Software Engineering

ΣΧΟΛΗ ΤΕΧΝΟΛΟΓΙΚΩΝ ΕΦΑΡΜΟΓΩΝ
ΕΦΑΡΜΟΣΜΕΝΗΣ ΠΛΗΡΟΦΟΡΙΚΗΣ & ΠΟΛΥΜΕΣΩΝ

TEI OF CRETE
DEPARTMENT OF APPLIED INFORMATICS AND MULTIMEDIA

Software Engineering Document
For:
E-Learning Software

This Project was elaborated by: Software Analysis Group (SAG)

UNDER PROFESSOR'S SUPERVISION: DR. VIDAKIS NIKOLAOS

Project Report For Software Analysis Class

THE TEAM OF THE SAG ORGANIZATION IS FORMED BY THE FOLLOWING MEMBERS:

Reg Number	Surname	Name	Contact Email
2105	Karadimitriou	*Nikolaos*	karadimnik@gmail.com
1668	Kavalinis	*Viron*	oinopneuma@gmail.com

Laboratory Team: C

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Procedure Maturity Models and Tools based on them that can assist in evaluation and in the improvement of e-Learning:

All of these models are Process Maturity Models, because they are built on the idea of success through different processes used.

THE CAPABILITY MATURITY MODEL is a 5 level model for judging the maturity of an organization's software development processes and for identifying the key practices or steps required to increase the capability or effectiveness of those processes.

The five levels of the model can be described as:

1) **Initial**: The development process is characterized as ad hoc, and occasionally even chaotic. Few processes are defined, and success depends mainly on individual effort and heroics.

2) **Repeatable**: Basic project management processes are established to track cost, schedule, and functionality. The necessary process discipline is in place to repeat earlier successes on projects with similar applications.

3) **Defined:** Management and development activities are documented, standardized, and integrated into a family of standard processes for the organization.

4) **Managed:** Detailed measures of the process and product quality are collected so that the process and product are understood and controlled.

5) **Optimizing:** Continuous process improvement is facilitated by feedback from the process and from piloting innovative ideas and technologies.

The model also provides a benchmark against which an organization may evaluate its current capability, plan for, and measure future improvements. Equally it allows an organization to compare its current capability with that of other organizations in its industry.
The last benefit provided by the model is that it identifies the essential key process areas necessary for the improvement of software development as defined by current professionals in the field.

One of the main strengths of the model is that it supports process improvement without a reliance on any particular development methodology or organizational model. The CMM has been applied successfully with both an institutional focus, as well as at the personal level for improving individual development processes. This versatility has seen it adapted for use in a number of related areas including systems engineering, product development and, project management. The model has even been successfully adapted to the development of people capability to assist in human resource management.

Research has shown that the CMM models assist organizations that want answers to questions like:

· Is the organization successful at learning from past mistakes?

· Is it clear that the organization is spending limited resources effectively?

· Does everyone agree which problems within the organization are the highest priorities?

· Does the organization have a clear picture of how it will improve its processes?

From this research we can see that this model is so abstract that with some changes it could be equally applied for e-learning and education in general(Educational Maturity Model). A new model based on this abstraction that CMM offers is EMM (E-Learning Maturity Model) which also adopts some of the SPICE's methodology. Another approach to learning through the CMM and P-CMM (People CMM) is Learning Maturity Model (LMM).

EMM (E-LEARNING MATURITY MODEL)

The **EMM (E-LEARNING MATURITY MODEL)**is an example of a process maturity model and like all such models it's founded on a basic presumption that success in any complex endeavor is a consequence of the processes used. When you are unfamiliar with the task being undertaken, decisions are often ad-hoc and made on the basis of immediate requirements. As experience in undertaking a task grows, successful organizations learn from their experience and use that information to be more effective in undertaking similar tasks. This growth in experience is referred to as "Maturity" and is commonly regarded as passing through five levels:

Process category	Brief description
Learning	Processes that directly impact on pedagogical aspects of e-learning
Development	Processes surrounding the creation and maintenance of e-learning resources
Support	Processes surrounding the oversight and management of e-learning
Evaluation	Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle.
Organisation	Processes associated with institutional planning and management

Image 1: eMM Levels

PROCESSES AT EVERY LEVEL OF eMM v2:

- *Processes at Learning Level:* *Processes that directly impact on pedagogical aspects of e-learning*

    1. Learning objectives are apparent in the design and implementation of courses
    2. Students are provided with mechanisms for interaction with teaching staff and other students
    3. Student skill development for e-learning is provided
    4. Information provided on the type and timeliness of staff responses to communications students can expect
    5. Students receive feedback on their performance within courses
    6. Research and information literacy skills development by students is explicitly supported
    7. Learning designs and activities result in active engagement by students
    8. Assessment of students is designed to progressively build their competence
    9. Student work is subject to specified timetables and deadlines
    10. Courses are designed to support diverse learning styles and learner capabilities

- *Processes at Development Level:* *Processes surrounding the creation and maintenance of e-learning resources*

    1. Teaching staff are provided with design and development support when engaging in e-learning
    2. Course development, design and delivery are guided and informed by formally developed e-learning procedures and standards
    3. Explicit linkages are made in the design rationale regarding the pedagogies, content and technologies chosen
    4. Courses are designed to support disabled students
    5. All elements of the physical e-learning infrastructure are reliable, robust and sufficient
    6. All elements of the physical e-learning infrastructure are integrated using defined standards
    7. Resources created are designed and managed to maximize reuse

- *Processes at Support Level:* *Processes surrounding the support and operational management of e-learning*

    1. Students are provided with technical assistance when engaging in e-learning
    2. Students have access to a range of library resources and services when engaging in e-learning
    3. Student enquiries, questions and complaints are collected formally and managed
    4. Students have access to support services for personal and learning issues when engaging in e-learning
    5. Teaching staff are provided with pedagogical support and professional development in using e-learning
    6. Teaching staff are provided with technical support in the handling of electronic materials created by students

- *Processes at Evaluation Level:* *Processes surrounding the evaluation and quality control of e-learning through its entire lifecycle*

    1. Students are able to provide regular formal and informal feedback on the quality and effectiveness of their e-learning experience
    2. Teaching staff are able to provide regular formal and informal feedback on quality and effectiveness of their e-learning experience
    3. Regular formal independent reviews of e-learning aspects of courses are conducted

- *Processes at Organization Level:* *Processes associated with institutional planning and management*

    1. Formal criteria used to allocate resources for e-learning design, development and delivery
    2. Institutional learning and teaching policy and strategy explicitly address e-learning
    3. A documented specification and plan guides technology decisions when designing and developing courses
    4. A documented specification and plan ensures the reliability, integrity and validity of information collection, storage and retrieval
    5. The rationale for e-learning is placed within an explicit plan
    6. E-learning procedures and which technologies are used are communicated to students prior to starting courses
    7. Pedagogical rationale for e-learning approaches and technologies communicated to students prior to starting courses
    8. Course administration information communicated to students prior to starting courses
    9. The provision of e-learning is guided by formal business management and strategy

E-LEARNING CAPABILITY MODEL (ECM2)

Levels in ECM2:

1. Initial,
2. Independent,
3. Shared,
4. Organized,
5. Learning.

Key performance indicators are identified for three of these levels (2-4) in the categories of people, processes and technology. These have then been applied over four institutions. An interesting aspect of the work presented is the use of an historical representation to show the evolution of capability over multiple years, something that will be explored with the eMM over the next few years. Assessments were performed on the basis of interviews and review of documents.

VOLLMER'S MATURITY MODEL

Discusses the commercial LMS market and presents a CMM approach with **five levels**, no empirical basis for the model or evidence of its application is supplied.

1. Organic: Ad-hoc, reactionary response to individual staff demands.

2. Initiative-Driven: Learning is targeted at process outcomes. Objective is business-unit excellence.

3. Enterprise-Based: The organization can establish consistent learning goals and objectives between business units. Reuse of IT investments via shared infrastructure.

4. Competency-Based: Learning becomes massively customized to meet end-user roles, performance needs and individual/teamwork models.

5. Knowledge-Management-Based: Human capital management and knowledge management strategies are unified, and learning becomes a key element to enhance workplace performance and innovation.

HARRIS'S MATURITY MODEL

Presents a six level model for enterprise e-learning improvement. No citations of any research included and the model appears to have a descriptive rather than empirical focus and to be aimed at the use of e-learning within commercial organizations rather than educational providers. The model has the following **levels**:

1. **Level 0 Nonexistent:** Essentially e-learning is limited to occasional use in the absence of strategy or explicit management.

2. **Level 1 Initial:** Silo based use of e-learning with an initial level of planning and awareness developing.

3. **Level 2 Repeatable:** Planning for the use and reuse of e-learning is evident within key aspects of the business.

4. **Level 3 Defined:** The use of e-learning is subject to a strategy, operational planning and ongoing budget provision is made for its use.

5. **Level 4 Managed:** E-learning planning is aligned within business plans and performance of the e-learning systems are measured and reported upon.

6. **Level 5 Optimized***:* E-learning is an integral part of operations within and without the business and a regular redevelopment program ensures that the systems grow and develop as the business develops and new technologies become available.

NEUHAUSER'S MATURITY MODEL (OCDMM)

Presents a model derived from the CMM, called the online course design maturity model (OCDMM).

Identifies **five levels**:

1. **Level 1:** Initial
2. **Level 2:**Exploring
3. **Level 3:**Awakening
4. **Level 4:**Synergizing Strategies
5. **Level 5:**Integrating Best Practices

Each of these levels is defined using five process areas:

• Components and Appearance
• Individualized and Personal
• Use of Technology
• Socialization and Interactivity
• Assessment
The practices were drawn from the literature and are defined in descriptive terms.

