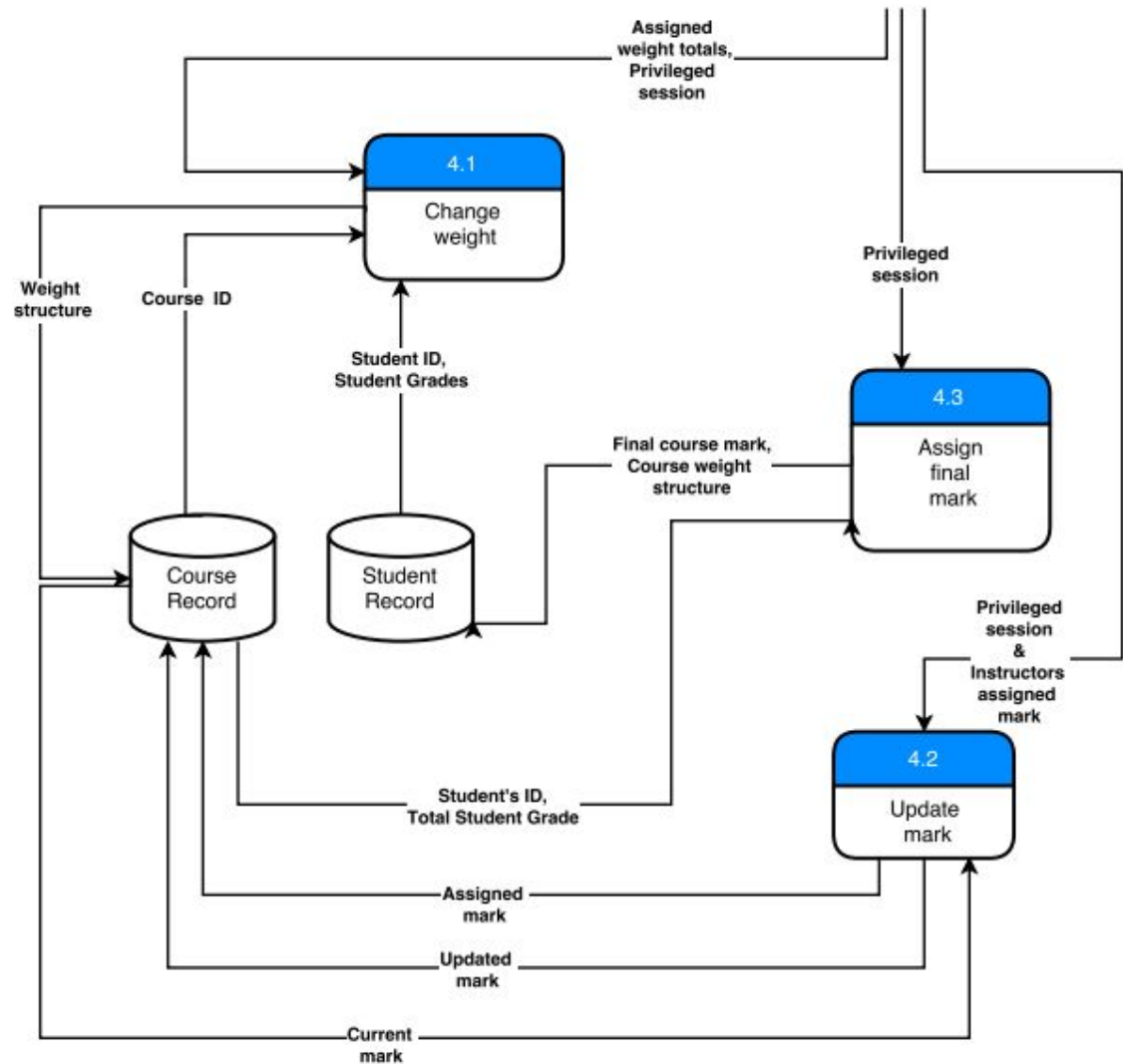
**Material:** A single assignment, reading, quiz or other such piece of course material.

