Faculty of Arts and Sciences

Department of Computer Science

CMPS 253 – Software Engineering

Spring 2020, M. Bdeir

Software Project Management Plan

For the Group Term Project:

AUB TV

Team Members:

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Pardi Bedirian

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Revision History

Version	Date	Update Comments	Author / Updated By
1.0	03/18/2016	Initial Document.	Mahmoud Bdeir
1.1	03/21/2016	Added section 3.2, renamed 11.2, changes to the cover page.	Mahmoud Bdeir
1.2	02/24/2017	Edited based on lessons learned from Spring 2016.	Mahmoud Bdeir
1.3	03/08/2017	Removed some sections, re-ordered others.	Mahmoud Bdeir
1.4	04/13/2018	Added 'About You' section	Mahmoud Bdeir
1.5	04/22/2020	Finish Section 11.	Mohammed Ezzedine
1.6	04/22/2020	Finish Sections 1, 2, 3, 4, 5.	Stephanie Maaz
1.7	04/25/2020	Finished Sections 6, 7, 8.	Adnan Jaljuli
1.8	04/26/2020	Finsihed Sections 12, 13.	Pardi Bedirian
1.9	05/29/2020	Finished Sectinos 9, 10.	Hamza Al-Sheikh

Table of Contents

1. Document Specifications and Conventions

A) Document Specification:

- Font: 11
- Font family: Cambria

B) Conventions and Abbreviations:

- ***NTH:*** Nice to have.
- ***MH:*** Must have.
- ***Avg:*** Average.
- ***CMS***: Control Management System
- ***API***: Application Programming Interface

2. Introduction

2.1. Project Description

AUBTV is an android smart television application. The application is designed to provide features fully adjustable to display a range of content. A typical user of the application should be able to receive informative, educational as well as entertaining content about the university or else.

A user-friendly content management system accompanies the application to provide responsible parties with full control over its content.

Product features description will be given in section 3.3. For detailed project's specifications relating to the current release, refer to section 4.1.

2.2. Customer or Market Needs

According to the market report published by technavio on February 2020, the smart television market size is expected to accelerate its usually steady growth in the coming four years, i.e. during 2020-2024.

Informally, this aforementioned steady growth becomes visible when looking into the several articles on the internet specifying how people's focus has shifted once again towards the entertainment box. This is specifically true for millennials and Generation Z who were thought to have abandoned this market after the sudden take over resulting from the development in the smart phones.

This growth should be accompanied by an expected growth in the television applications market. Actually, specifically forecasted to the video on demand market.

More context specific, demand for the product can be stated/summarized through the below:

1- There exists an increasing desire year-after-year for the people to remain connected and loyal to their alma mater and tend generally tend to revisit their educational institutions more than ever before.

2- AUB alumni have been and will always be distributed all over the globe, which makes it harder for them to stay connected with the university.

3- People more than ever before are interested in watching quality educational content, with market supply shyly participating in filling this gap. Though this is not the current objective behind the application, the university could always turn to provide more and more research and educational content for its students and others.

4- A television application is a more of an easy and more of a second nature mean to stay connected to the university than to have to visit its pages through firing up the desktop, laptop, or mobile phone.

5- With the current pandemic happening around the globe that has forced institutions and students to harness the seeds of online learning they never thought they should plant; a television application can prove to be the next big step in online learning as well.

6- In the context where students must accompany their education with campus involvement to form their complete skill suit, content informing and attracting students to participate in the latter proves its importance.

It should be noted that AUBTV aims to fill these needs through features it has implemented in this release or will be implementing in subsequent ones.

2.3. Business Objectives and Success Criteria

1- Expand the university reach and provide prospective students with information regarding the university application process as well as set the image for its student life experience.

2- Encourage the current student body to be more involved on campus by providing them with essential interactive information to do so and seize all college opportunities.

3- Provide targeted users with informative and educational content.

5- Cement the image of the university as a technology innovator in the region.

6- Grow alumni engagement which will pave the way for more donors. This is to eventually open the doors to making the university's education more accessible for all students and advance medical, and other research objectives.

Product Success Criteria include:

1- The product development was completed on time.

2- The product meets most of the appropriate quality targets.

3- The product contains most of the items within the agreed scope.

4- The product features meet client objectives.

5- The product meets most of the functional requirements.

6- Product handover to the responsible party *(refer to section 5.1)* was documented and completed appropriately.

7- University relevant representatives' *(refer to section 5.1)* satisfaction target is achieved.

8- The Product complies with all university appropriate policies, objectives and vision.

9- The responsible party recommended our team for a future project.

10 - The university has decided to adopt the product.

11- The product was mentioned in the university media outlets.

12- The product was installed and promoted by users during the first month of announcement.

13- The university has decided to invest time on further improving the product.

3. Vision

3.1. Vision Statement

Making schools more effective by providing its students with additional resources that would help them succeed; as well as allow the schools to better impact the greater community.
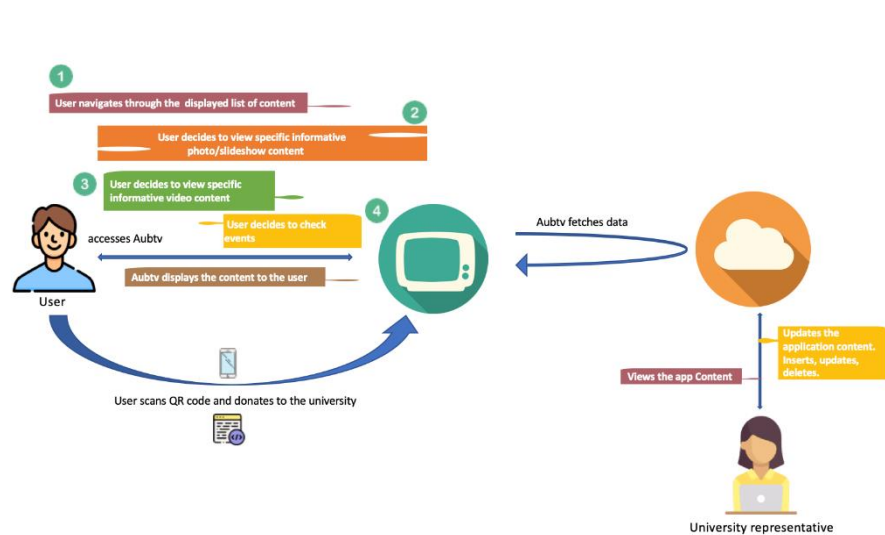
3.2. Story-Telling Diagram

3.3. Selected Features

1- View the university academic and other events' calendar.

2- View the university map.

3- Watch varying video content. The latter can include the following: in addition to educational content, information about the several majors, sports facilities, the counseling center, the surrounding university areas, etc.

4- View varying image/slideshow content. This can include in addition to the above: information about the writing center and its services, the university's and financial aid's application process, tuition fees, outlook news, etc.

5- View a video live streaming of sports and other university events.

6- Content is displayed by categories.

7- Easy access to the university donations website link through QR code scanning.

4. Scope

4.1. Scope of Initial Release

The initial release includes/supports the inclusion of the following user stories:

- TP User Story **#321**: watch video content about AUB through TV.
- TP User Story **#440**: watch videos about the university clubs and societies.
- TP User Story **#441**: watch videos about the university's libraries and its resources.
- TP User Story **#496**: watch videos about Beirut and Lebanon.
- TP User Story **#499**: watch videos about the sports facilities and courses offered.
- TP User Story **#501**: watch videos about the writing center and the services it offers.
- TP User Story **#503**: watch videos about the work-study program.
- TP User Story **#562**: watch videos about the counseling center.
- TP User Story **#564**: watch videos about the dorms and surrounding area.
- TP User Story **#565**: know more about the tuition fees, financial aid, and scholarships.
- TP User Story **#566**: know more about the venues.
- TP User Story **#323**: watch live streaming of events happening at AUB.
- TP User Story **#325**: view the AUB calendar.
- TP User Story **#438**: view content that informs about the several majors as well as the university application process.
- TP User Story **#327**: view AUB news, so I stay well informed with the latest news.
- TP User Story **#439**: View a map of the university campus.