THINQ LEARNING MANAGEMENT MATURITY MODEL

A commercial LMS provider has created a CMM based maturity model process for commercial e-learning provision and management. Uses the following **five levels:**

1. Ad Hoc
2. Managed Learning
3. Competency-Driven
4. Integrated Performance
5. Optimized Workforce

Practices are organized in nine areas:
1. Content Management
2. Knowledge Management
3. Collaboration
4. Program Strategy and Design
5. LMS
6. Change Leadership
7. Testing and Assessment
8. Performance Management
9. Competency Management

THE LMM'S EXTENSION TO LEARNING AND DEVELOPMENT MODEL LEVELS:

1. Initial
2. Repeatable
3. Defined
4. Managed
5. Optimized

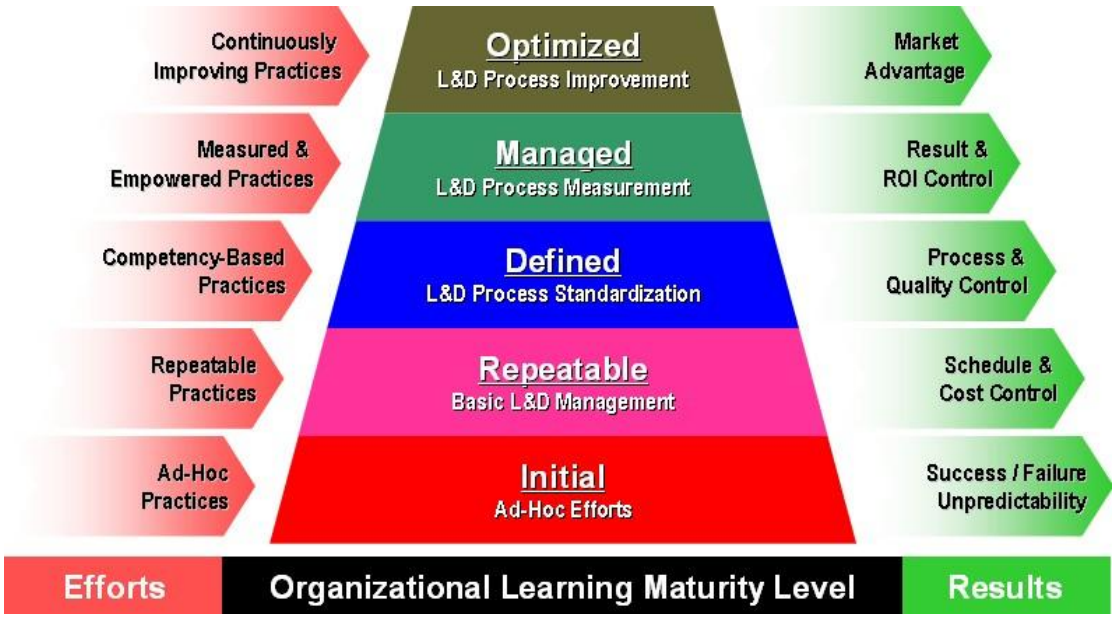


Image 2: LMM

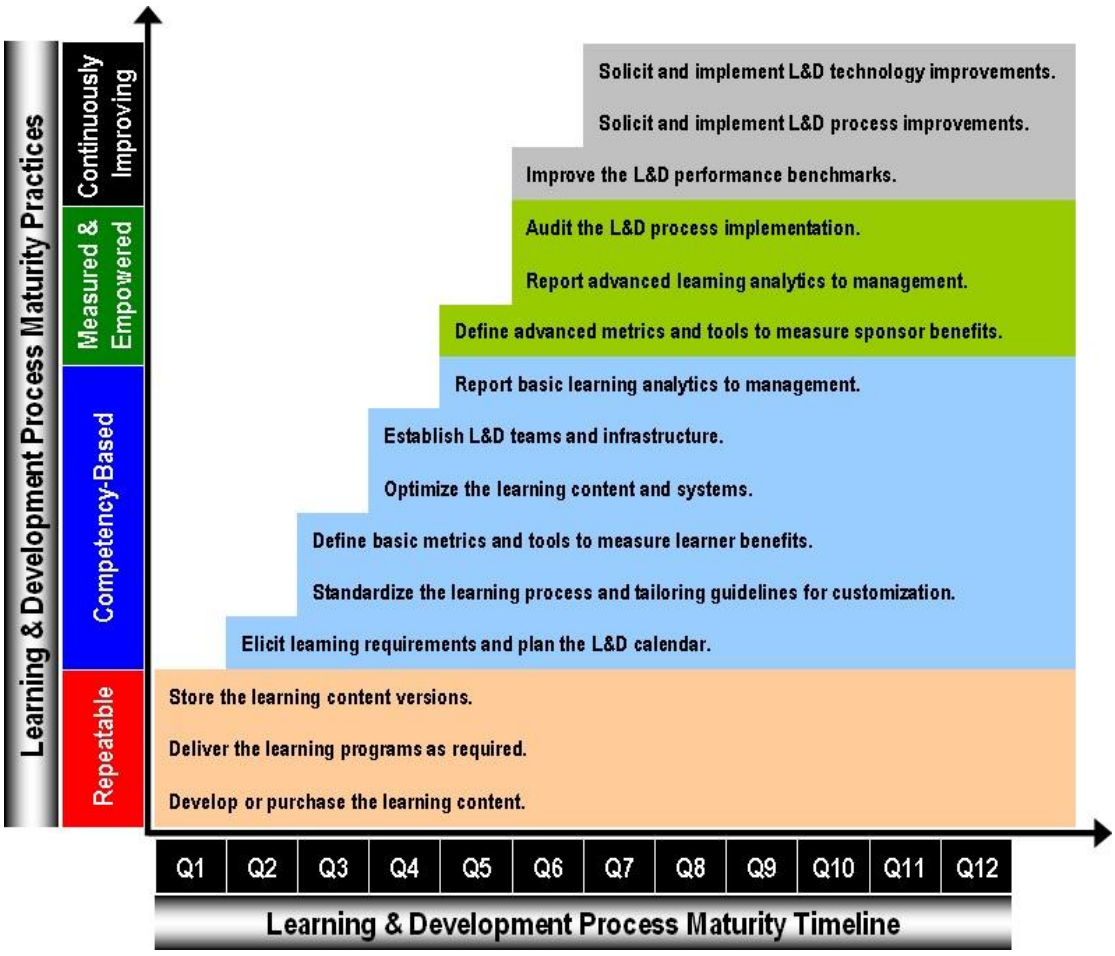


Image 3: LMM TimeLine

ANOTHER EDUCATIONAL MATURITY MODEL TOOL DEVELOPED FOR THE RASSP PROJECT:

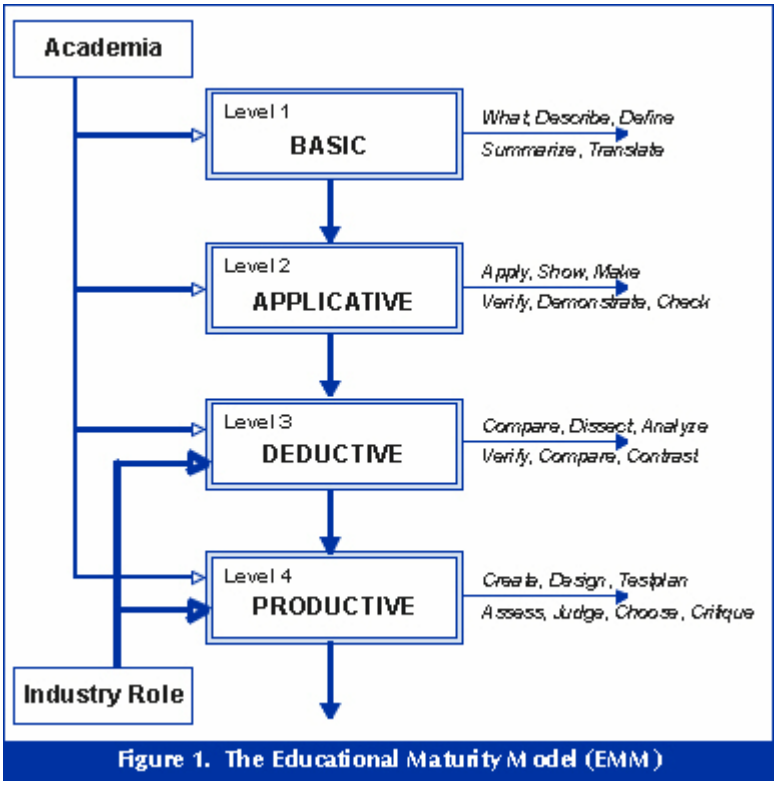


Image 4: Emm For Rassp

The Rassp's Maturity Model's levels:

1. Basic - This level of material supports knowledge and comprehension abilities on the part of the student.
2. Applicative - This level indicates that educational material facilitates usage of tools and application of knowledge to practical problems in limited context. Knowledge is primarily narrative.
3. Deductive - Supports learning of analytical aspects of technology, and the capability to apply general principles to specific cases. Prescriptive aspects of the knowledge are transferred at this level.
4. Productive - This level supports synthesis-related and evaluative aspects of learning and is the most advanced level. Included are the tacit aspects of the technology being transferred.

RESOURCES INFRASTRUCTURE PEOPLE POLICIES LEARNING EVALUATION SUPPORT

The **RIPPLES** (**R**esources **I**nfrastructure **P**eople **P**olicies **L**earning **E**valuation **S**upport) model is a framework organizations can use to plan for the successful implementation of new tools and practices.

- Online Survey Instrument

There are four main applications of the model:

1. **Implementation Planning** - Determining an organization's overall implementation readiness and identifying specific barriers or enablers to implementation.
2. **Implementation Support**- Developing specific interventions that will facilitate the implementation of an innovation thereby reducing stress, and saving time and money.
3. **Implementation Evaluation** - Understanding the reasons for a successful or unsuccessful implementation in order to better prepare for future implementations.
4. **Research** - Developing better theories about why implementations succeed or fail and creating theory-based models for supporting implementation in a variety of organizations.

RACE'S RIPPLES MODEL OF LEARNING

This model was taken as basis by Phil Race, and made the Race's RIPPLES Model of Learning. He rewrote the basic elements of the RIPPLES model to fit the domain of Learning and four of them are:

Race's RIPPLES levels:

1. **Needing/Wanting** - motivation
2. **Doing** - practice; trial and error
3. **Feedback** - seeing the results; other people's reactions
4. **Digesting** - making sense of it; gaining ownership.

Image 5: Race's RIPPLES model

THE KOLB MODEL

The Kolb Model (David Kolb) asserts that knowledge results from the interaction between theory and experience. It states that learning takes place in FOUR stages in cycle that continues the more one learns:

The Stages (Levels):

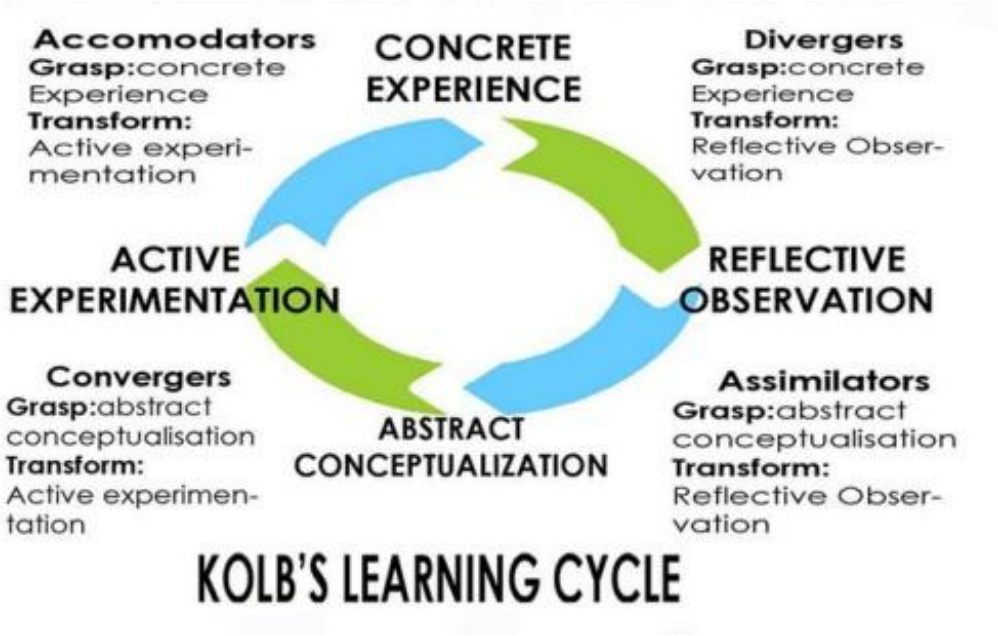


Image 6: Kolb's Learning Cycle

Comparing Models

MODELS OF INTEREST

- Capability Maturity Model (CMM)
  - People Capability Maturity Model
  - Blackboard's Descriptive Model
  - Educational Maturity Model (EMM)
    - E-learning Maturity Model (eMM)
    - Learning Maturity Model (LMM)
    - E-Learning Capability Model (ECM2)
    - THINQ Learning Management Maturity Model
    - Vollmer's Maturity Model
    - Harris's Maturity Model
    - Neuhauser's Maturity Model (OCDMM)
    - RASSP's MM
- Educational Models (EM)
  - The Kolb Model
  - Ripples Model

