

A dark blue vertical bar is positioned on the left side of the page. A blue arrow-shaped banner points to the right from this bar, containing the date '3/9/2018'. In the bottom-left corner, there are several thin, curved, light gray lines that sweep upwards and to the right.

3/9/2018

Analysis and Design Project:

Deliverable 1

Gayathri Etraj Janaki

A stylized illustration of a person in a black suit with gold buttons, viewed from the chest down. They are holding a magnifying glass over a white document. The document features a flowchart at the top with three boxes connected by arrows, a bar chart with three bars in the center, and a pie chart at the bottom left. The person's left hand is pointing at the document. On the teal background, there are two paper clips, a pink sticky note, and a white sticky note with a paper clip.



1. **Introduction:**

We plan on designing a system with Sentiment Analysis for Product Rating framework that identifies hidden emotions in remarks and rates the product accordingly. The framework utilizes sentiment analysis keeping in mind the end goal to achieve wanted usefulness. This project is an E-Commerce web application where the enrolled client will see the product, product features and based on which he/she will comment about the product.

The Framework will break down the remarks of different clients and will rank the products. We will be using a database of sentiment-based keywords along with their positivity or negativity weight in database. The client comments will be dissected by contrasting the comment and the keywords put away in database. The System will take remarks of different clients, in view of the remark, framework will indicate whether the product is great, awful, or most noticeably bad. When client login to the framework he/she can see the product and its features. In the wake of review product, client can remark about the item. Client can likewise see remarks of other users. The part of the administrator's job is to add product to the framework and to include related keywords in the database. Client can without much of a stretch discover and amend the product for his/her utilization. This application additionally acts as a promotion which makes numerous individuals mindful about the product. This framework is likewise valuable for the clients who need an audit about the product they are interested in.

2. **System Request: Sentiment Analysis based on Product Reviews**

a. **Project Sponsor:**

The sponsors for this project is the team of managers who had come up with this plan of utilizing the reviews and providing a proper experience to the customers, at the same time investigating how the business could make profit out in this scenario.

b. **Business Need:**

- **Improvement in the sales of a product:**

Based on the user reviews we will show which product needs improvement in the area required for the growth of sales of that product.

- **Analysis of reasoning behind developing or performing changes to a product.**

The products on sale are taken into consideration without proper reasoning and this gets rejected at high level management resulting in continued lower sales. Analytical reasoning will help the manufacturer understand the motive behind the changes that have to be brought about for the project. The reasoning will be based on the user reviews on your own e-commerce website.

c. **Business Requirements:**

- **We need the reviews of the product.**

The separation of positive and negative reviews is done with the help of keywords from the reserved keywords set. The split-up of the reviews will further help us decide the improvement on the product under consideration.

- **The details of the product which must be analyzed.**

The product chosen for analysis will have its own specification, this will reflect on the selection of the reserved keywords. Even though we would have a generic set of keywords, with the help of the details of the selected product the reserved keyword selection can be done in a more concise manner.

d. **Business Value:**

- This system will help improve the product quality or any faultily which might have been present in the initial release of the product. This in turn will improve the sales of the product.
- The improvement in sales of every product is a major plus for the economy of the company.

3. **Feasibility Analysis:**

1. **Technical Feasibility:**

Familiarity with the functional area.

The functional area for the development team will be the same IDE (Integrated Development Environment) as the webpage. In return helping in increasing the familiarity of the functional area.

The products used for analysis can be of varied range, the usage of the products will help the analyst to get a better understanding of the reviews to sort the keywords for the analysis. As we are dealing with already existing products and reviews the system will find less risk while developing a new system for sentimental analysis.

Familiarity with the technology.

The reviews obtained from the webpage already have a web platform which we will only be extracting the text from. This makes it easier for the developers to proceed as they have already worked on the development of the webpage.

The increased familiarity decreases the risk in development of the product.

Project size.

A team of 10 developers

The number of developers required will be based on the number and the variety of products involved in the analysis. We will conform ourselves to a limited number of products to see the feasibility and testing phase of the product in real time. For a smaller product set, the number of developers required will be less, with the team size varying from five to ten will be sufficient for the initial production of the system.

Compatibility.

