TourGo

Midterm Delivery Report

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Project Summary

Concept

TourGo is a Car as a Service platform which incorporates continuous learning tools via its platform to passively improve the driving behaviours of its users. Advantages of TourGo's vision include access to an untapped market of drivers, pioneering an innovative vehicle distribution model, and making roads safer.

Getting on the road as a new or recent driver in Ireland presents a variety of challenges. The upfront cost of getting on the road; finding insurance as a result of belonging to a suboptimal driving group (age, location, experience), or due to vehicle criteria (age, efficiency, engine size); vehicle maintenance; and driver training; and developing experience being difficult and expensive. These aspects represent the main challenges people face to getting on the road. TourGo was conceived in order to address these challenges and the intention is its continued operation will remedy each factor. Thus, making driving in Ireland more accessible and safer.

TourGo is a Car as a Service platform which provides each customer with a fully taxed, insured and maintained vehicle for their duration of their contract for a monthly subscription. The service utilises Internet of Things telematics devices which are installed into each vehicle. These devices record driving behaviours which feed into a learning platform. This platform then returns feedback to the driver based on their journey on how they performed and how they can improve their behaviours on the road. The passive learning experienced by customers will improve the driving quality of the customer group. The batch data of the customer group can then be utilised to improve insurance cost. The value of the data can be extended for further insights into the motor industry.

Value Proposition

Customer Jobs

In order to get on the road, a customer must complete several tasks which include:

- Gaining access to a car.
- Insuring themselves to drive the car.
- Learning to drive.

Customer Pains

The following add to the challenge a customer faces completing the jobs.

- Poor Customer Experience. Often due to the number of barriers to driving, customers will endure a poor customer experience in order to drive. This includes the difficulty accessing comprehensive insurance, servicing an older vehicle, or the many additional costs associated with driving.
- Excessive time spent researching. A driver will often be required to conduct personal market research before becoming a first-time driver. The combined time spent finding a car that is insurable, suitable, and affordable can be very time consuming. Additional considerations are often required beyond this including VRT, annual motor tax, NCT certification, and motor servicing.
- Total Cost of Ownership. Vehicle ownership is a constant exercise in economic assessment, the driver must be regularly assessing the current value of their vehicle, the cost of its fuel consumption, its maintenance cost, insurance cost, NCT certification, and motor taxation. Then comparing all of these to the cost of upgrading or downsizing their vehicle to fit their needs.

Customer Gains

The elements that contribute to a better customer experience in getting on the road:

- Better Quality Vehicles. With access to better quality vehicles, customers should incur a lower maintenance cost. These vehicles should also provide better fuel economy, lower motor tax, and less frequent NCT certification requirements.
- Improved Driver Behaviours. Overall a driver who better adheres to the rules of the road holds less chance of collision, thus should involve a lower insurance premium and reduced rate of dealing with the outcomes of a collision.
- Flexible Contract. A customer who can adjust the terms of their car ownership contract will have a better customer experience. They aren't left with an older vehicle that they are unable to sell or that they settle for a paltry scrappage deal for a newer vehicle.

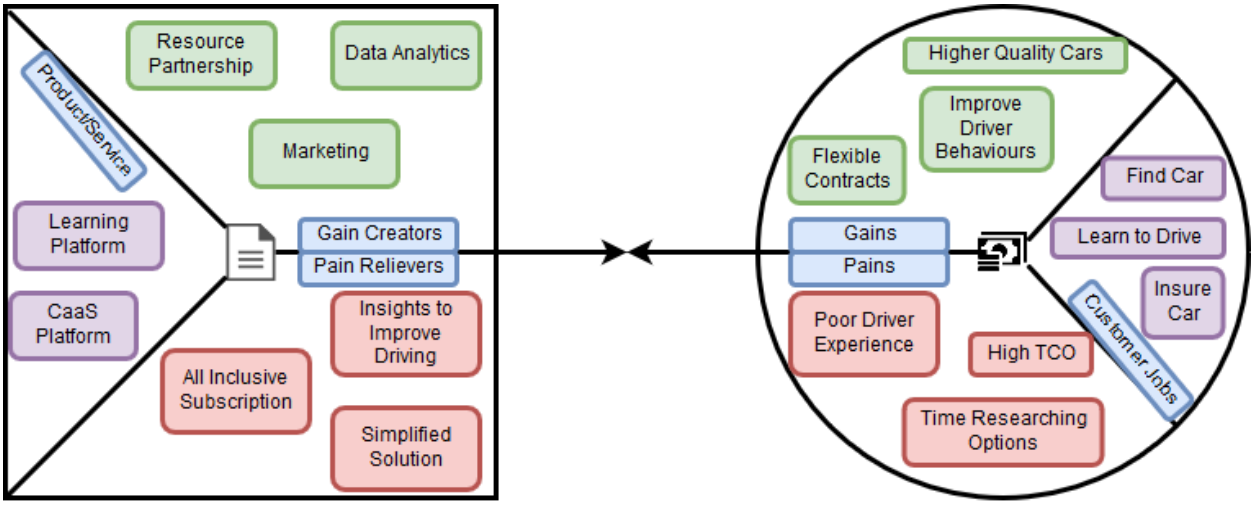

FIGURE 1: TOURGO VALUE PROPOSITION CANVAS

The Service

The service TourGo provides its customers is a combination of a Car as a Service Platform (Caas) and a Learning Platform. Both platforms enable each other's success in providing the customer gains and alleviating pains.

Gain Creators

The gains to the customer are achieved through:

- Resource partnership: partnering with existing motor industry leaders allows scalable use of resources that otherwise would be unavailable, leading to a quicker achievement of TourGo's vision.
- Marketing: To achieve market penetration, TourGo must be heavily invested in marketing and awareness campaigns. The service must stand out against alternatives for its target market.
- Data Analytics: The potential value of the data gathered through the service provides many innovative applications including an improvement to driving quality, reduction in emissions and insight into traffic infrastructure pain points to be improved.

Pain Relievers

Elements of TourGo's service which relieve the pains of the existing process are:

- Offering a simplified, informative solution to the customer in order to get on the road alleviates frustrations navigating existing channels.

- An all-inclusive subscription means customers aren't required to spend time on using various providers and channels to access vehicles, insurance, motor tax, or maintenance. The subscription model handles this for the user.
- Insights to Driving Behaviours: Constant passive learning allows users to avoid developing bad habits on the road and reinforce adhering to best practices.

Target Market

TourGo's target market comprises of all drivers and prospective drivers in Ireland. The market segments can be described as follows:

Market Segment	Age Range	Population
Segment 1	22 – 25	273,636
Segment 2	25 - 35	659,392
Segment 3	35+	1,643,028

TourGo will initially target young professionals and recent graduates in Ireland between the ages of 22 and 25. Using census data combined with our own market analysis we estimate a potential market size of 1 million people. Ideal characteristics of a TourGo customer include a disposable income level of €500 or more, less than five years driving experiences, and non-homeowners. This group face the challenges we have previously described as the barriers to driving in Ireland today.