4.2. Scope of Subsequent Releases

The following user stories will be supported in product subsequent releases:

- TP User Story **#435**: See a live streaming of the campus. (Continuous live streaming video of the college hall or other spots in the university).
- TP User Story **#443**: Play a video starting from where I left it.
- TP User Story **#567**: Search bar to search through the application content.
- TP User Story **#568**: The ability to login that would make the application experience more personal.
- TP User Story **#569**: Easier update of the content of the application through the CMS.
- TP User Story **#569**: Easier update of the content of the application through a CMS more focused on the human interaction side.
- TP User Story **#570**: See recommendations for related content.

4.3. Limitations and Exclusions

The following user stories were excluded from the projected current release:

- TP User Story **#435**: See a live streaming of the campus. (Continuous live streaming video of the college hall or other spots in the university).
- TP User Story **#443**: Play a video starting from where I left it.

Other exclusions related to the development process:

- System testing on a real android device; testing of the current release was performed only on an emulator.

The above were excluded for reasons relating to time scarcity especially with the current global pandemic and how it has imposed on students to leave campus and go back to their homes. This also hindered the ability to meet face to face which is much needed during a software development process.

Other limitations include:

1- Monetary limitations: A software development kit that would have allowed us to create a multi-platform television application was beyond the budget allocated for our product.

2- Time limitations: We have initially decided to develop the product in react native, however, faced with errors that were very new and incomprehensible to us in the time period allowed to develop the product, opted to use android studio that only works on televisions that run Android operating system.

3- Limitations related to the experience of the engineers: See 2 above.

4.4. Future Plans

4.4.1. What to fix first

- Test the app on a real tv
- Automatic pop-up for the QR code (aub donation)

4.4.2. What features to add

- Interactive map
- Live streaming section

4.4.3. What went right

- Development of a fully functional app
- Abiding by the requirements

4.4.4. What went wrong

- testing of the app due to the world-wide pandemic
- In team collaboration concerning some deliverables

5. Business Context

5.1. Stakeholder Profiles

Refer to worksheet A in appendix.

Note that as our application does not store sensitive content (e.g. credit card information), legal authority of the university or else is not included as a stakeholder in our assessment. As we will not be responsible for content creation and sharing, the latter legal obligations should be handled by the client.

5.2. Operating Environment

An android system smart television with an established network connection must be available in order to use the product. The product interface language is English. It is strongly suggested that the test-user must have a working command of this language.

5.3. Business Opportunity

AUB TV presents no monetary opportunity, ads and other forms of income are not supported in this application. This works in parallel and well under the umbrella of the university's non-profit organizational vision.

Some non-monetary business opportunities would include and are not limited to:

1- Students engagement and formation opportunities.

2- Alumni network expansion and alumni connection strengthening.

3- Encouraging donations to the university.

4- Better informed prospective students.

5.4. Complete Product Features

TP ID	Feature	Value
1135	Watch informative, educational, entertaining video content produced by the university on TV.	*MH*
1136	View informative, educational, entertaining slideshow or images content produced by the university on TV.	*MH*
1137	View the university's academic and other events calendar.	*MH*
1138	View the university map.	*MH*
1139	View live streaming of university's sports and other events.	*AVG*
1140	Easy access to the university donations website link through QR code scanning.	*MH*
1141	Have an ongoing live streaming of the campus.	*NTH*
1143	Play a video starting from where it is left.	*NTH*

6. Deliverables

ID	Date	Deliverable	Responsible Party
001	April 20	Vision and Scope Document	Stephanie Maaz
002	February 9	Draft User Stories & Use Case Diagram	Adnan Jaljuli Hamza Al-Sheikh Mohammed Ezzedine Stephanie Maaz
003	February 5	Screen Mockups	Mohammed Ezzedine
004	March 2	Prototype 1	Mohammed Ezzedine
005	April 12	Detailed Design Document	
006	April 25	Draft SPMP	Adnan Jaljuli Hamza Al-Sheikh Mohammed Ezzedine Pardi Bedirian Stephanie Maaz
007	April 28	UAT Test Cases	
008	April 17	Known Issues	Mohammed Ezzedine Stephanie Maaz
009	April 19	Release Notes	Hamza Al-Sheikh Pardi Bedirian
010	May 1	Compiled And Deliverable Machine Code (Binaries)	Mohammed Ezzedine
011	May 1	Source Code	Mohammed Ezzedine
012	May 1	SPMP (print and MS Word file)	Adnan Jaljuli
013	May 2	Deployment (Demo of the Software)	Mohammed Ezzedine

7. Milestones

ID	Date	Milestone
001	March 2	Prototype 1
002	April 16	Implementation Complete
003	April 25	Technical Preview (Alpha Testing Complete)
004	April 16	Code Freeze (no more features)
005	April 27	Release Candidate (Beta Testing Complete)
006	April 28	RTM Ready
007		Deployment Complete

