FLEET MANAGEMENT SYSTEM

GROUP NAME: COLLOID

TEAM 43 - DELIVERABLE 1

Requirements and Analysis

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Contents

1. Background & Surveys/Interviews

Background and surveys are done to identify tendencies in the methodology used by a company so as to determine the problem.

The goal of this section is to get an in depth idea of what the company is about and how it started. It will give information about the current system being used including both advantages and disadvantages as determined from the surveys. This will provide the root of the problem and give a more detailed problem statement and solution idea. This section will also show how this information was extracted from the company through discussing how the interviews were conducted.

1.1 Company Background

New Era Commerce is a material handling Logistics Company, based in Delmas, Mpumalanga. It provides transportation services to various companies. Currently, New Era Commerce distributes 3 type so materials – namely coal, clinkers and pozzsand. New Era Commerce presents a tactical approach to logistics and attempts to efficiently move materials so to reduce the total cost of transportation to consumers.

Mr. Mangana, Thokozane came up with the idea for the company in 2004 however the implementation of the company began in 2010. He saw a need for a more efficient system for delivering materials due to having worked in the industry part time while he was studying at the University of Johannesburg. After a few discussions with his friends, he came up with New Era Commerce. 2 of his friends became managers in the company and all 3 of them had to save up in order to get a few trucks running. The fourth manager came after he was voluntarily consulting for New Era Commerce. After starting with 2 trucks, they got a loan from the bank to get more trucks.

Mr. Mangana is currently the Chief Executive Officer and Managing Director of New Era Commerce. There 3 other managers each play different roles. They do not monitor the truck system but consult on other issues such as finances, human resources (employees and consumers).

There is system a specialist, a driver supervisor and data handlers. The system specialist is in charge of running the system. The driver supervisor is in charge of communication and allocation of deliveries to the drivers. The data handlers are in charge of typing the data from the tickets produced during the deliveries. They are also in charge of generating reports required by the managers.

The company currently owns 13 trucks with 10 more in the process of being purchased. There are 13 drivers currently and New Era Commerce is planning on increasing this number. The drivers are chosen based on their record and driving experience. New Era Commerce monitors behavior, speeding, route and theft amongst the drivers during the deliveries.

1.2 Current system

Driving monitoring

The system specialist, along with an intern, are the ones in charge of the delivery system. They use 3 different systems namely DynaFleet, CarTrack and Routing Management System.

Routing Management System is the “heart of the fleet controller” according to the system specialist. Routing Management System is a system provided by the insurance company for the trucks. It is used to support, evaluate, manage and report things about the fleets or trucks. New Era Commerce uses it to keep track of truck details such as Odometers. This system also allows the New Era Commerce to monitor if the truck is in motion or not. The issues with the system is that in order to check where the truck is, they need to use the 2 other systems. Reporting is also an issue because it only tells the system specialist that the truck has problems at the end of the day. Routing Management System can generate graphs but the specialist would need to look at the graphs in order to notice an outlier or to see if something is wrong. New Era Commerce would like the system to report simultaneously and provides alert through things such as email alerts or push notifications through an app.

DynaFleet and CarTrack serve the same purpose which is to track where the truck is at a specific time and whether it is moving, idling or stopped. These systems are provided by the car companies. CarTrack is for the MAN trucks, for which it is only 10 of the trucks. It is a slow system that allows the specialist to monitor the vital items for the trucks – over speeding and route. CarTrack is naturally a slow system despite good internet connection at the head offices. It provides the exact location of the driver at a certain point in time however one needs to refresh the system to get that. DynaFleet is a bit faster however it only monitors the 3 Volvo trucks.

New Era Commerce would like a system that combines all the good qualities of these 3 systems and efficiently puts them into one. The specialist would like the system to be user friendly and have a better refresh time.

Another system used is i-traffic which monitors the traffic so the drivers can be accountable for taking time. However the drivers drive according to experience of the road and not GPS which is problematic once the drivers need to drive into unknown territory or need to avoid traffic. The specialist would like the system to also provide route options and allow them to select a route and assign it to the driver. This should also allow them to change the route and thus alert the driver and reroute GPS.