We anticipate a growth of market segment in line with increases in third level graduations of 14% in 2017. The number of graduates in that year were 70,515 and we expect that continuous growth in this area leads to a larger market potential for TourGo (Higher Education Authority, 2018).

Total Market Valuation

TourGo is a Car as a Service platform and falls under carsharing and vehicle rental industries.

Currently the car rental industry is valued at $51 billion globally, with the European market valued at €12 billion. The domestic Irish market combined with the UK market represents €1.6 billion (Nedrelid Corporate Advisory, 2016).

Global revenue for the carsharing industry is due to experience growth to $6.2 billion by 2020 (Gallagher, 2016), with the industry expanding by factors of ten in recent years. Currently the European market represents 50% of the global carsharing market with over 5.8 million customers comprising of 68,000 cars in 2016. The number of carsharing service uses is due to increase by 15 million by 2020 (Monitor Deloitte, 2017) and due to stronger presence of such models, car ownership is expected to decrease by half a million cars by 2021 globally.

Target Company Revenue

We plan to have 100 customers on our platform generating revenues of €480,000 in our first year of operation. These figures assume that each customer would pay an average of €400 per month over a 24-month subscription. We anticipate initial capital to come from an Enterprise Ireland grant (€30,000), personal savings (€10,000) and personal loans from family and friends (€10,000). Using these figures, we project our total revenue for 2019 to be €530,000.

Market Trends

The motor rental market is currently growing at a rate of 1.7% while new car sales in Ireland are down by 10.43% (Nedrelid Corporate Advisory, 2016). These statistics allow us to predict that more people will be looking for alternative methods of acquiring new cars (Power, 2018). Employment has grown by 2.8% and average earnings have increased by 3%. We foresee growth in our potential customer pool who have the necessary income for our CaaS platform. A recent survey carried out by Carzone states that 25% of people intend to change their cars every 4 years and over 50% people would buy a car 2 years or younger (Carzone, 2017). This is a great opportunity as we plan to only source cars meeting these criteria.

The European Union's legislation; the European Emissions Reduction Standard is also a factor for TourGo's market. Ireland is set to miss the 20% reduction promised by 2020, despite government incentives such a VRT rebate and grants of up to €5,000 for purchases of electric vehicles and plug-in hybrids (Murphy, 2018). We predict a future demand for vehicles using renewable energy sources, thus TourGo's intention to expand to Electric and Hybrid vehicles after Year 3.

Marketing/Sales Strategy

Marketing Strategy

The initial market segment that TourGo will target are:

- Young professionals and recent graduates.
- Aged between 22 and 25.
- With less than five years driving experience.
- With disposable income of €500 per month or greater.

Reasoning for this segment is because this group are likely to have some driving experience, they are likely to be able to afford the service, and they generally will be heavily affected by the challenges outlined in the Company Description section of this document. We also suspect that this segment is an optimal starting point for TourGo because they are more recently able to get on the road, and more likely the take up the Car as a Service model, offering potentially greater long-term retention and achieving the safety goals of TourGo on Irish roads (McNally & Bradley, 2018).

Our strategy to reach the full target market is through combined retention of our initial segment as well as extension of our offerings to larger vehicles aimed at lower risk customer segments. Our initial segment can reap the benefits of being TourGo members through higher quality vehicles, lower insurance premiums, and safer driving. The intention is the success of TourGo's learning model can allow TourGo to offer a more comprehensive set of services at lower insurance premium. Additionally, through licencing the TourGo platform to other motor industry providers, the coverage of the analytics will grow to match.

Differentiating TourGo's product doesn't present the same challenge as other start-up companies face, as it's creating an entirely new market for its customers. In order to prevent TourGo being associated with car sharing services, or other short-term leasing solutions a brand awareness campaign is vital. This would comprise of demonstrations, media appearances, social media campaigns and competitions, and sponsorship opportunities. By promoting the service for its safety features, we would hope much of this marketing strategy would develop organically. We would also be dependent on our partnerships to assist in creating these opportunities.

The key benefits highlighted throughout the marketing strategy will be the simplicity of the service, the driver quality improvements, and the potential savings customers can experience. We intend to prioritise

to customers how the data will be used in an anonymised grouping model, as opposed to individually penalise customers- like current insurance policies which integrate a telematic tracking solution into their service. We believe this is an important factor to our customers and is the barrier other telematics monitoring solutions face.

Potential customers being targeted by TourGo are on active campuses around the country. TourGo's marketing strategy as previously mentioned would involve live demonstrations of the vehicles and user experience. We intend to be present at graduate events such as career fairs and conferences with a selection from our fleet there for potential customers to see. Business campuses where there is a large graduate population, or in trade apprenticeship campuses also present opportunity for demonstrations. We also foresee events like music and arts festivals, or conferences as optimal locations for demonstration of the vehicles and platform. TourGo's long term goal is to be able to offer 24-hour test drives of our vehicles to customers based on exclusive waiting lists, similarly current offerings by motor dealerships like BMW and Mini.

Contacts TourGo would use in order to generate market awareness include previously discussed motor industry contacts within the insurance, leasing and telematics sectors. We hope that the partnerships with these organisations can assist in promoting and selling TourGo nationally. Management would take up membership of our local Chambers Ireland chapter, to develop a network which in turn should assist in building our brand awareness.

The marketing will be directed through the Managing Director and the marketing leads from the partnership organisations. The ground work will likely be facilitated by existing structures within the partner organisations. For demonstrations, it is likely contracted agencies will be used with some representation from TourGo or the partner on site.

Revenue Sources

At start-up, all revenues for TourGo will be generated through the monthly subscriptions of each customer. All revenues generated during this period will be sourced from Ireland, exclusive of Northern Ireland.

There exists potential for licencing of the learning platform to other motor industry providers, and licencing the data for motoring insights, however the potential of these revenue models is based entirely on the scale and success of TourGo's initial offering. Thus, initial capital investment beyond partnership has the potential to lead to rapid expansion.

Sales Strategy

TourGo's channels of sale will primarily take place through the service's website. Where, like most motor insurance or car leasing services there will be a quote calculator. The use flow of the route to sale for a customer is as follows:

- Customer inputs their information into quote calculator.
- They are presented with a personalised quote based on this information.
- They then choose to purchase the policy and create an account.
- Their user dashboard is populated with their policy details where the customer can amend their policy and purchase additional services later.

A secondary method of sales is through an insurance or leasing partners existing sales portals. These organisations often will incorporate licenced or subsidiary products onto their sales portals, and TourGo's sales site could integrate into these portals, which are usually a wrapper of the licencing service. The

advantage of the method is that it allows TourGo to reach a larger segment of the market and streamlines the sales procedure into the existing experience of these providers.

Sales can be initiated at specific demonstration events and via phone sales, however interaction with the website or sales portal is how these sales must be completed in order to avoid unnecessary complexities to the sales process.