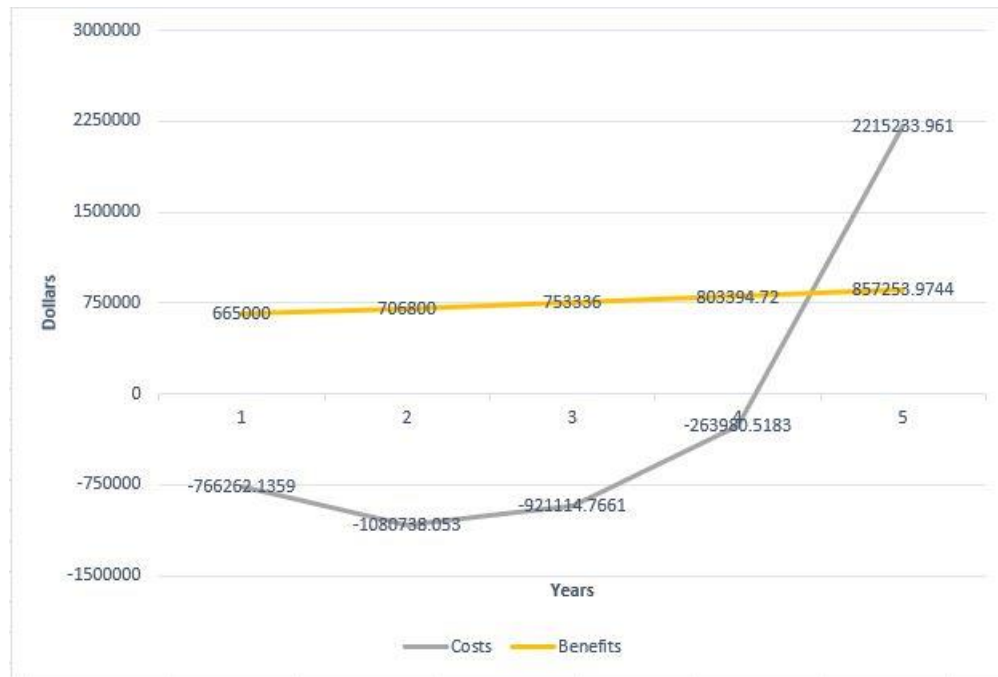
The compatibility of the new system will be co dependent with the technology.

2. **Economic Feasibility:**

The costs can be broadly classified into two categories i.e., **Development Cost and Operational Cost**. While the Development cost is a one-time initial investment, the Operational/progression cost is a periodic expenditure to keep the organization functional. The following expenditures can be considered as development cost, which are: Office setup and maintenance, Application software's, Development Labor. Whereas the operational costs are software licenses, Server software's, hardware's and operational labor.

The Tangible benefits include Improvement in subscription and Advertisements

| Year | 1 | 2 | 3 | 4 | 5 | Total |
|----------------------------------|--------------|--------------|--------------|--------------|-------------|-------------|
| Improvement in subscription | 500000 | 540000 | 583200 | 629856 | 680244.48 | |
| Advertisements | 170000 | 171800 | 175236 | 178740.72 | 182315.5344 | |
| Total Benefits | 670000 | 711800 | 758436 | 808596.72 | 862560.0144 | |
| PV Benefits | 650485.4369 | 670939.7681 | 694076.3796 | 718427.7127 | 744051.8455 | 3477981.143 |
| PV of all Benefits | 650485.4369 | 1321425.205 | 2015501.585 | 2733929.297 | 3477981.143 | |
| 2 servers @ \$150000 | 300000 | 0 | 0 | 0 | 0 | |
| Office Setup [Help desk support] | 200000 | 0 | 0 | 0 | 0 | |
| Software Licences | 125000 | 0 | 0 | 0 | 0 | |
| Server Licences | 9250 | 0 | 0 | 0 | 0 | |
| Development Labour | 600000 | 0 | 0 | 0 | 0 | |
| Total Development cost | 1234250 | 0 | 0 | 0 | 0 | |
| Hardware - Server | 50000 | 50000 | 50000 | 50000 | 50000 | |
| Server Software | 25000 | 25000 | 25000 | 25000 | 25000 | |
| Operational Labour | 150000 | 157500 | 165375 | 173643.75 | 182325.9375 | |
| Total Operational Cost | 225000 | 232500 | 240375 | 248643.75 | 257325.9375 | |
| Total Cost | 1459250 | 232500 | 240375 | 248643.75 | 257325.9375 | |
| PV Costs | 1416747.573 | 219153.5489 | 219977.1764 | 220916.7514 | 221971.6141 | 2298766.664 |
| PV of all Costs | 1416747.573 | 1635901.122 | 1855878.298 | 2076795.049 | 2298766.664 | |
| Total Project Benefits Costs | -789250 | 479300 | 518061 | 559952.97 | 605234.0769 | |
| NPV of all costs | -766262.1359 | 451786.2192 | 474099.2032 | 497510.9613 | 522080.2313 | |
| Yearly NPV | -766262.1359 | -314475.9167 | 159623.2865 | 657134.2478 | 1179214.479 | 915233.9609 |
| Cumulative NPV | -766262.1359 | -1080738.053 | -921114.7661 | -263980.5183 | 915233.9609 | |
| Return on Investment | 39.81413057 | | | | | |
| Break even point | 4.223861327 | | | | | |



3. **Organizational Feasibility:**

Proposed project is beneficial only if it can be turned into information systems that will meet the operating requirements. This test of feasibility asks-

- If the system will work when it is developed and installed.
- Are there any major barriers to Implementation?
- If there will be any resistance from users that will affect the possible benefits, or they will welcome the change and the new system.
- If the system will work when it is developed and installed.

The project was proposed as we wanted to make to make a simplified web application that provides the customers with a better shopping experience by providing them a proper reviews and feedbacks of what other customers of similar sense feel. It is simpler to operate and can be used in any webpages. It is free and not costly to operate.

4. **Requirement Definition:**

Functional requirement:

Creation of accounts:

- a. Customers and sellers sign up for accounts.
- b. Guest access facility provided for anonymous reviews.

Entry login page:

- a. Customers and sellers have separate sign in pages.
- b. Project related employees/admin will have separate sign-in as their access requirements are different.

Process reviews and verify the customer:

- a. Check the credibility of the customers.
- b. Classify the reviews according to its rating with the related keywords.
- c. Fake reviews will be filtered regularly.