Driver Allocation/Assignment

The supervisor assigns each driver to a delivery every morning. The drivers report to work and get their assignments. This could prove problematic once longer trips are required. The system would like the drivers to be notified, despite where they are, about their upcoming drive (which will be assigned by the supervisor).

Loading and Unloading of Materials

If the drivers are delivering coal, they get ticket numbers when they load the coal and a different one when they unload the coal at a given station. The driver then receives a ticket/receipt which can get lost thus needing the data handlers to call the given station. This ticket/receipt is needed in order to invoice and prove that the driver did deliver. The ticket is then taken to head office and the data handlers need to manually upload each detail on each ticket. This can get taxing when a lot of deliveries are done within a day. It is also a problem in that the offices close and the driver needs to keep the ticket overnight.

If the drivers are delivering clinkers or pozzsand, they get an order number beforehand that they give to the loading dock station and they receive a ticket stating the details as well. The issues surrounding the delivery then remain the same as those of coal delivery.

The manual input of data can result in lost/corrupted data which results in a loss because they do not get paid.

1.3 Interview/Survey Structure

The interviews were conducted on the 23rd of February 2018 in Delmas. The different stakeholders were interviewed. A separate questionnaire for the drivers was created. The manager, system specialist and supervisor were each asked basic questions and stakeholder relevant questions in order to understand what their needed are as stipulated in the “Current System” section.

Each team member interviewed a different stakeholder and that’s how we came up with the new system idea and got the requirements extractions.

Below are the questionnaire summaries.

The driver’s questions was a survey that involved circling the level of the answer i.e. if you fully agree with the statement, you would circle 5 and if you completely disagree you would circle 1. A total of 7 of the 13 drivers were asked the questions because the other drivers were making deliveries. Each team member got a chance to speak to a driver and we explained each question properly which means there was no confusion/lack of understanding.

Below are the questions:

a. Do you normally encounter traffic during your deliveries?
b. Do you have a set number of stops?
c. Are the delivery locations of great distance such that you need a resting stop?
d. Do you normally take short cuts that only you know?
e. Does the map give you the best route?
f. Do you think the current system of getting told about your delivery works well?

g. Do you think there is data lost in between transferring the clocking in paper to the admin?
h. Can you work and fix basic smartphone issues such as No internet?
i. Do you use mobile apps on a daily drive?
j. Would you need data to be bought when using your smartphone to drive?

Below are the answers from the driver's survey. The answers were combined from the 7 surveys filled out.

a. I normally experience traffic when doing morning deliveries since there are many other drivers in the roads during morning time, otherwise the routes are not very congested with cars. I also experience traffic later after 6pm because my people are using the roads, they are clear during the day.
b. Yes, I have a specific number of stops for every route I use for my deliveries. These stops vary depending on the length of the route and traffic congestion during that specific day. If the route is short with less traffic then I will have less to no stops, but if the route is long that's when I need the more stops.
c. No, the delivery locations are not very from the loading station so there is no great distance between delivery location and loading station in such a way that we might need resting time. Only when we have to deliver to other countries out of South Africa or to other provinces far from Mpumalanga.
d. Yes, I normally take short cuts only on routes that I am used to and have used before. When a route is new to me, I follow the exact map that I am assigned.
e. No, it just gives me a route based of which routes are most likely to not experience traffic and in most cases this is not true. There are problems only when I forget what I was told do to, then I will have to call at the office just for them to remind me of my deliveries. I would appreciate another alternative way of getting told about my deliveries.
f. Yes, I get to know all about my delivery before-hand which I think allows me to manage and prepare my time well.

g. Some small information is not clocked sometimes and it is sometimes important to clock every little detail. If some information is wrong or missed, this does affect my payment to due to non-accurate details.
h. No, I know very less about technology and smart phones. I can only receive and make calls, nothing much. I am willing to learn some other basic uses of smartphone, this is because I believe they make working easier and save time too.
i. No, I only use paper-based maps or just drive with our experience. I know most of the routes by head already, but I think the mobile app would come in handy for those route that I do not know.
j. I do not know much about technology so I trust the system we are using now. I am willing to give this new technological system a chance just to see if it would bring improvement.