Pricing

The vehicles TourGo have identified for the initial offering are as follows:

- Volkswagen Polo 1.0L Manual Petrol
- Hyundai i10 1.0L Manual Petrol
- SEAT Mii 1.0L Manual Petrol
- Toyota Yaris 1.0L Manual Petrol

FIGURE 2: TOURGO VEHICLES- VW POLO; HYUNDAI I10; SEAT MII; TOYOTA YARIS

Each of these vehicles retails new for between €14,000 to €18,000 and depreciates by under €3,000 over 2 years for mileage under 35,000 km. Car leasing companies typically operate on buyback contracts with their vehicle suppliers based on these figures. Thus, each vehicle must recoup €3,000 in order to break even across 2 years.

Insurance estimates are made via quotes from AXA which indicate an individual, in full employment, aged 22-25, with 2 or fewer penalty points, insured on any of the vehicles listed above aged up to 2 years old would receive a quote between €993 and €1765, with relatively consistent distribution we assume an estimated average of €1,379 annually per customer.

Cost per vehicle annually is estimated as follows:

Vehicle Procurement	€1,500
Insurance	€1,379
Telematics Device	€150
Installation (Labour)	€15 (30 minutes per unit)
Maintenance/Service	€150
Tax	€200
Total Vehicle Cost	**€3,394**
Sales Price	€4,880
Monthly	€400
Margin	70.7%

For the average customer within our target segment who currently drive they will typically be spending €325 monthly for a vehicle that is 10 years old with over 100,000 km on the odometer. This is combined insurance instalments, car loan repayments, tax and maintenance. Once these vehicles become 12 years old make them very difficult to insure, and as such will likely be replaced at that age or shortly after. With TourGo, this group get equivalency in longevity of the vehicle for a slightly higher price, but in the case of TourGo they are using a car that's less than 2 years old and have comprehensive insurance, a luxury not

afforded typically with older vehicles. Significant improvements in the fuel efficiency of the vehicles in TourGo's fleet also lead to better fuel savings for the customer.

The margin highlighted above is then divided across operational costs such as salaries, partnership fees, premises, utilities, etc. The amount this represents per customer is approximately €1,500 annual margin.

Advertising and Promotion

The advertising strategy for TourGo is reliant on the partnerships previously discussed. However, the advertising campaign can be described under the following:

- Event demonstrations: At various events we hope to be present with a selection of vehicles from TourGo's fleet along with sample systems for prospective customers to view mock dashboards and analytics from driver behaviours.
- Marketing partnership: TourGo's intended partnership with insurance and leasing companies should permit mutual promotion of service through each organisation's platforms.
- Social Media should play a role in creating awareness around TourGo's service, including providing customers with information about events and future offerings.
- Due to the limited capacity of TourGo's service within the first year of operation we will rely heavily on the exclusivity of the service in order to generate awareness of the brand. Similar marketing campaigns while utilise invites and waiting lists to gradually service the demand. This will require word of mouth in order to generate sales. This will also act as a useful tool for TourGo's partnership in predicting growth needs of the organisation in terms of vehicles and other resources.

Initial Functional Specification

General Description

We have outline below a preliminary list of the system functions for TourGo. The functional requirements of the system are considered fundamental to the core functionality of the system.

User Functionalities

- Get a Quote: Site visitors will be able to input their information into a quote calculator which will return a personalised price for joining TourGo. This can be done with or without being logged in.
- Retrieve a Quote: A user can access this function in order to access a previous quote using a Quote reference.
- Register: A user can register an account with their information in order to proceed with a quote purchase.
- Purchase Policy: Once registered a user can complete a policy purchase which allows them access to the TourGo service.
- Login: This will provide the user with their own personal login which they can use to access information on their policy and TourGo account.
- View Policy: Once logged in a user can view the terms of their TourGo contract, which will include the vehicle they're using, the length of their policy, and the price of their policy.
- Amend Policy: A user can apply through this function to amend their policy which includes changing their vehicle, updating their personal information, adding mileage, and adding a driver.
- Cancel Policy: Here a user can terminate their TourGo contract. This can be done at the end of the primary contract period or during the contract- they will be notified of any outstanding penalties they will incur through early termination.
- View Driving Data: A user can access their own personal driving data and view their journeys. Data will be presented in a series of time-based charts and maps.
- View Driving Tips: A user can access the learning portal to view recommendations based on their driving history on ways to improve their driving.

System Functionalities

- Web Portal Design: We intend to design a functional site that is easily navigated and understood by users.
- Data gathering from IOT Devices: Each IOT device on TourGo's vehicles will be transferring data for processing for driving history and scoring.
- Creation of Individual Dashboards: Users will be able to access a dashboard on login which will contain policy information; driving scores and history; and access to their own learning portal.
- Processing and Displaying Driver Data: Data Gathered from IOT devices is processed and displayed onto dashboards for users. Data is also anonymised and used for batch data analytics.
- Processing Driving Data to Present Driving Tips: Processed driver scores and history is used to generate driver recommendations for the learning platform.
- Database Connectivity: Our database and cloud platform will need to be capable of data capture, processing and connectivity to the site/portal so data can be retrieved, updated, and processed.

User Characteristics and Objectives

The system will be accessible through the web application, and thus easily accessed by any persons with internet access. The intended user, as outlined in depth in the Target Market section above is a customer or potential customer who are looking to access a car. The objective of the site is to provide potential customers with a means to viewing the product range and purchase a policy for themselves. For existing

customers, the site acts as a portal through which their policy, driving data, and learning recommendations can be accessed. The site's design provides an ease of use for any level of internet user.

Operational Scenarios

Before being able to use the site, a user must register as a member or login. Registration involves purchasing a policy via getting a quote. These initial access steps are available from the homepage of the site. In order to register a customer provides the system with personal information (detailed within Functional Requirements) and creates a login with an email address and password. Their email address is verified by sending an email to them with a hyperlink to the verify the account. In logging in, the user is presented with a login form, this login form will provide an option for a forgotten password which sends a forgotten email verification to the user's email address in order to reset the password.

Once logged in a user can access their policy in order to view information relating to it, amend it (add driver, change vehicle, etc.), or cancel their policy.

A user can also view their driving history which is processed and displayed based on time intervals across a variety of charts. The user can adjust the view based on time intervals such as journey, day, week, overall. This driving data will display a driver score as well as specific gradings which contributed to that score based on speed, time-of-day, fatigue, and smoothness.

Also, accessible once a user is logged in is access to TourGo's learning platform which provides them with personalised recommendations based on their driving history. The learning platform will also provide a series of learning resources and quizzes to the user.

Constraints

Below are constraints we must take into consideration in order to most effectively achieve our project goals.

Time

Our primary time constraint relates to the project deadline for CA472. Balancing time spent on the project with other assignments for the semester, preparation for exams, and job applications will present a challenge.

Accuracy

The level of accuracy of the assumptions made surrounding the information presented to customers and how these inputs can make an effective learning platform.