Display ratings and benchmarking:

- a. The reviews are weighted against their positivity/negativity.
- b. The customer's intention to purchase the product will also be collected.
- c. The scores are updated as such and benchmarked against the competitor's similar products.

5. **Non-functional requirements:**

Operating Requirement:

- a. The system will operate on all platforms.
- b. The database would automatically log all the data entered.

Performance requirement:

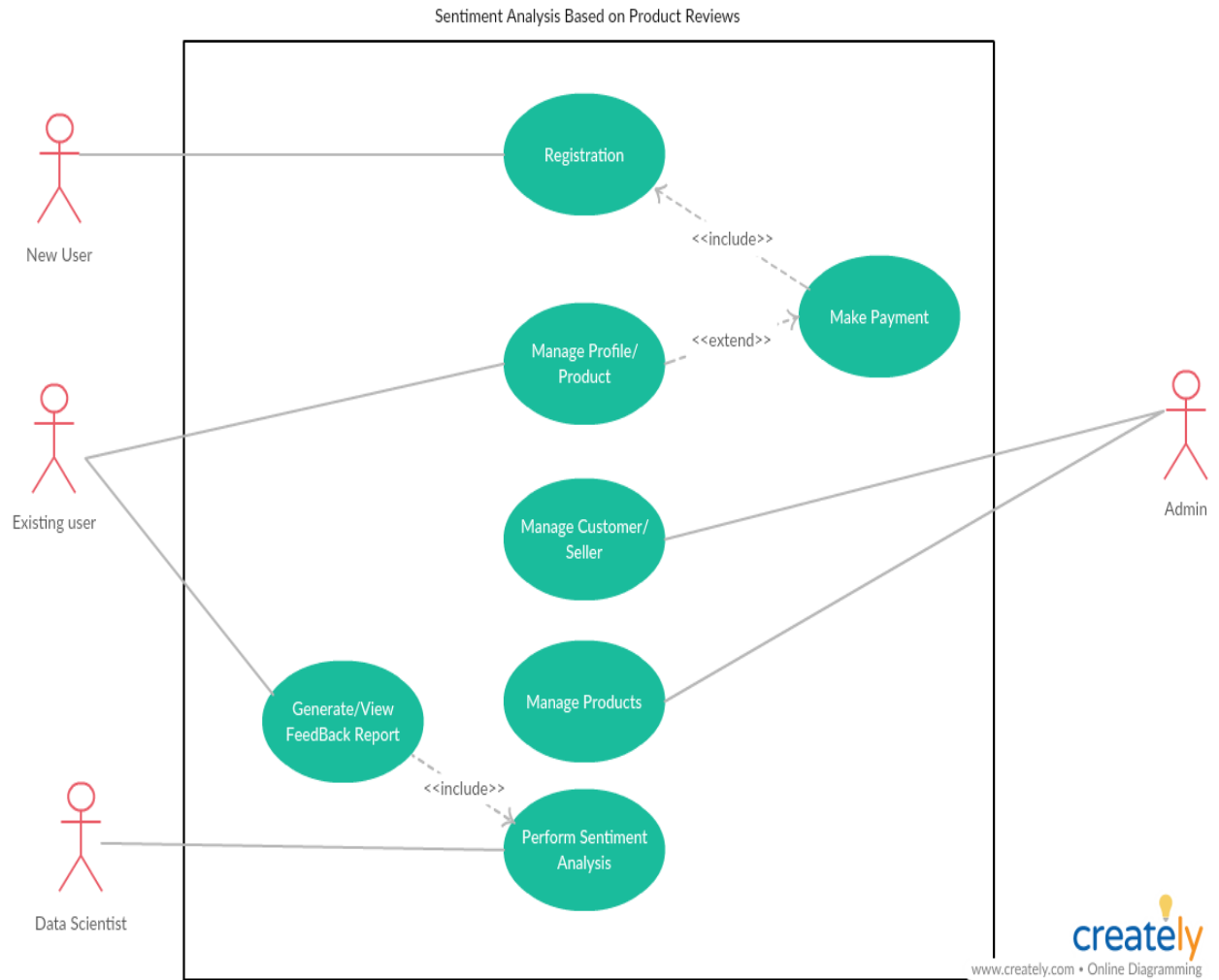
- a. The rating of the product would be updated as soon as the reviews are being verified against the products.

Security requirement:

- a. Only system administrators can access the pages and make amendments.
- b. All the review related data and comments will be transparent – thus assuring customers with dependability.
- c. All access is password protected.

