Student Project
The PicsArt case study

Executive Summary

This document describes the requirements of the PicsArt case study proposed as a student project in the [145072]RE course.

Specifically, this document presents a description of the application PicsArt which can be accessed on a mobile device or a personal computer. The report gives a brief description of the application domain, to begin with. The Goal-Oriented requirements of the application as it is now are shown in the form of a Strategic Dependency diagram and Strategic Relational diagram using the istar2.0 tool. The diagrams describe the actor-app relation including the factors such as quality, goals and sub-goals of each actor, the tasks carried out by an actor, and the relationship between the actors.

The subsequent section in the report tells the existing requirements of the in “good requirements” form. A survey questionnaire is prepared for eliciting requirements. With the analysis of the responses of the survey, new requirements and the flaws in the application are understood to the best of our knowledge. With the help of the responses of the survey, new requirements are listed as “good requirements”. There is an updated GO model in order to represent an application with necessary changes when compared with the previous version.

The complete project was carried out in order with the Gantt chart that was initially designed.

Revision History

Date	Version	Description	Author
13-Oct-18	1.0	Initial Outline Report	Yamini Chandrashekar
21-Oct-18	2.0	Goal Models inclusion	Evidence Monday
05-Nov-18	3.0	Complete report	Yamini Chandrashekar Evidence Monday
21-Nov-18	4.0	Analysis of Use-Case Diagram and sequence diagram	Evidence Monday
22-Nov-18	4.1	Feedback Analysis	Yamini Chandrashekar
27-Nov-18	5.0	Traceability Matrix Inclusion	Yamini Chandrashekar Evidence Monday
28-Nov-18	5.1	Modification of the GO models, inclusion of dependee-dependum,evaluation of survey	Yamini Chandrashekar Evidence Monday
15-Jan-19	6.0	Risk Prioritization	Evidence Monday

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Glossary

Acronym	Description
App	Application
GO	Goal Oriented
PC	Personal computer
DB	Database
SR	Strategic Rationale
SD	Strategic Dependency
Ad	Advertisement

PicsArt Software System Requirements

1. The Application domain

Application Case:

The PicsArt system is an image editing system used enhance the look and feel of their photos. It is also a social networking system.

Activities: take and edit pictures, draw with layers, and share their images with the PicsArt community and on other social networks. It also allows users to share photos with friends and edit them as a group.

Objectives: Allow users have fun while editing photos, networking with diverse individuals, and share with other friends and groups.

The stakeholders of the PicsArt system include:

End users: user could be photographers and art lovers for business or for pleasure purposes. Here, users are allowed to create custom profiles and also participate in interesting challenges revolving around art and photography. Users are also allowed to network with other users of their choice.

The PicsArt System: The system is available both on mobile devices (android, windows & iOS) and PC running windows 8.1 and above. It access photos from the DB. The user can either save photos on the device or share in the PicsArt community.

The PicArt Community: it is a large scale of PicsArt users. Here, users are able to see the feeds of other users, allowed to connect and interact with other user with similar ideas or likes.

Social Media: Here, the system allows users to find friends on Facebook or Instagram. Users can also share photos using this medium.

Context:

Time: The Picsart system has no regard for time; that is, can be used at any time without time constraints.

Place: The location of the user has no effect of the system's functionality.

Competing systems includes:

Instagram: is an easy way to share best moments of life, discover people all over the world who share contents of similar interest. Here, users can publish photos, view photos of other people, and videos, share stories on their timelines. Users can explore the variety of customizing their photos and videos and enable live feed sharing. That is, allow users share real-time happening videos with friends and the community.

Photoshop Express: This is a lite version of Adobe Photoshop package. It used mostly by professionals in the field of photography. One distinct feature is that it supports import and editing of raw photos. It also allows watermark creation and image resizing. It has a host of photo effects, ranging from brightness, contrast, exposure, lights, shadows, white, black, temperature, tint, sharpness, saturation.

Other competing systems include: Cymera, Photo studio, Snapseed and the likes.

2. Goal-oriented requirements analysis: As-Is situation

This section is concerned about the diagrammatic and theoretical analysis of the PicsArt system, its relationship amongst the actors, tasks carried out by end users, the goals of the system, and requirement of the system. The main actors here are The End Users, The PicsArt System and DB (holds the end users' resources).

2.1 Strategic Dependency

The main idea of the PicsArt app is to edit photos, share photos and connect with users in different geographical location in the world.

Users can create account on the application that contains basic information about them as means of identification. The Picsart system synchronizes the account created here to other accounts on social media such that users can connect with known friends directly from social media. This feature boosts collaboration and unity amongst users and allows group editing.

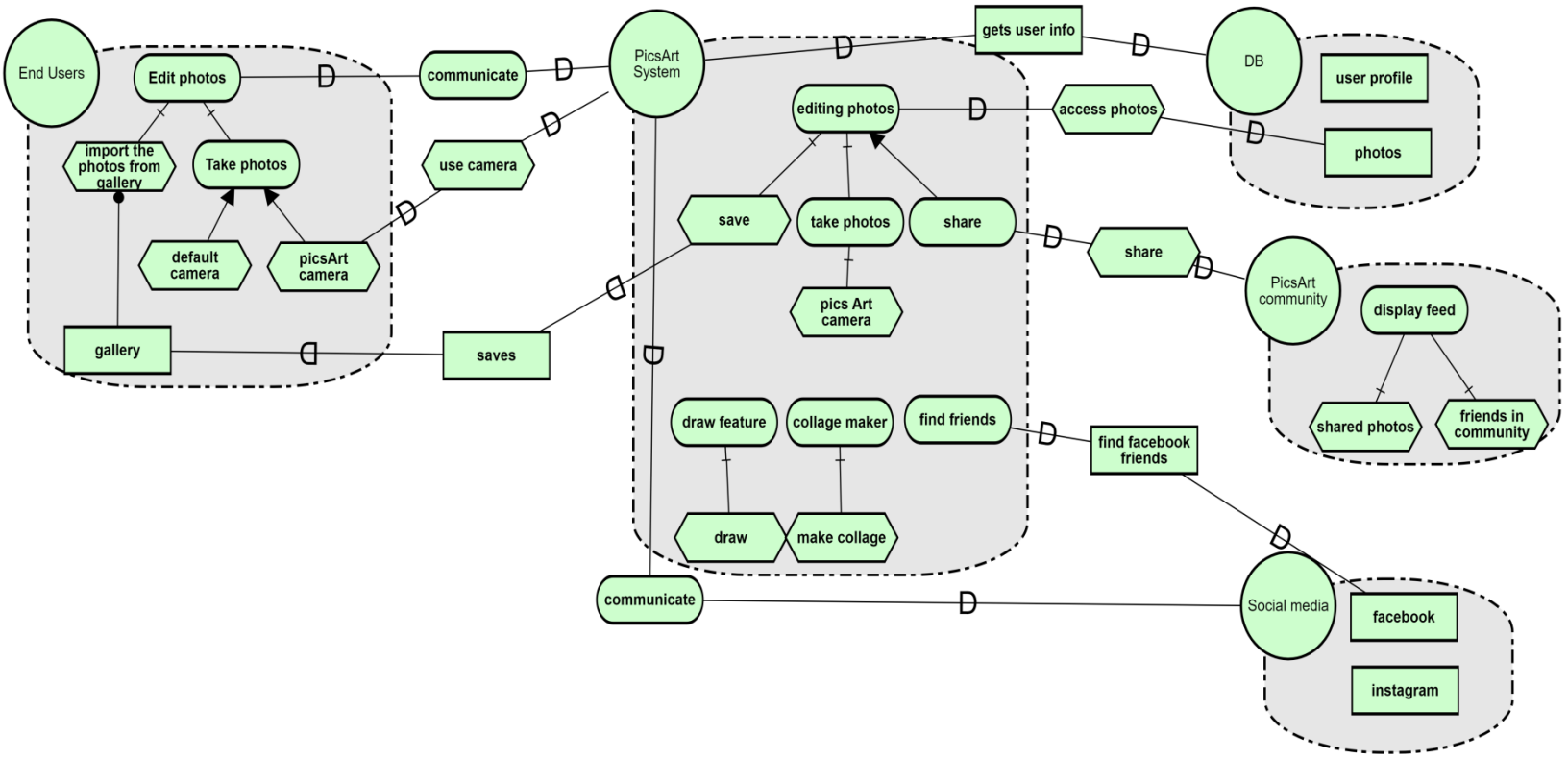


Fig 1: SD diagram of the PicsArt System

The application provides a community called *'Picsart Community'.* On here, users shared uploads are displayed for the delight and perusal of other users. The Picsart community creates a base for amateur and professional photographers alike to meet for exchange of ideas and works of arts. This is the business perspective of the PicsArt application, as photographers showcase their

works on here and gain significant recognition by prospective clients.

In the diagram above, we see interactions amongst the different Actors, how resources are being shared, understand the goal of each actors, the tasks performed by the end user and some quality and security requirement of the app.

2.2 Strategic Rationale

In this section, we analyze only the main goals of the system, having understood how the system works. The Strategic Rationale diagram represents a high level diagrammatic explanation of the system since we have gained full knowledge of how the system operates and interacts with other actors.

