FC Package

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Prototyper	*Project Manager*	*Feasability Analyst*

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Lifecycle Planner	*Software Architect*

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Requirements Engineer	*Operational Concept Engineer*

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Contents

1   Version History

Date	Author	Version	Changes Made	Rationale
08/20/2013	SK	1.0	Original for CS 477; Tailored from ICSM REQ Template	To fit CS 477 Course Content
09/14/2013	Team 1	1.1	First version	Project Requirements
10/15/2013	Team 1	2.0	Shifted marketing focus from LA Metro to TAP	Reassesment of stakeholder values
11/01/2013	Team 1	2.1	Fixed various design flaws	Incorporated feedback from ARB review board

FC Package   Version 2.1

2   Team Members

Elisabeth Brooks *Project Manager*

1. Create and manage schedules.
2. Maintain project management tool (Asana).
3. Hold team members accountable.

Andrew Borba *Prototyper*

1. Create application prototypes.
2. Develop the front-end.

Jorge Go *Feasibility Analyst*

1. Identify and analyse risks.
2. Plan risk mitigation strategies.
3. Run business case and cost-benefit analyses.

Katherine Hu *Graphics Designer*

1. Validate application design.
2. Ensure user-friendliness and legibility.

Nakul Joshi *System Architect*

1. System design on high-level.
2. Design security systems.
3. Back-end development.
4. Manage LaTeXdocumentation.

Ian Malave *Requirements Engineer*

1. Devlop front-end and prototype.
2. Update requirements to match prototype.

Rishi Mukhopadyay *Operational Concept Engineer*

1. Implement back-end.
2. Plan database structure.

3 Client Interaction Report

3.1 Current Infrastructure

The LA Metro Bus currently has a few options when it comes to purchasing redeeming tickets. Riders can either purchase single-ride fares on the bus or pay using pre-purchased tokens. For both these options the rider receives a paper ticket as a proof of purchase. Another option is for metro users to purchase a TAP card from many locations across Los Angeles, and be refilled from any TAP vending machine. To use these TAP cards, users simply tap their card as they enter the bus and the appropriate fare is deduced. The initial cost for the TAP card is $1 and can store values for up to three years.

There is currently no competitor for the TAP concept since it is produced and run by a government agency. The current options are either using a TAP card or pay as you go. Our product would save resources, time, and create a more user friendly interface and payment options.

3.2 Current Artifacts

Artifact	Description	Status	Planned Delivery Date
Requirements	Written list of requirements for the app	Requested	09/07/2013
Architecture	Structure of the app	Requested	11/01/2013
Life-cycle plan	Documentation of release cycle and list of new features	Requested	12/01/2013
Feasibility evidence	Documentation of feasibility of the application and use	Requested	12/01/2013