The different stakeholders were asked about the system. Only the system specialist, data handlers and CEO were asked as they are the ones using the current system. Each stakeholder was asked the questions below along with user specific questions that came up during the interview.

Questions:

a. What current system are you using?
b. How does it work?
c. How would you prefer it to work?
d. Do you have intensive budget constraints?
e. What technologies are you using?
f. Would you need training for newer technologies?
g. How many people are a part of the current system?

The answers:

a. The current system is a combination of DynaFleet, CarTrack and Routing Management System. Routing Management System is the main system for the fleet controller. It was provided by the insurance company for the trucks. It is used

to support, evaluate, manage and report things about the fleets or trucks. DynaFleet and CarTrack serve the same purpose which is to track where the car is at a specific time and whether it is moving, idling or stopped. These systems are provided by the car companies. CarTrack is for the MAN trucks is only 10 of the trucks DynaFleet only monitors the 3 Volvo trucks. Another system used is i-traffic which monitors the traffic so the drivers can be accountable for taking time.

b. The supervisor assigns each driver to a delivery every morning. The drivers report to work and get their assignments. If the drivers are delivering coal, they get ticket numbers when they load the coal and a different one when they unload the coal at a given station. The driver then receives a ticket/receipt which is needed in order to invoice and prove that the driver did deliver. The ticket is then taken to head office and the data handlers need to manually upload each detail on each ticket. If the drivers are delivering clinkers or pozzsand, they get an order number beforehand that they give to the loading dock station and they receive a ticket stating the details as well.

   The combination of DynaFleet, CarTrack and Routing Management System monitor the drivers as they start and end the trip during the delivery. The supervisor can call the driver if changes need to be made to delivery.

c. The supervisor would like the system to be able to notify the drivers through short message systems or mobile application push notifications about the delivery that the driver needs to make.

   The system specialist would like the system to run as one instead of using 3 different systems. They would also prefer the system to email issues as they happen i.e. real time notification instead of the getting reports at the end of the day CarTrack is a slow system which wastes time so the system specialist would prefer if the system would be faster than that. The current system require the system specialist to refresh the system in order to get the current location of the drivers so he would prefer a better refresh rate. A routing system is also needed that could provide the best routes for the drivers so as to avoid traffic and accidents.

   The data handlers would prefer to only validate the data and not have to manually input all of it especially when more drivers get employed in order to reduce the

errors that occur. The data handlers would also prefer to have a better way to recover lost tickets such as an image taken of the ticket.

d. There is no set budget for a new system however they are no willing to spend loads of money on new technology because they already have good technology running the company. They can buy things like new smartphones and data for the drivers and provide training for them.
e. Mainly laptops and desktops for now. They communicate with the drivers by calling them and they use cameras inside the trucks to view the drivers.
f. Yes, especially for the drivers. Most of the drivers only have matric and have not used technology as a daily living item. They would need to get accustomed to the device and how to use a mobile application.
g. There is a system specialist, a driver supervisor and data handlers. The system specialist is in charge of running the system. The driver supervisor is in charge of communication and allocation of deliveries to the drivers. The data handlers are in charge of typing the data from the tickets produced during the deliveries. They are also in charge of generating reports required by the managers

2. Requirements Extraction

The goal of this section is to determine what is needed from the system. This includes what the system should directly and indirectly do. The requirements will help in understanding the goals of the system and to develop the business rule. This section was based on the answers received from the drivers and the stakeholders about their current system during the interviews.

2.1 Functional Requirements

Functional requirements are the functions of the system. It states the behavior, input and output of the given system.

The new system will be called Fleet Management System

- A user (admin or driver) must be able to login into the system
- The admin should able to register new drivers and trucks
- The admin should be able to delete drivers and trucks

- The admin should be able the track and monitor fleets
- The supervisor should be able to assign delivery assignment to drivers
- The system should provide real time alerts to the admin
- The admin should be able to get reports about the deliveries, trucks and drivers.
- The system should give best routes
- The drivers and administrators must be able to communicate on the system
- The admin must be able to terminate driver's job
- The admin and supervisor must be able to update the driver's and truck's details.
- The system should be able to notify drivers of their assignments.
- The system should allow the driver to take pictures of their delivery tickets.
- The drivers should be able to enter the delivery information
- The data handlers should be able to edit the delivery information upon validation.