8. Requirements
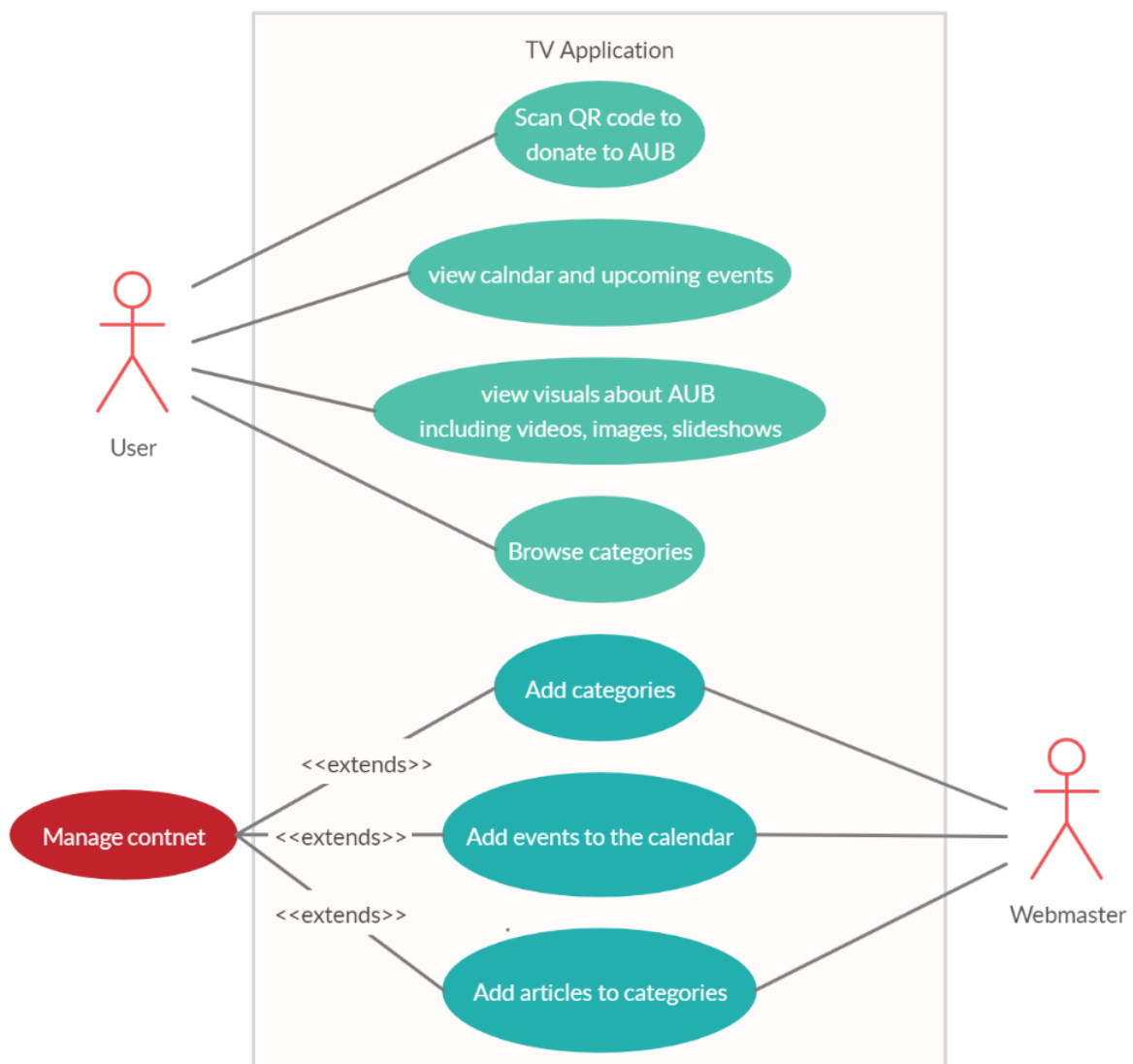
Use Case Diagrams
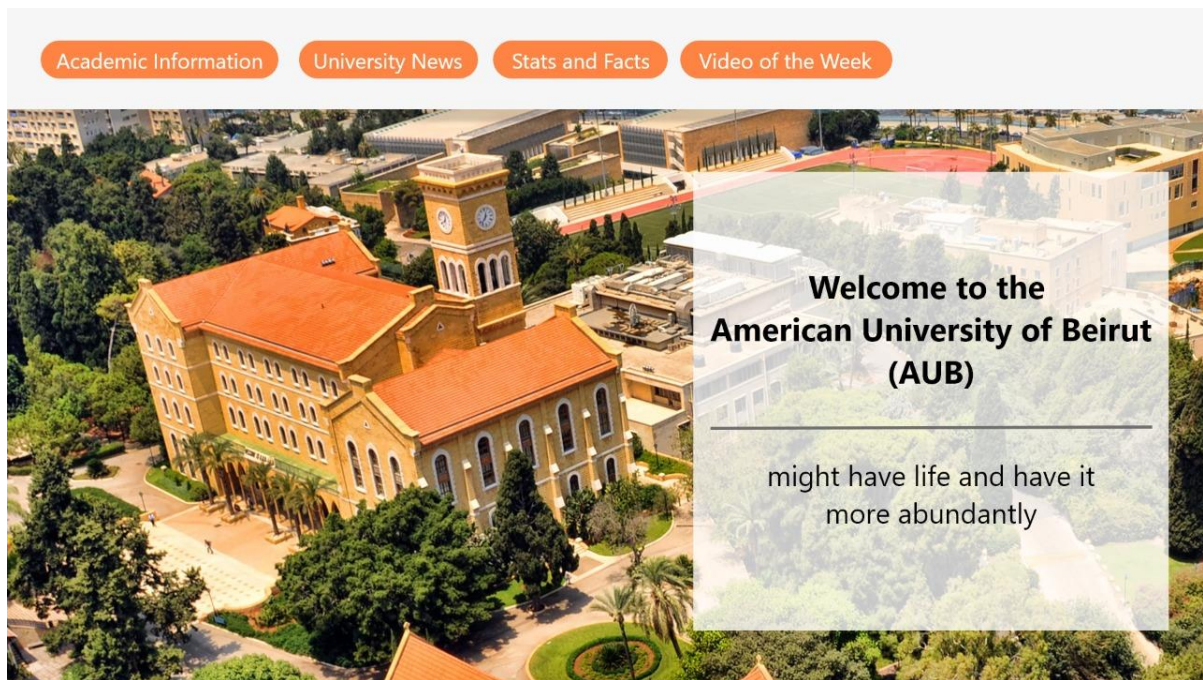

Figure 2 Use Case Diagram
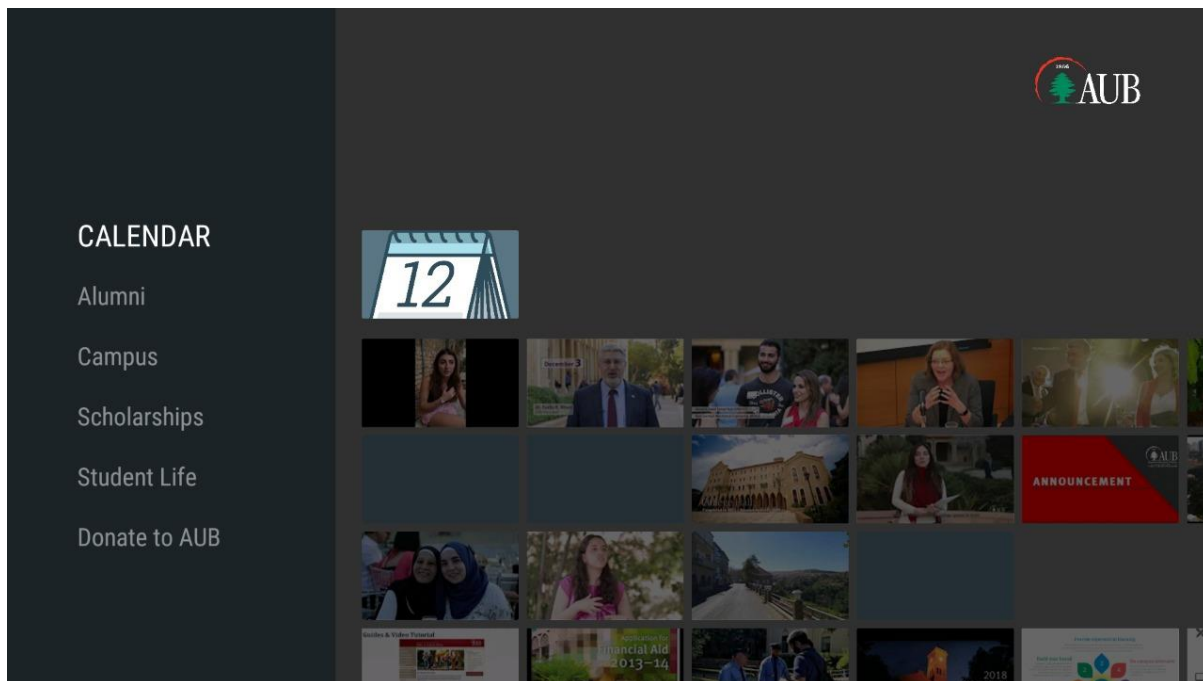
8.1. Screen Mockups
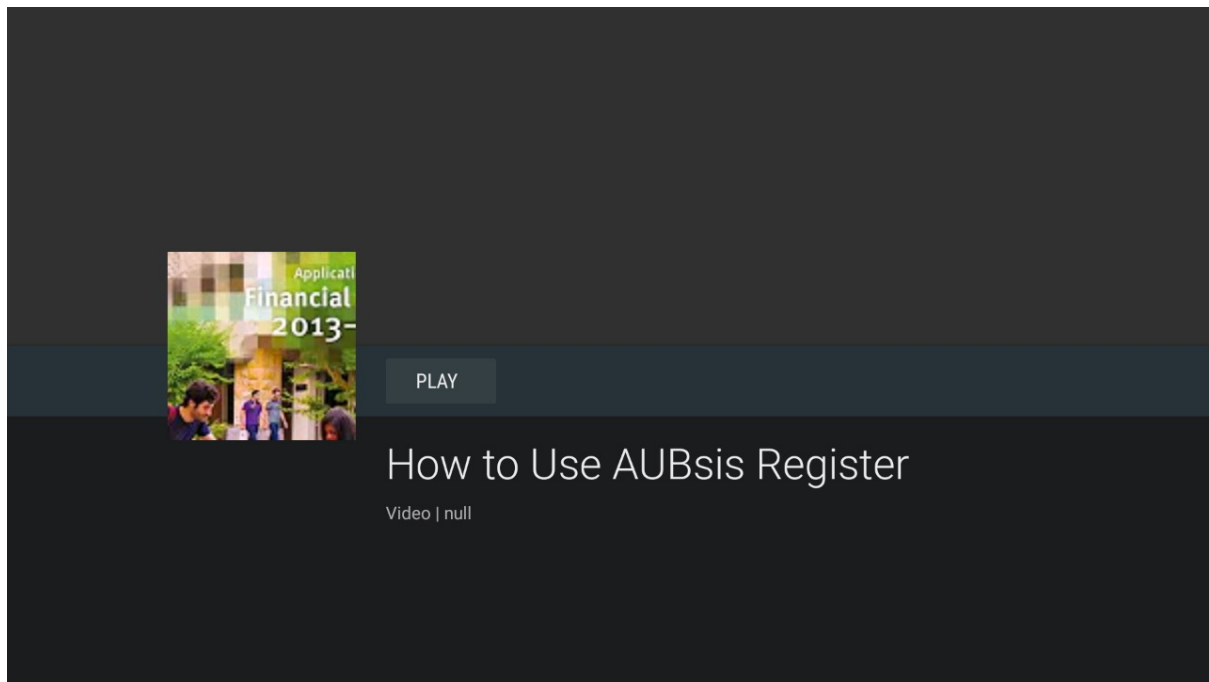