Comparison array. Different Color refers to different Model Branch

MODELS& TOOLS	LEVELS	PROCESSES
CMM	6(including 0)	5each Level
P-CMM	5	
THINQ Learning Management Maturity Model	5	9each Level
eMM	5	Varies Through Levels
LMM	5	
ECM2	5	Varies Through Levels divided in three Subcategories
Vollmer's MM	5	
Harris's MM	6	
Neuhauser's MM	5	5each Level
RASSP's MM	4	
Kolb's Model	4	
RIPPLES Model	4	

Table 1: Model Comparison

THE CO-COMPETITIVE MATURITY MODEL FOR E-LEARNING

This Maturity Model is based on the CMM, eMM, OCDMM and THINQ Learning Management Maturity Model. It consists of 5 levels. Within each level processes that must be accomplished are defined. The levels of it are a combination of the above, as the processes are too.

As it's a maturity based model tool, every level's processes must be executed in iteration until succeeding full knowledge of every level. Of course, as a tool, provides an evaluation of every level of an E-Learning Software applied in a University.

The fundamental idea in this model is the competency and collaboration factor derived from people working in teams. The outcome is the best practice generated by the team and is then applied onwards.

The Levels that create the basic structure of the model are:

- **Level 1: Initial Level**
- **Level 2: Exploring Level**
- **Level 3: Competency-Driven Level**
- **Level 4: Integrated Performance**
- **Level 5: Integrating Best Practices**

Level 1: Initial Level

- **Socialization and Interactivity**
- **Content Management**
- **Collaboration**
- **Knowledge Management**
- **Program Strategy and Design**
- **Competency Management**
- **Change Leadership**
- **Performance Management**
- **Testing and Assessment**
- **Managing Best Suited Designs**

Level 2: Exploring Level

- Socialization and Interactivity
- Content Management
- Collaboration
- **Knowledge Management**
- **Program Strategy and Design**
- Competency Management
- Change Leadership
- Performance Management
- Testing and Assessment
- Managing Best Suited Designs

Level 3: Competency-Driven Level

- Socialization and Interactivity
- Content Management
- Collaboration
- Knowledge Management
- Program Strategy and Design
- **Competency Management**
- **Change Leadership**
- Performance Management
- Testing and Assessment
- Managing Best Suited Designs

Level 4: Integrated Performance

- Socialization and Interactivity
- Content Management
- Collaboration
- Knowledge Management
- Program Strategy and Design
- Competency Management
- Change Leadership
- Performance Management
- Testing and Assessment
- Managing Best Suited Designs

Level 5: Integrating Best Practices

- Socialization and Interactivity
- Content Management
- Collaboration
- Knowledge Management
- Program Strategy and Design
- Competency Management
- Change Leadership
- Performance Management
- Testing and Assessment
- Managing Best Suited Designs

Project Phase 2: Requirements

"Software Processes Analysis"

In this section the demands of the company or organization are being analyzed. In our case the faculty, the staff and the students are the main source of information for our analysis. Of course there could be others involved, such as university counselors, pedagogical counselors and professors from other domains.

The basic ways to acquire the intel needed are by:

- Observing everyday tasks, and processes of the organization.
- Meeting with several persons involved.
- Reading documents based on the subject.
- Bibliography.
- Questioners for faculty, staff and students.

There are three kinds of software requirements:

- **Operational Requirements:** Definition of the services that a system must support. How system react on incoming information and how it behaves in different situations.
- **NonOperational Requirements:** Services or functions restrictions that the system offers. Like time restrictions, standards.
- **Domain Requirements:** Requirements that derive from the domain specified application of the system and usually represent the characteristics of the specified domain.

Requirements' Tables

OPERATIONAL REQUIREMENTS

Requirement Code Name:

User Registration

Definition/ Requirement Title

The system must support online new user registration.

Requirement Description:

1. User must fill all the required fields.
2. Fields must be checked to be correct.
3. Checks if unique value fields are violated.
4. User feedback on success or failure.

Requirement Code Name:

User Login

Definition/ Requirement Title:

System must demand user login in order to interact with its functions.

Requirement Description:

1. System gives users the ability to enter the REGISTERED username and password and notified if wrong login occurred.
2. Live sessions should last a predefined period.
3. For security reasons after a number of failed login attempts, system must lock the login form for the current incoming IP packages.
4. On a successful login, user must be redirected to the main page and notified properly.
5. This process must be the same for all different kind of users.

Requirement Code Name:

NewAnnounce

Definition/ Requirement Title

It should be possible to members of a particular user group to post announcements.

Requirement Description:

1. The user should be able to choose in which sector and what user group the announcement will be available.

Requirement Code Name:

ReadAnnounce

Definition/ Requirement Title

The program should give the ability to users to read new announcements.

Requirement Description:

1. The user should be able to find in what sector has been posted a notice.
2. Every announcement should be entitled.
3. Each announcement should contain the time and date posted.

Requirement Code Name:

File Upload

Definition/ Requirement Title

The program should give the ability to users to upload files.

Requirement Description:

1. The user should define the file name.
2. The user should choose in which user group the file will be available.
3. The file should have a small preview.
4. The file should be mapped with the program that created.
5. There must be a restriction for the file size.

Requirement Code Name:

File Download

Definition/ Requirement Title

The user should be able to open uploaded files.

Requirement Description:

1. Every file should have an icon and a small preview.
2. Each file should be linked with the application that created it with.
3. By clicking the file icon should be launched the appropriate application.

Requirement Code Name:

User Communication

Definition/ Requirement Title

The program should let users to communicate each other.

Requirement Description:

1. The communication information of each user should be invisible.
2. The user should be able to choose to which user or user group wants to send message.
3. The program should check so the message should not be longer than one specific length.
4. There should be a time restriction. More specific, users should not be able to send messages in a specific time interval.

Requirement Code Name:

Notify

Definition/ Requirement Title

System must operate as an event reminder to students.

Requirement Description:

1. Course exercise deadline remind, through email or sms.
2. Team meeting reminder.
3. Feedback on questions asked to public.

Requirement Code Name:

On Site Visual Support

Definition/ Requirement Title

System must have preinstalled online tools for specified support.

Requirement Description:

1. A professor can give the opportunity to students for live lecturing through streaming.

Requirement Code Name:

Course Template Projects

Definition/ Requirement Title

System must have predefined templates on courses' projects.

Requirement Description:

1. A professor can upload a template about the ongoing projects of a course.
2. Templates should be modifiable.

Requirement Code Name:

User Categorization

Definition/ Requirement Title

The program should categorize users in user groups.

Requirement Description:

1. Admins should be able to characterize a user to Professor, Student or service user or other user group.
2. The program should give the ability to admins to add users into user groups.
3. The admins should be able to create or delete user groups.

Requirement Code Name:

Course Creation

Definition/ Requirement Title

Only admins should be able to create new lessons according to professor's requirements.

Requirement Description:

1. Admins should be able to create new courses.
2. Admins should concert with the professors for the number of new courses and their properties (locked or public).

Requirement Code Name:

Database Backup

Definition/ Requirement Title

The program should allow admins to backup database.

Requirement Description:

1. Admins and only that specific user group should be able to create backups of the database.
2. The program should provide a mechanism for auto backup of database in specific time and day provided by the admins.
3. Program should check for database changes and adding them to existing database backup.

Requirement Code Name:

Database Maintenance

Definition/ Requirement Title

The program should provide admins a mechanism for the database maintenance.

Requirement Description:

1. Admin should be able to check the data stored in the database.
2. They should be able to find broken links and missing information.
3. If admins find a bug or a problem in database they should be able to take a database backup and correct the bug.

Requirement Code Name:

Program Debugging

Definition/ Requirement Title

The program should be able to collect information for bugs and problems that appeared to users and feedback from them.

Requirement Description:

1. If a problem occurs the program should be able to record it and allow the user to contact with the admins.
2. The program should provide a feedback from the users at any time for anything.
3. The program in case of problem should provide a convenience message to the user.

Requirement Code Name:

Database Restore

Definition/ Requirement Title

The programs should provide an easy way to restore database in case of lost.

Requirement Description:

1. In case of problem the program should allow admins and only admins to restore database.
2. Until admins restore a database the program should provide an auto backup of database for the users.

NONOPERATIONAL REQUIREMENTS

Requirement Code Name:

Time Table

Definition/ Requirement Title

The entire project must be complete in one semester.