3.3 Current Business Workflow
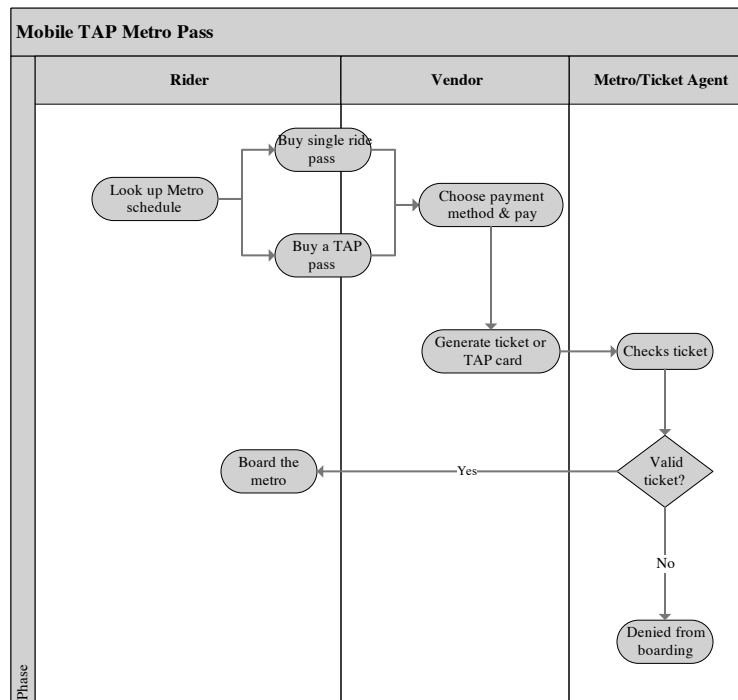
4   Operational Concept Description

4.1   Shared Vision

4.1.1   System Overview

Key Partners

1. TAP

Key Activities

1. Software Design and Development

2. Integration with Metro infrastructure

3. Marketing of application

Key Resources

1. Development Team

2. PhoneGap API

3. NFC technology

4. QR technology

Value Proposition

1. Convenience for customers to purchase and use metro tickets

2. Ticket elimination reducing cost and environmental impact

3. Technological advancement of public transportation system.

Customer Relation

1. LA Metro

2. Apple Appstore

3. Android Store

4. Windows Phone Marketplace

Channels

1. Application stores

2. LA Metro website

3. Posters and billboards at stations.
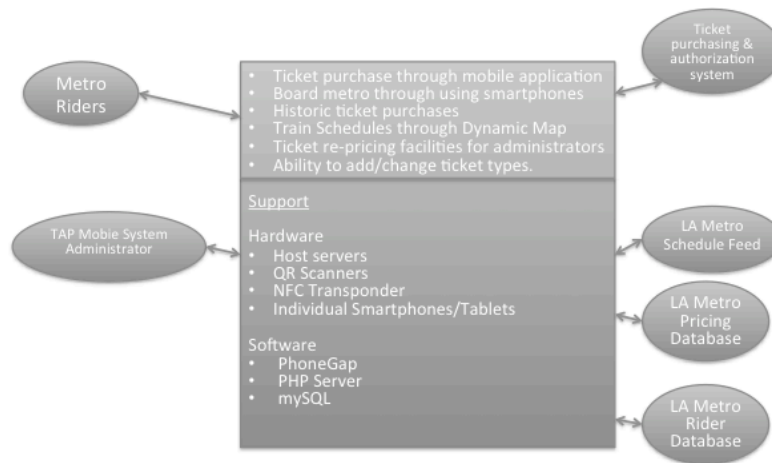
Customer Segments

1. Transportation Companies

Cost Structure

1. Development Team

2. Back-end System Administrator

Revenue Streams

1. Flat fee for project implementation

2. Recurring fee per ticket sale through application

4.1.2   System Boundary and Environment

Ticket
purchasing &
authorization
system

Metro
Riders

- Ticket purchase through mobile application
- Board metro through using smartphones
- Historic ticket purchases
- Train Schedules through Dynamic Map
- Ticket re-pricing facilities for administrators
- Ability to add/change ticket types.

Support

Hardware
- Host servers
- QR Scanners
- NFC Transponder
- Individual Smartphones/Tablets

Software
- PhoneGap
- PHP Server
- mySQL

TAP Mobie System
Administrator

LA Metro
Schedule Feed

LA Metro
Pricing
Database

LA Metro
Rider
Database

4.2   System Transformation

4.2.1   System Objectives, Constraints, and Priorities

Capability Goals	Priority Level
OC-1 Cross-platform Compatible: The application is compatible with iOS Android and Windows Phone	Must have
OC-2 Account Creation: The application is able to create new rider accounts update information and log in users using existing information.	Must have
OC-3 Usage: The application allows metro riders to board trains via NFC or QR code technology.	Must have
OC-4 Payments: The application allows metro riders to pay for tickets using a secure payment gateway.	Must have

Level of Service Goals	Priority Level
Reliability of application	1
Usability	2
Performance of system	5
Inter-operability	3
Maintainability	4

Organizational Goals

OG-1 Increase convenience for ticket buyers.

OG-2 Decrease cost for LA Metro and ticket buyers.

OG-3 Increase efficiency of public transit system by advancing technologically.

Constraints

CO-1 Align with Current Infrastructure: The new application must complement the existing tap card system, and be implemented with minimal changes to existing infrastructure.

CO-2 Cross Platform Compatibility: The new application must be compatible with major smartphone operating systems(iOS, Android and Windows)

CO-3 Phone Hardware: The application must be compatible with the existing hardware in major smartphones.

4.2.2   Proposed Operational Concept

The application will allow metro riders to use their mobile devices to purchase tickets and board trains eliminating the need for physical TAP cards. The new system will act as a complement to the TAP card system; allowing riders to use existing metro facilities if they wish.

    For those smartphones enabled with NFC, the rider will be able to tap their phones instead of their tap cards. For those smartphones not enable with NFC, QR readers will be installed at stations that have turnstiles. For stations that do not have turnstiles, Metro agents will be given a QR reader to verify tickets on the train.