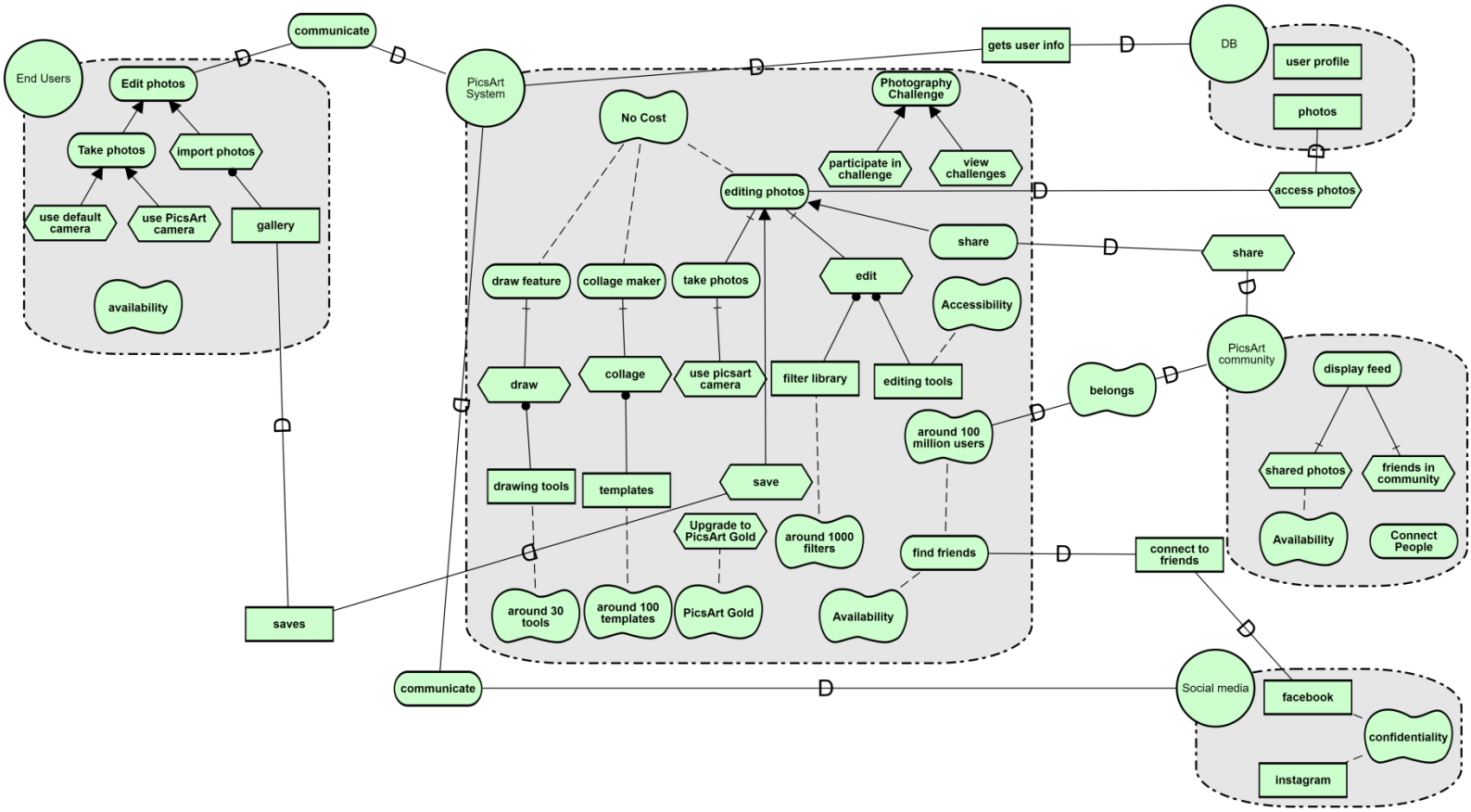


Fig 2: SR diagram of the PicsArt System

For profit making purpose, the system has advertisement contents and users may choose to deactivate this by upgrading to *PicsArt Gold*. Here we also notice other added goals where the user needs to activate an upgrade (at low cost) to gain access to more filters in the library and to deactivate Ad contents. This called *PicsArt Gold*. Users can collaborate and participate in different photography and editing challenge, having different tags like '*Meme Friday*', '*Picturesque*', '*Sunburst*'

and the likes. This is one unique feature about the PicasArt application that differentiates it from other photo editing applications.

3. App Requirements

3.1 App Requirements

In this section we shall be considering the User (Business or Personal user), Functional and Non functional requirements of the application.

User Requirement: the user requirements will be outlined in a table using the SCRUM methodology approach. The table shall accommodate the user as a role, an activity that can be performed and the value gained.

	"Good" Requirements **As a <Role>, I can <Activity> so that <Business Value>**
	Personal Use
1	As a user, I can access a community so that I can share my photos.
2	As a user, I have a personal account so that I can have a personalized experience.
3	As a user, I can choose the users to follow so that I can have a feed of my interest.
4	As a user, I can use free templates so that I can create a photo collages.
5	As a user, I can edit the photos so that I can portray my creativity.
6	As a user, I can use the filters so that I can edit my photos.
7	As a user, I can use pics collage maker to make collages.
8	As a user, I can use the PicsArt camera so that I can take photos with live effects.
9	As a user, I can use the PicsArt application with a mobile device or on a PC so that it is flexible for me to access the app.
10	As a user, I can participate in PicsArt's photography and editing challenge so that I can learn new editing techniques.

11	As a user, I can upload photos, collages and edits so that I share my interest.
12	As a user, I can use free clipart library so that I edit the photos.
	Business Use
1	As a photographer I can import raw photos from my DSLR camera and edit
2	As a photographer I can network with other photographers all over the world
3	As a photographer I can share my work of art and gain recognition globally
4	As an amateur photographer I can learn from experienced photographers
5	As client I can search for photographers for my business
	<System> shall allow the user to< Activity>
1	The PicsArt system shall allow the use of camera which provides default filters.
2	The PicsArt system shall allow the user to access the filter library which has a collection of 1000+ filters.
3	The PicsArt system shall allow the user to access the tools to create cutouts, crop, stretch, clone, add text, and adjust curves.
4	PicsArt system shall allow the premium access to PicsArt Gold with a nominal monthly or annual subscription fee.
5	The PicsArt system shall allow the access feature of Draw which includes brushes, layers, and professional drawing tools.
6	The PicsArt system allows its users to take part in creative contests and photo challenges.
7	The PicsArt system shall allow the users to connect to their Facebook friends.
8	The PicsArt system shall allow the users to edit their photos offline without being dependent on the internet access.
9	The PicsArt system shall allow the use of the application at no cost.

Functional Requirements

Functional requirement essentially specifies the behavior or function of the PicsArt system. We see that the PicsArt System is easily accessible both on mobile devices and computers. The basic function of the system is to allow users edit and share photos, as well as interact with like minds. Here, users can create accounts and can declare its privacy.

Nonfunctional Requirements

Nonfunctional requirements describe how the system works. Here we consider the Capacity, Performance and Security aspect.

Capacity Requirement:

- Users can gain access to over 1000 types of filters and can upgrade to PicsArt Gold and gaining access to even more features of the app.
- Users can network with other users all over the world.
- Users have no restriction to the number of persons they can follow

Performance Requirement:

- Users can edit photos offline
- Users can use the app camera to take photos, giving a better quality in output.
- Users can find friends on social media
- Users can share photos and view feed on the PicsArt community.
- The app sessions of pop-ups, displaying Ads and users can choose to upgrade to PicsArt Gold to avoid getting them.

Security Requirement:

- Users can choose to modify the privacy setting of their account, limiting the number of users that can access their information.

4. Eliciting new requirements

Questionnaire Design

Before designing the questionnaire, we studied the application as it was ideal to have a first-hand experience of the application before taking our ideas public. We had an online interview with professional photographer on his experience with the PicsArt system and as well checked online resources relating to the present users' overview concerning the application. This gave us insights regarding the structuring of the questionnaire. From this off-the-book survey, we were able to understand that vast majority of users of the PicsArt application are between the ages of 18-25. Hence, the questionnaire was targeted to users with 18-25 age brackets, although 20% of respondents were above the age bracket. The questionnaire is structured based on the application design interface, its responsiveness, its interoperability with third party application, its consistency of

output (either with mobile device or PC), its cost effectiveness, and its flexibility to meet the demand of different users. Some images from the application are also inserted so that it would be better for the users to understand the questions regarding the display of the application.

The questionnaire is started with a description of the application and the link to have looked at the application before filling out the survey. From some of the earlier reviews of the survey, it was understood that not many users were familiar with the application and thus the link was provided to help future users to fill out the application.

1. **Knowing the User**: In this part of the survey, the aim was to understand the type of user as regard age range, gender and interest. We believed different users have different preferences and views regarding an application.
2. **Comparison with Competing Systems:** Here, we strived to know other applications users prefer other that the PicsArt application. This exposed some shortcomings of the system understudy as the Instagram application gained the highest percentage. With this we were able to fashion out new user requirement from the idea of the Instagram application to meet users demand.
3. **Interoperability:** This section aimed at understanding the system's present state in operating with third-party application seamlessly. Here be observed some drawbacks, as the PicsArt system does not support importation of photos from Facebook and direct uploads to Instagram.
4. **Design Interface:** the aim of this section was to find out if users have a good experience in relating to the look, feel, and possibly understanding the functionality of the application from a quick gaze. We gained insights to the need of the users regarding automatic display of photos in the gallery on the home page of the application, making text and icon bigger and bolder and options in choosing theme preferences.
5. **Consistency:** here, we *aimed* that gaining insights as regards the results in using a PC or a mobile device for photo edit.

The second part of the survey includes questions about some new features, whether or not those will be liked by its users or not. The survey was improved in stages. The improvement and the corrections were made after the reviews provided by the participants of the survey.

From the output of the survey, it is understood the application is mostly used for the personal purpose. The data collected from the survey also highlights the fact that most of the participants use the similar and more widely used application Instagram. Another interesting understanding was that, the participants using a photo editor for a professional purpose are inclined towards yet another application Adobe Photoshop express. The analysis also shed some light towards the other popular applications used by the participants such as Photogrid, collage maker and default phone photo editors, but the percentage of users was on the lesser side when compared to the mentioned editors

in the survey. The PicsArt user experience is rated as average as per scale from 1 to 5 where 1-fair and 5- very good. Another highlight from the survey conducted was that the users who mostly use the application for the personal use preferred to access the application on their mobile device.

4.1 Revised Goal Models

From the responses of the survey there are some updates in the System balloon. There is an inclusion of the new goal to improve the outlook of the system to make it more attractive for the users. This goal in turn has three tasks, the user is given a choice of selecting the background theme, user can choose to have a bolder look in terms of design of icons and to make editing a little easier task user's photos will be displayed on the home screen of the application.

There is another feature which is added to the revised goal model, now the photos can be imported from other social media websites such as Facebook and Instagram which are widely used and thus popular. Not only import of the photos but also sharing of the edited photos on these social websites.