6. Functional Models:

6.1 Use-Case Diagram:

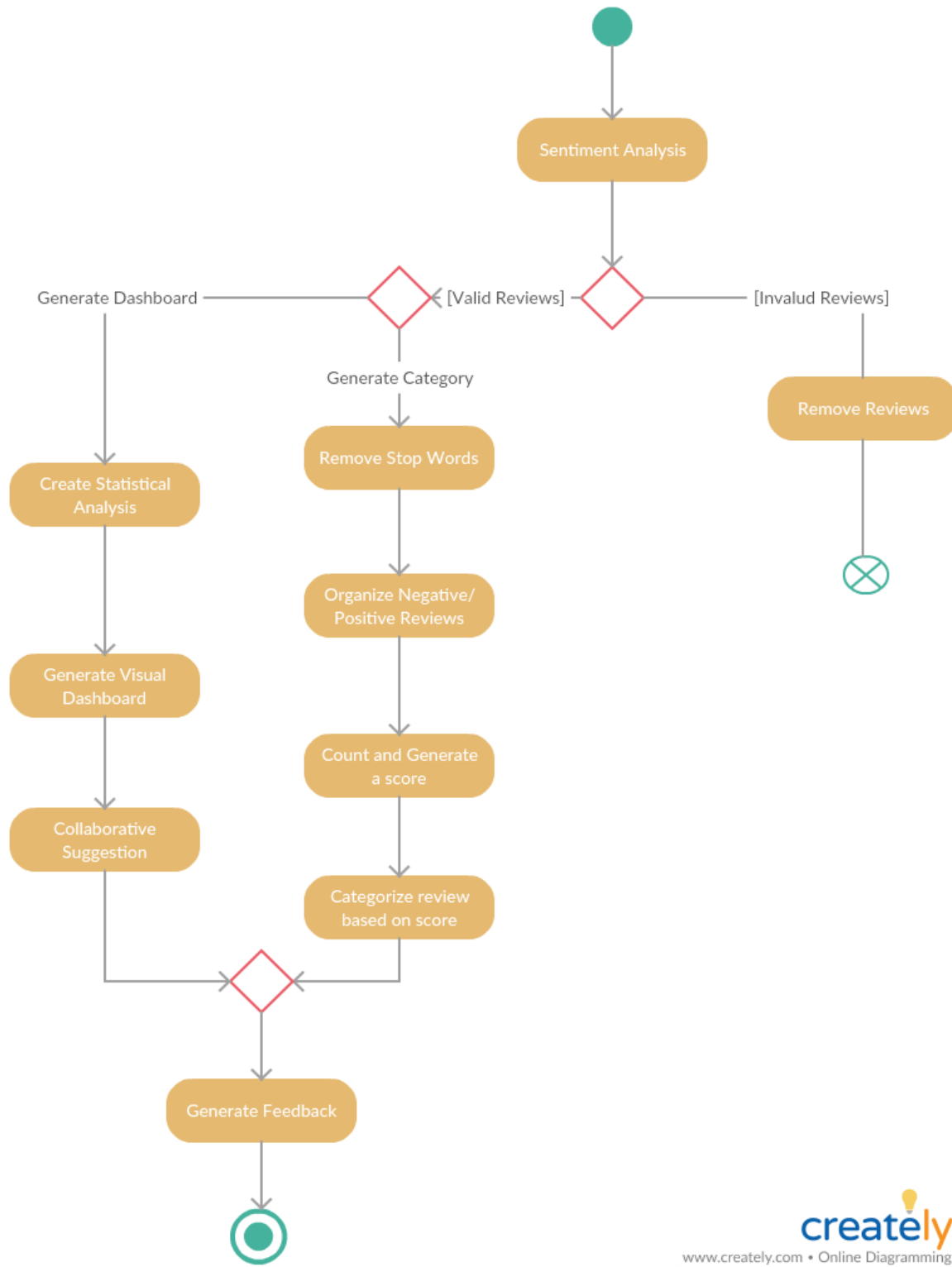


Use Case for performing Sentiment Analysis
Based on Product Reviews

7. Activity Diagrams:

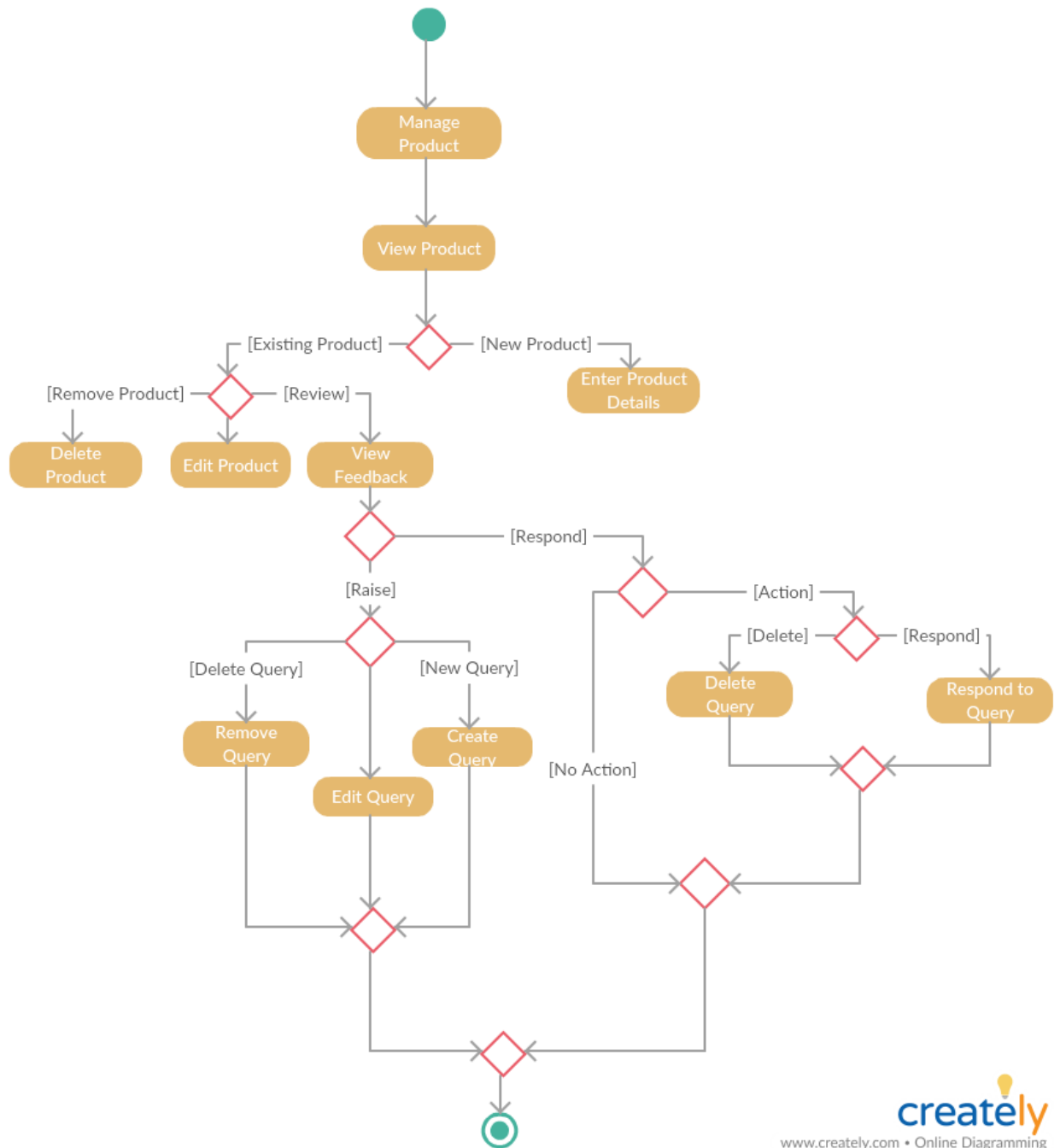
7.1 Activity Diagram 1:

Perform Sentiment Analysis



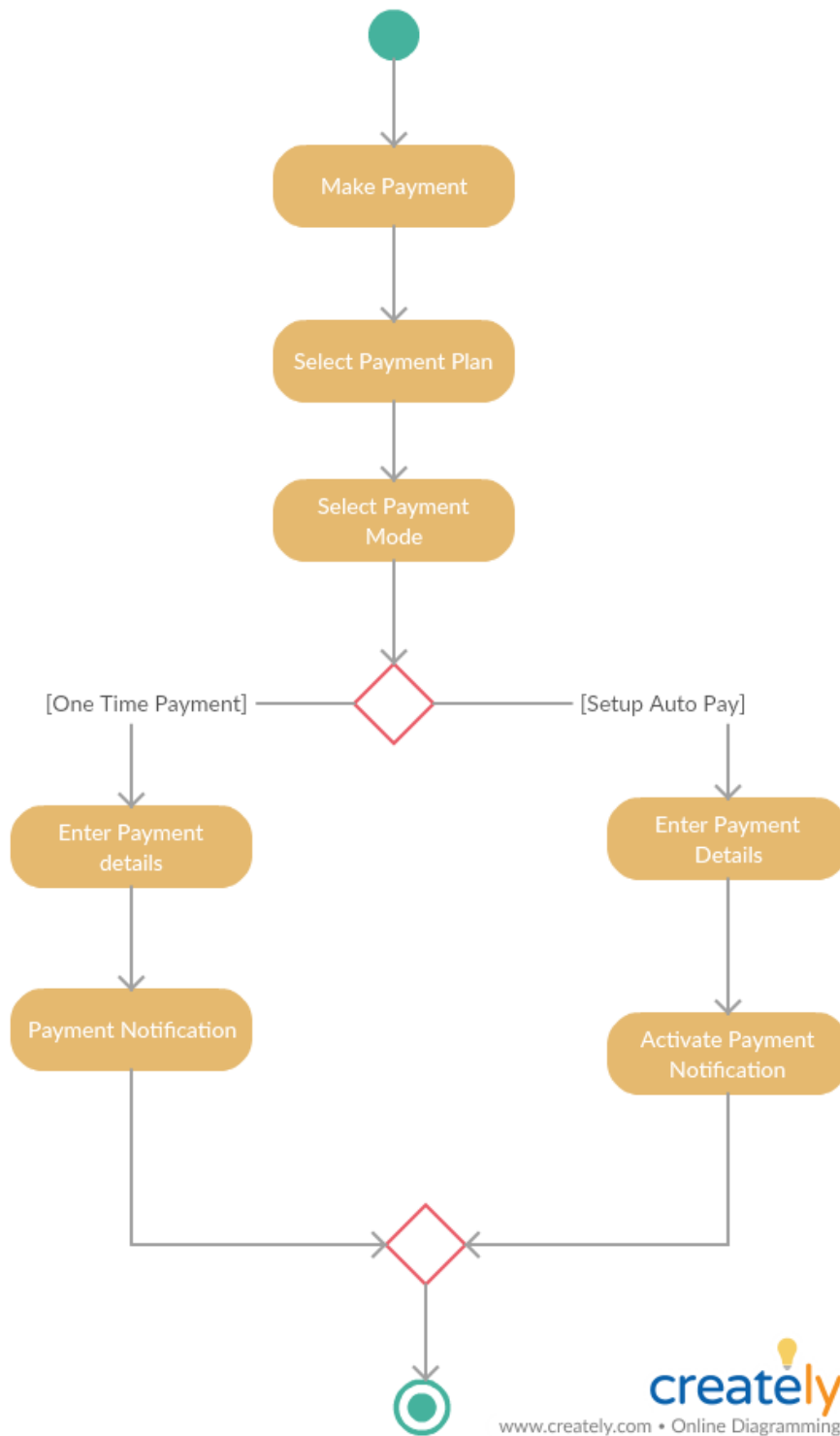
Activity Diagram for Perform Sentiment Analysis