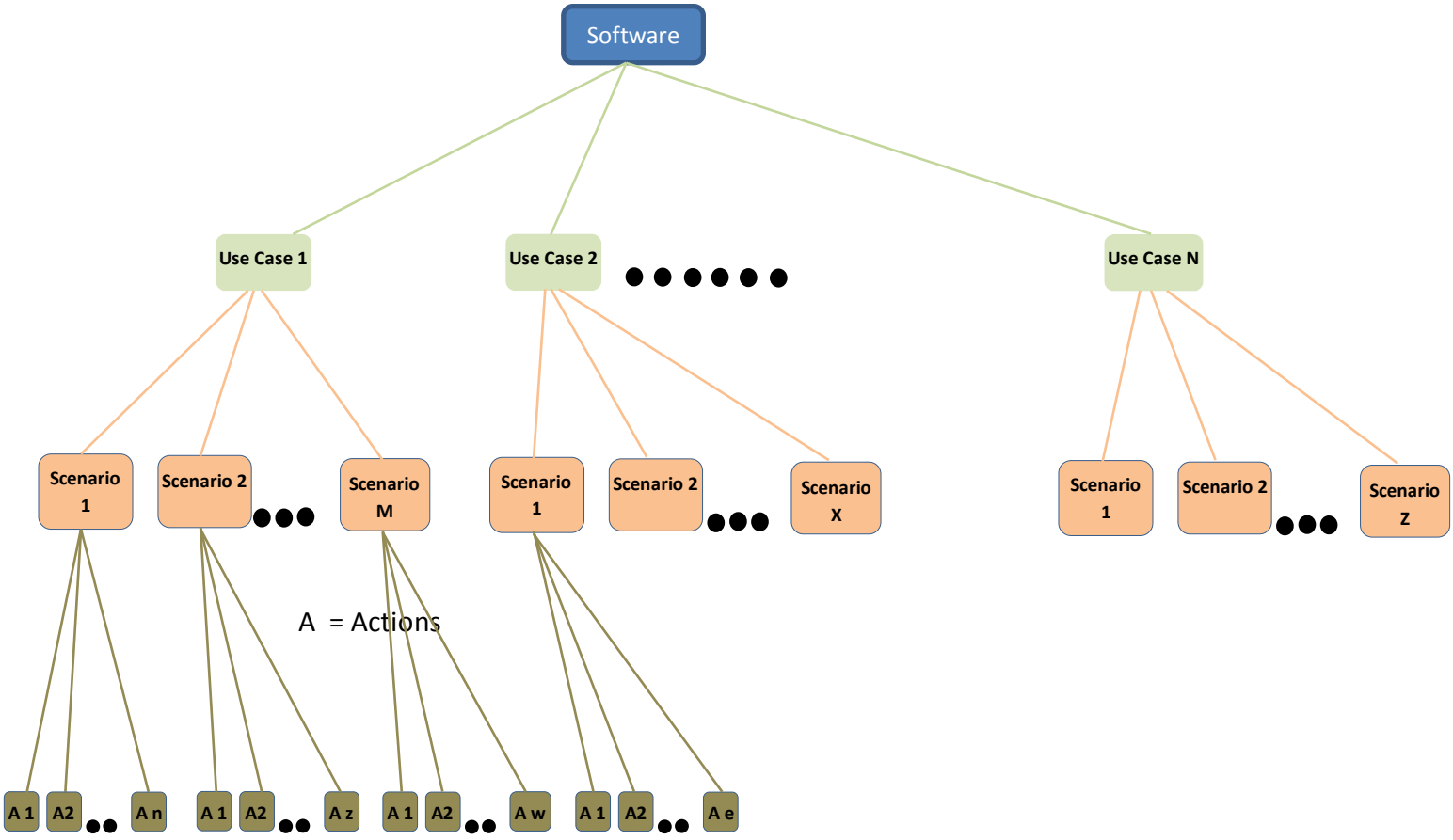
Requirement Description:

1. The team working on the project has 6 month time to produce a fully operational system based on the requirements.

Project Phase 3: Use Cases

In this phase of the project, the use cases with the according scenarios and the actions derived from them are specified.

First of all, use cases might “contain” one or more of scenarios. Also, scenarios might contain one or more actions. So in order to make it little bit clearer think of use cases, scenarios and actions as a tree data structure as show below:



USE CASES – SCENARIOS – ACTIONS STRUCTURE

USE CASE-SCENARIO MATRIX

Use Case	Scenarios
Rated System Access	• User Account Creation • User Account Administration • User Profile Administration • User Group Administration
Communication	• Recipient Management • Message Management • Message Composing • Recipient Choosing • Subject Choosing • Communication Type Selection
Evaluation	• Domain Evaluation Selection • Grade Selection • Message Composition • Evaluation Submission • Submitted Evaluation Management • Submitted Evaluations View
Content and Resource Management	• Database Maintenance • Interfaces Management • Double, Faulty, Old or Nonexistent Users • Security Services Maintenance • Network Maintenance • Backup File Creation • Server Capability check

USE CASE DESCRIPTION TEMPLATE BY DENNIS

Use Case Name: Rated access	**Importance Level: High**
Primary Actor: Admin	**Use Case Type: Important**
Stakeholders and Interests: *Administrator, end user*	
Brief Description: *User Account Creating Managing and Updating*	
Trigger: *User request to the program*	
Relationships: Association: Include: Create user account, Manage user account, Manage user profile, Manage user groups Extend: Guest user becomes member Generalization:*Students, Faculty, Staff*	
Normal Flow of Events: 1. Create user account a. If the user haven't entered all the necessary information check EX1 b. If information are correct check SB2 c. If the user already exists check EX2 d. If the inserted information are incorrect check EX3 2. Manage user account a. If changed important information check SB2 3. Manage user profile 4. Manage user groups	
Subflows: SB1. Do again the authentication procedure to save the new data SB2. If data are correct continue to next step.	
Alternate/Exceptional Flows: EX1: Prompt to enter all the information needed and highlight them EX2: Prompt to enter the platform with the stored data EX3: Prompt to check the information entered	

Use Case Name: Communication	**Importance Level: High**
Primary Actor: Student, Professor	**Use Case Type: Important**
Stakeholders and Interests: *Administrator, Student, Professor*	
Brief Description: *Communication between users and user groups*	
Trigger: *User wants to send message to other user or user group*	
Relationships: Association: Include: Choose recipients, Write subject, Choose communication method, Manage recipients, Manage messages, Write message Extend: User send message to other users Generalization: *Broadcast messaging, Private Messaging, Group Email*	
Normal Flow of Events: **1.** Choose recipients a. If user has chosen not to be listed check SB1 **2.** Write subject a. If subject length is small check EX1 b. If subject is empty check EX2 c. Subject too big, check EX3 **3.** Choose communication method a. Method unavailable, check SB2 **4.** Manage recipients **5.** Manage messages a. No messages saves, check SB3 **6.** Write message a. If message too small, check EX4 b. If message too big, check EX5 c. If message is empty, check EX6	
Subflows: SB1. Not listed to available users SB2. Inform user that the selected method is unavailable and ask him to choose a different one SB3. Inform the user that no messages are saves SB4.	
Alternate/Exceptional Flows: EX1: Prompt to check again and add more words. EX2: Prompt to enter subject otherwise the message will be sent without subject EX3: Prompt to shorten the subject EX4: Prompt to type more EX5: Prompt to shorten the message EX6: Inform that the message won't be sent because it's empty	

Use Case Name: Evaluation	**Importance Level: High**
Primary Actor: Final users	**Use Case Type: Important**
Stakeholders and Interests: *Final user, Staff*	
Brief Description: *Users evaluate the platform*	
Trigger: *User rates a platform service*	
Relationships: Association: Include: Choose rate group, Choose grade, Write message, Submit review, Manage submitted reviews, View submitted reviews Extend: Admins check for bugs and problems from the users' reviews. Generalization: *Admins*	
Normal Flow of Events: 1. Choose rate groups a. If already rated a group check EX1 2. Choose evaluation method a. Oral exams check SB2 b. written examination check SB3 c. By observation check SB4 d. Questionnaire check SB5 3. Choose grade a.If already submitted rate check EX2 4. Write message a. If message too short check EX3 b. If message too big check EX4 5. Submit review a. If system unavailable check EX5 6. Manage submitted reviews a. No messages saved, check SB1 b. Manage privacy check SB6 7. View submitted reviews	
Subflows: **SB1.** Inform the user. **SB2.** Individual or group Examination – On scheduled date **SB3.** Predefined or upon end of semester. **SB4.** Entire semester subject observation on group or on individuals. **SB5.** Suggested at the end of semester. **SB6.** Change evaluation visibility	
Alternate/Exceptional Flows: EX1: Inform the user that already have rated EX2: Inform the user that already have submitted a review EX3: Prompt the user to enter more text EX4: Prompt the user to shorten the message EX5: Inform the user that the review couldn't be delivered	

Use Case Name: Management of content and sources	**Importance Level: High**
Primary Actor: Administrators	**Use Case Type: Important**
Stakeholders and Interests: *Admins*	
Brief Description: *Administrators manage the sources of the platform*	
Trigger:	
Relationships: Association: Include: Maintain database, Control Interfaces, Delete old/ duplicate users, Maintain security program, Maintenance of network, Backup, Authentication server, Server Maintenance Extend: Admins check for bugs and problems from the users' reviews. Generalization: *Admins*	
Normal Flow of Events: 1. Maintain database a. If already there is backup check SB1 2. Control Interfaces a. If interface is broken check EX2 3. Delete old/duplicate users 4. Maintain security program 5. Maintenance of network 6. Backup 7. Authentication server 8. Server Maintenance	
Subflows: **SB1.** Check when the last backup is made and if necessary make a new one	
Alternate/Exceptional Flows: **EX2:** Inform user for the problem	

SCENARIOS WITH ACTIONS

System:E-Learning Software	
User: Administrator, User	
USE CASE : RATED ACCESS	
Scenarios	**Actions**
User Account Creation	Insert mandatory user information for registration
	Insert additional user information for registration
	Define user role
	User submission
User Account Management	Insert user name and password for login
	Choose from the available services
	Define contact information
User Profile Management	Insert or change personal information
	Insert or change contact information
	Insert or change educational information
	Insert or change profile privacy
	Change user role (Administrators)
User Groups Management	User group creation
	User group deletion
	User group modification

System:E-Learning Software	
User: Administrator, User	
USE CASE:EVALUATION	
Scenarios	**Actions**
Domain Selection	Select domain to evaluate
Grade Selection	Select Grade
Message Composition	Compose a message
	Choose receiver
	Preview message
	Confirm message
Evaluation Submission	Enter personal info
	Check the integrity of evaluation form
	Confirm evaluation
Submitted Evaluations Management	Categorize the Evaluations
	Compose overall grade on course
	Compose overall grade on domain
	Compose overall grade on professor
	Delete obsolete evaluations
Submitted Evaluations View	Statistical view
	Graphical view
	Overall view

ACTIONS IN DETAIL – STEPS REQUIRED TO COMPLETE A SCENARIO OF A USE CASE

USE CASE: RATED SYSTEM ACCESS

Scenario: User Account Creation

In order the system administrator to able to create new users, certain information through steps must be processed.

Actions:

1. Insert mandatory user information for registration
2. Insert additional user information for registration
3. Define user role
4. User submission

Actions In Detail:

1. **Insert mandatory user information for registration**
   In this step user inserts important personal information like name and surname, username, password and contact information. All the information must be provided by the user to continue registration.

2. **Insert additional user information for registration**
   In this step user adds more information that are not necessary to continue the registration.

3. **Define user role**
   The user selects either he is a student or a teacher

4. **User submission**
   User submits his information to complete the registration.

USE CASE: RATED SYSTEM ACCESS

Scenario: User Account Management

In order the the user to manage his account and his information, some mandatory information needed.

Actions:

1. Insert username and password for login
2. Choose from the available services
3. Define contact information

Actions In Detail:

1. **Insert username and password for login**
   In order to use the services the user must provide to the system the saved username and password that he has chosen in the registration.
2. **Choose from the available services**
   After the user enters correctly username and password he can choose the service he wants to user like change some information.
3. **Define contact information**
   In this step user provides with the necessary information needed like e-mail or maybe a phone number or other services.

S.A.G.

USE CASE: RATED SYSTEM ACCESS

Scenario: User ProfileManagement

In order the the user to manage his profile and his information, some mandatory information needed.