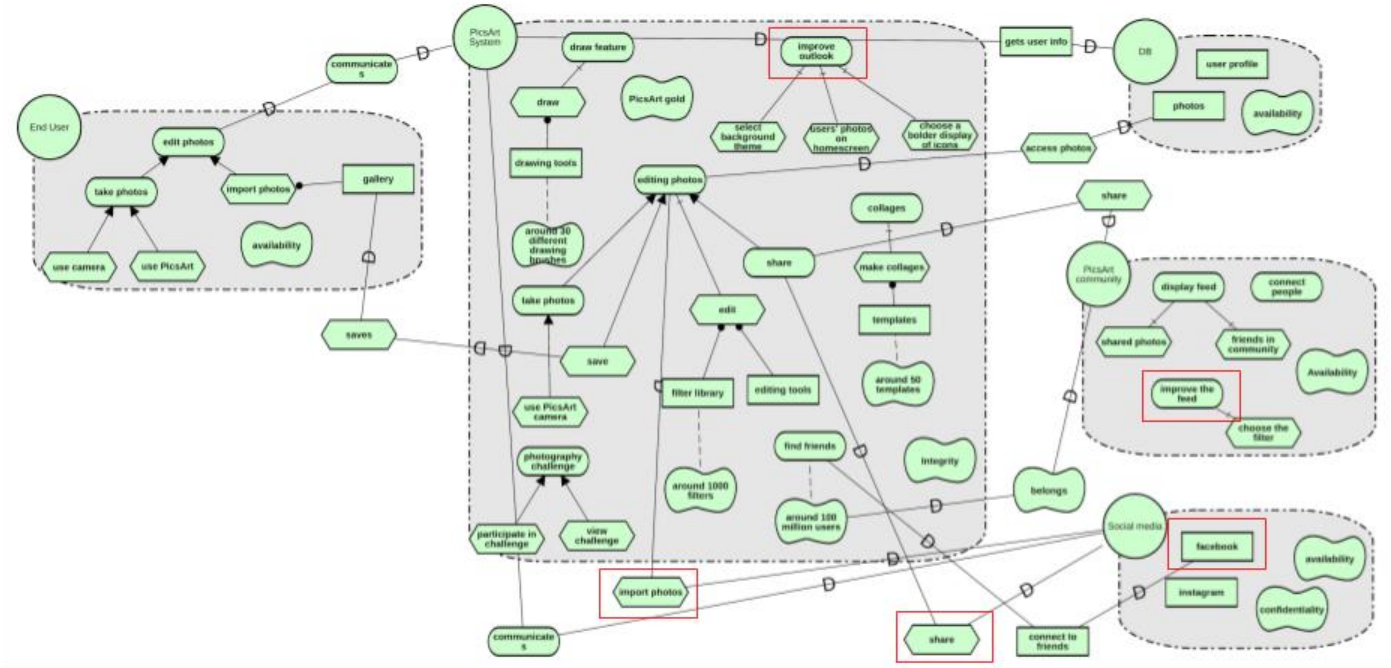


Fig 3: SR diagram of the Revised Goal Model

An inclusion of security requirements in Social media balloon. After the inclusion of import and share feature on other social media, availability and confidentiality will be the important requirements for the users. Availability gives the authorisation for the users to use the photos on their social media to be imported. Confidentiality will play an important role as only the information regarding the photos can imported and not any other personal confidential information can be shared without consent. Another

feature which is added to the goal diagram is the filter feature in the PicsArt Community balloon. This filter will enable the users to avoid the obscene and censored pictures which are not preferred by many users.

The table below describes the depender-dependee link and type of dependency which is defined by the dependum.

Depender	Dependum	Dependee	Type
Edit photos	communicates	PicsArt	Goal
save edits	saves	Gallery	Task
PicsArt	communicates	Social media	Goal
Share edits	shares	Social media	Task
Users(number)	belongs	PicsArt community	Quality
Edit photos	imports	Social media	Task
Share edits	shares	PicsArt community	Task
PicsArt	Gets user info	Database	Resource
Edit photos	imports	Photo database	Task
Find friends	Connects to friends	Social media	Resource

Table 1: depender-dependee relation

The depender-dependee table gives an understanding to analyze the GO model. The description in the table depicts the relation between the task or goal performed by one actor with another.
To start with the first row in the table, the goal to edit photos by the actor-user is dependent on the PicsArt system and the dependency is to communicate with the system and the type of the dependency is goal oriented. For better understanding , there is another example where PicsArt uses the functionality of the database to save the details of the user with the type of the dependency of resource.

4.2 New Requirements

The table below lists the new requirements that have been understood after conducting a survey about the PicsArt application. Some new requirements have been listed which were not a result from the survey that was conducted, but from the reviews of the application in playstore.

	"Good" Requirements **As a <role>, I can <activity> so that <business value>**
1	As a user, I can use the application on the PC if I have a paid subscription on my mobile device, so it is easy to access my account.
2	As a user, I can share my edited photo on social websites at the same time, so that it saves my time.
3	As a user, I can choose to share my edits publicly, so that I can have my privacy.
4	As a user, I can access the PicsArt application on my PC so that I do not have to use the app online through a browser.
5	As a user, I want to take a picture in the portrait mode so that I can have the effect of DSLR camera.
	<System> shall allow the user< activity>
6	The PicsArt system shall allow user's photos load on home screen immediately the app is launched.
7	The PicsArt system shall allow users freely choose their preferred theme colour.
8	The PicsArt system shall provide an option to also find friends on Instagram
9	The PicsArt system shall have bolder text and icon sizes.
10	The PicsArt system shall allow users to import photos from facebook.
11	The PicsArt system shall allow the users to avoid advertisements.
12	The PicsArt system shall allow the users to turn on filter mode to avoid appearance of absurd photos.

5. Object Oriented Analysis

In this section, we will be analyzing the use case diagram amongst the actors for the new requirement and the sequence diagram for each use cases.

5.1 Use Case Diagram

In the use case diagram we define what the PicsArt system does when viewed by an external user (in terms of new requirements). The actors involved here are: ***The end user, DB, PicsArt Community and Social Media***. The communication amongst the four actors in the scenario below:

> *The end user will use the PicsArt System to choose a **preferred theme**, selected amongst the theme stored in the DB. The DB communicates back to the PicsArt system and effect the change of theme selected.*
>
> *The end user can choose to **block Ads** on the PicsArt System and the changes will be seen immediately on the application.*
>
> *The end user can choose to turn on **filter mode** on the PicsArt System which then can be viewed by users in the PicsArt Community*
>
> *The end user can choose to use the PicsArt System to **import photos** from social media. From the diagram below, we see that the 'import photo' extends the 'filter mode feature' after observing that both feature can exist alone and an end user might choose to turn on filter mode after photos are imported but the inverse is not true.*
>
> *The end user can use the PicsArt System to **share photos publicly** on social media. Here, the 'share photos publicly' feature includes the 'import photo' feature: photos have to be imported before sharing can occur.*
>
> *The PicsArt System syncs the end user's Instagram account to the application. Hence, the end user can use the PicsArt system to **find friends on Instagram**.*
>
> *The end user can choose to communicate the PicsArt System to change to **portrait mode**. The PicsArt System then communicates with the DB to confirm the presence of the selected option and assert the change made.*

From the scenario above we were able to draw out use cases, observing the following:

- The main task the actors must perform
- Checking actors that intend querying or modifying information in the PicsArt System.

- Checking actors that want to inform the PicsArt system about changes in other systems.

The use cases after analyzing the scenario and making the observations above are: *Theme Preference*, *Block Ads*, *Turn–on filter mode*, *Import Photos*, *Choose to share photos publicly*, *find friends on Instagram* and *choose Portrait Mode***.**

Description of Use Cases

1. **Name:** Theme Preference
   - **Short Description**: The end user can change the theme of the app (e.g aqua, dark, light theme).
   - **Preconditions (input):** The end user chooses from a list of themes is housed in the DB.
   - **Trigger:** The user is unsatisfied with the outlook of the system.
   - **Basic Flow**:

     1. The end user clicks on the settings icon in the app,
     2. The end user chooses preferred theme.

   - **Alternative Flow:** None
   - **Post Conditions (output):** Changes are seen on the PicsArt system.

2. **Name:** Block Ads
   - **Short Description**: this feature allows the end user to block Ads on the PicsArt system.
   - **Preconditions (input):** The end user clicks on the ‘Block Ads’ option from a list of settings on the system.
   - **Trigger:** The user is distracted by a pop Ad while editing a photo.
   - **Basic Flow**:

     1. The end user clicks on the settings icon in the app,
     2. The end user clicks on the ‘block Ads’ option.

   - **Alternative Flow:** the user simply clicks on the cancel button on an Ad each time it pops up.
   - **Post Conditions (output):** Pop up Ads stop displaying on the system.

3. **Name:** Turn-on Filter Mode
    - **Short Description**: here, the end user activates this feature to create filters some disturbing photos.
    - **Preconditions (input):** The end user clicks on the ‘Privacy’ and then the ‘Turn on Filter Mode’ option from a list of settings on the system.
    - **Trigger:** The user notices a disturbing photo on his/her feeds.
    - **Basic Flow**:

      1. The end user clicks on the settings icon in the app,
      2. The end user clicks on the ‘Privacy’ option.
      3. The end user clicks on the ‘Turn on Filter Mode’ option.

    - **Alternative Flow:** None
    - **Post Conditions (output):** Disturbing photos stop displaying on the user’s feeds.

4. **Name:** Import Photos
    - **Short Description**: this feature basically allows the end user the freedom to import photos from social media through the PicsArt System.
    - **Preconditions (input):** the user’s photo on a social media platform.
    - **Trigger:** The end user wants to import a photo on a social media platform he/she would like to edit on the Picsart System.
    - **Basic Flow**:

      1. The end user sees a preferred photo on social media,
      2. The user clicks on the ‘Import photo’ option.

    - **Alternative Flow:** None
    - **Post Conditions (output):** Photo is saved on the user’s device or shared on PcsArt Community.

5. **Name:** Share photos publicly
    - **Short Description**: the end user is at will to share photos imported from his/her device

or from social media.

- **Preconditions (input):** the user's photo on a social media platform or device.
- **Trigger:** The end user wants to share photos on a social media or PicsArt Community.
- **Basic Flow**:

  1. The end user sees a preferred photo on his/her device,

  2. The user clicks on the 'Share photo' option.

- **Alternative Flow:** None
- **Post Conditions (output):** These photos can be viewed on the social media pages or on PicsArt Community as feeds.

6. **Name:** Find friends on Instagram
   - **Short Description**: this feature basically allows the end user find friends on Instagram at will.
   - **Preconditions (input):** the user's friends on Instagram.
   - **Trigger:** The end user wants to connect with new or old friends on Instagram.
   - **Basic Flow**: The end user clicks on 'Find Friends' option in the PicsArt community section,
   - **Alternative Flow:** None
   - **Post Conditions (output):** The user can then view new friends on his/her local PicsArt system friends list.