2.2 Non-functional Requirements

Non-functional requirements specify the overall characteristics of the system such as security and usability.

Security

The system should allow for different user access. The supervisor can only assign drivers and choose route. The admin is the only one who can access everything Fleet Management System has to offer. The drivers can only access the mobile application.

Usability

The system will be user friendly and basic. This is due to the fact that the drivers do not have a lot of technology experience. User friendly in that it is easy to navigate through and the colors are not confusing mainly in the mobile application. Basic in that it should not have complicated features such as animations.

Maintainability

The system will be updated by Colloid in accordance to the changes needed by NEW ERA COMMERCE. However, things such as Google Maps are regularly updated thus there will not be much change in the route assignment.

Process

The system must have good process time performance in order to not be slow. A complaint that came from the system specialist was that CarTrack is very slow which makes the reaction time to alerts slow as well. In order for a fast system, there should be good process time.

3. Feasibility Study

The goal of this section is to determine the viability of Fleet Management System for the company. It will help determine whether the project is worth doing or is not doable. It will place emphasis on potential problems that might occur and determine, based on different factors, whether or not the project can be pursued. The goal of this section is to also allow New Era Commerce to view potential obstacles, competition and funding issues that may arise during the project. It will also show potential solutions to solve the issues.

3.1 System feasibility

System feasibility is the industry the system is in as well as the market potential and competition. It will also include the prospective buyers of the system excluding New Era Commerce.

Fleet Management System is a management system for trucks and is in the logistic technology industry. Fleet Management System is similar to Routing Management System which monitors the fleet of trucks however does not provide all reports needed and functions needed such as viewing where a truck is at any time. It is similar to pointer which is a system that optimizes the fleet performance by providing oversight of the fleet and cargo. However, New Era Commerce does not want a complicated system as they are only starting out. New Era Commerce would prefer if the system is developed as a basic and updated along with them so as to ensure that they understand it fully and to teach the drivers as more complicated features are added. It is also similar to truckingoffice which is a much more expensive options especially given that it will not be tailor made to fit New Era Commerce's needs.

Due to being in the logistics industry, the system can be bought by truck companies to provide to their customers as a benefit. However it would require a more complicated system which can be customized.

Fleet Management System is similar to a few management systems however it has its unique method allowing New Era Commerce to grow with the system instead of bombarding them with every possible functionality. It has a few international competitors however there are not a lot of big competitors locally that provide an all-in-one system. It has a disadvantage of only being made for New Era Commerce and not being customizable for high end material handling companies. This issue can be solved by adding more features in accordance to a different companies' needs. Fleet Management System is a viable solution in terms of the system feasibility.

3.2 Technical feasibility

The technical feasibility determines whether the system will perform the required specifications. It will also outline the technical systems options that Colloid proposes to use if they are different from the current system being used. It will give a technical solution and constraints of Fleet Management through looking at hardware and software requirements.

Hardware Requirements

Currently, New Era Commerce has computers that have decent processors (i5) so they will not be slow. There are 2 big desktop screen mounted on the wall which allows surveillance on the trucks. Both admin and the supervisor use these computers which minimizes the costs of new hardware. Routers are also available thus there is an internet connection at the head office for both supervisor and admin.

Smart Phone for the drivers need to be purchased that are GPS enabled for the routing and 3G enabled for coverage.

Fleet Management System can be integrated with the existing hardware equipment despite the smartphone need. This will achieve New Era Commerce's goal of saving costs.

Software Requirements

New Era Commerce has a router which provides fast and seamless internet connection. The only issue that arises is the need for data in order for the drivers to use the mobile application. Fleet Management System can be integrated with the existing software solutions.