Actions:

1. Insert or change personal information
2. Insert or change contact information
3. Insert or change educational information
4. Insert or change profile privacy
5. Change user role

Actions In Detail:

1. **Insert or change personal information**
   In this step user can change all or some of his personal information like address or if he is married or not.
2. **Insert or change contact information**
   In this step user can add or change existed information for his communication. He can change email, phone number, on line service and other
3. **Insert or change educational information**
   User can change, add or remove information about his education like high schools, college and other.
4. **Insert or change profile privacy**
   User can set his profile visible to everyone or not.
5. **Change user role**
   In this step, Administrator only can change the user's role. So, an administrator can promote a user to student, faculty or other staff.

S.A.G.

USE CASE: RATED SYSTEM ACCESS

Scenario: User GroupsManagement

In order the administrator to manage user groups, must follow some steps.

Actions:

1. User group creation
2. User group deletion
3. User group modification

Actions In Detail:

1. **User group creation**
   Administrator can create new user groups. User group name must be simple and understandable by reading for the role of the group.
2. **User group deletion**
   In this step administrator can delete existed user groups.
3. **User group modification**
   Administrator can modify the information of the user group or the member that are in it.

USE CASE: Evaluation

Scenario: Domain selection

In order user to evaluate the system must choose a specific domain.

Actions:

- Select domain to evaluate

Actions In Detail:

1. **Select domain to evaluate**
   User chooses from the available domains in order to evaluate.

S.A.G.

USE CASE: Evaluation

Scenario: Message Composition

In this scenario user composes a new message.

Actions:

- Compose a message
- Choose recipient
- Preview message
- Confirm message

Actions In Detail:

1. **Compose message**
   In this step user writes the message he want to send
2. **Choose receipient**
   User selects the receiver of the message he composed.
3. **Preview message**
   User overviews his message before he send it.
4. **Confirm message**
   In this step user is sure that the message is correct and confirms it so it can be sent to the receiver.

S.A.G.

USE CASE: Evaluation

Scenario: Submitted Evaluations management

In this scenario user can manage his older evaluations.

Actions:

- Categorize the evaluations
- Compose overall grade on course
- Compose overall grade on domain
- Compose overall grade on professor
- Delete obsolete evaluations

Actions In Detail:

1. **Categorize the evaluations**
   In this step user manages his evaluations in categories. Categories made by system
2. **Compose overall grade on course**
   The user checks the overall grade for a specific course
3. **Compose overall grade on domain**
   User checks the overall grade on a domain
4. **Compose overall grade on professor**
   User checks the overall grade on a professor
5. **Delete obsolete evaluations**
   User can delete evaluations that he thinks are not correct in this step

S.A.G.

USE CASE: Evaluation

Scenario: Submitted Evaluations View

In this scenario user can view statistical information for evaluations

Actions:

- Statistical view
- Graphical View
- Overall view

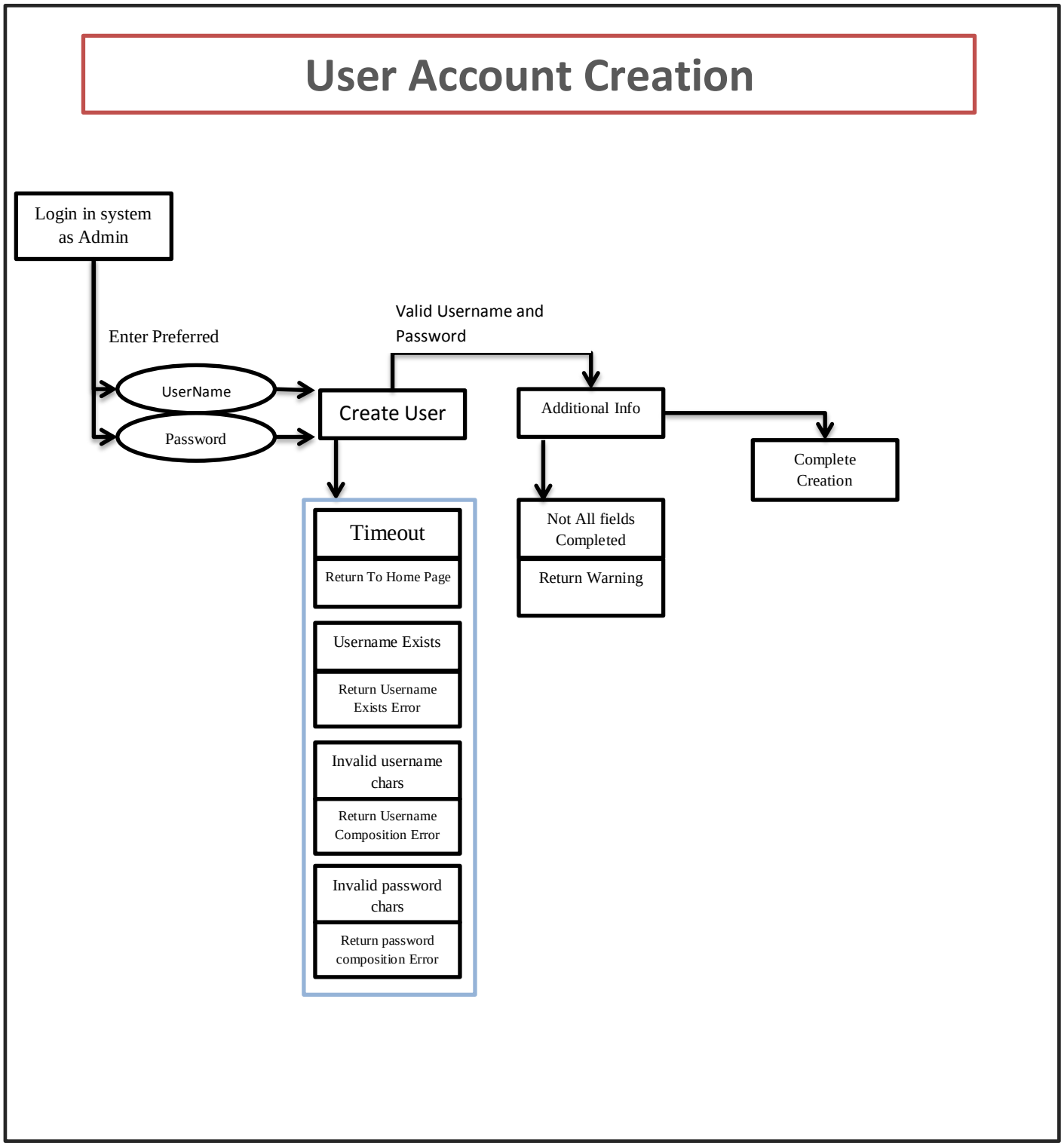
Actions In Detail:

1. **Statistical View**
   In this step user views the statistic information
2. **Graphical View**
   In this step user checks the statistical information in graphic
3. **Overall View**
   Users checks overall information

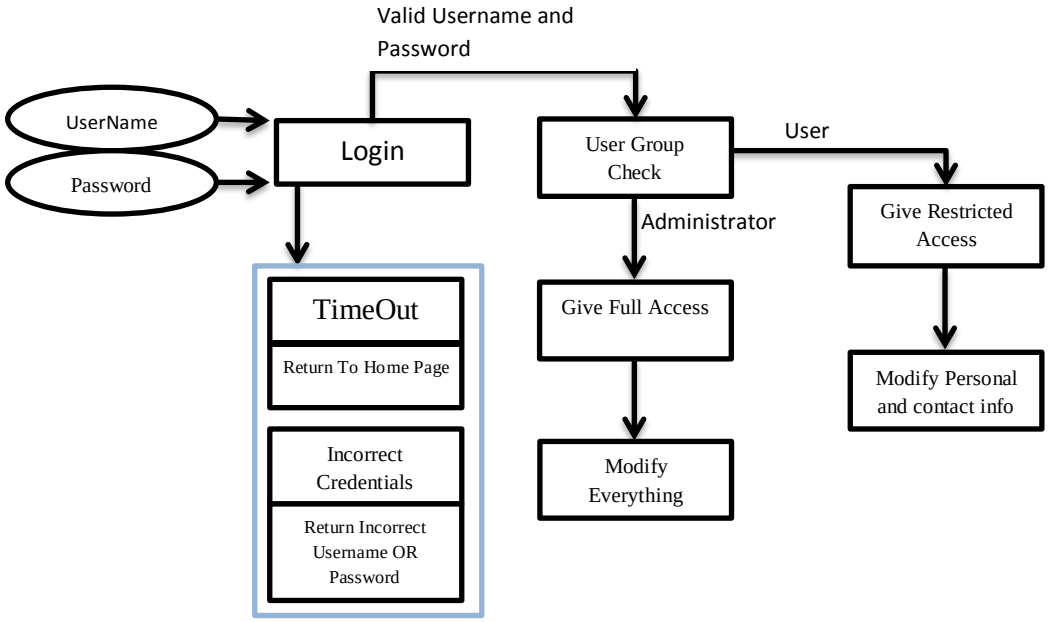
RECORDED SCENARIOS

- **User Account Creation**
- **User Account Administration**
- **User Profile Administration**
- **User Group Administration**
- ~~Recipient Management~~
- ~~Message Management~~
- ~~Message Composing~~
- ~~Recipient Choosing~~
- ~~Subject Choosing~~
- ~~Communication Type Selection~~
- ~~Domain Evaluation Selection~~
- ~~Grade Selection~~
- ~~Message Composition~~
- **Evaluation Submission**
- **Submitted Evaluation Management**
- ~~Submitted Evaluations View~~
- ~~Database Maintenance~~
- ~~Interfaces Management~~
- ~~Double, Faulty, Old or Nonexistent Users~~
- ~~Security Services Maintenance~~
- ~~Network Maintenance~~