7. **Name:** Portrait Mode
   - **Short Description**: the end user selects this mode from the PicsArt System, which communicates to the DB to verify the presence of this selection and activates it
   - **Preconditions (input):** the user's photos.
   - **Trigger:** The end user wants to change the view of photos in the Picsart System.
   - **Basic Flow**:

     1. The end user clicks on mode in photo settings,

     2. The user chooses the 'Portrait Mode' option.

- **Alternative Flow:** None

Post Conditions (output): The end user notices changes made on the PicsArt System..

The diagram is given below:

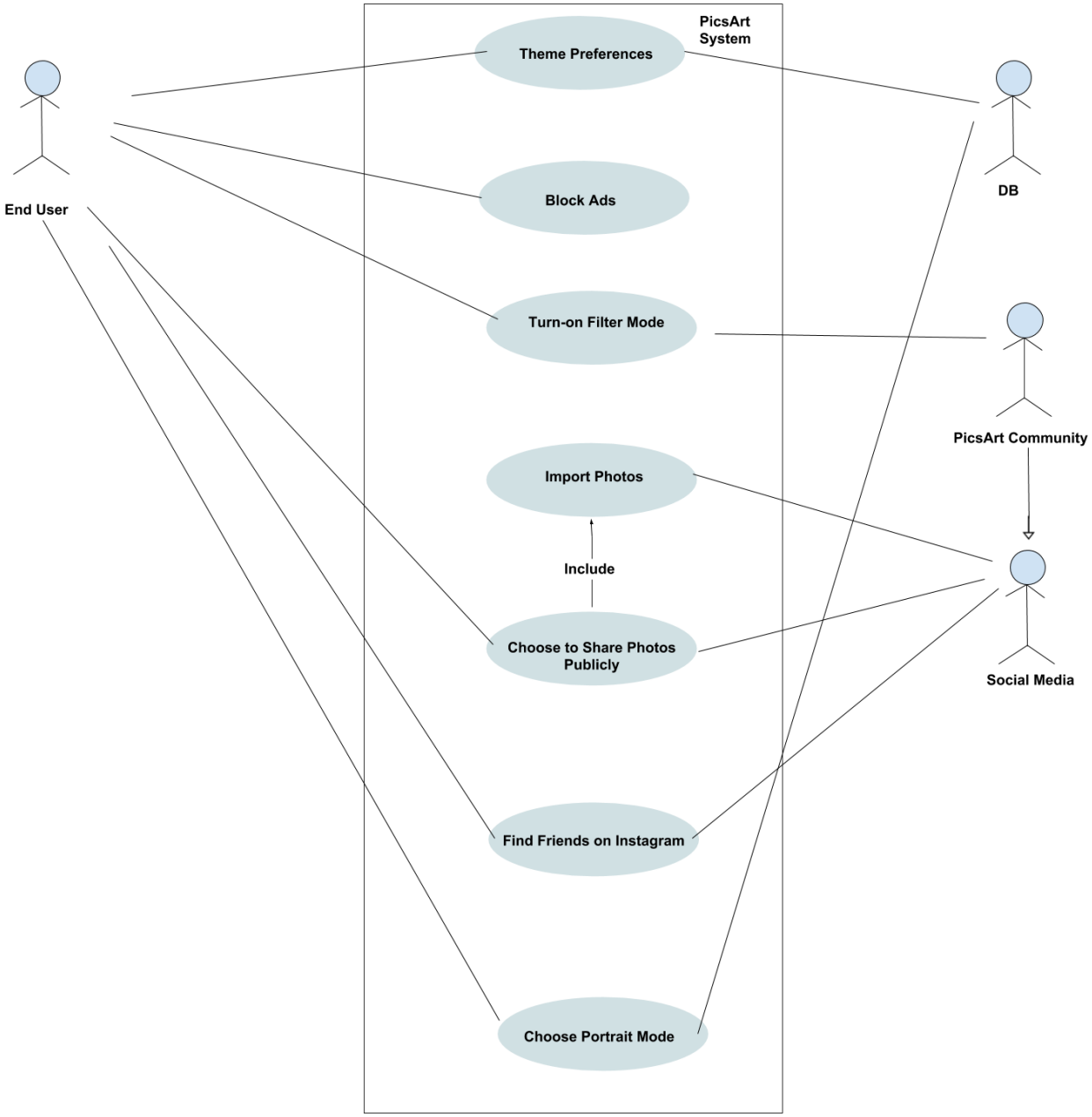


Fig 4: Use Case diagram of the PicsArt System

5.2 Sequence Diagrams

This diagram shows a particular scenario of a use case, the events that external actors generate and their order. The horizontal axis explains involved interaction partners and the vertical axis explains the chronological order of interaction.

Theme Preference Sequence Diagram

The actors involved here are the end user, PicsArt System and the Database (DB). The send event is initiated when the end user sends the ‘select theme’ request to the PicsArt System. Note that the ‘select theme’ request is a synchronous message (the end user will have to wait for response from the PicsArt system before the process can continue). The PicsArt System the sends a ‘GET selected theme’ request to the Database, which verifies the existence of the selected theme, prepares the theme and sends ta response to the PicsArt System. The PicsArt system processes and updates the system with the selected theme and the end user can view changes made on the application. The diagram below:

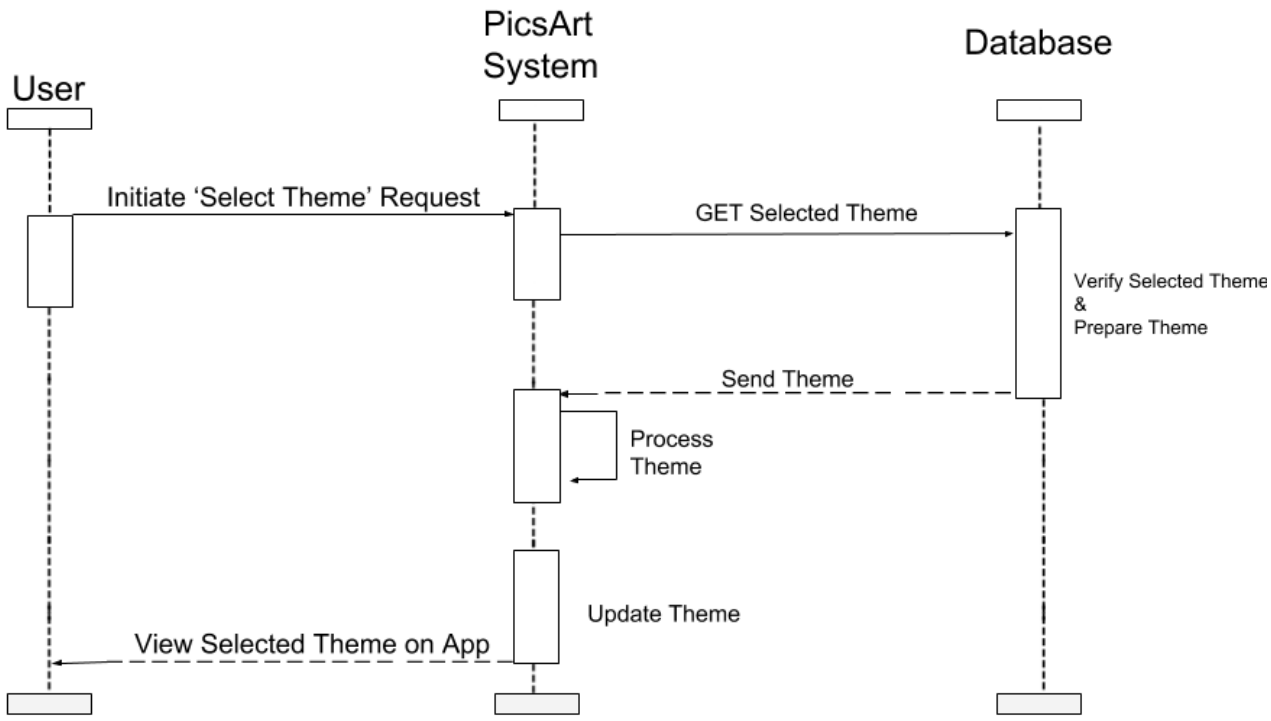


Fig 4.1: Sequence Diagram for the Theme Preference Use Case

Block Ads Sequence Diagram

The actors involved here are the end user and the PicsArt system. The send event is initiated when the end user sends the 'block Ads' request to the PicsArt System. This is an asynchronous message as the user can very well proceed with other requests without waiting for a response from the PicsArt system. The PicsArt system then processes the request, update the app and end user view updated changes in the app. The diagram is given below:

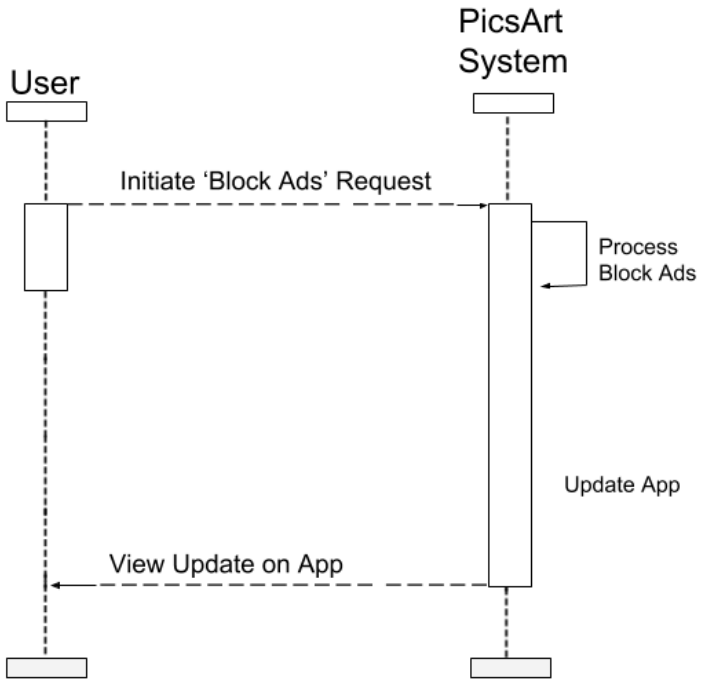


Fig 4.2: Sequence Diagram for the Block Ads Use Case

Import Photo Sequence Diagram

The actors involved here are the end user, PicsArt System and social media. The send event is initiated when the end user sends the 'import photo' request to the PicsArt System; this is a synchronous message call. The PicsArt System then proceeds by sending a 'GET Photos' request to Social Media, which verifies and prepares photos for import. The PicsArt System receives a response from Social Media, download the sent photos and update library. The end user can now view imported photos on the app. The diagram is given below:

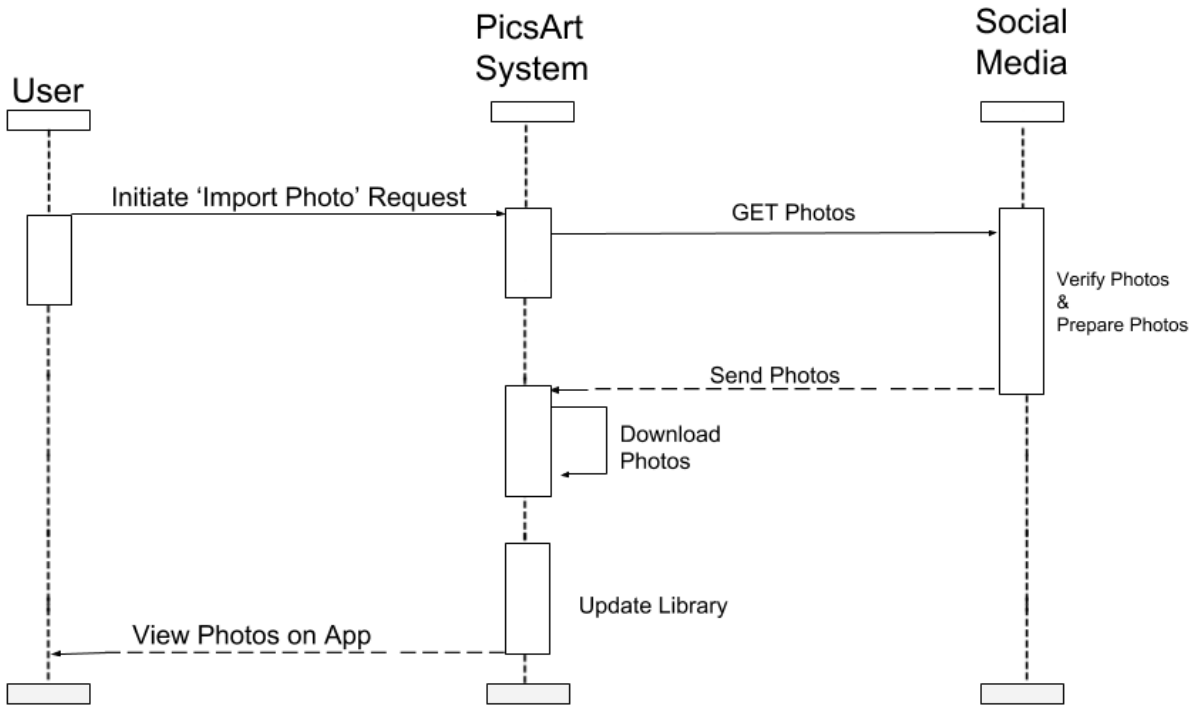


Fig 4.3: Sequence Diagram for the Import Photos Use Case

Portrait Mode Sequence Diagram

The actors involved here are the end user, the PicsArt System and the Database. The send event is initiated when the user sends the 'select portrait mode' request; this is a synchronous message call. The PicsArt System then proceeds by sending a 'GET Portrait Mode request to DB, which verifies and prepares the selected mode. The PicsArt System receives a response from the DB, process the sent mode and update the mode of the app. The end user can now view the app in portrait mode. The diagram is given below:

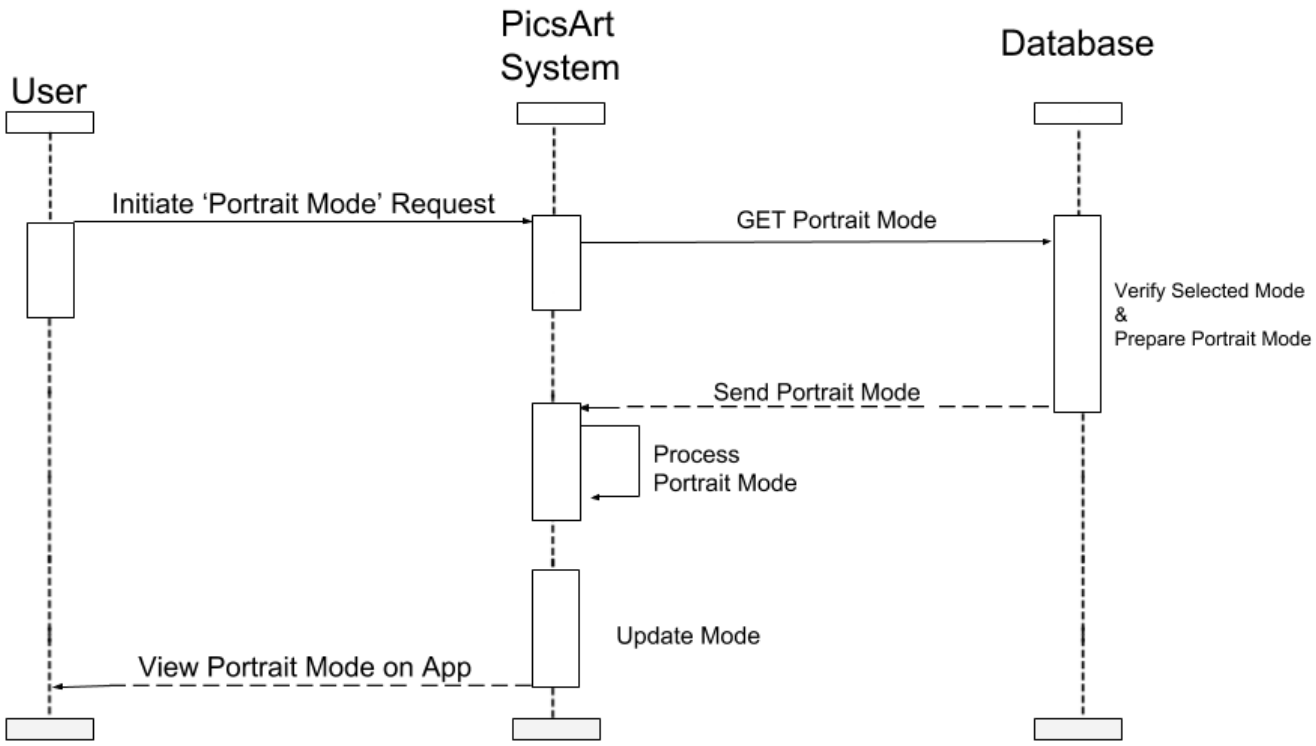


Fig 4.4: Sequence Diagram for the Portrait Mode Use Case

Find Friends Sequence Diagram

The actors involved here are the end user, PicsArt System and social media. The send event is initiated when the end user sends the 'Find Friends' request to the PicsArt System; this is a synchronous message call. The PicsArt System then proceeds by sending a 'GET Friends' request to Social Media, which verifies and prepares friends. The PicsArt System receives a response from Social Media, processes the verified friends and update friends' list. The end user can now view friends on the app. The diagram is given below:

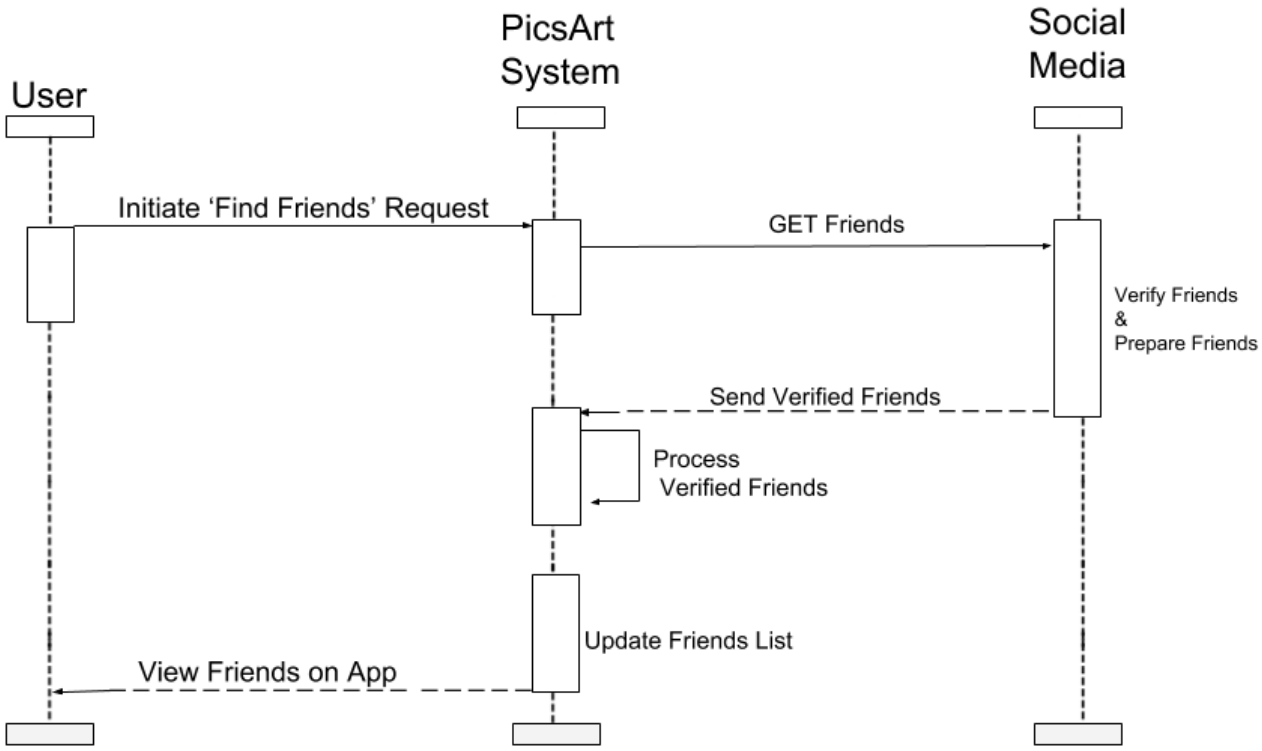


Fig 4.5: Sequence Diagram for the Find Friends Use Case

6. Traceability

The first traceability matrix shows the links between requirements and the intentional elements. These elements are the goals and the tasks in the Strategic relational goal model before the inclusion of the new requirements. The Goals are numbered in the sequential order as observed in the SR diagram. The first step was to list out all the user requirements.