#### Assumptions:

1. Within the View Content (6.6) process, students will be able to view grades.

#### 4.4 Level 2, Process 4 Data Flow Diagram

### Learning Management System DFD level 2 for process 4 Manipulate Marks for University of Bridgeland

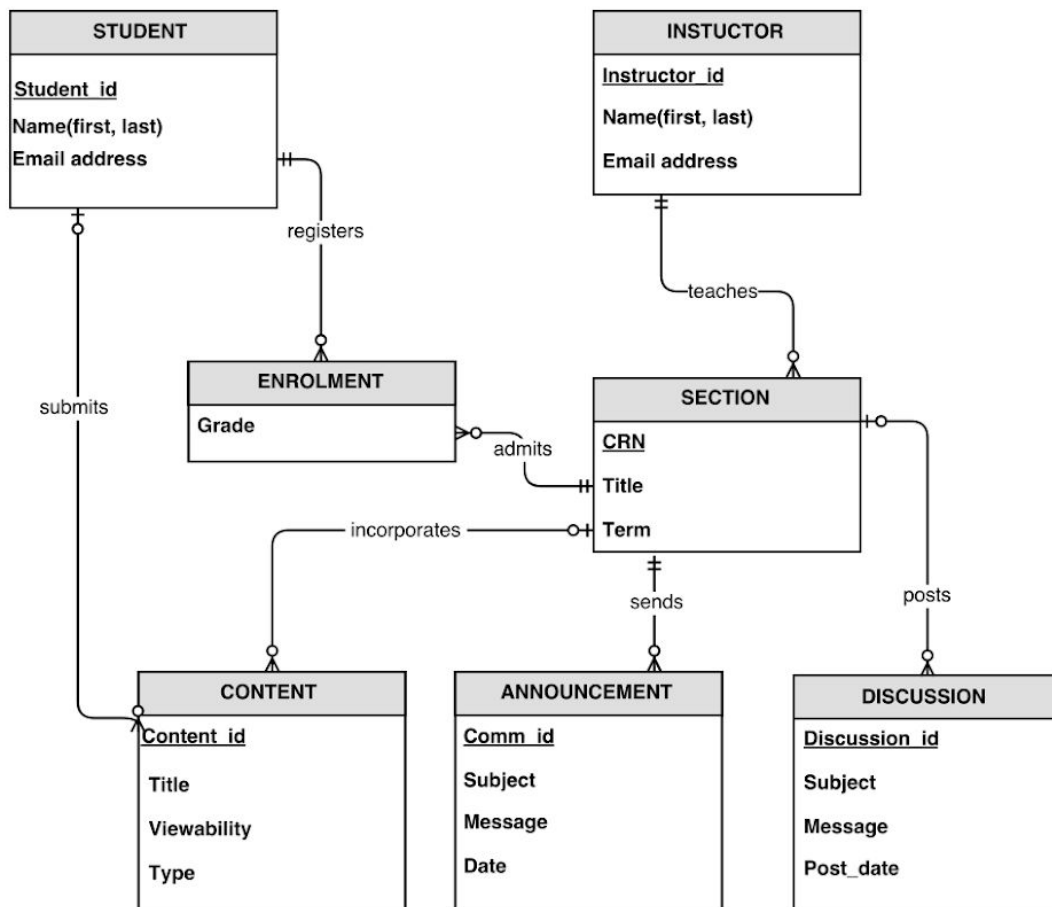


#### Assumptions:

1. Marks can be updated for a single student or an entire class in the same process.
2. The system does not track marks or weights unless they are correlated with a course.
3. Student records are independent of Banner's student records.

## Appendix 5: Entity Relationship Diagram

### Learning Management System ERD Author: Flex Analysis Prepared for: University of Bridgeland April 3rd, 2017



#### Assumptions

1. A section may only be managed by one and only one instructor.
2. An instructor does not have to teach any sections to exist within the system.
3. A student can exist without being enrolled.
4. A section may or may not have any content at a given point .
5. A section may or may not have students enrolled at a given point.
6. An announcement may only come from one and only one section.
7. A section does not need to send any announcements.
8. A section may exist without any discussions.
9. Discussions may only be posted to one section.