Industry Knowledge

We have made ample attempt to understand the motor industry in Ireland through conversation with representatives from the insurance, vehicle leasing, telematics, and vehicle manufacture sectors. We hope that this consultation is enough to understanding the requirements of the project.

Usability

The site will be developed with a view that it can be used by any age or demographic easily.

Development

With limited experience in developing a project like this within finite timescales we expect a challenging process for the coming months.

Initial Functional Requirements

Get a Quote

DESCRIPTION

This function is the first step a user will make upon visiting the site. A hyperlink to a form will be provided on the homepage of the site which will lead to a registration form. The user will have to input their information into the form. The information requested will included, but is not limited to: Name, Date of Birth, Email address, Phone number, Employment Status, Type of Household, Residential Address, Driving History, Previous Insurance Claims, and Service Preferences. After entering valid information into the form, the site will then process the user information and return a quote for joining TourGo's service, along with some additional options. The user will then be given a Quote Reference for the quote which will allow them to register for the policy or return later.

CRITICALITY

This function is essential to the system as it provides the user with tangible information about the cost of using the service prior to joining. It also provides the site with important information about the type of users applying for the service, permitting TourGo to adjust their offerings to suit demands in the future.

TECHNICAL ISSUES

The Get a Quote form will be designed using HTML and will fit the style layouts of the rest of the site. The form's inputs will be handled using *Django forms POST method*. Data collected from users' inputs will be used to generate a quote through a combination of *if/else statements* and the *Python math library*.

DEPENDENCIES

This function is not dependent on other requirements.

Retrieve a Quote

DESCRIPTION

A user can input a previously received Quote Reference from the past 72 hours into this form in order to then access registration and policy purchase on that quote.

CRITICALITY

There is no criticality, however this improves the user experience by allowing them to return to quotes later.

TECHNICAL ISSUES

A user will input a Quote reference which will then search for the quote in the *Quote table* this will be handled by the *Django forms GET method* the information from that quote can be used to access registration and policy purchase functionalities. A timestamp column will be added to the *Quote table* to check if the reference number was added within the last 72 hours. This check will be performed using the *if/else Django Query-set*.

DEPENDENCIES

This function is dependent on the Get a Quote functionality. Without that function there are no records of historical quotes to access.

Register

DESCRIPTION

This function is a step the user can take following the Get a Quote function. A user can also access the registration by way of the Retrieve a Quote function. A user provides additional information in order to create a user profile. They are sent an email confirmation which they are required to confirm and then can create a password and complete registration.

CRITICALITY

This is a critical function to the system. Without it we cannot create users and thus cannot sell policies.

TECHNICAL ISSUES

The Registration form will be designed using HTML forms and will fit the style layout of the rest of the site. The form's input will be handled by *Django form POST method*, which will access our *database* to store form information. Once completed, this will create a new entry to the *user profile* table.

DEPENDENCIES

This function is dependent on the Get a Quote function.

Purchase Policy

DESCRIPTION

This is the final function within acquiring a customer. Following a customer receiving a quote and registering an account they will be required to select their policy option and then purchase the policy. This can take place in the form of a one-time payment for an annual policy, or more likely through a monthly fee. The customer will at this point be provided with the comprehensive Terms and Conditions of their policy outlining the costs, parameters of service, and cancellation fees. The user will also be advised where to collect their vehicle.

CRITICALITY

This function is critical in order to complete a purchase of a policy. Without it, users won't be able to access the service beyond creating an empty profile.

TECHNICAL ISSUES

This function will require access to the database to update the user table and make entries to a policy table and payment table. This function will also require a payment processing service to handle payments this will be handled by an API from card merchants such as Stripe or PayPal to provide industry standard payment security

DEPENDENCIES

This function is dependent on the Get a Quote and Register functions.

Login

DESCRIPTION

This will involve a simple user login script that prompts the user for their email address and password. The user will have used this information in order to complete registration of their account and will be retained by the database for logins. A Forgot Password option will be available which will email a password change hyperlink to the user's email.

CRITICALITY

This is a critical function as it is required for user access to their dashboards in order to view, update or cancel elements of their policies.

TECHNICAL ISSUES

The system will require a security protocol to prevent unauthorised access to the system or other user accounts. Such as a two-factor authentication when a user loses their password.

DEPENDENCIES

This function is dependent on the registration of the user.

View Policy

DESCRIPTION

Once an existing user has logged in, they will be able to view their policy. It will detail their policy information including the length of their policy, payments, and their vehicle information.

CRITICALITY

This is a critical function of the system as it is required for a user to access information on their policy and as such is part of the service agreement of TourGo with its customers.

TECHNICAL ISSUES

This function will query the database using SQL to view policy information of the customer.

DEPENDENCIES

This function is dependent on the Registration and Login functions.

Amend Policy

DESCRIPTION

This function allows the customer to update elements of their policy. It will provide them with a variety of options in terms of policy amendments which the user will click on. Options will include changing vehicle, adding a driver, adding mileage, and changing payments. Once the user selects an option, they will be prompted with a form for the specific amendment they selected, once the form is completed the user is prompted with any policy change factors caused by this change, such as mileage increases, or payment changes. The user will need to confirm any changes before they are applied to the policy.

CRITICALITY

This is a critical functionality for any changes that need to be made to a policy up to and include amending errors to policy agreements.

TECHNICAL ISSUES

The Amend Policy forms will be designed using HTML forms and will fit the style layout of the rest of the site. The form's input will be handled by *Django form POST method*, which will access our *database* to store form information. Once completed, this will update entries to the *user profile* table.

DEPENDENCIES

This function is dependent on the Registration and Login functions.

Cancel Policy

DESCRIPTION

Here a user will be able to submit a request to cancel their services. The user will be advised of any penalties to their cancellation if they are within contract. The user will then be able to select how to pay any penalties they incur. In the case of no penalties the user can end their contract and advised of how to return their vehicle.

CRITICALITY

This functionality is critical to the system. Without it, users are indefinitely within contract and unable to leave the service.

TECHNICAL ISSUES

User information will be removed from the database using the *Django Query-set* and *SQL*.

DEPENDENCIES

This function is dependent on Registration and Login functions.

View Driving Tips

DESCRIPTION

This functionality pertains to the user's access to the site's learning platform. Here they will be able to see recommendations based on their driving behaviours and performance. It will include information on how to reduce risk of an accident or collision while driving and attempt to make the user a safer driver.

CRITICALITY

This is a core functionality to the service and without it TourGo's vision is impossible. The learning platform is the primary area which will improve the safety of customers.

TECHNICAL ISSUES

A dashboard will display general information and quizzes on how drivers can improve behaviours this will be built using the Django Template Language.

DEPENDENCIES

This function is dependent on the Registration and Login functionalities as well as all system functionalities.

Database

DESCRIPTION

All user login information, driving data, and learning platform information will be stored in an organised database for access via the cloud system.

