**THE AUSTRALIAN NATIONAL UNIVERSITY**

***First Semester Final Examination 2017***

**SYSTEMS ENGINEERING FOR SOFTWARE ENGINEERS**

**(COMP3530 and COMP6353)**

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| Q1 [30] |  | Q2 [20] |  | Q3 [20] |  | Q4 [30] |
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**QUESTION ANSWER GUIDELINES**

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Make sure that you use a font size of 12pt and single line spacing.

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**REFERENCES**

The questions in this examination refer to papers and other publications listed in the references section at the end of this document. These documents are also available on the COMP3530/6353 Wattle site.

**REFERENCING REQUIREMENTS**

All referencing is to comply with the following:

* IEEE Citation Reference [3]

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* ANU Webpage Evaluation Criteria [4]

**QUESTION 1 – Emerging approaches to Systems Engineering**

**(30 marks, Maximum of three pages)**

“70% of embedded software system errors are introduced during requirements and architecture design, while 80% are found during system integration or later, resulting in exponentially growing rework and qualification costs … [ meaning that] system integration becomes high risk, and system evolution (lifecycle support) becomes expensive and results in rapidly outdated components” [5].

An emerging approach to dealing with these problems is known variously as Model Based Engineering (MBE) [5], Model-Based Systems Engineering (MBSE) [6] or Model-Driven Engineering (MDE) [7]. Although there are some minor differences in approach, for the purposes of this exam, all three will be identified as *MBSE*.

The three references [5-7] provide an overview of *MBSE*. The France and Rumpe paper [8] is a well cited source regarding the challenges faced by model-driven development of software. Rhodes and Hastings [9] describe *Engineering Systems* and how it can be differentiated from traditional *Systems Engineering* [10][11].

1. [5 marks] Summarise the limitations of traditional systems engineering approaches that are addressed by *MBSE*.

1. [15 marks] Explain the key characteristics and features of *MBSE* and how they help address the limitations of traditional systems engineering you identified in a) above.
2. [10 marks] Identify and discuss limitations of MBSE. For example, would it work in any situation? What barriers would there be to implementing the approach?

**Additional Resources**

The following three short videos provide a good overview of MBSE. The end of Part II and all of Part III comprise a very useful Q&A

* [VitechCorp - Empowering the Organization Through Model-Based Systems Engineering (MBSE) - Part I](https://www.youtube.com/watch?v=d8C33Vr0Y98)
* [VitechCorp - Empowering the Organization Through Model-Based Systems Engineering (MBSE) - Part II](https://www.youtube.com/watch?v=MGFYsaWtANo)
* [VitechCorp - Empowering the Organization Through Model-Based Systems Engineering (MBSE) - Part III](https://www.youtube.com/watch?v=a55DghUP_Ns)

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a)

In my opinion, following points are the limitations of tradition systems engineering approaches which are figured out by MBSE.

1. Mismatching issue

As Carnegie Mellon University [5] stated, the mismatching among the physical system, distributed hardware platform and embedded system software components resulted in the current circumstance which mentioned at the beginning.

2. Connection with organisation and influence issue

VitechCorp [16] demonstrated that SE organisations are insufficiently utilised to leverage for documentation and auditing. For instance, team members in groups always dictate solutions. In addition, the impact, especially the predictive impact, is also limited. Sometimes schedule does not correspond to the SE plan, although the scheme is not effective to deal with the primary function of the system.