Figure 3 Screen Mockup
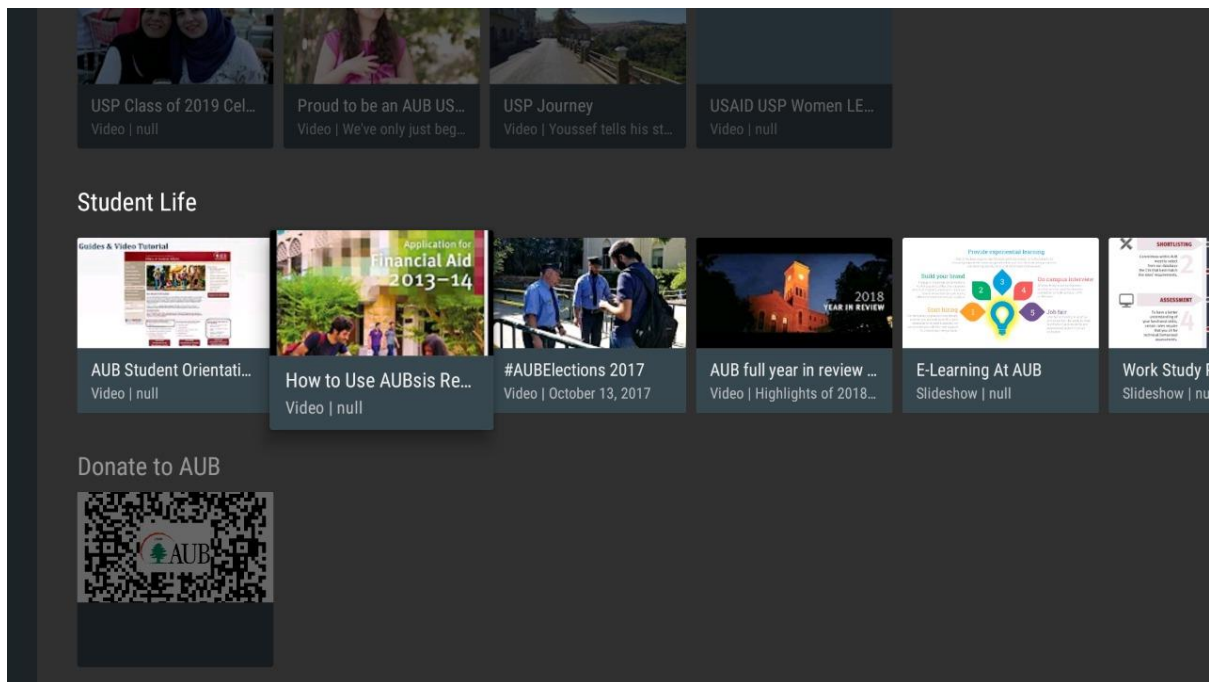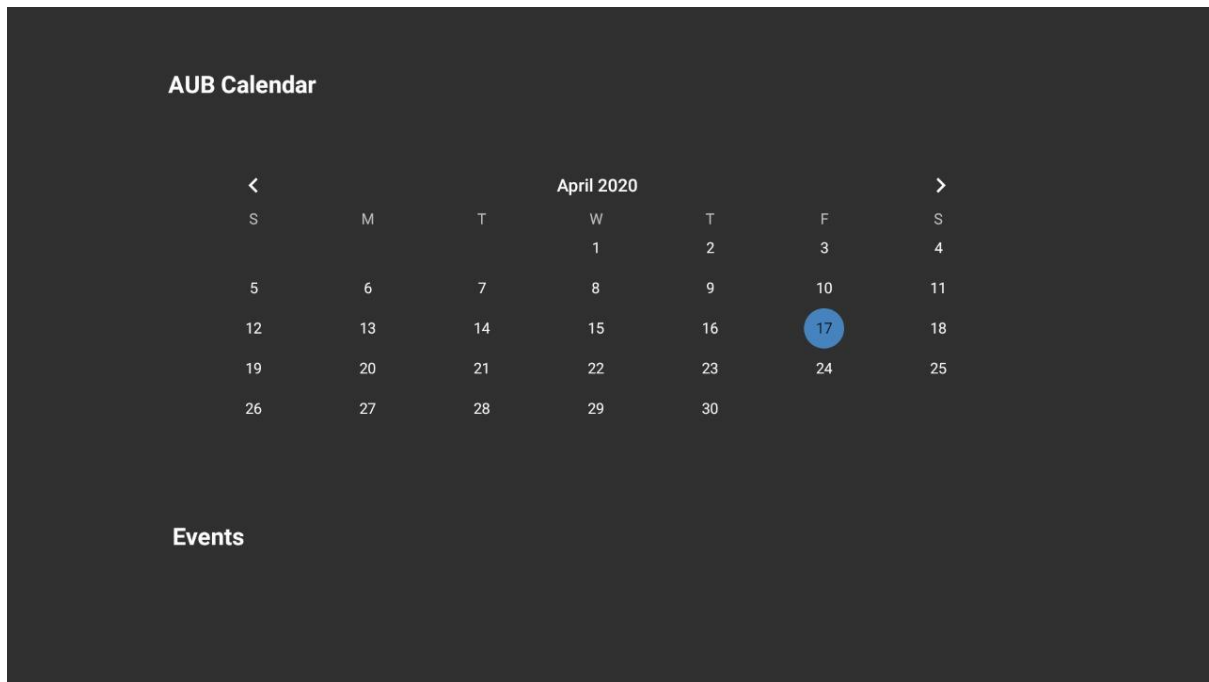