CRITICALITY

Critical to the success of TourGo's service, the database should be reliable, organised, and provide ease of access by the system and its users.

TECHNICAL ISSUES

The database will be accessed by using Django methods for queries.

DEPENDENCIES

The function is dependent on user registration.

Technical Summary

The following are the functionalities we intend to develop as part of the prototype deliverable for this service.

User Functionalities

DESCRIPTION

These functionalities include Login, Get a Quote, Retrieve a Quote, Register, Purchase Policy, View Policy, Amend Policy, Cancel Policy. Details on how we will develop this has been mentioned above in the Functionality specifications.

TECHNICAL CHALLENGES

Developing the front-end UI in the Django Framework may cause issues, as Django's tags link the template to the program code. So, we cannot use editors like Dreamweaver. Templates from bootstrap or HTML5 boilerplate will be added and we will manually edit the HTML to give desired layouts.

Driver Safety Analysis

DESCRIPTION

This function displays dashboards where users can view their driving history. This will use data analysed from IOT devices to provide a journey scored based on driving criteria's such as fatigue, speed, braking and time of day. Each time a driver completes a journey, a journey score will be added to their dashboard. They will receive a weekly notification with their driver score aggregated from the week's journey scores.

TECHNICAL CHALLENGES

A Django view that will display the data collected from the IOT devices. Using the *dashboard application* via *Django packages* will provide a set of interactive data analysis charts to display driving trends. The *django-push-notifications* will allow us to send notification to drivers each week.

CRITICALITY

While not critical to the system it helps users visualise their vehicle use and progress within their use of the service.

DEPENDENCIES

This function is dependent on the Registration function as well as data collected from IOT devices.

Learning Platform

DESCRIPTION

Our learning platform will provide recommendations on how drivers can improve their driving behaviour in the future based on analysis of their *daily*, *weekly* or *monthly* driving trends. This will be created using either data from an *API* or *JSON* dataset of driving habits collected in real time from *IOT telematics devices*. information will be displaying using an interactive dashboard that contains general information, quizzes and other learning resources.

In addition, there will be a weekly maintenance check form that the user must complete. This form verifies the user has performed visual and manual checks of their vehicle (oil/fluid levels, tyre thread depth, bulbs, etc.). This feature provides opportunity to pre-empt maintenance needs of the vehicle, a chance for the user to improve their knowledge of the responsibilities of vehicle ownership, and for the application to reinforce recommendations from the learning outcomes.

TECHNICAL CHALLENGES

The *dashboard application* from *Django packages* will provide a set of interactive data analysis charts where general information, quizzes and learning resources to improve driver behaviours will be presented. Benchmarks for good or bad driving will be established through analysis of individual journey scores using the *Django Query-Set*. A form will also be made available using Django for the maintenance check.

CRITICALITY

This function is crucial part of our project as we aim to teach drivers on our platform how to improve their driving habits.

DEPENDENCIES

This function is dependent on the registration of users and data collected from the IOT devices, it also requires users to log in and view the recommendations we provide them.

Reporting tool

DESCRIPTION

The reporting tool is used to show an aggregated result of all TourGo members driving behaviours. We plan to present this to insurance companies to show how safe drivers on our platform are and receive a reduction of the cost of insurance on our car fleet.

TECHNICAL CHALLENGES

We will first anonymise the data using a python script called MySQL Anonymous (Dash, 2015) on the data held in the database. We then plan to use a data visualization using *charts* from *Django packages* to generate reports to be presented, triggers will be included to warn us if individuals that are driving dangerously using the *django-push-notifications*. Lastly, we will need to make steps to ensure the data we display is GDPR compliant (Penel, 2017).

CRITICALITY

This function is crucial part our project as we look for other revenue streams for TourGo other than customer subscription. The data collected can be sold to the insurance industry or government bodies such as Transport for Ireland. It also lets us monitor our fleet to check if we have still compliant with our buyback and maintenance agreement.

DEPENDENCIES

This functionality is dependent on users continuing to log in and interact with the learning platform and data collected from the driver safety analysis function.

Database Connectivity

DESCRIPTION

All registered members on the TourGo platform will have their *policy* and *driving data* stored on septate tables in a *MySQL database* which will be normalized to reduce *data redundancy* and *improve data integrity*. They can also access the database to *view, update* and *cancel* their policies. The database will also be used to feed information for the *learning platform* and *generate reports*.

TECHNICAL CHALLENGES

The *Django Query-Set* and *SQL* will be used to query the Database.

CRITICALITY

We need a reliable database that can handle many *Create, Read, Write* and *Updates* to it by many users and functionalities.

Dependencies

This function is reliant on information gathered from members Registering and driving our vehicles.

System Architecture

TourGo system architecture will comprise of a typical IOT architecture structure that can be described as follows:

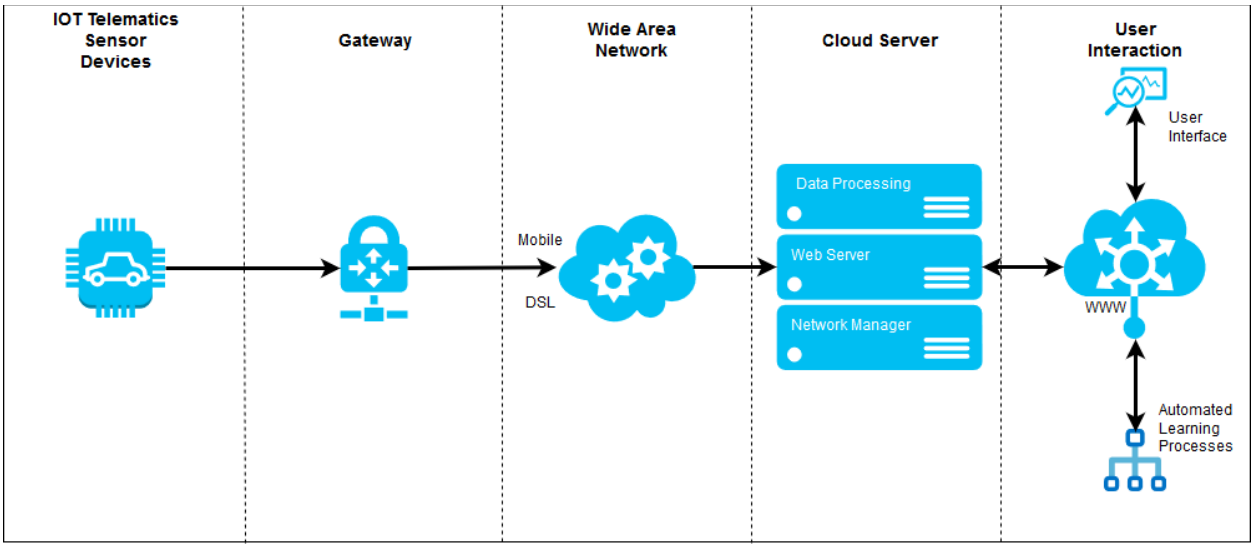

FIGURE 3: TOURGO SYSTEM ARCHITECTURE

Architecture Stack Components:

- Telematics Sensor Devices: Entry point components for data interactions.
- Gateway: Aggregators for controlling sensor network in terms of device maintenance and information gathering.
- Wide Area Network: Communication layer of network equipment that connects cloud server to gateways.
- Cloud Server: The application/business logic that processes the data from the sensors as well as storage and network management. The database is an element of this layer as well as the access controls for the Django framework. Within the database information relating to user policies, driving data, and learning portal data is stored and processed.
- User Interaction: Uses web application to process driving data into presentable knowledge for user interface presentation. This is the front-end of the application and is concerned with the Django templating using HTML and CSS.