3. Some related issues caused by the development of platform

Schmidt [7] claimed that though the platform and the language made some progress, the increase of the platform complexity developed quicker than the capability of general language to mask, which always required developers to put a lot of effort to transplant code of applications to a different version of the platform manually. Meanwhile, it takes too much time and energy to write code for significant integration relevant activities like configuration. Using newer notations and similar but unnecessary codes also increase the complexity. These problems lead to a situation that the software industry is at the peak of the complexity limit. More seriously, due to lack of the integrated view, it is difficult for developers to understand the particular effect which is caused by the variety of user requirements and languages/platforms.

b)

Compared to the traditional SE, a uniform and consistent model are utilised as the primary artifact to promote the SE activities by the MDSE, which enhance the communications between teammates and stakeholders [6]. Moreover, the shared knowledge and understanding advances the accuracy and integrity of design [6]. These improvements play an important role in dealing with the impact issues and strengthening the utilisation rate of SE which mentioned in the VitechCorp's video. VitechCorp [17] also illustrated that after the enhancement of the communications, it is easier to realise the cost and performance engineering through the logical decision making and reflect the cost and risk of the program in order to advance the cost and risk awareness in the organisations.

The MBSE consists of the requirements, structures, behaviours and parameters, which always interact with other engineering models to produce an integrated, coherent environment [6], which avoid the mismatching issues and provides the integrated view to developers. In addition, the complexity issues, including platform complexity and geographical complexity, will improve as the environment (the unified platform) is without the obstacle and team members all over the world are supposed to use the same language [6].

Schmidt [7] also indicated that domain-specific modelling language(DSML) which formalise the structure of the application, and transformation engines and generators are the particular characteristics to overcome the complexity challenges in the traditional SE aspect. The DSML could indicate the relationship between different concepts and significant sentences and constraints precisely [7], while the transformation engines automate the analysis and composition processes instead of the traditional manual construction process with the high error rate [7].

Meanwhile, some mistakes, such as the mismatching problems, are able to be detected and prevented in the early lifecycle as the domain-specific constraints are reinforced, and model checking functionality is added [7]. Lastly, since the rapid development of functions and quality-of-service (QoS), the MDE tool generator become simpler and more accurate. It composes an artifact component of standardised API and frame works instead of the API of lower-level operation systems, which enables the development, debugging and maintenance to become easier. Thus, to some extents, the complexity issues are resolved.

c)

As far as I am concerned, the limitations of MBSE contains:

1. Lack of the standard and metrics

Ramos and Barceló [6] demonstrates that some experts recommended to constitute the specific metrics and value model of the MBSE and generalise the norm and support. To some stages, in the current circumstance, there is no uniform standards and metrics in the MBSE area. And Schmidt [7] stated because of the shortage of the valuable standard, the efficiency of integration work remains low continuously. Moreover, the existing methods, like OOSEM, RUP SE and OPM, are not mature to attract people to pay attention to the MBSE area which contains potential research opportunities. Hence, the significant challenge is defining an effective standard for tools and models to interact efficiently, which is a limitation of the MBSE in my opinion.

2. Challenges from modelling language

On the one hand, the integration of modelling languages is an aspect of the limitation of the current MBSE environment. Ramos and Barceló [6] indicated different modelling languages, such as SysML and OPD/OPL, have obvious distinctions in the size and complexity aspects. SysML owns powerful and abundant functions, but it is complex for beginners to use, while OPD/OPL is easy to learn and apply, especially for modelling to high-level concepts. Thus, it is helpful to promote the understanding of the MBSE and improve the communications between the stakeholders for us to integrate these two kinds of modelling languages.

On the other hand, the technical challenges also influence the development of the MBSE. France and Rumpe [8] illustrated that developers would encounter challenges from both problem-level abstractions in modelling language and the formality aspect. How to deal with the creating and operation issues in the abstraction aspect? How to formalise the semantics to provide the normal operations? These two questions are supposed to be taken into considerations.

3. Need the reliable infrastructure to support

Schmidt [7] claimed that due to the support from the application of MDE, like the modelling environment Eclipse of the IBM, the various commercial and development projects are able to be designed, applied, developed and completed. Some emerging tools increasingly become the primary graphical modelling framework, such as DSL tools pack in MS visual studio and openArchitectureWare of the SourceForge.

4. Lack of firm technical materials

The solid technical information is the foundation of MDE assessment [7]. Since developers lack the solid materials of MDE, when engaging in the process of MDE estimation, they should consider the compatibility of the MDE tools, the standardised environment and exchange formats and the specification of the automation [7].