The technical feasibility is viable because New Era Commerce has both software and hardware that can integrate most of the Fleet Management System. The mobile application is the only issue that arose from the hardware requirements. This will be dealt with through purchasing entry level smartphones and data for the drivers.

3.3 Economic feasibility

Economic feasibility is to demonstrate the economic benefit of the project. It includes the projection of the amount of funding required, sources for the capital and the return that can be expected from implementing Fleet Management System.

New Era Commerce does not want to make profit from our system rather to save costs/expenses. The system is affordable because there will not be much cost in terms of hardware. Data will not be a problem because they phones will only be used for the deliveries and handed back in after the delivery. Which means that data bought for the drivers should last a while. The data usage will be monitored by New Era Commerce so as to minimize wasted data. Development costs will be the training for the drivers to use the system which is provided by Colloid. The system will also need to be introduced to the different stakeholders. Running costs will only be the upgrades of the phones, maintenance of the phones and data for the drivers and router. The system will eliminate traffic routes and unnecessary stops made by the drivers which means fuel will be used efficiently because drivers will not be doing as they like with the trucks. This is an indirect benefit of the system. The improved management of the data will be another indirect benefit as this increases the efficiency of the system and lessen the errors made. Less errors means that payments can be done on time and invoices can be sent to clients on time which improves the customer service.

Fleet Management System will have initial costs however in the long run, it will help solve waste of petrol and inefficiency which will achieve the goal of the system. It will do this by

providing a system that monitors the fleets efficiently so as to deal with the different items that lead to wasted funds.

3.4 Operational feasibility

Operational feasibility is the measure of how well a system solve the problem. It also considers whether the proposed system will be accepted by people who will be affected by its introduction. It will describe the effect on the users and discuss the need for retraining.

Fleet Management System would be difficult to accept for the drivers however based on the study, the drivers are willing to learn the use of the app. This is due to the drivers realizing that the system will not eliminate jobs but rather make their jobs easier. The drivers realized this during the interviews as each team member explained the idea. Training would be needed for the drivers in order to navigate around a smartphone and mobile application. It may take time for the drivers to get used to the new system however after using it a few times, they will get it. Errors may occur in the beginning but since the system will be tested on known routes, it will not be errors that cost the company. This will be until the drivers are properly used to the system.

The data handlers feel overwhelmed hence they would be willing to accept the new system. It does not eliminate jobs but rather allows them to focus on other things such as reporting and monitoring instead of spending a lot of time manually typing out the data. There will be a need to retrain the different stakeholders including the data handlers about the new system. However because the data handlers are used to working with data and computers, it will not be difficult.