High Level Design

Logical Data Model

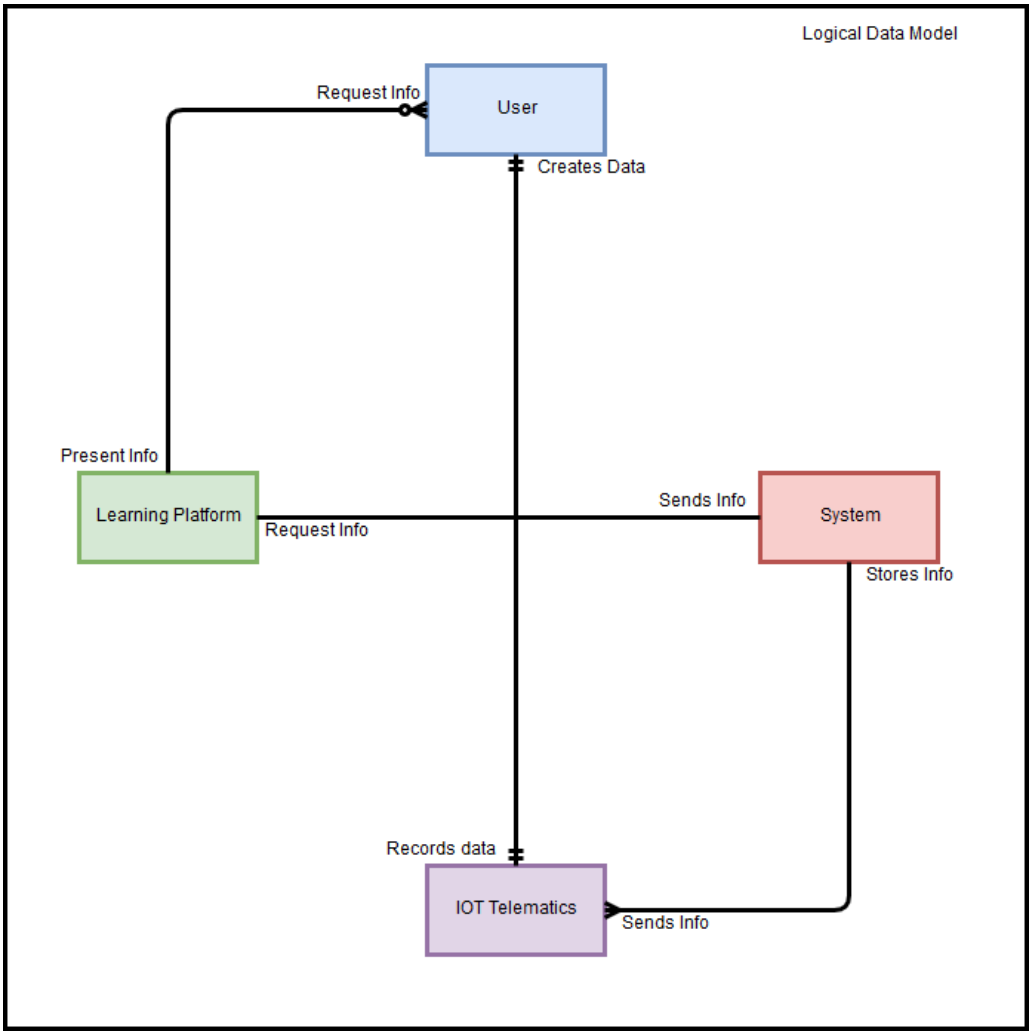

FIGURE 4: TOURGO LOGICAL DATA MODEL

The simplified Logical Data Model above presents as follows:

- The user creates IOT data by use of the vehicle. The cardinality is described as a one-to-one relationship by assuming one user will be creating data for a single IOT sensor; even though there are many users and many IOT sensors across the network.
- Many IOT devices send information to the system which stores this information for processing.
- The user requests information from the Learning Platform. The Learning Platform requests this information from the system and then presents it to the user based on the presentation parameters.