REQUIREMENTS TRACEABILITY MATRIX Legend													
Project Name:		PicsArt											
Team		G4											
	IE-ID	T1.1	T2.1	T3.1	G3.2	G4	T3.3	G3	QG3	QG5	QG7	QG8	T5.1
Req-ID	Requirement Specification	Draw feature: draw	Collage maker: collage	editing photos: Use PicsArt camera	editing photos: share	find friends	editing photos: edit	editing photos	No cost	Premium upgrade: PicsArt Gold	Integrity	Accessibility	Photography challenge: participate
F6	User can access the community to share photos				*						*		
NFR2	User can have a personal account												
F5	User can choose to follow other users					*							
F13	App shall allow the free use of application								*				
F14	Users can create a photo collage		*						*				
F1	Users can edit photos							*					
F10	Users can use filters to edit						*						
F11	The user can use the App camera.			*									
F15	Use can choose the device to access the application											*	
F16	User can participate in Photography challenge												*
F6	User can upload photos, collages and edits												
F2	User can use free clipart library to edit photos.						*						
F3	System shall allow the users to access filter library.						*						
F2	System shall allow the users to access the editing tools.						*						
NFR1	App shall allow premium access to PicsArt Gold									*			
F4	App shall allow the access to use draw feature.	*											
F5	App shall allow the users to connect to their facebook friends.					*							
F1	App shall allow offline editing of photos.							*					
NFR1	App blocks Ads									*			

Table 3: Traceability matrix

The second traceability matrix shows the links between requirements and the original app description. The features are categorised by the Non-functional features and otherwise. Then these descriptions are added as a column in the traceability matrix 1 as well.

Features		T1.1	T2.1	T3.1	G3.2	G4	T3.3	G3	QG3	QG5	QG7	QG8	T5.1
		Draw feature: draw	Collage maker: collage	editing photos: Use PicsArt camera	editing photos: share	find friends	editing photos: edit	editing photos	No cost	Premium upgrade: PicsArt Gold	Integrity	Accessibility	Photography challenge: participate
F1	Edit photos							*			*		
F2	Use editing tools						*						
F3	Use filters						*						
F4	draw feature	*							*				
F5	connect to friends					*			*				
F6	share edits				*								
F7	save edits						*						
NFR1	premium access									*			
F9	block Ads									*			
F10	use picsArt camera			*									
F11	offline editing							*					
NFR2	Personalised account										*		
F13	Use basic tools for no cost								*				
F14	make photo collage		*										
F15	Use app on PC or Mobile											*	
F16	Photography challenge												*

Table 4 : Traceability matrix

7. User Feedback Analysis

Sentiment Analysis

The analysis was executed with the help of tool to classify the input into a scale ranging from -3 to 3. Each text is classified based on the sentiment value allocated to the text based on the significant words such as GOOD,BAD,GREAT,COOL as so on. These significant words are known as sentiment lexicons. Each of that term has a value either positive or negative which is called as the sentiment polarity.

The scale as mentioned already ranges from -3 to 3 where

-3 : highly negative Ex: Frustrated
-2 : moderate negative Ex: Trouble
1 : negative
0 : neutral
1 : positive
2 : moderate positive Ex: good
3 : highly positive Ex: wow,love

The tool classifies the text based on the most significant(highest absolute value) word in a positive sense and a word in the negative aspect. The overall sentiment value is calculated as the sum of the maximum positive and the negative value.

Dataset :

1. Given: Data with user feedback with all details such as userid, review,rating.
2. The dataset was manually cleaned by taking only 2 columns userid and feedback. All the unnecessary symbols and language not understood by the machine were filtered.
3. Version of the application : v9 (ambiguous)
4. size of dataset: 4067 feedbacks
5. percentage of noisy data: the original dataset was around 5500 reviews with noisy data of 1500 feedbacks.

The input given to the tool is in the form of a CSV file which contains two columns. The first column is the ID of the user who has submitted the review. And the second column is the text which is the view given by the user.

After the sentiment analysis the polarity ranged from -4 to 5. Manually all the positive and the negative feedbacks were sorted into two different dataset.

Sentiment Value	Number of Feedbacks categorised	Polarity
-3	7	Negative
-2	16	
-1	51	
0	1151	Neutral
1	1175	Positive
2	1178	
3	457	
4	32	

Table 5: The sentiments categorisation based on the feedback

Features	Number of positive feedbacks	Number of negative feedbacks
Edit the photos	2500	150
Quality of the edits	15	3
share the edits	10	5
App camera	1	1
run in the background	-	1
no filter for the content	-	1

Editing tools	2	2
update of the App or the download	5	12
Memory usage	-	4
Network connection	-	2
Free app	10	-
Processing of the application	2	11
Stickers library	5	1
save the edits	10	1
draw tool	1	-
collage tool	50	-
Community	5	1

Table 6: Collection of features and number of feedbacks

The tool can only analyze the English text and not any other form of input such as emojis, or other language text. So before the input is given to the tool, it is manually cleaned by removing the meaningless text which will not provide any useful information. The initial csv file which was provided contained more than two columns with information regarding the version and other details. So for the input, only the necessary two columns were selected for carrying out the process.

Topic Modeling

The Topic modeling tool is used to find the relatable topics based on the reviews provided in the feedback. Then manually the topics were categorized to find out the features that were liked or disliked by the users of the application. The tool has the input as the feedback of the users but which are filtered. So the input is a meaningful comments in a text file.

To find the number of feedbacks that have either a positive or negative response for a particular feature, the sentiment value is used to group the feedbacks which is done manually.

The identification of the features in feedback was done manually where the positive and negative feedbacks were separated in two excel files. The general topics were identified by the tool topic modeling. The input for the tool is given as separate csv files of each positive and negative feedbacks after separated by sentiment tool.

After the topic modeling process, the required questions can be answered.
Below is the table representing the feature that were liked and disliked by the users.

Features that are liked	Features that are disliked
Editing tools	Memory usage
Free application	Processing speed
share the edits	Updates
draw tool	No filter on content
collage maker	limited free tools
PicsArt Community	
creative platform	
Application camera	

Table 7: Features liked and disliked by the users

Conclusion on the feedback analysis:

Based on the data analyzed in the above table there are many features liked by the users. After performing the sentiment analysis, it was convenient to analyze the feedback for the positive and the negative portion of the feedback. Then the topic modeling made it easier to find the reason for their respective sentiment. And thereby the features liked and disliked.
As the answer to the final and a very important question is the extent to which the user goals are satisfied. From the statistics obtained from all analysis, the features liked by the users are more in number when compared to the problems faced by them. And for sure there is a room for lot of improvement.
The top three liked features give a conclusive reasoning that the application has achieved the main goal of editing photos, the quality goal with the services provided for free.
Based on the most disliked features, there is no particular goal in our model but the task of processing of application is slow. The other major technical issue is the memory usage by the application.
From the features that listed in the traceability matrix, there is a table which shows the number of features that are implemented.

8. Requirements Prioritization

In this section, we will be analyzing requirements, risk associated with these requirements and prioritization of these risks using the Analytic Hierarchy Process (AHP).

	Requirement	Risk Involved
1	User can create personal account on PicsArt System	Users' account may be hacked, if privacy setting is not in order. ***(Threatened Privacy)***
2	User can share photos on social Media	A user will have no control over downloads by other users. ***(No Control)***
3	User can block Ads	If the user mistakenly clicks on the Ad while trying to cancel it, the user's data will exposed and can be hacked. ***(Phishing)***
4	User can find friends on Instagram	If the friend the user adds is a robot, it will expose the system too malicious activities ***(Robot Account)***
5	User can import photos from social media	Photo import will halt when there is network failure ***(Network Failure)***
6	User can choose preferred theme	If the themes in the Database get corrupted by a virus, it will affect the PicsArt System ***(Virus Attack)***
7	User can activate filter mode	If the there is a malfunction of this feature, absurd photos will be present. ***(Feature Malfunction)***

Using AHP

Here, we will be prioritizing the risks using AHP pairwise comparison and two criteria: Implementation effort and User value. The risks we will be considering are: *Risk of threatened privacy, Risk of No control, Risk of Phishing, Risk of Robot Account, Risk of Network Failure, Risk of Virus Attack & Risk of Feature Malfunction.*

AHP for User Value

	Risk of threatened privacy	*Risk of No control*	*Risk of Phishing*	*Risk of Robot Account*	*Risk of Network Failure*	*Risk of Virus Attack*	*Risk of Feature Malfunction*

Risk of threatened privacy	**1**	4	3	4	2	3	2
Risk of No control	1/4	**1**	1/2	1	1/3	1/2	1/3
Risk of Phishing	1/3	2	**1**	2	1/2	1	1/2
Risk of Robot Account	1/4	1	1/2	**1**	1/3	1/2	1/3
Risk of Network Failure	1/2	3	2	3	**1**	2	1
Risk of Virus Attack	1/3	2	1	2	1/2	**1**	1/3
Risk of Feature Malfunction	1/2	3	2	3	1	3	**1**
Sum	2.9167	16	10	16	5.6667	11	5.5

Table 8: AHP for user value

In this section, we prioritized the risks from a user perspective, attributing arbitrary values in form of weights to the risks. For example, we can easily deduce from the table that ***'the Risk of Privacy is 4 times more important than the Risk of no control'*** and ***'Risk of malfunction is 3 times more important than Risk of Robot account'***. We also included the sum of column values which will be used for further prioritization analysis by normalizing the columns.