5. Challenges from separation concerns

The kind of limitations is possibly caused by the utilising of overlapping multi-perspectives [8]. The method for solving a problem may restrict other approaches of other questions, which might result in some interaction issues [8]. For instance, the flight software produced a synchronisation issue which leads to the failure of the initial launch of the aerospace plane Columbia [8]. In this case, the internal function did not engage in an adequate interaction with the primary functions [8]. Therefore, when designing the modelling, it is necessary to approve developers to separate and test the functions to identify and repair the interactions errors in order to understand and avoid the emergency happening.

6. Challenges from the model operation and management

Although the essential supports of storing and operations are provided by the MDE, the environment, which covers various model editors, has restricted functions and supports on the detections and model transformation [8]. However, they are insufficient for the development of the MDE. The MDE requires not only the strict techniques of model transformation and analysis but also the abundant infrastructure based on the storages to provide various modelling operations, which support the development of modelling with more efficiency.

**QUESTION 2 – Emerging approaches to Systems Engineering**

**(20 marks, Maximum of two pages)**

In COMP3530/6353 we looked at perspectives on systems engineering including Systems Thinking and Cause-Effect loops, Engineering Context, Design Thinking, Systems Engineering life-cycles, Sustainability, Commercial aspects and Human aspects. From these perspectives, you developed your own view of systems engineering and described that in your Learning Portfolios.

1. [20 marks] Compare and contrast MBSE with your own view of systems engineering as developed during COMP3530/6353 and described in your Learning Portfolio.

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a)

I would compare what I learned from this course with what I understood on MBSE in these aspects:

1. Systems Thinking and Cause-Effect loops

In the system thinking section, the Cause-Effect loops and ‘fix that fail’ are useful tools to help people consider and understand the issue more adequately [19]. I think these tools are similar with the MBSE since I regard them as methods which turn specific problems into virtual and abstract models to cycle in a loop in order to find the shortage of the thinking. However, the obvious distinction is that the MBSE uses modelling language, while model diagrams are applied in these loop methods.

2. Engineering Context

In the engineering context aspect, including skills and ethics, they are similar because they all serves for the engineering.

In my opinion, the noticeable difference between them is in the actual operation. I think applying MBSE is more efficient than the computer language (code, binary format…etc.). Sometimes the large-section and miscellaneous code without the annotation makes the development team feel confused when they review and maintain. Moreover, it is disordered when altering the functions with the global variable and local variable which is separate in the different part of the entire code. By contrast, the MBSE displays more direct views and the development team could consider the result and distribution situation rapidly as it also provides the independent entities, processes and relationships. Once they find issues when engaging in the analysis, they could modify on the diagram directly which is more efficient than altering codes. Thus, I think that integrating the modelling and coding, and follow the principle ‘first modelling, last coding’ is the best operation.

3. Design Thinking

The core idea of design thinking presented by the lecture is ‘human-centric’, which is similar with the one of the MBSE which Ramos and Barceló [6] expressed.

The traditional design based on the document metrics requires the development team to develop independently first and invite users to proceed the iteration test, while when applying MBSE, it is possible to encourage users to participate in the design process in principle as the modelling language is easy to understand [7]. If the direction of design is incorrect and divergent or it encountered errors in the process, the development team and users could reach an agreement on the demand as soon as possible. Nonetheless, it is difficult to apply MBSE to the non-functional requirement, which is the disadvantage of the MBSE [24].

4. Systems Engineering life-cycles

The overall lifecycle of these two concepts is analogous. The development processes of them are different. The lifecycle of the development of SE is like waterfall model, which is a continuous and non-iterative process and regarded as water sequentially flows downward. By contrast, the lifecycle of the MBSE is a kind of agile development, which is iterative and based on the increment to construct and fulfil the requirement gradually by teamwork and communications rather than finishing the mission at one time.