Figure 4 Screen Mockup

Figure 5 Screen Mockup

Figure 6 Screen Mockup

Figure 7 Screen Mockup
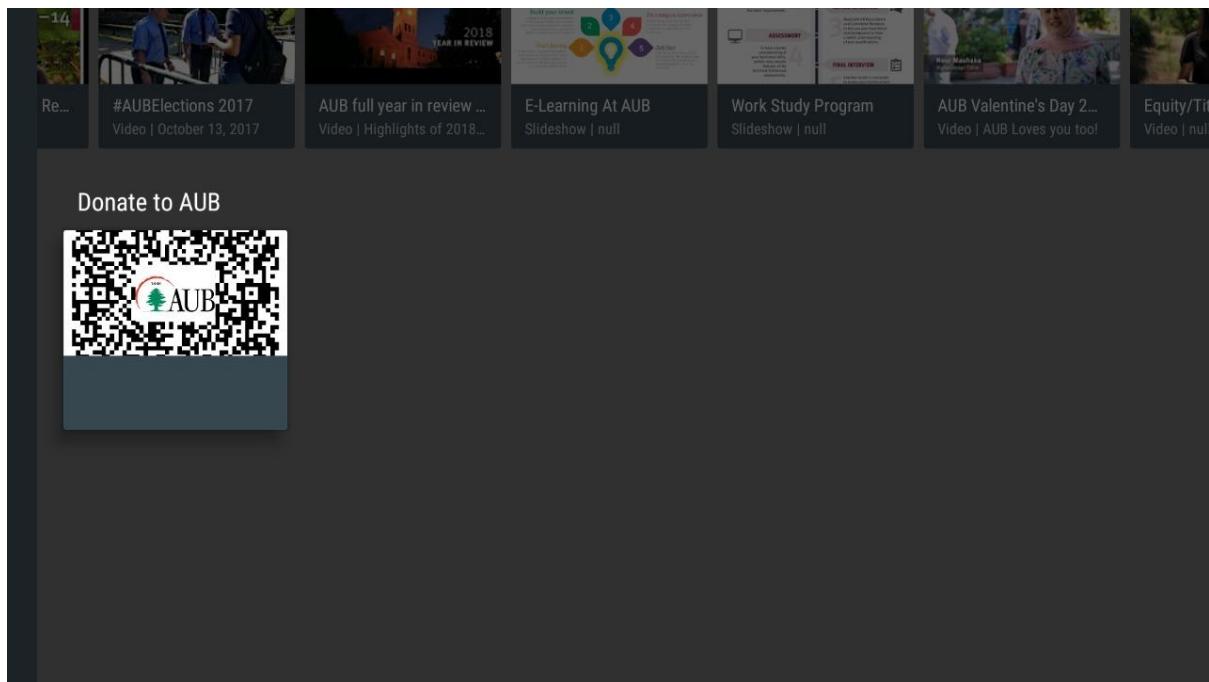
Figure 8 Screen Mockup
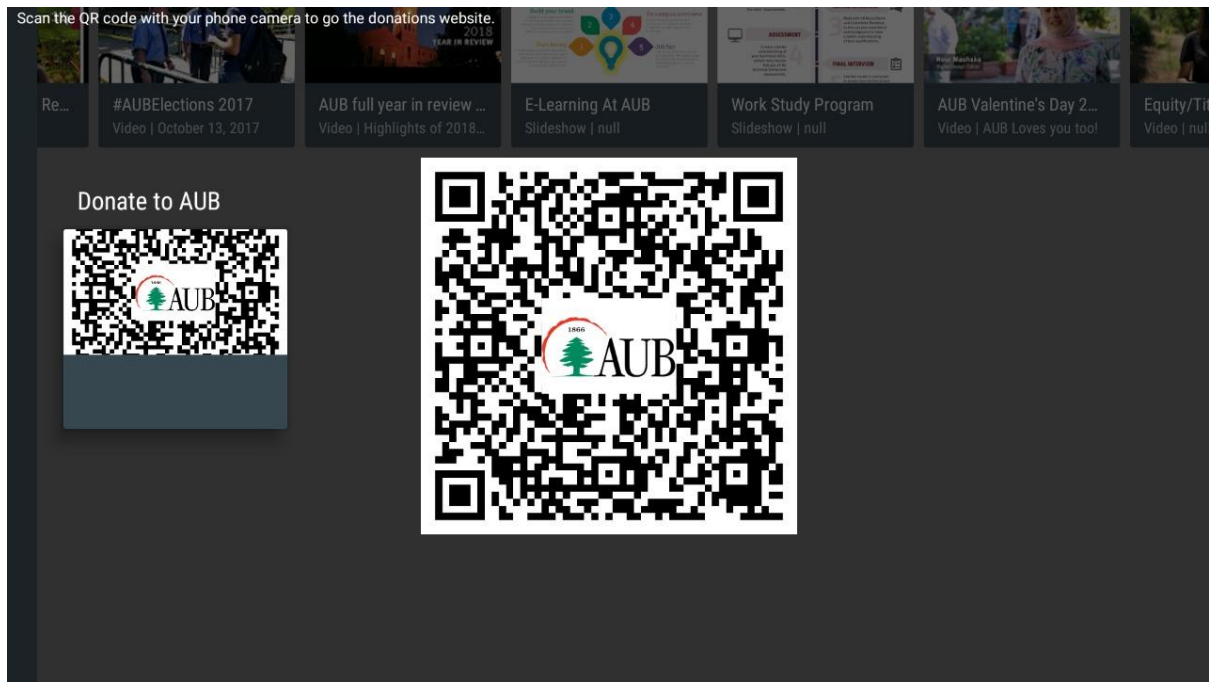
Figure 9 Screen Mockup

8.2. User Stories

- TP User Story **#321**: watch video content about AUB through TV.
- TP User Story **#440**: watch videos about the university clubs and societies.
- TP User Story **#441**: watch videos about the university's libraries and its resources.
- TP User Story **#496**: watch videos about Beirut and Lebanon.
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- TP User Story **#439**: View a map of the university campus

8.3. Non-Functional Requirements

- Accessibility: The TV application requires access to the database through the API updated by the CMS.
- Reliability: In order to function, the TV application must have access to internet connection at all time.
- Usability: To use the TV application, the user must have an Android smart TV

9. Project Organization

9.1. Process Model

We are using Scrum as the process model.
Every sprint is designed with the objective of addressing a specific user story

The bug found is fixed and tested by the developer who was in charge of the segment of the code it was found in. Bugs where communicated and documented in the blog and weekly reports.

9.2. Organizational Structure & Project Responsibilities

ID	Task	Assigned Member
1	Code, spmp, requirements	Mohammad Ezzidine
2	Code, presentation	Stephanie Maaz
3	Code, testing	Adnan Jaljuli
4	Code, video	Hamza F. Al Sheikh
5	Code, Spoc	Pardi Badridian

10. Managerial Process

10.1. Management Objectives and Priorities

Knowing that AUB is going through financial difficulties during these challenging times, minimizing cost is the outmost priority. That would be done by using open-source solutions rather than buying sass or building services from scratch. In the tradeoff between scope and schedule, we decided to prioritize schedule over scope. Through this pandemic AUB needs more marketing channels to reach more people while the campus, and the whole country is on lockdown. The scope comes least, as we are working on finishing a fully functional app with the main important requirements.

10.2.   Assumptions, Dependencies, and Constraints

Assumptions:

- The university will accept our app as an official aub application
- The app will work no all android tvs

Dependencies:

- Depending on youtube being pre-installed on android tvs
- Depending on AUB creating content and adding it the application

Constraints:

- Tv app will only work on android televisions
- We can only add features the communication office accepts

10.3.   Project Risks

10.3.1. Risk Table

Risk ID	Description	Category	Proba bility	Impact	Risk Exposure
1	Product will not be accepted by Mr. Bdeir	Process Definition	50%	$ 18,000.00	$ 9,000.00
2	Time constraint	Staff Size and Experience	10%	$ 6,000.00	$ 600.00
3	Communication office Approval	Customer Characteristics	50%	$ 18,000.00	$ 9,000.00
4	App failure on real TV	Technology to be built	15%	$ 6,000.00	$ 900.00

10.3.2. Discussion of Risks to be Managed

First of all, we agreed as a team of continuously giving feedback to Mr. Bdeir after each milestone, and that is to make sure that we'll end up with a project he will approve on. Using Scrum as an spoc, we were trying to manage the time constraint risk, as scrum and the agile methodology focus on fast execution. We were also visiting the communication office as frequent as possible to gather feedback and keep them up-to-date. Lastly, we couldn't manage testing the app on a real TV due to the outbreak of the pandemic, leaving this risk out of the scope of management.