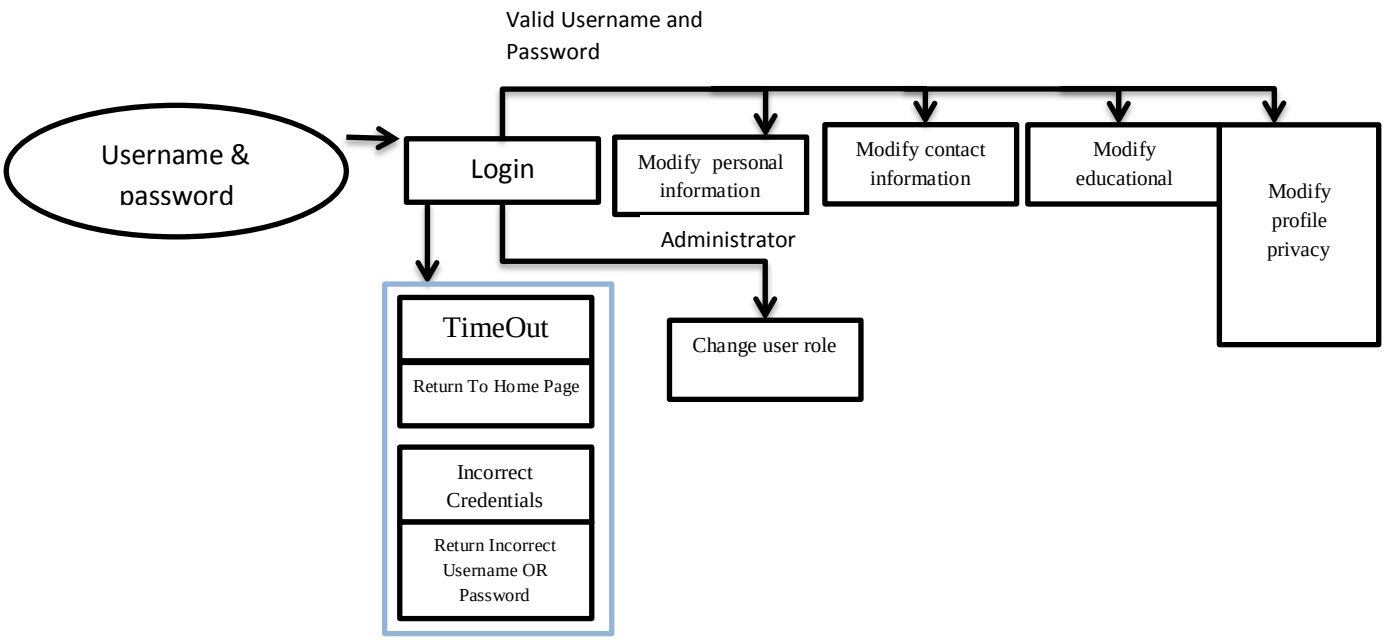
VORD DIAGRAMS



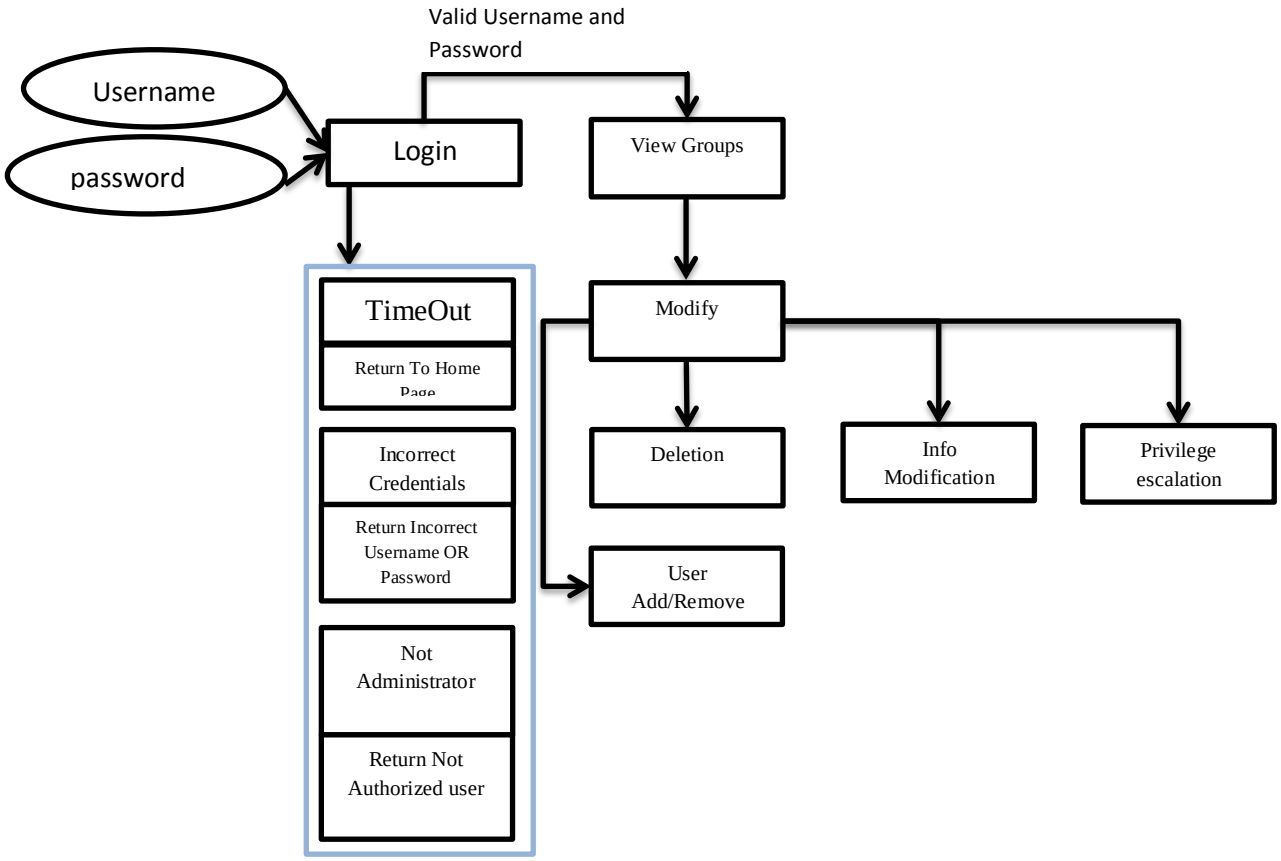
User Account Administration



User Profile Administration



User Group Administration



RATED ACCESS USE CASE DIAGRAM

using Visual Paradigm

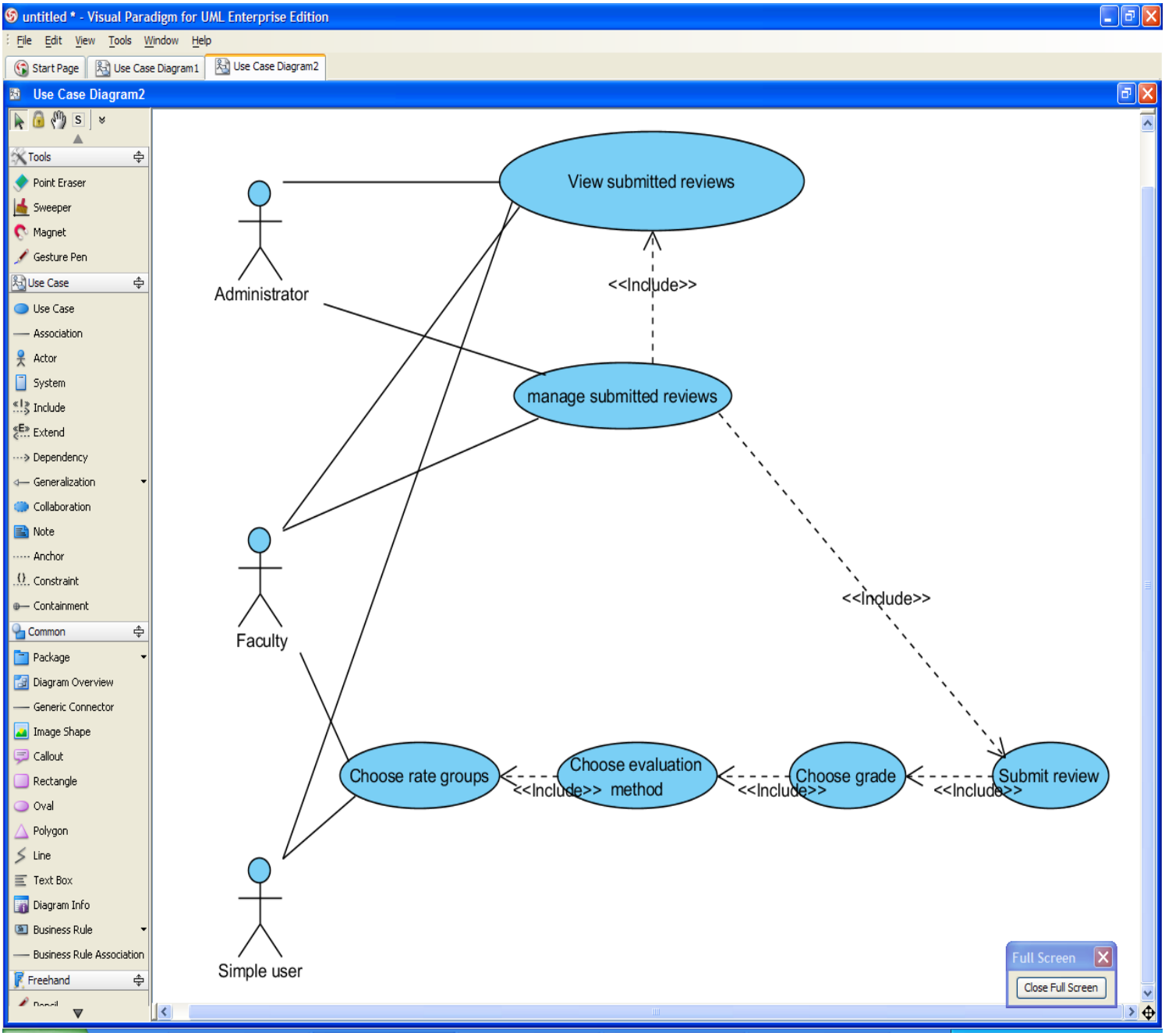


Image 7: Evaluation Use Case Diagram

EVALUATION USE CASE DIAGRAM

using Visual Paradigm