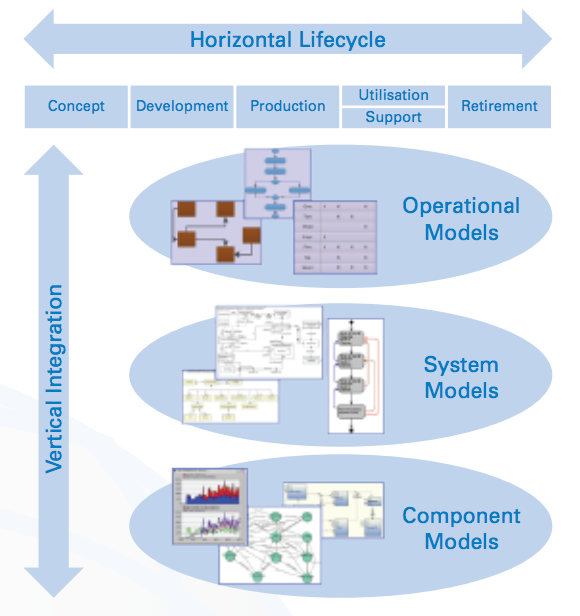
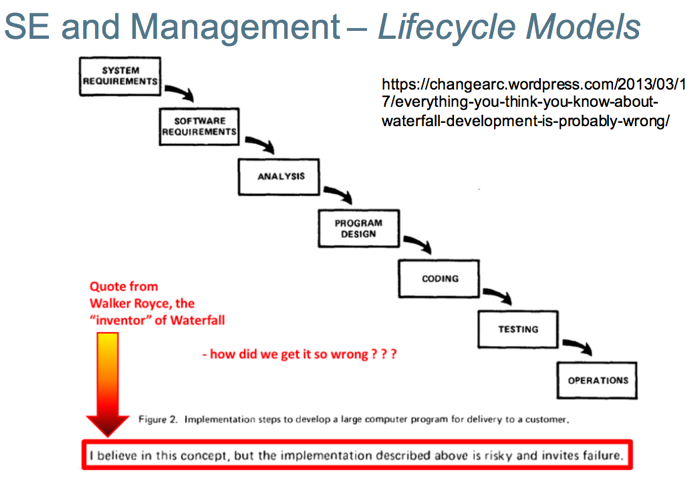


Figure 1. The lifecycle of the SE [25]. Figure 2. The lifecycle of the MBSE [24].

5. Sustainability

I think in the sustainability part, the only relation and connection is the reusability. Some models after using could be reused when the development team analyses the similar circumstance to reduce the time cost. On the other side, this method is also a sort of sustainability.

6. Commercial aspects

The objective and effort of engineering are to focus on the customers’ requirement and generate more profit. In this aspect, they all achieve the goal to increase the profit and enhance the competitiveness of the enterprise. However, the example and illustration above also describe that the MBSE is more efficient to raise productivity and decrease the cost, which is a better method to apply [6].

7. Human aspects

From learning, it is well-known that human errors led to many unfortunate accidents and results. Modelling plays an important role in diminishing the mistakes. For instance, the UML, one of the greatest modelling languages, could display some dynamic and static information in the process obviously and uniformly. In the expression aspect, the modelling language is more accurate than the code and simpler than the communication and speaking. Meanwhile, modelling is appropriate to the development of most systems (normal, concurrent, distributed…etc.). For the different system, it is better for the development team to apply unified modelling method and language to increase the experience of operating the MBSE and reduce the error which may be caused by the switch of different methods instead of taking high risks of the human error aspect.

**QUESTION 3 – Application of the concepts introduced during COMP3530/6353 to the analysis of a scenario**

**(20 marks, Maximum of two pages)**

Kodak was established in the 1880s by George Eastman. “By the 1950s, Kodak had the lion's share of the US amateur film market … [controlling] almost 70% of the highly lucrative US film market. Gross margins on film ran close to 70%, and its success was further underpinned by a massive distribution network and one of the strongest brands in the world. The company completely dominated its industry” [12]. In 1975 Kodak developed the first digital camera [13], in 1976 it “commanded 90% of film sales and 85% of camera sales in the U.S.” [14], and in 2001 acquired the photo sharing site Ofoto [14], yet in January 2012 it filed for bankruptcy.