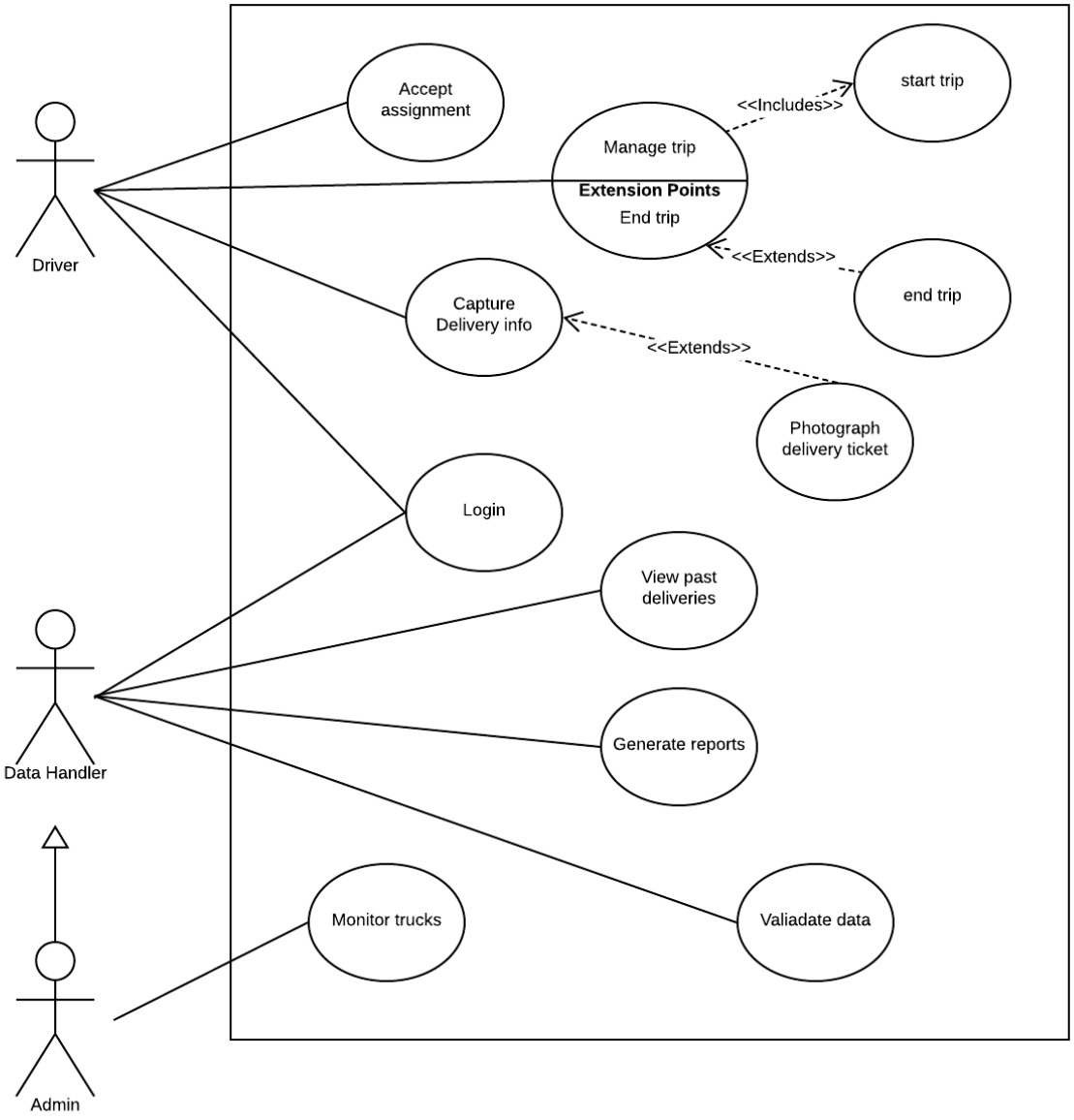
The other stakeholders, mainly the managers and the system specialist (Admin), are more than willing to have a more efficient system. They each want New Era Commerce to stop wasting money in order to use the money to grow the company. The system specialist is used to working on different system so he will not need as much training. The managers will only see how it works and get a brief understanding of it.

Fleet Management System will work well within New Era Commerce mainly because the different stakeholders are willing to learn. The system may have a few issues in the

beginning however Colloid will ensure a smooth transition through providing both a user friendly system and intensive training.

4 Identification of Use Cases & Use Case Diagrams

Delivery Subsystem



Use case description: Delivery Use Cases

1. Accept assignment
    a. System alerts driver of new assignment
    b. Driver opens assignment notification
    c. System shows drivers assignment and chosen route for delivery
    d. Driver accepts assignment

1.1. Accept assignment alternate
    a. System alerts driver of new assignment
    b. Driver does not view assignment
    c. System send persistent notification and rings periodically until driver views assignment
    d. If driver does not view assignment after constant retries admin is alerted of driver misconduct

2. Manage trip
    a. Driver requests to see trip details
    b. System shows driver all information related to current trip
    c. Driver presses panic button
    d. System alerts admin that driver needs assistance

3. Start trip
    a. Driver starts trip after loading the truck
    b. System notes driver has started trip and starts monitoring truck

3.1. Start trip alternative
    a. Driver starts trip after loading the truck
    b. System notes that said truck is not at the loading location
    c. System notifies admin of inconsistent location and only admin can start the trip

4. End trip
    a. Driver ends trip after unloading truck
    b. System notes driver has an empty load and sends new assignment if driver still has some deliveries to make