Normalizing Columns, we have:

	Risk of threatened privacy	*Risk of No control*	*Risk of Phishing*	*Risk of Robot Account*	*Risk of Network Failure*	*Risk of Virus Attack*	*Risk of Feature Malfunction*	**Sum**	**Norm**
Risk of threatened privacy	1/(2.9167)	4/16	3/10	4/16	2/(5.6667)	3/11	2/(5.5)	2.1322	**0.3046** 1st

Risk of No control	(1/4)/(2.9167)	1/16	(1/2)/10	1/16	(1/3)/(5.6667)	(1/2)/11	(1/3)/(5. 5)	0.4256	**0.0608**
Risk of Phishing	(1/3)/(2.9167)	2/16	1/10	2/16	(1/2)/(5.6667)	1/11	(1/2)/(5. 5)	0.7343	**0.1049** 4th
Risk of Robot Account	(1/4)/(2.9167)	1/16	(1/2)/ 10	1/16	(1/3)/(5.6667)	(1/2)/ 11	(1/3)/(5. 5)	0.4256	**0.0608**
Risk of Network Failure	(1/2)/(2.9167)	3/16	2/10	3/16	1/(5.6667)	2/11	1/(5.5)	0.8237	**0.1177** 3rd
Risk of Virus Attack	(1/3)/(2.9167)	2/16	1/10	2/16	(1/2)/(5.6667)	1/11	(1/3)/(5.5)	0.7040	**0.1006** 5th
Risk of Feature Malfunction	(1/2)/(2.9167)	3/16	2/10	3/16	1/(5.6667)	3/11	1/(5.5)	1.1899	**0.1600** 2nd

Table 9: User value Normalized table

After normalizing each column, we can safely conclude that:

Risk of threatened privacy is of the highest priority, being the weightiest. This analysis was drawn from the fact that, as a user, the security of my data is priority so the developer must ensure the system is immune to data breach.

Risk of feature malfunction came second on the list. As a user, I will be greatly dissatisfied if the system does not meet my need. If one of the features in the system is malfunctioning, users becomes less motivated to continue using the app.

Risk of network failure comes next because, if there is a problem with network connectivity, it defeats majority of the purpose of the app. If there is network failure, a user will be unable to share edited photos on PicsArt Community, Instagram, a user will be unable to import photos from Facebook, a user will be unable to connect with other users, a user will be unable to view feeds on the PicsArt Community. Therefore, effective network connectivity is priority.

Risk of Phishing comes next, as this directly relates to data breach. Users are concerned about the privacy of their personal information. Hence, this risk is also of high priority.

Risk of virus attack is the fifth on the list. If the system is virus infected, it not just affect the functionality of the system, it also corrupts the users files (photos). As we know that photos are the main input for interaction between the user and the system, if the user's photos are at risk of being corrupt, then the system uses its usability value.

AHP for Implementation Cost

	Risk of threatened privacy	*Risk of No control*	*Risk of Phishing*	*Risk of Robot Account*	*Risk of Network Failure*	*Risk of Virus Attack*	*Risk of Feature Malfunction*
Risk of threatened privacy	**1**	1/5	1/4	1/3	1/2	1/4	1/5
Risk of No control	5	**1**	2	3	3	2	1
Risk of Phishing	4	1/2	**1**	2	2	1	1/3
Risk of Robot Account	3	1/3	1/2	**1**	2	1/2	1/3
Risk of Network Failure	2	1/3	1/2	1/2	**1**	1/2	1/3
Risk of Virus Attack	4	1/2	1	2	2	**1**	1/3
Risk of Feature Malfunction	5	1	3	2	3	3	**1**
Sum	24	3.8667	8.25	10.833	13.5	8.25	3.5332

Table 10: AHP for implementation cost

Here, we analyze and attribute arbitrary values to the risks in view of implementation cost. The arbitrary values are regarded as weights of the risk in relation to their priorities. From the table, we can deduce that in term of implementation cost ***'the Risk of feature malfunction is 5 times more important than the Risk of threatened privacy', 'the Risk of Virus attack is as important as the Risk of Phishing'***. We can further analyze the priorities by normalizing the columns using the sum

value obtained by addition of all the value in a column.

Normalizing Columns, we have:

	Risk of threatened privacy	*Risk of No control*	*Risk of Phishing*	*Risk of Robot Account*	*Risk of Network Failure*	*Risk of Virus Attack*	*Risk of Feature Malfunction*	**Sum**	**Norm**
Risk of threatened privacy	1/24	(1/5)/(3.8667)	(1/4)/(8.25)	(1/3)/(10.833)	(1/2)/(13.5)	(1/4)/(8.25)	(1/5)/(3.5332)	0.2784	**0.0396**
Risk of No control	5/24	1/(3.8667)	2/(8.25)	3/(10.833)	3/(13.5)	2/(8.25)	1/(3.5332)	1.7340	**0.2477** 2nd
Risk of Phishing	4/24	(1/2)/(3.8667)	1/(8.25)	2/(10.833)	2/(13.5)	1/(8.25)	(1/3)/(3.5332)	0.9655	**0.1379** 4th
Risk of Robot Account	3/24	(1/3)/(3.8667)	(1/2)/(8.25)	1/(10.833)	2/(13.5)	(1/2)/(8.25)	(1/3)/(3.5332)	1.1708	**0.1672** 3rd
Risk of Network Failure	2/24	(1/3)/(3.8667)	(1/2)/(8.25)	(1/2)/(10.833)	1/(13.5)	(1/2)/(8.25)	(1/3)/(3.5332)	0.5053	**0.0722**
Risk of Virus Attack	4/24	(1/2)/(3.8667)	1/(8.25)	2/(10.833)	2/(13.5)	1/(8.25)	(1/3)/(3.5332)	0.8270	**0.1181** 5th
Risk of Feature Malfunction	5/24	1/(3.8667)	3/(8.25)	2/(10.833)	3/(13.5)	3/(8.25)	1/(3.5332)	1.8841	**0.2912** 1st

Table 11: Normalised table for implementation cost

From the above table, we can safely conclude that:

The **Risk of feature malfunction** comes is of the highest priority here. In terms of implementation cost, a developer will expend (effort and cost) more in building an absolute app to meet the demand of the user. The developer must ensure that every feature of the app functions properly and the entire app meets a user-friendly specification.

The **Risk of no control** comes second in this context. The view is that it takes a lot of implementation cost and effort to build a proper app that ensures users' control over their photos being downloaded by third parties.

The **Risk of robot account** comes next. Here, we see some legitimate users accepting connection requests from other supposed users who in fact are just robots. This exposes users to the possibilities of their accounts being hacked and some other malicious activities on users' accounts. It requires some extra cost for developers to build a system that effectively detects these robot accounts and automatically filters or destroys them on spot.

Fourth place is the **Risk of phishing**. Here, a lot of cost and effort is expended in ensuring against the invasion of users' privacy through Ads on the system. Since the system makes money from these Ads, we cannot completely eradicate the aspect but spend a lot of time and effort to curb this.

The fifth place is the **Risk of virus attack**, as ensuring every part/feature of the app is prone to virus attack is costly. Hence, implementation cost expended to avoid this menace is quite high.

Importance between Criteria

	Implementation Cost	**User Value**
Implementation Cost	1	1/2
User Value	1/4	1

Table 12: criteria importance

To get the final rank of prioritization we use the formula

Final rank = importance_g1 * Rank1 + importance_g2 * Rank2

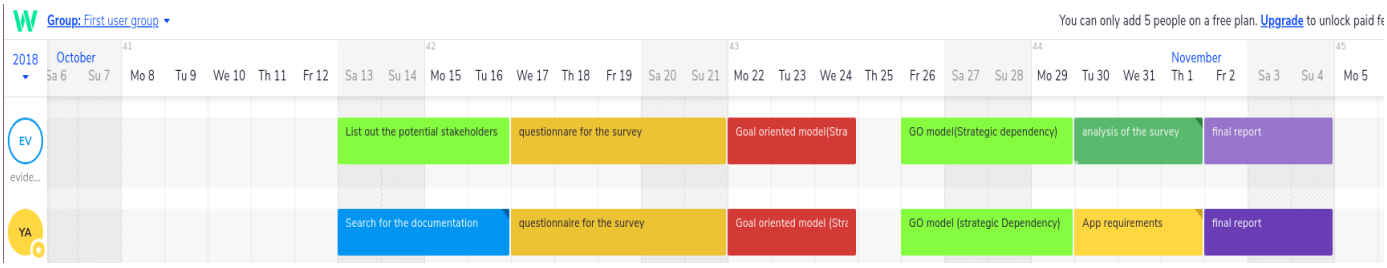
	Final value	Final Rank
Risk of threatened privacy	0.2532	2
Risk of No control	0.2004	3
Risk of Phishing	0.1649	4
Risk of Robot Account	0.1501	5
Risk of Network Failure	0.1334	7
Risk of Virus Attack	0.1493	6
Risk of Feature Malfunction	0.3020	1

Table 13: Final rank in order of priority

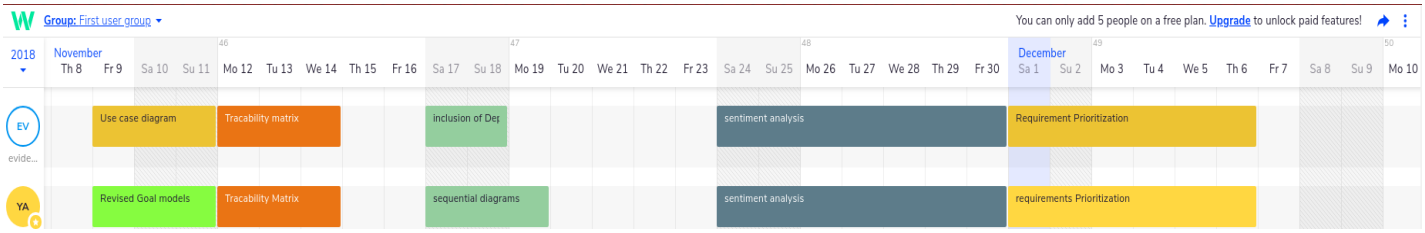
From our calculation, we see that the risk of feature malfunction is of high priority compared to all other risk.

9. Annexes

9.1 Plan of activities (e.g. Gantt chart)



The above figure gives the time layout for the assignment 1 for the duration of one month.



The above figure gives the task distribution for the second assignment.

Link to the Gantt chart:

https://app.teamweek.com/#timeline/365347/groups/325738?zoom=month

9.2 Existing info/data: i.e. App description, and other info found on Internet (always clarify the source)

PicsArt is an image editing application and a social network. It has fun tools, effects, collage maker, camera, free clipart collection, more than 5 million stickers created by users and drawing tools and also enables users to share their images with the PicsArt community and on other networks like Facebook and Instagram. PicsArt is all about making great images and having fun turning free-to-edit images into exceptional collages and memes.