1. [10 marks] Using concepts covered in COMP3530/6353, explain why you think the Eastman Kodak company failed.
2. [10 marks] Are there any alternative approaches covered in the course, or from *MBSE*, that might be used to avoid the problems experienced by Eastman Kodak?

a)

From the course, we learned some topics and knowledge about the system engineering. However, in my opinion, the failure of the Kodak company is related to these concepts:

1.Lifecycle process

Jiu [18] indicated that the Kodak company hold such product lifecycle: Market research -> Stakeholders’ analysis -> Growth -> Maturity ->Decline.

The Kodak company did right market researches and stakeholders’ analysis in the film industry at the beginning of the establishment of the enterprise, which contributed to the expansion and growth in the future [13]. To some extents, the Kodak company reached its maturity in the middle of last century in the film industry [13]. Nonetheless, the Cambridge University [12] demonstrated that the market researches and stakeholders’ analysis in the digital picture industry and digital camera area are developed insufficiently, which resulted in the managers adopting the inappropriate development strategy to continue to expand the traditional film area and invent new film products to increase the market share. Once the emerging digital camera became popular, the market dominance of Kodak film diminished sharply. The lifecycle for the digital camera area which is selected by the Kodak company is poor since the shortage and inaccuracy of the market search and stakeholders’ analysis led to the failure of the growth and maturity, even further decline.

2.System thinking

As far as I am concerned, the ‘fix that fail’ model is appropriate to analyse the problems that the failure of Kodak produced. The ‘fix that fail’, which contains four aspects, problem symptom, fix, unexpected consequence and problem, shows that in the case of ‘repair failure’, it seems to figure out the issue after applying the repair methods. Nevertheless, these methods may result in some unpredicted consequences [19]. They created a feedback loop which worsens the original problems or generates some other related issues [19]. The apparent problem is the mismanagement and bad investment. And I put the situation that ‘the market share decrease’ in the problem symptom section. The Kodak company adopt the method that increases investment and R&D fund in the traditional film area as the fix (solution). It is no doubt that it led to the circumstance that the emerging digital camera industry was established. Obviously, the investment in the traditional film industry is not reasonable. However, unfortunately, the analysis department in the Kodak company did not apply this analysis model.

3.Environment concerns:

Since the 21st century, the usage of paper increasingly decreased in the America and experts in the worldwide green organisations appealed to propagandise to the paperless office [20]. However, the Kodak company still put effort into the film industry which is a kind of waste and raise the cost compared with other digital camera companies.

4.Industry standard

Anthony [14] claimed the Kodak company ever invented the first digital camera and new connection technique between the camera and the computer. Nonetheless, the company did not develop any standards at that time. The development of standard produces large amounts of benefits, particularly in the aspects that reducing the cost and enhance the interoperability of different departments. But Kodak company miss this opportunity.

5.Human error

In the learning portfolio, I mentioned the Swiss Cheese Model which refer to describe that the accident could happen but coincidentally it went through each loophole of the protective measures [22]. It is like that it allows a beam of light pass through the random holes of the layers of cheese, and as long as it is not able to across one layer of cheese, the accident will be avoided [22]. The CEO of Kodak was not willing to transform to invest the digital aspect and insist the traditional film industry which led to the loss of customers and resources. Once customers lost their interests in the products, the profit decreased, which implies that the company will become bankrupt soon.

6.Commercial aspect of engineering

The engineering effort focused on the customers’ requirements and dedicate to deliver value [23]. But the CEO made several mistakes, such as the inappropriate strategy, lack of the innovation ability and incorrect market attention, which caused the decrease in the profit and further loss of competitiveness.

b)

I have obtained a clear mind about the knowledge of the course. Hence, if I had a chance, I would suggest the Kodak company review these aspects before constituting new strategies.