10.3.3. RMMM Plan for each risk

10.3.3.1. Risk Mitigation

10.3.3.2. Risk Monitoring

10.3.3.3. Risk Management

Risk Information Sheet			
Risk ID 1	Date 26/02/2020	Probability 50%	Impact high
Description Product won't be accept by Mr. Bdeir			
Refinement / Context The app has to pass through Mr. Bdeir before gaining acceptance from the communication office			
Mitigation / Monitoring Discussing his comments after every meeting			
Management / Contingency Plan / Trigger Keep on updating him after every milestone			
Current Status On going			
Originator Hamza F. Al Sheikh		Assigned All team members	

Risk Information Sheet			
Risk ID 2	Date 04/10/2020	Probability 10%	Impact High
Description Time constraint			
Refinement / Context Risk of not being able to finish the app on time			
Mitigation / Monitoring Sprints on target process			
Management / Contingency Plan / Trigger Scrum meetings discussing progress			
Current Status Solved			
Originator Hamza F. Al Sheikh		Assigned All team members	

Risk Information Sheet			
Risk ID 3	Date	Probability 50%	Impact high
Description Communication office Approval			
Refinement / Context Not getting the approval of the communication office to publish the app			
Mitigation / Monitoring Sending emails to the office concerning app progress			
Management / Contingency Plan / Trigger Discussing responses within team members			
Current Status On going			
Originator Hamza F. Al Sheikh		Assigned All team members	

Risk Information Sheet			
Risk ID 4	Date	Probability 15%	Impact high
Description App failure on real TV			
Refinement / Context After the breakout of the pandemic, we don't have access to a real TV for testing			
Mitigation / Monitoring Kept on testing on an emulator			
Management / Contingency Plan / Trigger Test on a real TV as soon as possible			
Current Status On going			
Originator Hamza F. Al Sheikh		Assigned All Team Members	

10.4.   Change Management and Control

We only have a gentleman agreement with Mr. Martin concerning the acceptance of the tv app. A change in the office of the communication might change the deal with them.

10.5.   Monitoring and Controlling Mechanisms

We used Git and Github to control and monitor our code. To maintain all of our documents, we created a folder on Google Drive so that all of us stay up to date. We also used zoom for meetings between the team to monitor the progress. Target process was an excellent asset for us to keep thinking about finishing requirements all the time.

10.6.   Weekly Progress Reports

Weekly report
Team: TV APP 2 Week: 1 Date: Jan 24, 2020
Completed Tasks
Choose Tv app as the team's project
Ongoing Tasks
Research about all possible technologies
Comments
The team was undecided at first concerning the app, but after further investigation we decided to go for it.

Weekly report

Team: TV APP 2

Week: 2
Date: Feb 1, 2020

Completed Tasks

After research, we decided to go for you.i framework for building cross-platform TV application

Finished requirements and app features

Ongoing Tasks

Waiting for the You.i team to reply

Comments

We are not sure about the price of you.i

Weekly report

Team: TV APP 2

Week: 3
Date: Feb 8, 2020

Completed Tasks

Team got familiar with react native

Ongoing Tasks

You.i didn't reply to the email yet

Comments

Weekly report

Team: TV APP 2

Week: 4
Date: Feb 14, 2020

Completed Tasks

Decided to build the app using only react native.

Ongoing Tasks

App being built using react native

Comments

You.i framework turned out to be very expensive, so we decided to build our cross-platform app using only react native (ios and android)
Canceled **(February 10, 2020)**

Weekly report

Team: TV APP 2

Week: 5
Date: Feb 21, 2020

Completed Tasks

Target process tool initiated
MVP was built using react native
Meeting with the communication office

Ongoing Tasks

Building the app on a real machine
Building two version of the app using different technologies:
- Flutter app
- React native

Comments

We were having difficulty building on the sony tv we have due to restriction from the maker

Weekly report
Team: TV APP 2 Week: 6 February 26, 2020
Completed Tasks
Canceled building the app using react native Final decision: app is going to be built natively on android.
Ongoing Tasks
Building the app using Android
Comments
The app didn't build using react native, so we decided to build the app for only android TV using pure Java. The flutter version was built on the tv but it excluded important functionalities like focus and scrolling. We had to start the work again.

Weekly report

Team: TV APP 2

Week: 7
Date: March 2, 2020

Completed Tasks

App built on Android

Ongoing Tasks

Working on different features in the android tv app

Comments

This was our last access to a real tv for testing due to the covid-19 pandemic outbreak. The app built successfully.

Weekly report

Team: TV APP 2

Week: 8
Date: March 12, 2020

Completed Tasks
App complete with dummy data

Ongoing Tasks
Building a database and an api for real data Integrating a video server (canceled later on) Integrating Youtube Api (canceled later)

Comments
Not sure whether to use an open-source cms or build our own cms. We're having trouble communicating due to online connection.

Weekly report
Team: TV APP 2 Week: 9 Date: April 15, 2020
Completed Tasks
Real data from an on the cloud database built Slide show functionality built Calendar Built
Ongoing Tasks
Minor bug fixes UI enhancements Joomla cms built
Comments
The team successfully finished building the app

11. Technical Process

11.1. Methods, Tools, and Techniques

- GitHub: online template to share our code on
- Android Studio: IDE used to write and run the code.
- Android TV Emulator: TV Emulator used to simulate the app on a virtual TV.
- SmarterASP: Hosting server used to publish the CMS, API and the database.
- TargetProcess: Used for writing the requirements, and convert them into sprints.
- Slack: Communication software used to share ideas among the team members, as well as to communicate with the boss.
- Postman: Used to test the API functions as well as create a mock server to simulate an API.
- Blogger: Template used for writing the project blog and update it frequently.
- MindMeister
- Joomla: an open-source CMS used to manage the data by the user and store them in the database.
- Selenium: Used to test functionality of the CMS and the API.
- Java: Programming language used for writing the app.
- PHP: Programming language used for writing the API.
- MySQL: Database used to store the data of the app.
- Google Drive: Cloud used to share documents among team members.
- OneDrive: Cloud used to live edit documents by all the team members.

11.2. System Modeling

11.2.1. Context models

11.2.1.1. Technical Interfaces

1. The Android TV App
2. Control Management System: Web interface designed by Joomla for the admin to upload data through.