4.2.3   Proposed Element Relationship
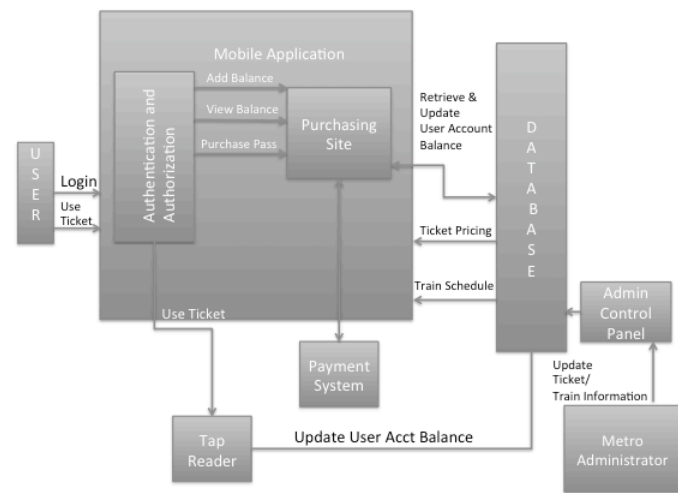
4.2.4   Proposed Workflow
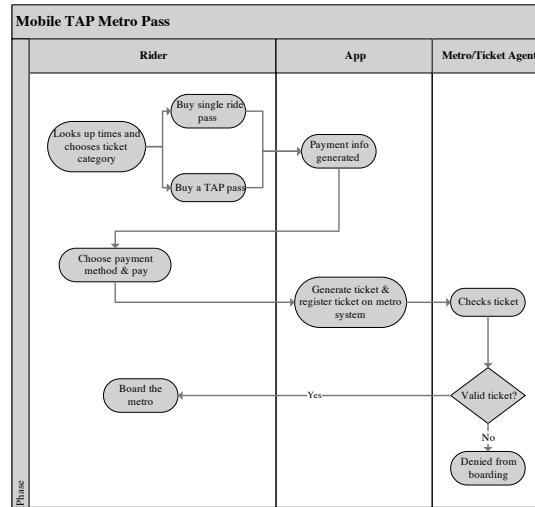
5   Requirements

5.1   Capability Requirements

5.1.1   Platform

1. The application shall be compatible with the iOS mobile platform.

2. The application shall be compatible with the Android mobile platform.

5.1.2   User Accounts

1. If it is a users first-time opening the application, the application shall prompt the user to enter an email address, password, credit card information, and to create or link to a TAP account.!

    (a) If the account is created successfully, the application shall send a confirmation to the users stored email address.

    (b) If the account creation is not successful, the application shall display an error message that prompts the user to reenter their information and will not be logged in.

2. If a returning user opens the application, it shall prompt the user to enter their log-in information.

    (a) If the log-in attempt fails, the application will display an error message that prompts the user to reenter their log-in information.

    (b) If the log-in attempt succeeds, the user will be shown a transit management screen.

5.1.3   Usage

1. If the application loses connectivity, the application shall display an error message.

2. The application shall retrieve the users location at intervals of 120   10 seconds.

3. Upon updating the users location, the application shall update information for nearby Metro transportation.

4. The application shall be able to display a static map with Metro routes.

5. The application shall allow the user to change their email address.

6. The application shall allow the user to change their password.

7. The application shall allow the user to delete their account.

8. The user shall be able to link up to 5 dependents (name & birthdate) to their account.

5.1.4   Payments

1. The application shall allow users to purchase non-exclusive TAP passes.

2. If the user selects to purchase a ticket, the application shall check to see if the user has an applicable TAP pass.

   (a) If the user has an applicable TAP pass, the application shall generate the selected virtual ticket.

   (b) If the user does not have an applicable TAP pass, the application shall confirm with the user it will charge the stored credit card.

   (c) If the card does not process, an error message shall be displayed and the order shall not be accepted.

   (d) If the transaction succeeds, the application shall create a virtual ticket.

3. The user shall be able to select up to 2 dependents accounts to be attached to a virtual ticket.

   (a) If the dependent is over 5 years old, the application shall calculate the additional ticket fare.

4. If the user selects to use their ticket, the application shall signal the gate up to a maximum of 3 attempts at 20 5 second intervals to accept.

   (a) If the application is unsuccessful on the 3rd attempt, the application shall attempt to use bluetooth to signal the gate (see 4.5).

   (b) Otherwise, the gate is unlocked, permitting the user to pass through.

5. If the application does not have connectivity when the user attempts to use a ticket, the application shall attempt to use bluetooth to use the ticket up to a maximum of 3 attempts at 20 5 second intervals.

   (a) If the application is unsuccessful on the 3rd attempt, an error message shall be displayed.

   (b) Otherwise, the gate is unlocked, permitting the user to pass through.

6. The application shall store unused virtual tickets for at least 1 year.

7. The application shall store used virtual tickets for at least 30 days.

8. The application shall allow the user to change their credit card information.

9. The application shall support remote adjustment of ticket prices (e.g., senior discount) by TAP id through a web interface.