1. Lifecycle process

The lifecycle in the past is suitable for the digital camera industry. However, the market research and stakeholders’ analysis must be modified to more accurate and reasonable. In addition, the manager of the market department should have the long-term vision to organise several times market research and analysis to acquire the actual result.

2. System thinking

As I illustrated and introduced above, the ‘fix that fail’ model should be used when the company encountered serious problems to reach a clear and integrated view of the big picture.

3.Environment concerns:

The paperless office is popular and accepted by many companies [20]. Thus, I suggest the Kodak should deploy the digital plan to reduce the cost and promote the market competitiveness.

4.Industry standard

The innovation ability and creativity of the employees of the Kodak is unquestionable. However, as the standard brings many benefits related to the operation and management of the company, all the staff should own the awareness of the standard.

5.Human error

I believed that the CEO has the clear mind about the Swiss Cheese Model. Sometimes the accident and failure are not able to be prevented even the safeguard and risk management are analysed and prepared adequately. Thus, one feasible method I think is to hold several times meetings to refer to different people’s ideas as many as possible before making any significant decisions

6.Commercial aspect of engineering

After concluding all the suggestions and recommendations, the first mid is still to achieve the financial goal and plans – increasing profit. In my opinion, as similar as the lifecycle process aspect, when developing right market research and stakeholders’ analysis, the commercial missions will be realised.

**QUESTION 4 – Your ‘World View’ of Systems Engineering**

**(30 marks, Maximum of three pages)**

Through an iterative process of discussion, analysis and reflection you will have made your own connections between the many aspects of systems and software engineering in a way that 'makes sense' to you; in other words, you will have developed your own holistic ‘World View’ of systems and software engineering.

Learning Statements (LS) [15] are used to help students identify their learning from experiences. An LS requires students to reflect upon their “experience, identify learning from that experience, and then describe the value of integrating that learning in their future endeavours” [15]. The LS follows a fixed ‘triplet’ structure as identified in Table 1. Table 1 also provides some suggested phrasings.

Table 1 - Learning Statement ‘Triplet’ Structure and Some Suggested Phrasings [15]

|  |  |  |
| --- | --- | --- |
| **Experience *x*** | **Learning *y*** | **Value/Utility *z*** |
| Through *x* (From *x*, By doing *x* …)  I did not consider *x* initially  I thought (expected) *x* before/initially | I learned *y*  I realised *y*  I found out *y*  I discovered *y*  I became conscious of *y* | Value/utility *z* in the future of learning *y* |
| Value (Lectures/Tutorials/Learning Journal) = Topics covered in COMP3530/6535 which will help you transition from a student to a junior software engineer | | |

An example LS might be “*Initially, I thought that the learning portfolio was a waste of time and was simply a piece of assessment I had to complete to pass the course; however, I have now come to realise that careful analysis and reflection has not only helped me to develop an in-depth understanding of the strengths and weaknesses of each of the topics covered in the course but has also taught me the value of reflection in the learning process; this skill will be of value to me in the future even when I’m in a new and unfamiliar circumstance as I will be able to recognise situations where I might apply some of the concepts covered in this course, and understanding the value of reflection in the learning process will ensure I continue to learn from new experiences and situations.”*

Autrey et al [15] explain in detail on page 5 the marking of an LS. It is strongly recommended that students read this page carefully to ensure they understand what is required to gain maximum marks for an LS before completing their own LS.

1. [12 marks] Write two distinct Learning Statements (LS) that describe the two most important pieces of learning you will take away from COMP3530/6353.