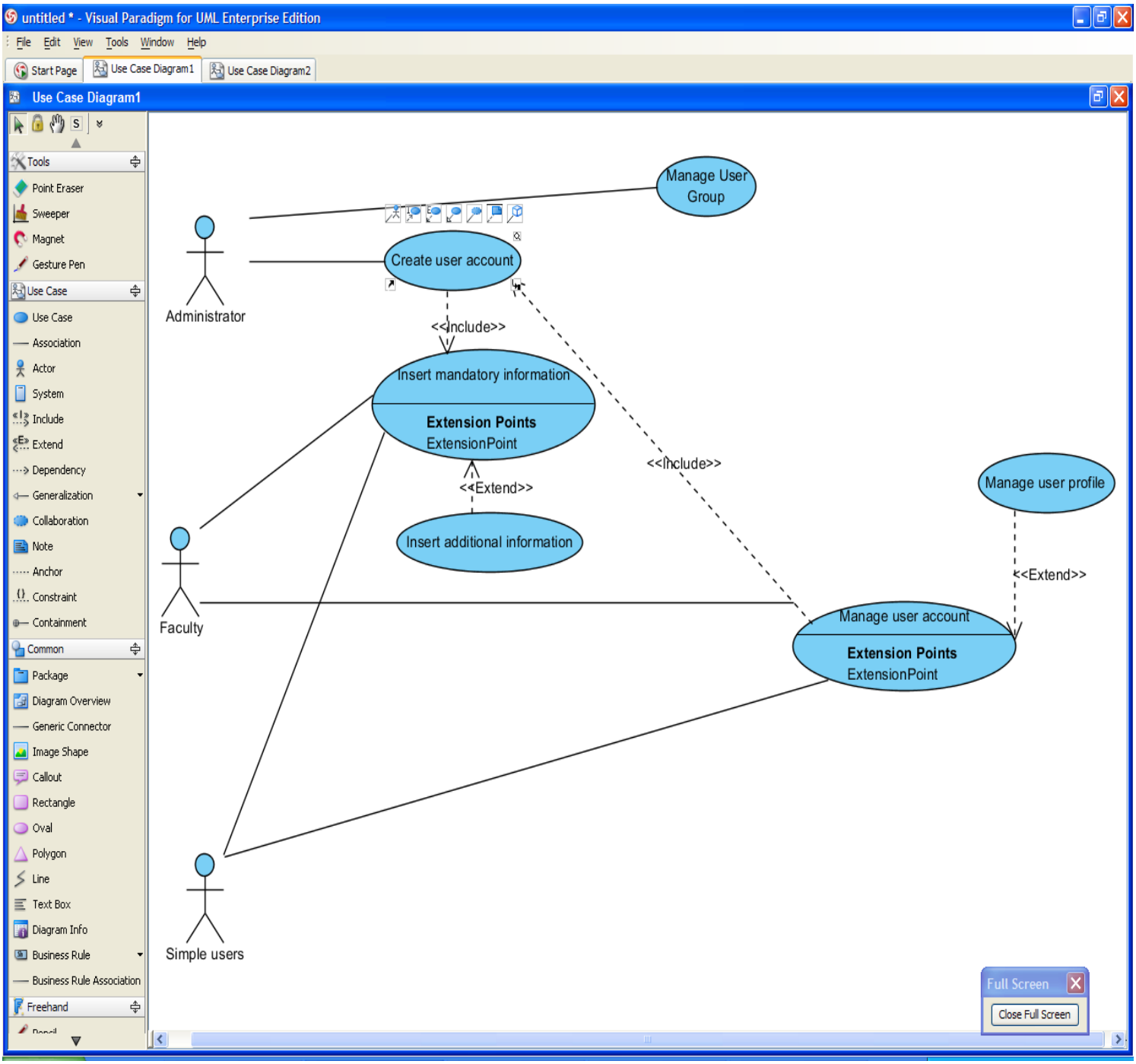


Image 8: Rated Access Use Case Diagram

RATED ACCESS CLASS DIAGRAM

using Visual Paradigm

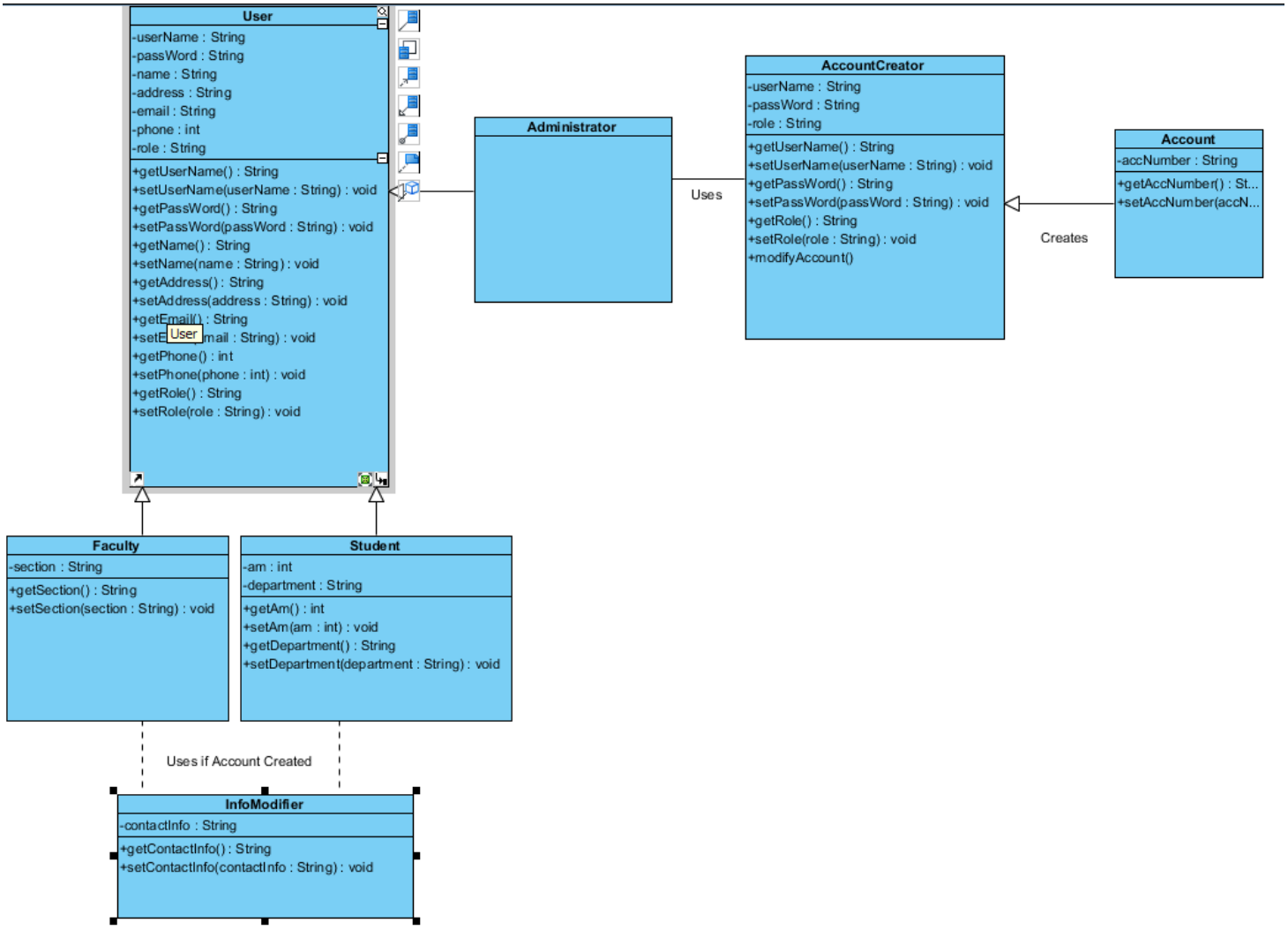


Image 9: Rated Access Class Diagram

EVALUATION CLASS DIAGRAM

using Visual Paradigm

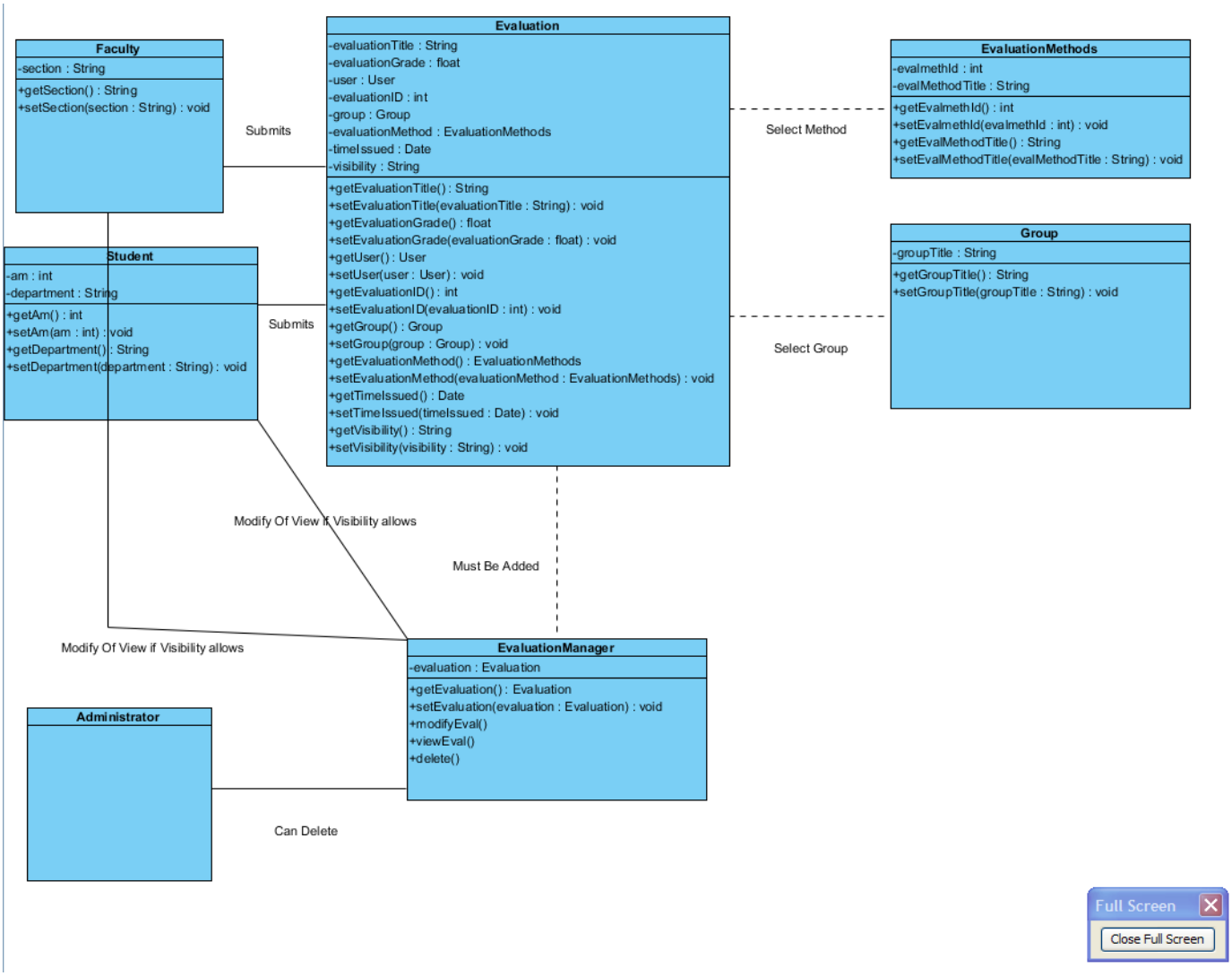


Image 10: Evaluation Class Diagram

FORUM TOOL STATE DIAGRAM

using Visual Paradigm