11.2.2. Structural models

The Structure Hierarchy is defined as:

1. TV APP
    1.1. Gird View (The Home Page)
        1.1.1. Cards
            1.1.1.1.   Image
            1.1.1.2.   Slide show
            1.1.1.3.   Video
                1.1.1.3.1.   Video Details Page
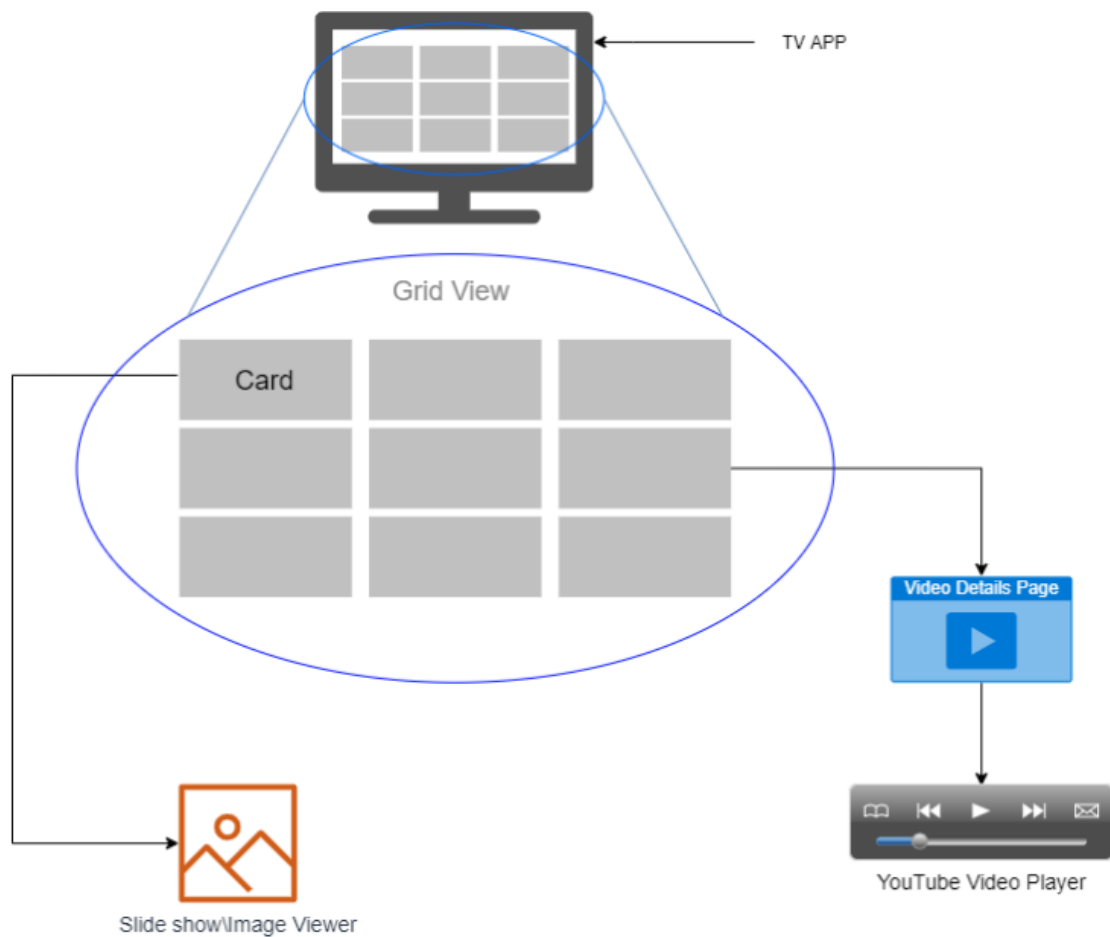   1.1.1.3.1.1. YouTube Video Player

Figure 10 Structural Model

11.3. Software Documentation
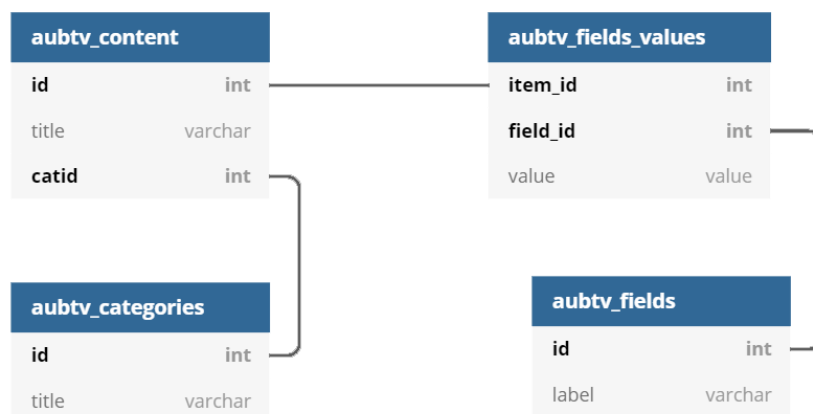
11.3.1. Database Model

Figure 11 Database Model

11.3.2. Data Dictionary

- aubtv_content: table that stores the title and the category id of videos, slideshows and events
- aubtv_categories: table that stores the categories of each item stored in the content table
- aubtv_fields: table for storing different fields that changes among the type of the item: e.g. (type, description, youtubeId, thumbnail image url) for videos, (type, description, image Urls) for the slideshows, etc.
- aubtv_fields_values: table containing the value of each field regarding each item

This design was produced by Joomla. It makes adding new fields easier and gets rid of the anomalies and the extra unneeded work.

11.4. Configuration Management

Managing changes that are applied to the software was done as following:

- Program code changes: these changes were confirmed by Stephanie Maaz and Mohammed Ezzedine.
- Git repository actions such as merging, branching: all the team members were allowed for branching and pushing commits, but merging branches together and confirming pull requests were Mohammed Ezzedine's job.
- Requirements, these changes were the responsibility of Hamza Al-Sheikh.
- Updating the test cases was done by Adnan Jaljuli.
- Adjustments on the SPMP were to be confirmed by Mohammed Ezzedine.

11.5. Quality Assurance and Control

Testing the backend was done through selenium: controlling the browser to navigate to the cms, add several items (videos, slideshows and events), then call the API function to ensure that the added items are presented.

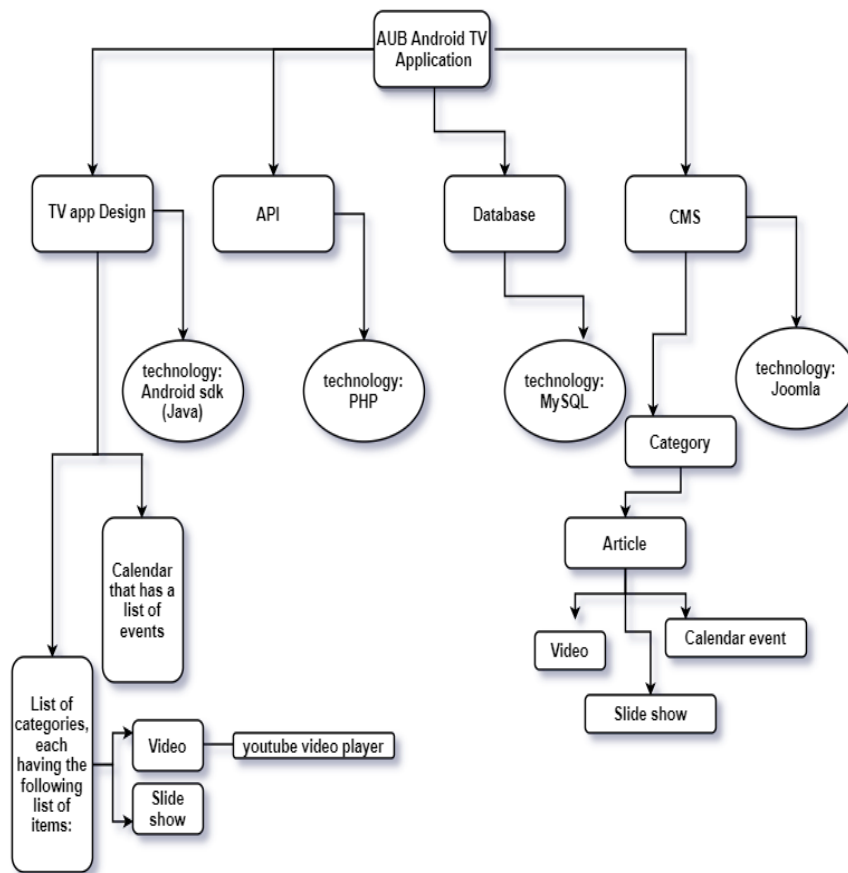# 12. Work Packages, Schedule, and Budget