5.2   Level of Service Requirements

LOS Requirements	Desired Level	Accepted Level
LOS-1: Concurrent Users	150000	75000
LOS-2: Start-up and user location time	7 s	15 s
LOS-3: Ticket Purchase Transaction Time	5 s	20 s
LOS-4: Update Account Information Time	10 s	30 s
LOS-5: Tickets stored per User	1500	500
LOS-6: % first-time users able to purchase ticket without outside help	80	75
LOS-7: % first-time users able to use ticket without outside help	85	80
LOS-8: % users that ride metro at least once per week that would rate ease of use at 3 out of 5 or higher	90	80
LOS-9: Average Time for User to Create an Account	45 s	60 s
LOS-10: Failed Ticket Purchases per 1000	0.25	1
LOS-11: Failed Ticket Uses per 1000	0.25	1
LOS-12: Hours per day that app shall purchase tickets	20	19.5
LOS-13: Hours per day that app shall allow use of tickets	20	19.5
LOS-14: # iOS generations app shall support	3	2
LOS-15: # Android generations app shall support	3	2
LOS-16: # versions of app that Metro system shall support	3	2

6 Risk Lists

6.1 Technical Risks

Risk# 1(Last week: 1)
Weeks Active 7

Risk Description   An unsecure platform might be exploited or easily manipulated (e.g. people finding loopholes to avoid fees), which can result in the LA Metro losing profits.

Mitigation Action Items   Our groups architect will develop a cryptosystem for our application that will be tested until it meets the clients requirements and security standards.

Risk# 3(Last week: 3)
Weeks Active 7

Risk Description   A technical malfunction of our platform might cause boarding delays for passengers and cause inefficiencies in LA Metro operations.

Mitigation Action Items   A back-up system will be designed in a later stage of the project. Also, we will advise passengers who are particularly sensitive to delays to have a back-up physical tap card.

Risk# 4(Last week: 4)
Weeks Active 7

Risk Description   Not enough end users (passengers) might not have phones on iOS and Android systems that are compatible with our app.

Mitigation Action Items   A feasibility study will be conducted to verify iOS/Android penetration rates within the LA Metro passenger base, and if needed, we can tailor our platform to target only a certain segment of the customer base that has access to the required technology.

Risk# 8(Last week: 8)
Weeks Active 7

Risk Description   We will be using PhoneGap to implement the mobile application with standard web technologies like HTML/CSS/Javascript which makes the application subject to device-specific mobile browser display discrepencies.

Mitigation Action Items   Test on a wide variety of devices within iOS/Android space (different iPhone versions and various Android phones) to ensure the application is rendered properly on all screen sizes and OS versions.

6.2   Requirement Risks

Risk# 2(Last week: 2)
Weeks Active 7

Risk Description   TAP might not be willing to implement our system or work with our group to test our platform on their systems/hardware.

Mitigation Action Items   Our project manager is currently in talks with TAP, but we could also do a proof of concept using similar hardware/systems or mock interfaces.

Risk# 6(Last week: 6)
Weeks Active 7

Risk Description   After the platform has been implemented and integrated, the TAP requirements might change, or the technologies being used in relevant processes might change.

Mitigation Action Items   If we are under a contract/agreement, the team will develop updates/patches that will adapt to new requirements. Otherwise, we will provide a copy of our comprehensive documentation for the software so that necessary changes can be handled in-house.

Risk# 5(Last week: 5)
Weeks Active 7

Risk Description   To get the application fully working and integrated into TAP/LA Metro infrastructure, there will be a large set of evolving requirements. Two semesters might not be enough time to complete the project, especially if there are unexpected risks (e.g. another developer completes the same project before we do, bureaucratic risks, etc.)

Mitigation Action Items   We will develop a running list of unexpected risks as they come up and develop strategies to approach them. For example, we would explicitly ask TAP for their timeline and ask for an exclusive partnership.

6.3   Human Resources Risks

Risk# 7(Last week: 7)
Weeks Active 7

Risk Description   Due to rapid formation of teams without proper analysis of required skill sets needed for this project we may lack the technical skills to complete this project in a professionally acceptable manner.

Mitigation Action Items   Identify team member skills and project requirements so we can individually prepare ourselves for technologies that we will be implementing next semester.

Risk# 9(Last week: 9)
Weeks Active 7

Risk Description   The statically defined list of team roles may not fit our specific project requirements.

Mitigation Action Items   Dynamically reassign team roles as the project and its requirements mature. Also the team shall be aware that responsibilities will be very flexible and we may need to step outside the scope of our assigned position

Risk# 10(Last week: 10)
Weeks Active 7

Risk Description   The amount of cooperation needed between our team and TAP may be more than expected which could make this project unfeasible for them.

Mitigation Action Items   Come up with a plan focused around the idea that TAP should have to do as little as possible. Extensive testing should be done internally before our software can be ready for beta testing with TAP. The goal should be to get it right the first time.