7.2 Activity Diagram 2: Manage Products



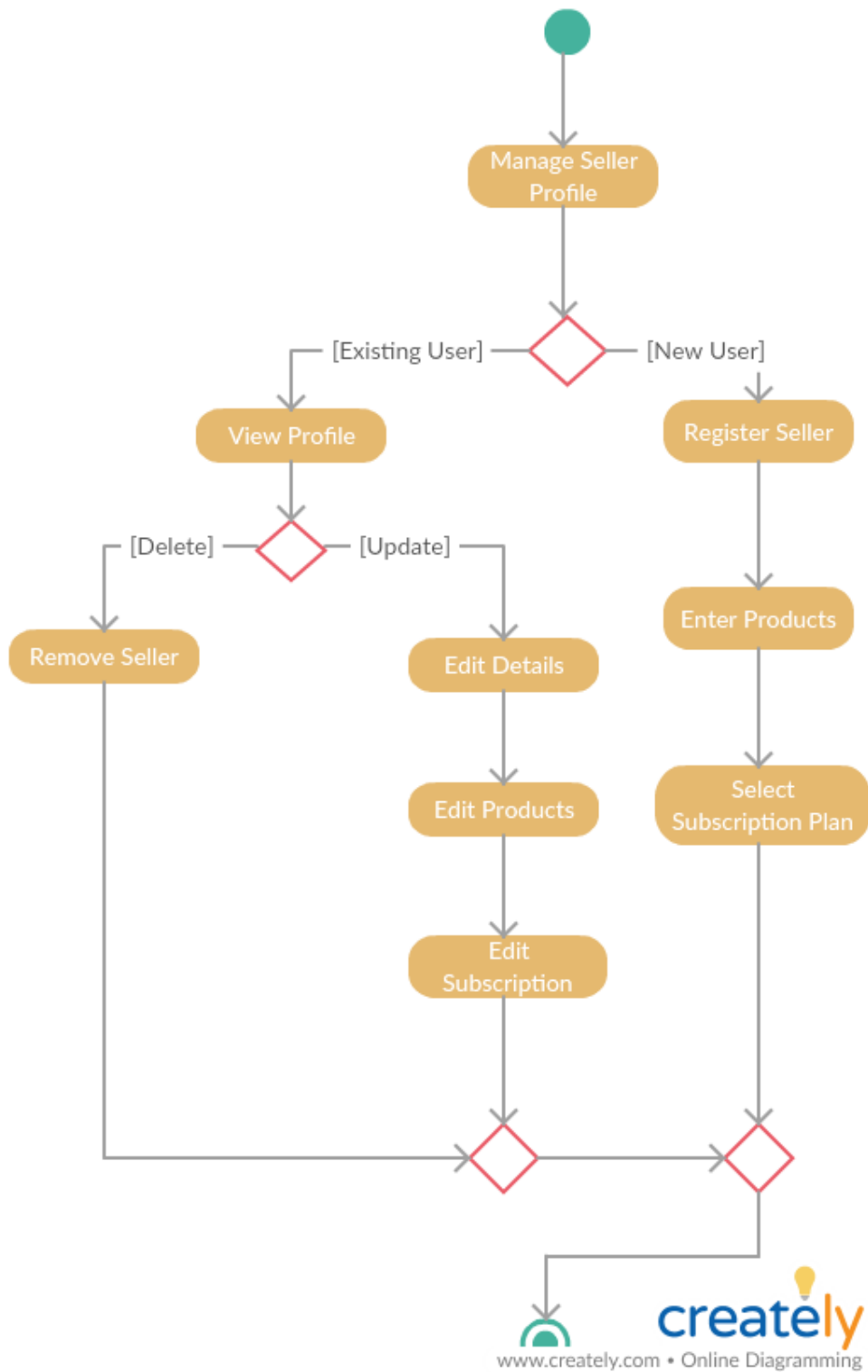
Activity Diagram for Manage Products

7.3 Activity Diagram 3: Make Payment



Activity Diagram for Make Payment

7.4 Activity Diagram 4: Manage Sellers



Activity Diagram for Manage Sellers

8. Use-Case Descriptions:

8.1 Perform Sentiment Analysis

| | | |
|---|----------------------------------|------------------------|
| Use Case Name: Perform Sentiment Analysis | ID: 001 | Importance Level: High |
| Primary Actor: Data Scientist | Use Case Type: Detail, Essential | |
| Stakeholders and Interests: Seller: Who would benefit from the Sentiment Analysis Results. Data Scientist: Would execute and generate Analysis Report. | | |
| Brief Description: This use case describes how a Data Scientist extracts useful feedback for the sellers. | | |
| Trigger: When Sellers are looking for vital product Feedback. Type: External | | |
| Relationships: Association: Data Scientist Include: Generate/View Feedback Report Extend: Generalization: | | |
| Normal Flow of Events: <ol style="list-style-type: none">1. The algorithm would filter out the genuine review and remove the fake ones.2. Data Scientist will remove stop words from the text feedback using NLP.3. Data Scientist will aggregate the positive and negative keywords obtained from the feedback and organize the reviews.4. Data Scientist will run a sophisticated algorithm to obtain an overall score.5. Data Scientist will categorize the Product based on the aggregated scores. | | |
| Sub Flows: | | |
| Alternate/Exceptional Flows: | | |