Physical Level 1: Data Flow Diagram

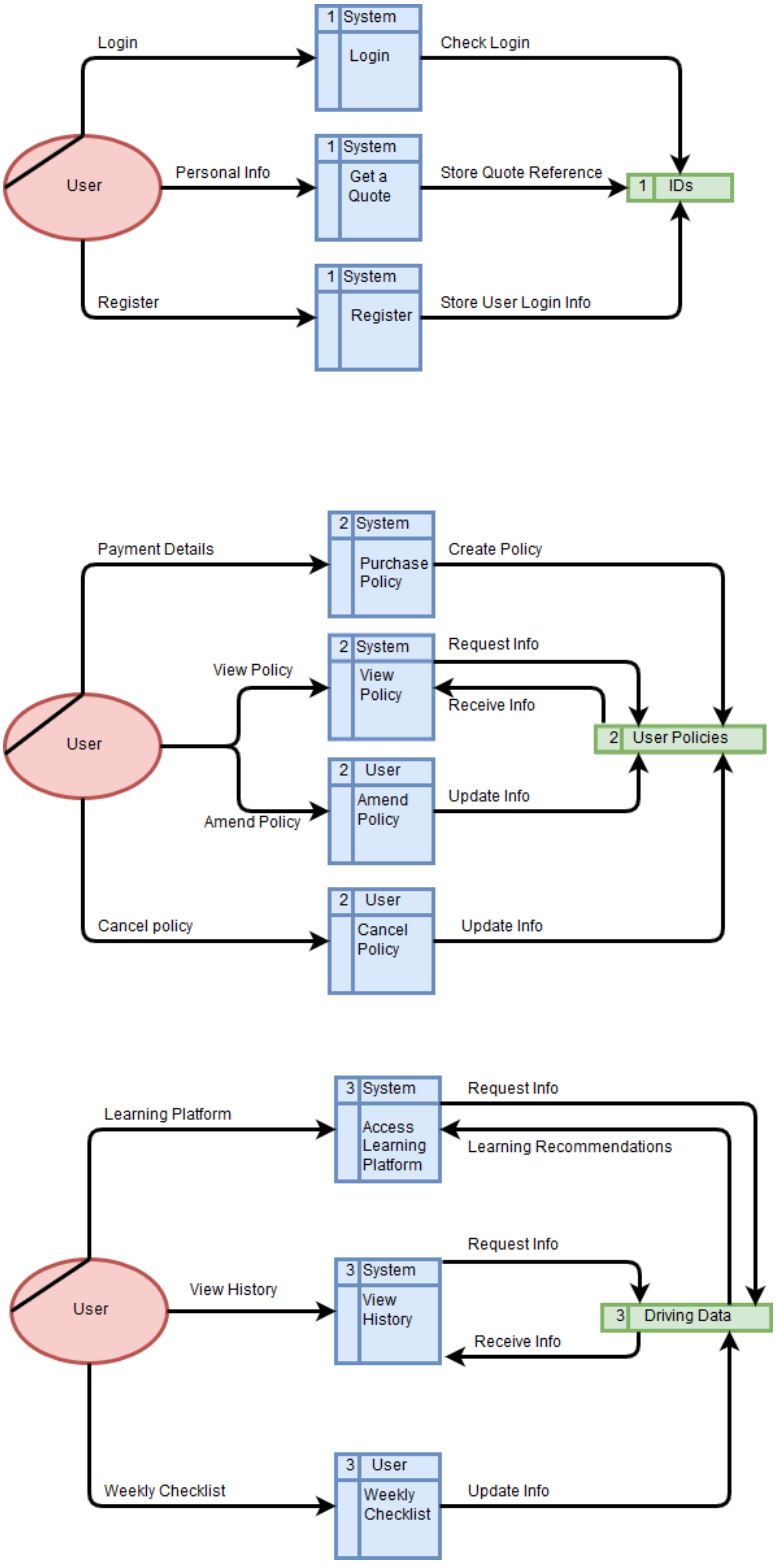

FIGURE 5: TOURGO DATA FLOW DIAGRAM

The user interacts with the ID relates data structures via function Login, Register, and Get a Quote. The system accepts the input and matches or stores it to the table.

The user can access policy functionalities Purchase Policy, View Policy, Amend Policy, or Cancel Policy. In order to View or Purchase a policy, the system accepts the user inputs, makes relevant changes to the data structure and returns information to the user where relevant. In the case of amendments or cancellations, the user inputs directly manipulate data stored in the database.

The user functionalities involving interactions with their driving data include Accessing the Learning Platform, View History, and Weekly Checklist. Both former functions involve a user accessing the function, the system requesting information from the database which returns a result. The Weekly Checklist involves the user directly interacting with the database in order to input their completed vehicle maintenance checklist as well as acknowledgment of their driving recommendations checklist.

Functional Layout

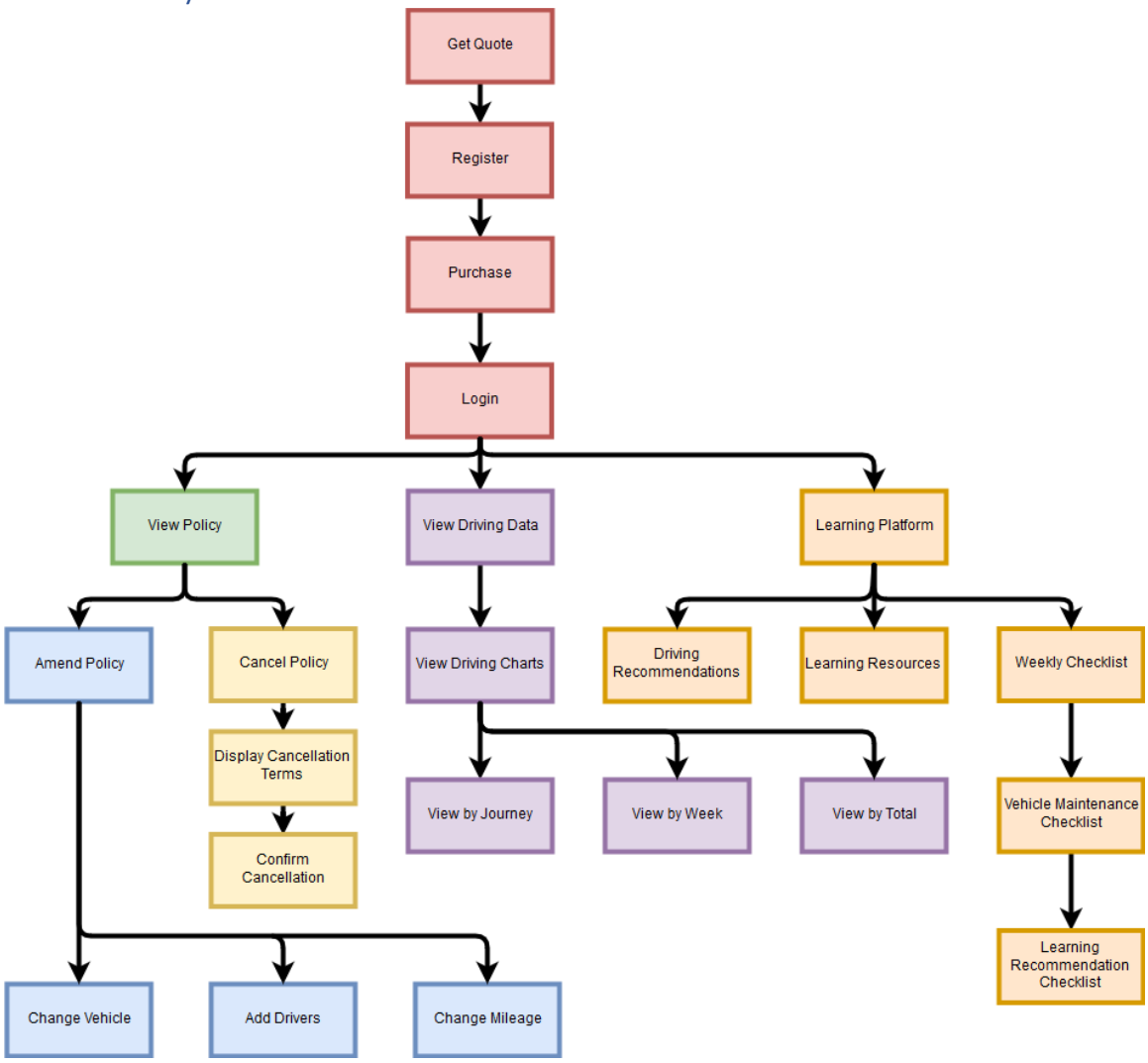

FIGURE 6: TOURGO FUNCTIONAL LAYOUT

Following initial user functionalities: Get Quote, Register, Purchase, and Login, the functionalities can be divided into three directions- similarly to the representation from the Data Flow Diagram: View Policy, View Driving Data, Access Learning Platform. Within the Policy functionalities a user can opt to make amendments or cancellations to their policy- which have been sampled above. Viewing Driving Data is specified further based on the various types of data views we anticipate being accessible. The Learning Platform branches to allow the user to view their Driving Recommendations, which are an overview of their driving performance. The Learning Resource option features a variety of general information, quizzes, and tools for improving driving- these resources will likely be presented to the users based on their own driving behaviours. The Weekly Checklist is a function used to confirm the user is engaging with the behaviour improvement purpose of the system. It requires the user submit a weekly maintenance check for their vehicle (oil and fluid levels, tyre thread depths, etc.), and acknowledgment of their pain points for driving behaviours.

