FACULTY OF SCIENCE

ACADEMY OF COMPUTER SCIENCE & SOFTWARE ENGINEERING

MODULE	**IFM3B10** ADVANCED SOFTWARE ENGINEERING
CAMPUS	APK
EXAM **SSA**	DECEMBER 2014

CASE STUDY

DATE	2 DECEMBER 2014	**SESSION**	15H00 – 18H00
DURATION	3 HOURS	**MARKS**	150
ASSESSOR		MR T.D. MPHUTHI	
INTERNAL MODERATOR		DR W.S. LEUNG	
EXTERNAL MODERATOR		DR L. FUTCHER	

PLEASE TAKE CAREFUL NOTE OF THE FOLLOWING:

1. Read this CASE STUDY carefully.
2. The CASE STUDY serves as a guide to describe the role that you should take on when answering the questions provided in the question paper.
3. All questions provided in the question paper that make a reference to the CASE STUDY should be answered in relation to this CASE STUDY.
4. All provided questions in the question paper that do not make a reference to the CASE STUDY should be answered in relation to the learning material covered during the course of the module.
5. This CASE STUDY consists of 5 (including this cover page) pages.

Gold Town Police Force

The Gold Town Police Force's Hijack Unit has been tasked with combating hijackings that take place on the streets of Gold Town ever since their inception 10 years ago. The year 2014 has seen the town produce the worst hijackings statistics since the Hijack Unit was put together, outraging the community and causing the local government to demand immediate action to be taken by the Gold Town Police Force. As such, the Gold Town Police Force has decided to develop a tracking system called Anti-Hijack, which makes use of the Global Positioning System (GPS) technology in smart-phones to track the location of vehicles in an attempt to counter this problem. The aim of the system is to track all vehicles through a mobile app on the smart-phones of the drivers of vehicles, to improve the ability to pinpoint hijacked vehicles and to identify patterns of hijackings.

The software development project for the development of the Anti-Hijack system has started, however there have been some setbacks, which have led the Gold Town Police Force to seek your consulting services for the purpose of providing guidance on what actions they need to take from a software development as well as a project management perspective.

Software Development & Testing

The Gold Town community is happy with the system proposed by the Gold Town Police Force; however a large portion of the community is worried about issues of the reliability of the system, having had poor experiences with previous technology systems of the Gold Town Police Force. Essentially, the community would like to have a degree of assurance that the system will be adequately tested before being issued to them. The Gold Town Police force has processes in place for verification and validation, however some of the defined goals associated with these processes are not satisfied. The community would also like to be included in the decision making process for such tests. As the lead consultant on the software project, one of your tasks will be to help the community understand the approaches that will be used for testing the system, as well as the role that the community will play during the testing of the system.

The software development team is considering employing pair programing for the development of some small modules within the system. The lead developer sees this as a brilliant idea as younger developers could be paired up with experienced developers for learning purposes.

System Architecture & Security

The Anti-Hijack mobile app will have a client-server architecture, so the Gold Town community will be able to download the Anti-Hijack mobile app onto their smart-phones and log into their unique profiles using their unique user code and their password. For the initial release of the Anti-Hijack mobile app, the user code will be a 7 digit number greater than 1000000, while the password will be an alphanumeric string of 8 characters in length.

Police officers will also be able to access the system through a web browser, where they will login using their badge number and password combination. Once logged in, the police officers will be able to get access to the location information of users of the Anti-Hijack mobile app located in the area of the town where the police officer is posted. Police officers will also get access to locations of potential hijackings in progress, which are determined by a learning algorithm in the system that makes use of historic data in the database.

A major worry for the development team is that this historic data that is continuously growing as new hijacking and user information is being obtained, will be corrupted if the system's security is compromised.

The Gold Town Police Force would like to link the Anti-Hijack to the Traffic Department's vehicle registration database. They are considering the use of the two architectures described in Figure 1 for this component composition.

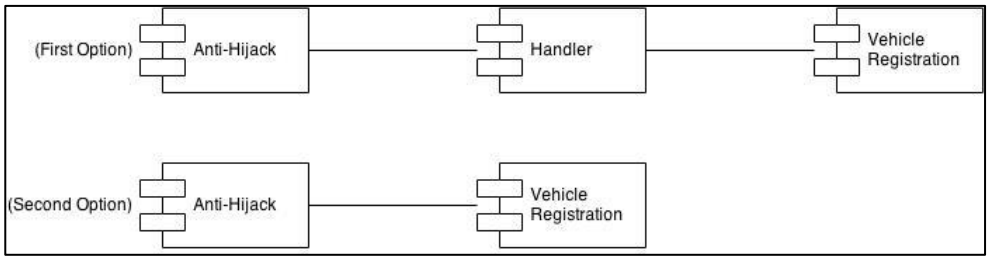

Figure 1: Component Compositions

The Gold Town Police Force's Legacy system

The Gold Town Police Force's Hijack Unit currently uses an old system for recording entries of hijacking cases as they take place. The police officers use the legacy system to add new cases into the system as well as to review old cases already existing in the system. The legacy system lacks integration with modern technologies and it requires users to physically

be located at the office in order to use the system, as it is only accessible from a limited number of workstations that still have the old technology that supports the system. This is a critical issue for the Gold Town Police Force because their core work is done in the streets of Gold Town.

The lack of support for the system on newer technologies has made maintenance difficult, with some of the police officers humorously calling the legacy system "long weekend" because the system is often down on Mondays and Fridays. Many police officers have refrained from using the legacy system, with a recent survey showing that only 18% of the police officers use the system on a daily basis. The Gold Town Police Force needs a strategy for dealing with the legacy system as a large amount of money is spent on training all new members of the force on how to use the legacy system, with organisational policies put in place for this process.

Project Management

The Gold Town Police Force has had some issues with the quality of teamwork in previous projects resulting in teams lacking effectiveness. This has been worrisome to the Gold Town Police Force's management because their software development team is made up of engineers who are motivated by complex and challenging problems.

After further analysis, you have identified the following two risks:

- The organisation is facing a restructure due to new shareholders taking over.
- There is a new virus outbreak at Gold Town.

The high level project time-line for the Anti-Hijack system is presented in Table 1. This time-line represents the managed process that the Gold Town Police Force uses as a starting point for executing all of their projects, each new project adapts this process to meet the project–specific requirements. The Gold Town Police Force has put aside R120 000 for the project based on estimations driven by measurements made on previous projects that used the same managed process.

TASK	DURATION (MONTHS)	DEPENDENCIES	END DELIVERABLE
T1 (Verification & Validation)	10		D1 (Verification & Validation Documents)
T2 (Design)	4		D2 (System Design)
T3 (Development & Testing)	6	T2	D3 (Initial Release)

Table 1: High Level Project Time-Line

Upon evaluating the high level requirements, you have identified the variables in Table 2 as good descriptions of the project, which may be used during cost modeling.

VARIABLE	VALUE
Constant Factor	5
Number of Lines of Code	20 000
Complexity	1
Multiplier	6

Table 2: Cost Modeling Variables and Values