4.1. End trip alternate
    a. Driver ends trip after unloading truck

b. System notes that truck is not at the delivery location specified
c. System alerts admin and matter is handled accordingly

5. Capture delivery info
   a. Driver selects to capture a finished delivery
   b. Driver enters delivery information required by system
   c. System saves information and alerts data handlers of completed delivery

5.1. Capture delivery info alternative
   a. Driver selects to capture a finished delivery
   b. Driver enters information required by the system
   c. System notes info given does not match info for the start of the trip
   d. Admin is warned and can make changes to fix the errors

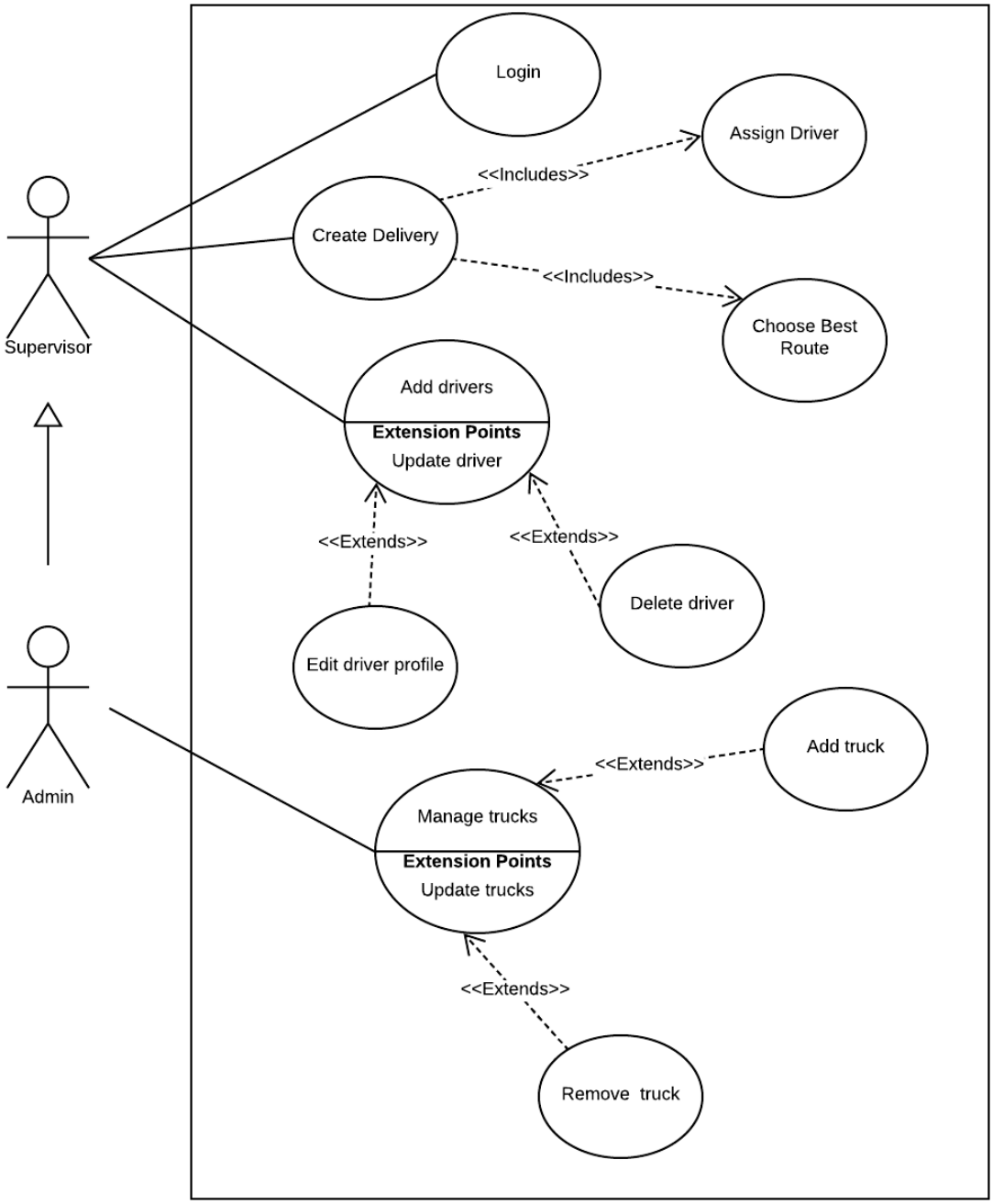
6. Photograph delivery ticket
   a. Driver completes delivery and captures delivery info
   b. System asks driver to take a picture of proof of delivery
   c. Driver takes a photo and uploads it to the system
   d. System saves photo as proof of delivery which will be later used for validation
7. Login
   a. User login into system
   b. System logs in user and allows specified access to the system