Project Timeline

ID	Task Name	Resource Names	Duration	Start	Finish	Predecessors
1	**project kickoff**	J. Gambo; D. Moore	1	24/09/2018	25/09/2018	
2	**project proposal**		59	25/09/2018	23/11/2018	
3	project decided	J. Gambo; D. Moore	7	25/09/2018	02/10/2018	1
4	requirement analysis	J. Gambo; D. Moore	19	03/10/2018	22/10/2018	3
5	Overview of Project Description	J. Gambo; D. Moore	23	23/10/2018	15/11/2018	4
6	Meet with Supervisor	J. Gambo; D. Moore; Cathal Gurrin	1	15/11/2018	16/11/2018	5
7	Revised Requirement Analysis	J. Gambo; D. Moore	7	16/11/2018	23/11/2018	6
8	*Project Submission*	J. Gambo; D. Moore; Renaat Verbruggen	1	22/11/2018	23/11/2018	7
9	**Function Specification**		68	24/11/2018	31/01/2019	
10	Requirement Descriptions	J. Gambo; D. Moore	18	30/11/2018	18/12/2018	8
11	Christmas Holidays		13	18/12/2018	31/12/2018	10
12	Exam Study Period		10	01/01/2019	11/01/2019	11
13	Exam Period		7	11/01/2019	18/01/2019	12
14	Create System Diagrams (prototype)	J. Gambo; D. Moore	12	18/01/2019	30/01/2019	13
15	*Functional Specification Submission*	J. Gambo; D. Moore; Renaat Verbruggen	1	30/01/2019	31/01/2019	14
16	**Iteration 1**		42	01/02/2019	15/03/2019	
17	Interface Design	J. Gambo; D. Moore	11	01/02/2019	12/02/2019	15
18	Coding 1	J. Gambo; D. Moore	16	13/02/2019	01/03/2019	17
19	Testing 1	J. Gambo; D. Moore	12	03/03/2019	15/03/2019	18
20	*Revision and Acceptance*	J. Gambo; D. Moore; Renaat Verbruggen	1	14/03/2019	15/03/2019	19
21	**Iteration 2**		40	16/03/2019	25/04/2019	20
22	System Design	J. Gambo; D. Moore	12	16/03/2019	28/03/2019	
23	Coding 2	J. Gambo; D. Moore	16	29/03/2019	14/04/2019	21
24	Testing 2	J. Gambo; D. Moore	10	15/04/2019	25/04/2019	23
25	Final Revision and Changes	J. Gambo; D. Moore; Renaat Verbruggen	1	24/04/2019	25/04/2019	24
26	Project System Documentation	J. Gambo; D. Moore	2	26/04/2019	28/04/2019	25
27	*Project Submission*	J. Gambo; D. Moore	1	28/04/2019	29/04/2019	26
28	**Project Demonstration**		24	29/04/2019	23/05/2019	
29	Project Demonstration Preparation	J. Gambo; D. Moore	3	01/05/2019	04/05/2019	27
30	Project Demonstrations	J. Gambo; D. Moore	18	05/05/2019	23/05/2019	29

FIGURE 7: TOURGO DEVELOPMENT TIMELINE

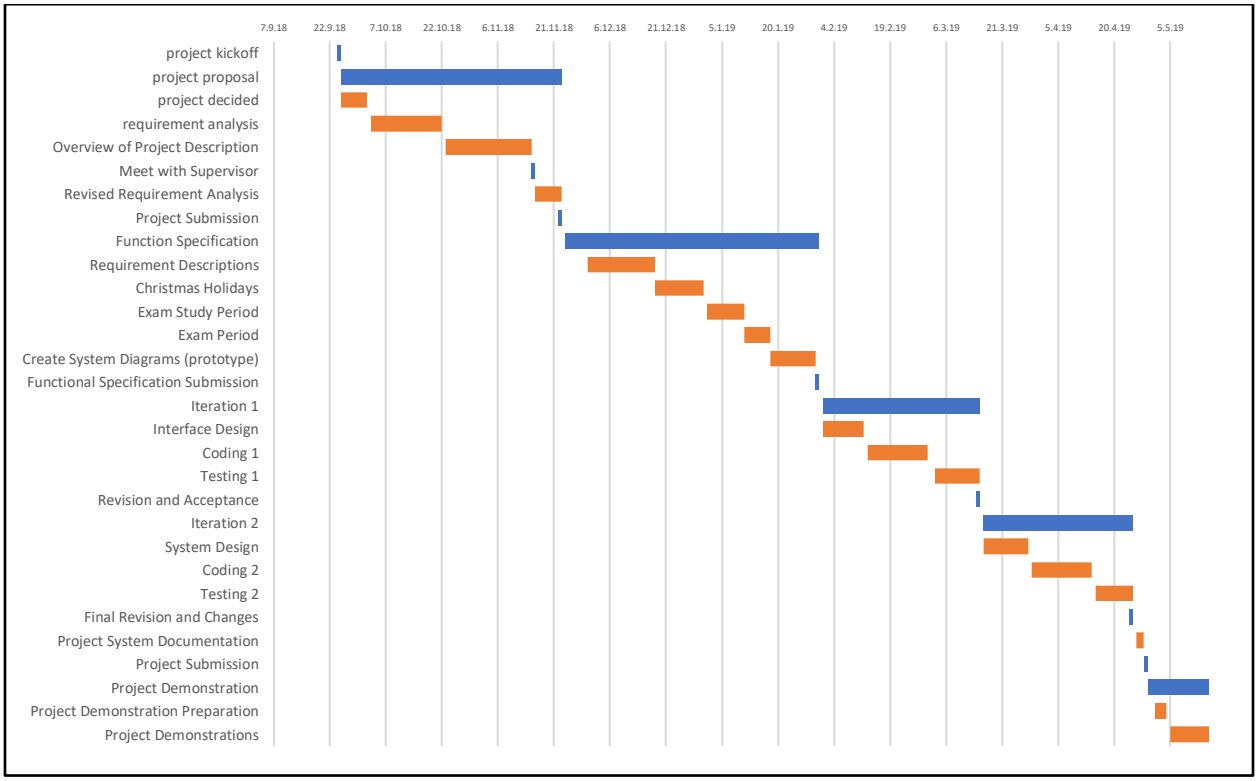

FIGURE 8: TOURGO DEVELOPMENT GANNT CHART

Conclusion

As presented through this midterm delivery report we intend to develop a comprehensive technical prototype with accompanying documentation in order to prove the capability and value of TourGo as a viable application of technology and a feasible business case for such a service.

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