8.2 Manage Product (For Admin)

| | | |
|--|----------------------------------|------------------------|
| Use Case Name: Manage Product | ID: 002 | Importance Level: High |
| Primary Actor: Admin | Use Case Type: Detail, Essential | |
| Stakeholders and Interests: Seller: When seller is unable to update his own profile or products or has raised a query. Admin: When admin has to view/respond to the open queries or want to edit seller information. | | |
| Brief Description: This use case describes how admin can manage the products and respond to queries raised by sellers. | | |
| Trigger: When seller has raised a query or when the seller is unable to access their products. Type: External | | |
| Relationships: Association: Admin Include: Extend: Generalization: | | |
| Normal Flow of Events: 1. Admin will view all the active products. 2. Admin can edit existing product details. 3. Admin can view feedbacks posted by the sellers. 4. Admin will respond to the raised query. | | |
| Sub Flows: 4b. Admin will not respond to the query and continue using the system. | | |
| Alternate/Exceptional Flows: 1a. Admin will be able to add a new product into the system under a specific seller. 2a. Admin can remove an existing product. 4a. Admin will delete an existing query. | | |

8.3 Manage Product (For Existing User)

| | | |
|---|----------------------------------|------------------------|
| Use Case Name: Manage Product | ID: 003 | Importance Level: High |
| Primary Actor: Existing User | Use Case Type: Detail, Essential | |
| Stakeholders and Interests: Seller: When the seller desires to add new products or manage existing products or when the seller has a query towards the admin. Admin: Admin gets the queries raised by the sellers. | | |
| Brief Description: This use case describes how Seller can manage the products and raise queries towards the admin. | | |
| Trigger: When seller wants to add new products or manage existing products or has an issue or concern. Type: External | | |
| Relationships: Association: Existing User Include: Extend: Make Payment Generalization: | | |
| Normal Flow of Events: 1. Existing User will view all the active products. 2. Existing User can edit existing product details. 3. Existing User can view feedback responses posted by the admin. 4. Existing User will raise a new query. | | |
| Sub Flows: 4b. Admin will not respond to the query and continue using the system. | | |
| Alternate/Exceptional Flows: 1a. Existing User will be able to add a new product into the system under a specific seller. 2a. Existing User can remove an existing product. 4a. Existing User will edit raised query. 4b. Existing User will remove raised query. | | |

8.4 Generate/View Feedback Report

Use Case Name: Generate/View
Feedback Report

ID: 004

Importance Level: High

Primary Actor: Existing User

Use Case Type: Detail, Essential

Stakeholders and Interests:

Seller: When the seller desires to get vital analytical report about the product based on customer reviews.

Brief Description: This use case describes how the feedback dashboard is generated for the sellers.

Trigger: When seller wants to view a personalized feedback for their product based on customer reviews.

Type: External

Relationships:

Association: Existing User

Include:

Extend:

Generalization:

Normal Flow of Events:

1. Existing User will view all the active products.
2. Existing User can edit existing product details.
3. Existing User can view feedback responses posted by the admin.
4. Existing User will raise a new query.

Sub Flows:

4b Admin will not respond to the query and continue using the system.

Alternate/Exceptional Flows:

- 1a. Existing User will be able to add a new product into the system under a specific seller.
- 2a. Existing User can remove an existing product.
- 4a. Existing User will edit raised query.
- 4b. Existing User will remove raised query.

8.5 Perform Registration

| | | |
|--|----------------------------------|------------------------|
| Use Case Name: Registration | ID: 005 | Importance Level: High |
| Primary Actor: New User | Use Case Type: Detail, Essential | |
| Stakeholders and Interests: Seller: New Seller wants to register to the system to avail the facilities. | | |
| Brief Description: This use case describes how a new first-time seller can register themselves into the system. | | |
| Trigger: When seller is new to the system and feels the need to create a profile. Type: External | | |
| Relationships: Association: New User Include: Make Payment Extend: Generalization: | | |
| Normal Flow of Events: <ol style="list-style-type: none">1. New User will create a new profile with the user details.2. New User will enter the product details.3. New User will be able to select subscription plan based on the facilities the user wants to avail. | | |
| Sub Flows: | | |
| Alternate/Exceptional Flows: | | |