Links

1. https://play.google.com/store/apps/details?id=com.picsart.studio&hl=it
2. https://en.wikipedia.org/wiki/PicsArt_Photo_Studio
3. https://www.tomsguide.com/us/picsart-photo-studio,review-2945.html
4. https://www.commonsensemedia.org/app-reviews/picsart-photo-editor-collage/user-reviews/adult

9.3 GO model source files

1. GO SR model
2. GO SD model
3. Revised SR model
4. Revised SD model

All the above files are stored in the drive. Link is given below:

https://drive.google.com/drive/u/1/folders/1tpKva7dls_t31DPBrJmYvOkNJJimZJxA

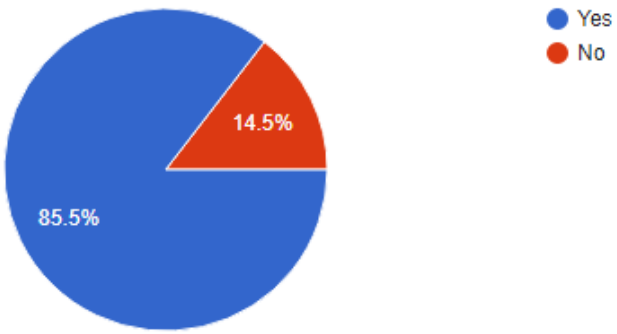
9.4 Survey questionnaire

The link to the questionnaire is given below:

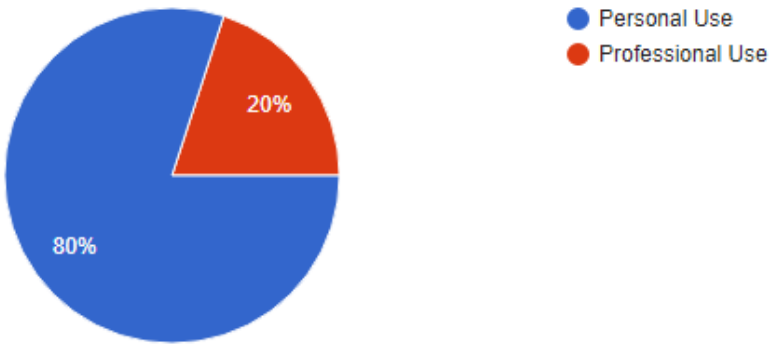
https://goo.gl/forms/fze3JOmwdNt5Twxi2

9.5 Data collected with the survey

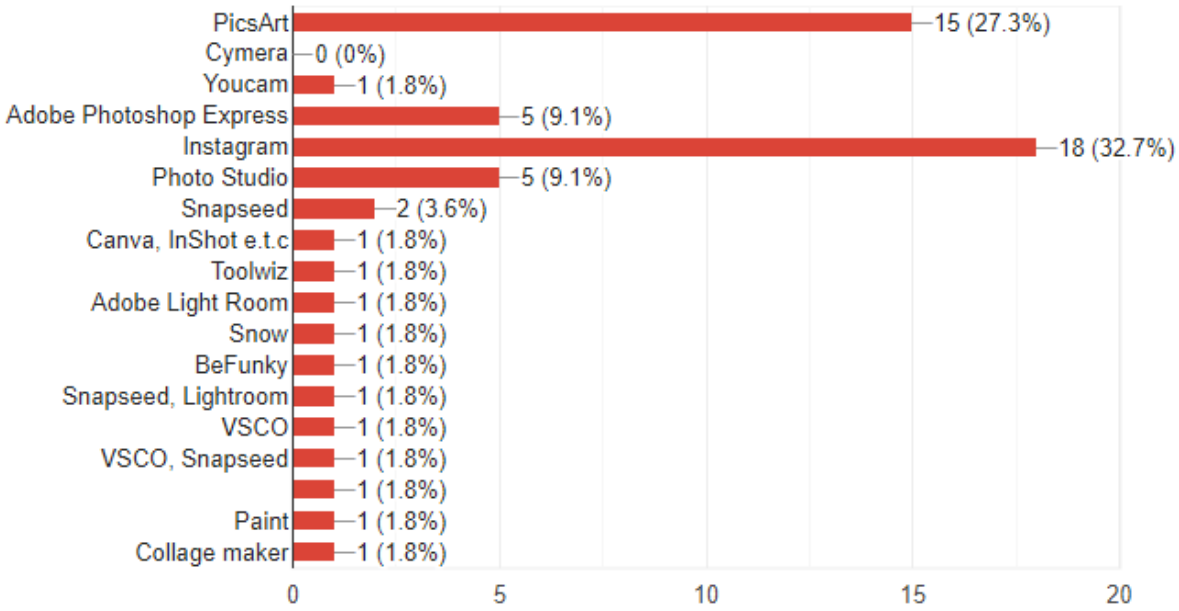
Do you like editing photos? [55 responses]



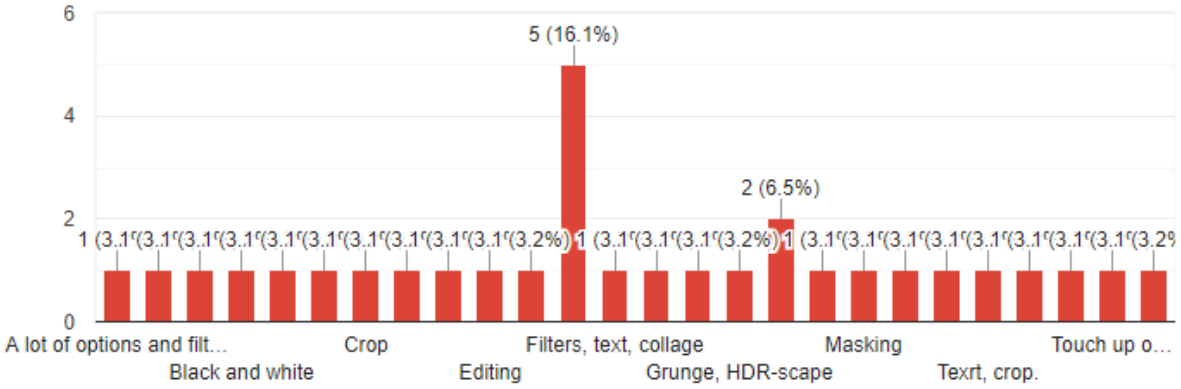
What is your purpose of using picsart? [55 responses]



What app do you use for photo editing? [55 responses]



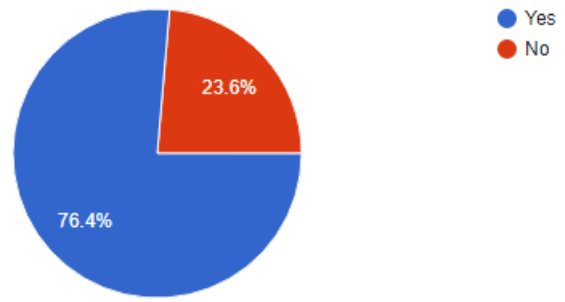
What is your favourite feature? [31 responses]



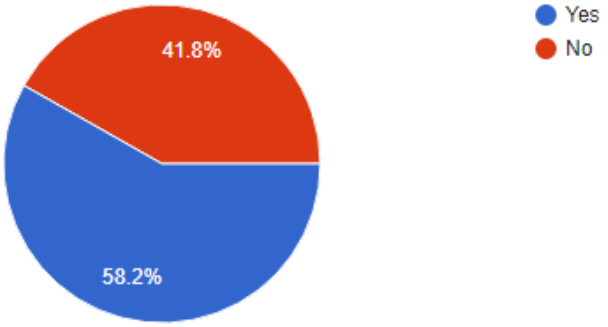
In elicitation of new requirements for the app, the following responses from users were evaluated:

Would you like an option to directly post your edits on Instagram?

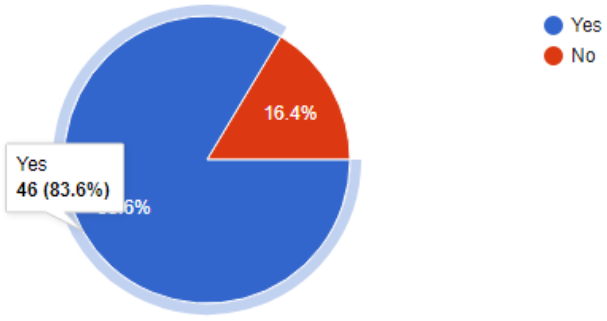
[55 responses]



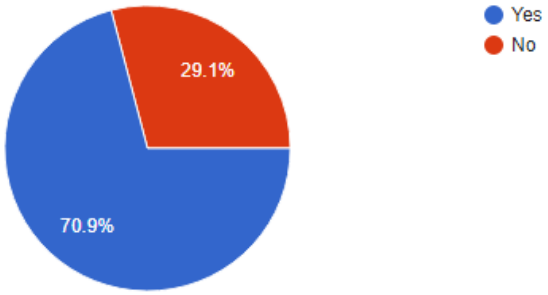
Would you like the text in the app to be bolder? [55 responses]



Would you rather choose a theme colour according to your preference? [55 responses]



Would you love to see your photos on the home screen of the app? [55 responses]



The survey was carefully carried out targeted at respodents between the ages of 18-25 as stated in the 'New Elicitation' section of the report. Questions were asked in relation to user experience, the functionality of the app and the app's interoperability with third party apps (social media). From the data collected from the survey we observed that, 85.5% of respondent preferred using the app for personal dealings and a vast majority liked the filter feature. The new requirements were gotten on the observation that 58.2% of the respondents preferred a better feel in display of text and icons in the app, 83.6% will like to be given theme options. Having noticed that navigating through folders to get photos in one's device could be a bother, we needed to ask users if they will prefer photos to load automatically upon app launch. 70.9% of the respondent opted for this change. As for interoperability with third-party apps, we noticed that users preferred using Instagram. Hence we proposed a feature where users can directly share their edits on Instagram with ease.

All the data collected from the survey is saved in the spreadsheet in the link below:

https://docs.google.com/spreadsheets/d/1LkiYsFRVHpvofHZFpVvfsXeqsz0Kjnb1cKVREFY-KSQ/edit#gid=565934708

9.6 Excerpt of feedback classified with sentiment analysis

Link to the spreadsheet with the sentiment analysis of the feedbacks

https://drive.google.com/open?id=1awrgDN_USdwToN20VaiNJcfTF6LW9nNz

9.7 Table features - feedback

Link to the spreadsheets with the positive and negative feedback for the respective features.

Negative feedback:

https://drive.google.com/file/d/1FvUVhvnQDOTMPCKjIe0xJf2PwxuN9rxF/view?usp=sharing

Positive feedback :

https://drive.google.com/open?id=1aYxZsYRwFP99pWY5lMArdW_fuBDHUwKe