7.1. Login alternative
   a. Driver logins into system
   b. System notes driver gave invalid credentials
   c. System alerts driver of mishap and allows to retry or login attempt is cancelled
8. View past deliveries
   a. Data handler selects past delivery to view
   b. System shows when the delivery was made and more information about the delivery
9. Generate reports
   a. Data handler selects a driver or a list of drivers
   b. Data handler requests reports about selected driver(s)

c. System generates illustrative reports about the drivers and the deliveries they have made

10. Validate data
    a. Data handler selects a completed delivery
    b. System shows data handler information about the past delivery
    c. Data handler requests to validate the delivery
    d. System shows data handler delivery information and photo of proof of delivery for the trip
11. Monitor trucks
    a. Admin requests to monitor trucks
    b. System shows admin map with pins showing where the drivers are on the road and where they are headed

Assignment Subsystem



Use case description: Assignment Use Cases

1. Login
    a. User login into system
    c. System logs in user and allows specified access to the system

1.1. Login alternative
    a. Driver logins into system
    b. System notes driver gave invalid credentials
    c. System alerts driver of mishap and allows to retry or login attempt is cancelled

2. Create delivery
    a. Supervisor requests to create a new delivery
    b. System asks for delivery information
    c. Supervisor enter delivery info
    d. System adds new delivery and starts tracking it's progress

3. Assign driver
    a. Supervisor requests to assign a new driver
    b. System shows supervisor list of available drivers
    c. Supervisor chooses driver for delivery
    d. System assigns driver and alerts driver of delivery

4. Choose best route
    a. System offers supervisor a list of recommended list of routes for the given delivery
    b. Supervisor chooses the route he wants for the delivery
    c. System sets route for the given delivery

5. Add drivers
    a. Supervisor selects to add a new driver
    b. System asks for driver general information
    c. System adds new driver to the database

5.1. Add drivers alternative
    a. Supervisor selects to add a new driver
    b. System asks for driver information
    c. System detects driver is already on the system

d. Supervisor is not allowed to add driver, changes have to be made or operation cancelled

6. Edit driver profile (Add driver extension)
   a. Supervisor selects profile of existing driver
   b. Supervisor makes changes to driver profile
   c. System keeps tracks of changes and update database to current state
7. Delete driver (Add driver extension)
   a. Supervisor selects profile of existing driver
   b. Supervisor request to delete profile of said driver
   c. System marks driver as no longer part of the company and is no longer available for deliveries

7.1. Delete driver alternative
   a. Supervisor selects profile of existing driver
   b. Supervisor requests to delete profile of said driver
   c. System notes that driver is still on a delivery
   d. Supervisor is notified and driver has to bring back the truck before the profile can be deleted

8. Manage trucks
   a. Admin requests to manage trucks
   b. System shows trucks in the system and who has been driving them where
9. Add truck
   a. Admin views the trucks in the system
   b. Admin requests to add a truck
   c. System asks Admin to enter information about the new truck
   d. System saves the new truck
10. Remove truck (Manage truck extension)
   a. Admin views trucks in the system
   b. Admin selects a truck
   c. System shows Admin information about the truck
   d. Admin removes truck from the system
   e. System marks truck as no longer part of the company's fleet

Informatics 3 Year Project

Academy of Computer Science and Software Engineering

Plagiarism Declaration

Deliverable #	1	Team #	43	Supervisor	Mr HJC Van der Westhuizen
Team Name	COLLOID				

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