12.1. Work Packages (WBS)

12.2. Sprint Schedule

Sprint	Time Period	Description Of The Potentially Shippable Product
1	2/2/2020	Canceled the use of You.i framework for cross-platform application.
2	2/26/2020	Canceled the use for React-Native for application running on Android and Apple TVs.
3	2/28/2020	Canceled the use of Flutter for application running on Android and Apple TVs.
4	3/2/2020	Build a layout and run it on a real device (Android TV).
5	3 /4/2020	Integrate a video server Saving videos as mp4 file formats in a file server, or as a media type in database is expensive, that's why a video server is preferable. Available servers: Vimeo

6	3/6/2020	Canceled the integration of a video server having Vimeo the available server for the following reasons:
		   i. It's not free ($240/year)
		   ii. Live streaming is expensive ($75/month $\equiv$ $900/year)

7	3/9/2020	Add a main slider in the home page.
8	3/12/2020	Integrate the YouTube API a. Free streaming for live and recorded videos.

		b. No additional work would be needed concerning uploading the old videos. Requirement: YouTube being installed on the device (doable, since both YouTube and Android are owned by Google, so it's going to be either built in the device, or available in the Play Store). Note: we didn't have the chance to test it on a real TV yet.
9	3/13/2020	Displaying Images and displaying Slideshows.
10	3/30/2020	Displaying Calendar of Events.
11	4/17/2020	Completed CMS (Joomla) and API (PHP).

12.3.   Budget

1. Hosting the CMS: different plans with different prices.
2. Deploying the app to the play store. In case we were to publish the app, a 25$ subscription fee would be needed.

13.   Project Resources

13.1.   People

<u>Team members:</u>

      Adnan Jaljuli

      Hamza Al-Sheikh

      Mohammed Ezzedine

      Pardi Bedirian

      Stephanie Maaz

13.2.   Hardware and Software

<u>Software:</u>

    a.   Android sdk
    b.   Java
    c.   Joomla
    d.   MySQL database

13.3.   Special Resources

For learning Joomla:

https://websitesetup.org/build-website-with-joomla/

13.4.   Reference Materials

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- Zhangxing, An, L. T., & Moses, A. (n.d.). Android TV application hands on tutorial. Retrieved from http://corochann.com/android-tv-application-hands-on-tutorial
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14. About You

14.1.   About Me

- Mohammed Ezzedine:
    1. I am Mohammed Ezzedine, junior Computer Science student. I am interested in software in general, and currently in web applications. I'm motivated about learning the open-source software produced by Microsoft, especially ASP.NET Core. I have several goals in mind, my next one is to start learning about the authentication process and the OpenID, how to works and how to implement one from scratch.
    2. In the future, I see myself as a software architect, who's mainly concerned about writing the right stuff using the right tools. I'm not interested in theories and studying algorithms as much as I am into software.
    3. Five years from now, I hope I would've gained the needed experience and knowledge to work in one of the big companies in Europe or US.

- Stephanie Maaz:
    1. I am Stephanie Maaz, a junior computer science student holding an undergraduate degree in Finance from the American University of Beirut. I have always been motivated by the design and thinking that goes behind different concepts. The more complex the design, the more motivated I become to tear it apart, put it back together and see all its steps unfold. Currently, my goal is to step further into the area of more complex algorithms and deepen my knowledge of software design patterns.
    2. In the short term, my aim is to graduate as high on the ladder of excellence as possible, then go after my master's degree in an area that will be decided during the coming year. In the future, I have 2 roads in mind. Either put my knowledge gained of complexities, algorithms, software design, and theories to work in a company on products I believe in their impact and mission, or to pursue research and teaching in subjects of interest.

3. Whether it be working or studying, in Lebanon or outside of it, in five years, I see myself doing what I want to do, given five years of acquired deeper knowledge and experience.

- Adnan Jaljuli:

    1. As a Computer Science undergraduate student, I was most interested in courses that included theory, mathematics and algorithm design. And to improve my abilities in these fields, I am now working hard to compete in the upcoming LCPC (Lebanese Collegiate Programming Competition) and hopefully be able to make it to later stages in the competition, the ACPC and ICPC. It offers me a competitive environment to learn and be a faster, more efficient programmer. This will certainly be a tool to use for future career as it improves my logical thinking and teaches me a lot of algorithms and theory that are not taught in universities. I would also like to know more about the hot topics in computer science right now such as data science and artificial intelligence.
    2. Certainly, graph theory and algorithm design are two of the most interesting topics to me. And I see myself in the future writing papers to discover new theories in the field of algorithms.
    3. In five years, I see myself pursuing a PhD in the field of graph theory at a prestigious university.

- Pardi Bedirian:
    1. I'm Pardi Bedirian, I was born and raised in Kuwait, I'm double majoring in physics and computer science and I'm going into my final year of university. I have an obsession for playing the piano, I've been doing it ever since I was 6 and I've won multiple national competitions in Kuwait.
    2. I thoroughly enjoy programming and statistics, hence I'm very passionate about data science. I'm also intrigued by Machine Learning which includes techniques such as decision trees, logistic regression and survival analysis that will definitely the contribute immensely towards the process of solving complex data science problems.
    3. In 5 years, given my desire to work in teams and my love for data science, I see myself managing a successful team of bright data scientists at a large financial or tech company.

- Hamza Al-Sheikh:

    1. I'm a computer science junior minoring in economics. Although I feel I need to explore more in the field to narrow down my interests, I'm mainly interested in algorithm design now. I wanted to study business; I competed and won in startup competitions, and started my own small business when I was 16 years old. After the experience I had I knew that I want something more mind scratching and computer science was the bridge between building a business and being intellectual.

2. I see myself working for, or building a startup in domains such as FinTech or cleanTech. I hope that my education and self-improvement help me innovate in fields like algorithms and graphs, which enables me to apply my innovation in the sectors I mentioned before.
3. In five years, I see myself pursuing my PhD and searching for business use cases to implement my findings

14.2. Lessons Learned From Working in a Team

- Pardi Bedirian:

Working in teams has improved both my technical and soft skills. I was fortunate enough to work on my project with bright individuals who enlightened me with new perspectives. The most important benefit that I got out of this course is that it taught me to work on a realistic project as a team and coordinate the work effectively and efficiently which will help me tremendously in my future endeavors.

- Stephanie Maaz:

Being in a team where each member comes from a different background has taught me how to convey ideas and communicate them in different ways, as well as seeing problems through different lenses, things that I wouldn't have learned in solitary work. Working on such a demanding project has helped me enhance my coding skills as well as learning about app development and the various steps needed to bring such projects to life. A knowledge that will prove indispensable in the future.

- Adnan Jaljuli:

Working in a team taught me that the most important aspect of a successful project is honest communication among the members of the team. Honest and clear communication is key, and if it is not done right then the project will fail no matter how good members are on an individual level. In this project I was lucky to be with good team players who know how to work well in a team.

- Hamza F. Al Sheikh:

Working with a team of smart people is much harder than leading a team of average teammates, and I was fortunate enough to be in such a team. I learned that more than one perspective or idea can be correct. Moreover, being on different point of views is healthy for the project, as the discussion will give more insight and thus a better solution for what we're working on. Lastly, I found that we should care about all team members, and adjust to the needs and circumstances we are all facing to successfully finish tasks.

- <u>Mohammed Ezzedine:</u>

For a person who's used to doing things on his own, working with a team wasn't an easy task at all. It's true it wasn't the best experience for one to have in a team project, but yet I've learned some valuable lessons from it. Distributing tasks among the team members wasn't the obstacle, but going through discussions trying to convince them by your ideas was the real action. Just then, you realize deep inside whether you truly believed in what you're saying or not, and that makes you understand the importance of having a team and presenting your thoughts for another person with a different perspective.

Appendix A – Table of Figures

Appendix B – Definitions, Acronyms, and Abbreviations
Appendix C – SPMP Grading Criteria