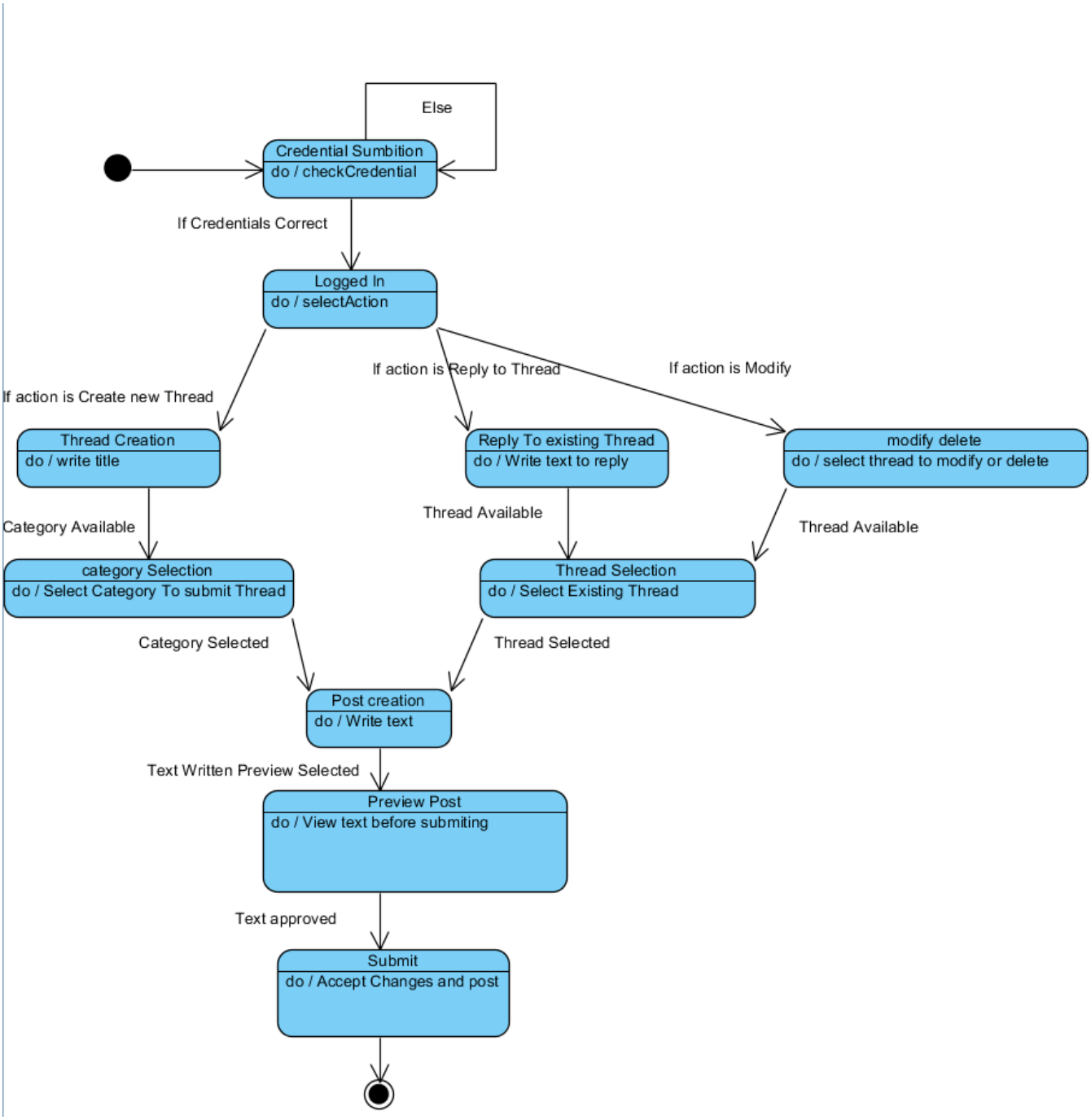


Image 11: Forum Tool State Diagram

EVALUATION TOOL STATE DIAGRAM

using Visual Paradigm

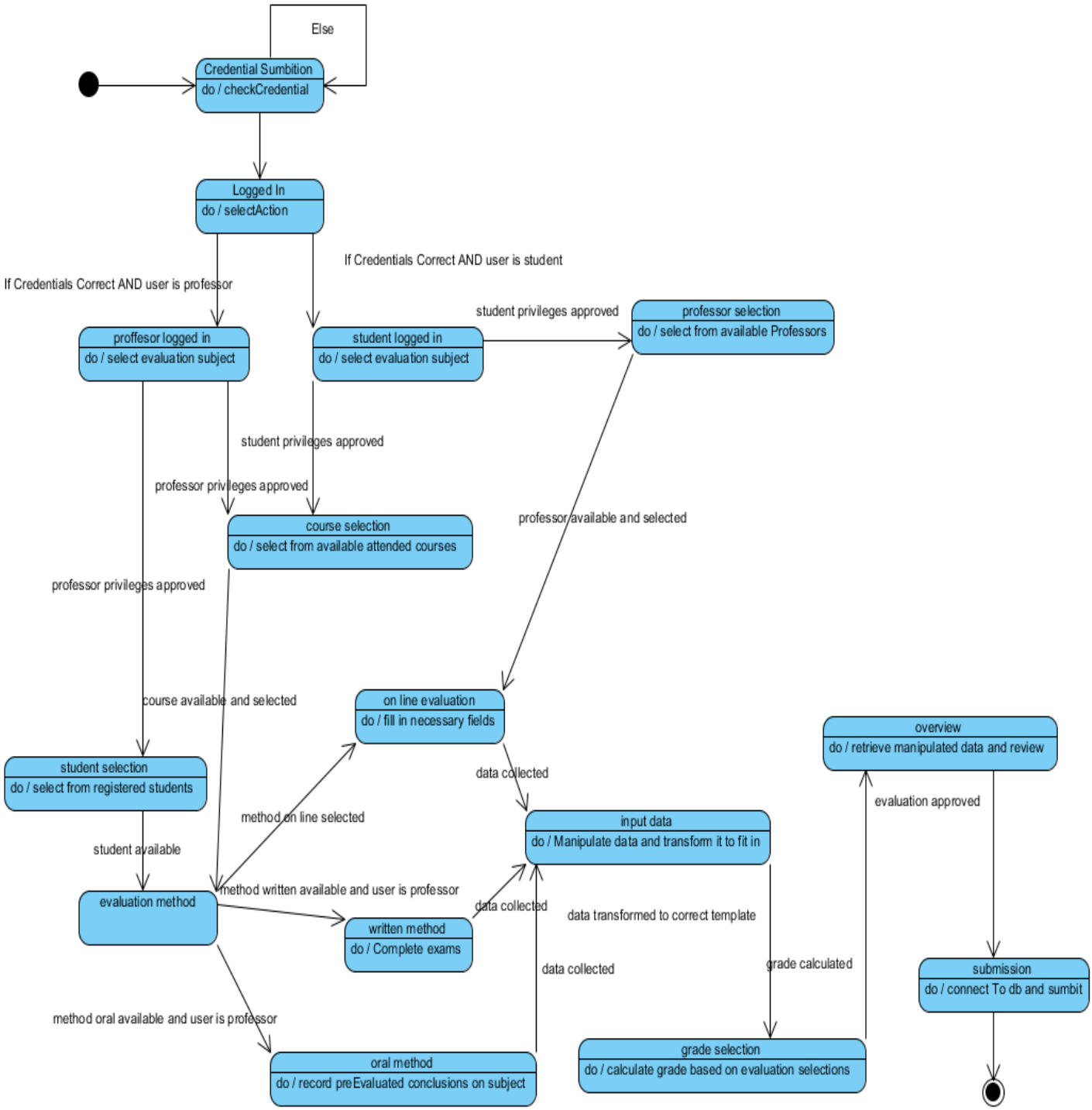


Image 12: Evaluation Tool State Diagram

EVALUATION TOOL SEQUENCE DIAGRAM

using Visual Paradigm

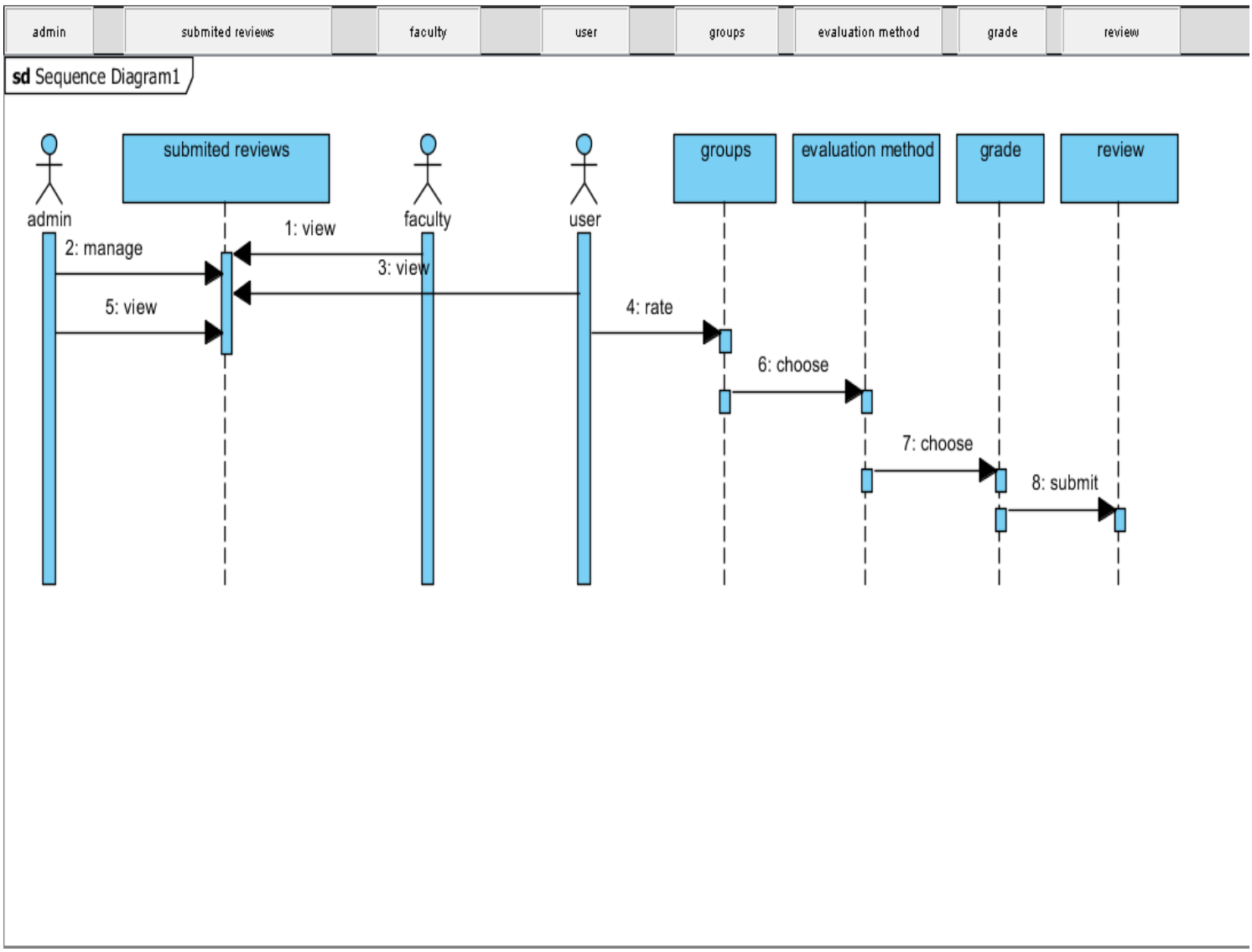


Image 13: Evaluation Tool Sequence Diagram

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