### 6.1 Blackboard Economic Feasibility Calculation

### 6.1 Blackboard Economic Feasibility Calculation

## Blackboard Ultra Cost Benefit Analysis

## 6.2 Canvas Economic Feasibility Calculation

Canvas Cost Benefit Analysis						
Year	0	1	2	3	4	5
Net Economic Benefit	\$0.00	\$413,525.00	\$225,560.00	\$236,752.00	\$249,182.00	\$263,099.00
Discounted Benefits	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Benefits	\$0.00	\$397,620.19	\$208,542.90	\$210,471.67	\$213,001.82	\$216,248.20
NPV of Benefits	\$0.00	\$397,620.19	\$606,163.09	\$816,634.76	\$1,029,636.58	\$1,245,884.78
Cost						
	-\$358,796.00	-\$125,745.00	-\$141,395.00	-\$159,255.00	-\$179,643.00	-\$202,922.00
Discounted Cost	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Costs	-\$358,796.00	-\$120,908.65	-\$130,727.63	-\$141,577.12	-\$153,559.59	-\$166,787.09
NPV Costs	-\$358,796.00	-\$479,704.65	-\$610,432.28	-\$752,009.39	-\$905,568.98	-\$1,072,356.08
Yearly Cashflow	-\$358,796.00	\$276,711.54	\$77,815.27	\$68,894.55	\$59,442.23	\$49,461.11
Cummulative Cashflow	-\$358,796.00	-\$82,084.46	-\$4,269.19	\$64,625.36	\$124,067.59	\$173,528.70
Discount Rate	4%					
Break Even Point (years)	0.061966989					
Payback Period	2.06					
ROI	16.18%					



### 6.3 Moodle Economic Feasibility Calculation

Moodle Cost Benefit Analysis						
Year	0	1	2	3	4	5
Net Economic Benefit	\$0.00	\$435,677.56	\$447,168.86	\$459,660.01	\$473,348.49	\$488,474.68
Discounted Benefits	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Benefits	\$0.00	\$418,920.73	\$413,432.75	\$408,636.08	\$404,620.27	\$401,490.58
NPV of Benefits	\$0.00	\$418,920.73	\$832,353.48	\$1,240,989.55	\$1,645,609.83	\$2,047,100.40
Cost						
Cost	-\$322,817.75	-\$234,522.00	-\$236,381.00	-\$236,483.01	-\$236,590.87	-\$236,704.66
Discounted Cost	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Costs	-\$322,817.75	-\$225,501.92	-\$218,547.52	-\$210,232.53	-\$202,238.87	-\$194,553.98
NPV Costs	-\$322,817.75	-\$548,319.67	-\$766,867.20	-\$977,099.73	-\$1,179,338.60	-\$1,373,892.57
Yearly Cashflow	-\$322,817.75	\$193,418.81	\$194,885.23	\$198,403.54	\$202,381.41	\$206,936.60
Cummulative Cashflow	-\$322,817.75	-\$129,398.94	\$65,486.28	\$263,889.82	\$466,271.23	\$673,207.83
Discount Rate	4%					
Break Even Point (years)	0.663975127					
Payback Period	1.16					
ROI	49.00%					

## 6.4 Desire2Learn Economic Feasibility Calculation

Desire2Learn Cost Benefit Analysis						
Year	0	1	2	3	4	5
Net Economic Benefit	\$0.00	\$653,845.00	\$666,107.00	\$678,921.00	\$692,398.00	\$706,670.00
Discounted Benefits	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Benefits	\$0.00	\$628,697.47	\$615,853.35	\$603,558.23	\$591,864.41	\$580,831.00
NPV of Benefits	\$0.00	\$628,697.47	\$1,244,550.82	\$1,848,109.05	\$2,439,973.46	\$3,020,804.46
Cost						
	-\$431,962.00	-\$333,589.00	-\$353,713.00	-\$371,144.00	-\$389,447.00	-\$408,667.00
Discounted Cost	1	0.9615	0.9246	0.8890	0.8548	0.8219
PV of Costs	-\$431,962.00	-\$320,758.41	-\$327,027.15	-\$329,945.30	-\$332,901.09	-\$335,894.53
NPV Costs	-\$431,962.00	-\$752,720.41	-\$1,079,747.56	-\$1,409,692.86	-\$1,742,593.95	-\$2,078,488.47
Yearly Cashflow	-\$431,962.00	\$307,939.06	\$288,826.21	\$273,612.93	\$258,963.32	\$244,936.47
Cummulative Cashflow	-\$431,962.00	-\$124,022.94	\$164,803.26	\$438,416.19	\$697,379.51	\$942,315.99
Discount Rate	4%					
Break Even Point (years)	0.429403364					
Payback Period	1.42					
ROI	45.34%					