8.6 Manage Sellers

| | | |
|--|----------------------------------|------------------------|
| Use Case Name: Manage Sellers | ID: 006 | Importance Level: High |
| Primary Actor: Admin | Use Case Type: Detail, Essential | |
| <p>Stakeholders and Interests:</p> <p>Seller: Seller is unable to update their profile and requires support of the admin.</p> <p>Admin: When admin requires to view or update the sellers' profiles.</p> | | |
| Brief Description: This use case describes admin can view/edit the profiles of the sellers. | | |
| <p>Trigger: When admin requires to view all the sellers or gets a request from the seller to update some profile information.</p> <p>Type: External</p> | | |
| <p>Relationships:</p> <p>Association: Admin</p> <p>Include:</p> <p>Extend:</p> <p>Generalization:</p> | | |
| <p>Normal Flow of Events:</p> <ol style="list-style-type: none">1. Admin will be able to view the profile of all the registered sellers.2. Admin can update the seller profile details.3. Admin can update the seller products.4. Admin can update the seller subscription. | | |
| Sub Flows: | | |
| <p>Alternate/Exceptional Flows:</p> <p>2a. Admin can remove a seller from the systems completely.</p> | | |

8.7 Make Payment

| | | |
|---|----------------------------------|------------------------|
| Use Case Name: Make Payment | ID: 007 | Importance Level: High |
| Primary Actor: New User, Existing User | Use Case Type: Detail, Essential | |
| Stakeholders and Interests: Seller: New User during registration will require to make a payment or existing user during renewals. | | |
| Brief Description: This use case describes how new or existing user would be able to make payment towards their subscription. | | |
| Trigger: When a new user signs up or when an existing user has to renew their subscription, they are required to make a payment. Type: External | | |
| Relationships: Association: Include: Extend: Generalization: | | |
| Normal Flow of Events: <ol style="list-style-type: none">1. User will be able to select their payment plan as monthly or yearly.2. Users will be prompted for the mode of payment of their choice.3. User can opt for one-time payment and enter Payment details.4. User can opt for payment notification and provide details regarding the same. | | |
| Sub Flows: | | |
| Alternate/Exceptional Flows: 3a. User can opt for Auto Pay as part of their payment plan. 3b. User will Enter the payment details for which the auto pay is required to be set up. 3c. User will activate payment notification for each payment made towards the organization. | | |

9. Effort Estimation:

| Unadjusted Actor Weighting Table: | | | | |
|--|---|--------|--------|----------------|
| Actor Type | Description | Weight | Number | Weighted Value |
| Simple | External System with well-defined API | 1 | 3 | 3 |
| Average | External System using a protocol-based interface, eg., HTTP,TCP/IP or a data! | 2 | 2 | 4 |
| Complex | Human | 3 | 4 | 12 |
| Unadjusted Actor Weight Total (UAW) | | | | 19 |
| Unadjusted Use-Case Weighting Table: | | | | |
| Use Case Type | Description | Weight | Number | Weighted Value |
| Simple | 1-3 transactions | 5 | 5 | 25 |
| Average | 4-7 transactions | 10 | 3 | 30 |
| Complex | >7 transactions | 15 | 2 | 30 |
| Unadjusted Use Case Weight Total (UUCW) | | | | 85 |
| Unadjusted Use-Case Points (UUCP) = UAW + UUCW | | | | 104 |

| Technical Complexity Factors | | | | | |
|--|--|--------|----------------|----------------|-------|
| Factor Num | Description | Weight | Assigned Value | Weighted Value | Notes |
| T1 | Distributed System | 2.0 | 1 | 2 | |
| T2 | Reposnse time or throughout performance objectives | 1.0 | 2 | 2 | |
| T3 | End-user online efficiency | 1.0 | 4 | 4 | |
| T4 | Complex internal processing | 1.0 | 4 | 4 | |
| T5 | Reusability of code | 1.0 | 5 | 5 | |
| T6 | Easy to install | 0.5 | 2 | 1 | |
| T7 | Ease of use | 0.5 | 2 | 1 | |
| T8 | Portability | 2.0 | 3 | 6 | |
| T9 | Ease of change | 1.0 | 1 | 1 | |
| T10 | Concurrency | 1.0 | 1 | 1 | |
| T11 | Special security objectives included | 1.0 | 5 | 5 | |
| T12 | Direct access for the third parties | 1.0 | 3 | 3 | |
| T13 | Special user training required | 1.0 | 2 | 2 | |
| Technical Factor Value (Tfactor) | | | | 37 | |
| Technical Complexity Factor (TCF) = $0.6 + (0.01 * Tfactor)$ | | | | 0.97 | |
| Enviornmental Factors | | | | | |
| Factor Num | Description | Weight | Assigned Value | Weighted Value | Notes |
| E1 | Familiarity with system development process being used | 1.5 | 4 | 6 | |
| E2 | Application experience | 0.5 | 4 | 2 | |
| E3 | Object-oriented experience | 1.0 | 5 | 5 | |
| E4 | Lead analyst capability | 0.5 | 5 | 2.5 | |
| E5 | Motivation | 1.0 | 3 | 3 | |
| E6 | Requirements stability | 2.0 | 4 | 8 | |
| E7 | Part time staff | -1.0 | 1 | -1 | |
| E8 | Difficulty of programming language | -1.0 | 4 | -4 | |
| Enviornmental Factor Value (Efactor) | | | | 21.5 | |
| Enviornmental Factor (EF) = $1.4 + (-0.03 * Efactor)$ | | 0.755 | | | |
| Assigned Use Case Points (UCP) = UUCP * TCF * ECF | | 76.16 | | | |
| PHM | | 20 | | | |
| Effort in Personal Hours = UCP * PHM | | 1523 | | | |