Your answer must follow the LS structure outlined above. **Answers which do not follow this structure will receive no marks.**

1. [18 marks – **maximum 2 pages**] Write a brief reflective essay that explains how this learning has changed your approach to systems and software development and how you have implemented your learning.

a)

|  |  |  |
| --- | --- | --- |
| **Experience *x*** | **Learning *y*** | **Value/Utility *z*** |
| I thought tutorial facilitation was only an assessment with low efficiency initially. | I realised my thought is incorrect and unilateral. | Value of the skill of facilitation in the future of learning new knowledge. |

Before the beginning of the semester, I considered that the impact of tutorial facilitation is limited and low efficient since, in my idea, students almost obtain similar knowledge after attending only one lecture for a topic. Then in the tutorial, they delivered similar values to us which may not contribute to my learning; Nevertheless, since I prepared for the facilitation by myself, the responsibility drove me to search and browse more external materials and videos, and capture more knowledge to demonstrate what I learned from the topic and additional readings to my colleagues and put my effort to hold the brainstorm to help others understand the topic; Although this is originally an assessment for the course, I gained large amounts of values and realised why the lecturer always know the topic and figure out the questions quickly. Apart from the experience of teaching, the preparation for the lecture is also important. As a proverb goes, ‘One is never too old to learn’. In the future, when I acquire new knowledge, it is no doubt that I will apply this method. Prepare well, and then invite friends to listen to my ‘facilitation show’. When I enable to deliver the knowledge adequately and precisely to help them understand the related content, I have constituted my personal thoughts on this new knowledge.

|  |  |  |
| --- | --- | --- |
| **Experience *x*** | **Learning *y*** | **Value/Utility *z*** |
| I thought the engineering was not related to the commercial areas initially. | I realised engineering serves for the commercial goals. | Value of the searching more materials rather than subjective thoughts in the future of learning new knowledge. |

Before the week ten’s topic ‘Commercial aspect of engineering’, I always thought the engineering and areas related to the engineering would not intersect with the business domain. Although there are many aspects covered in the engineering area, I never realised the commerce is related to the engineering; However, Mr. Merv Davis changed my simple thoughts. I understood the thinking and his view which he would like to deliver to us and concluded that besides the design, the context and test aspects of software and engineering, the root aim of the software and engineering are application and sale [23]. Moreover, the ‘optimisation’ is another important concept which indicates the role of engineering when selling a product to a customer without any specific wish list. In my opinion, the optimisation is that when selling a product as the same as time as your competitor, the company should investigate and analyse sufficient samples of potential requirements and do not leave any inflexible information [23]; These two concepts changed my mind thoroughly. I decided to do more related researches when I learn the new knowledge, as same as what learned in the first LS, instead of subjective judgements in the future to ensure that I have an explicit recognition of the new knowledge.

b)

From what I learned in the LS and the course, I summarise the change they brought and the improvement the change will impact on two aspects:

1.Critical thinking in the mind

LS instruct me to try to think the problem adequately and comprehensively and be cautious to make decisions when encountered a ‘hot potato’. For instance, in the human error aspect, my classmates mentioned the Smile Roller-coaster accident. What I thought only considered the reason of the roller-coaster engineer perspective, which is not sufficient. If I had a chance to reanalyse, it is appropriate to consider every element which is involved in the roller-coaster system. For engineers and operators, I could infer they were overconfident about the automatic system and did not pay enough attentions to the actual circumstance. For travellers, I would try to think whether there existed situations that some of them did not read the safety instruction and did not tie the safety belt. For the design and maintenance of the system aspects, should add an extra verification mechanism to detect the correctness of system instruction? And could we apply the ‘fix that fail’ model into this accident? However, these contents and considerations are not included in my learning portfolio.

For system thinking, when I write codes in the future, I should consider the functions from the global perspective to arrange the sequence of developing. Meanwhile, I should pay attention to the relationships between different functions rather than putting efforts into one function to make it look perfect. Although one function is excellent, if it has terrible relevance with others, the entire project will also fail. In addition, since I have learned the MBSE before, I would think to build a suitable model before writing codes.

2. Optimisation to personal learning

From LS, I understand that it is efficient for us to learn a new knowledge prior by ourselves before accepting others’ guidance. I remembered when I did the facilitation in the tutorial, and I noticed two or three students did not participate in the discussions and went to the whiteboard to record their ideas. They did not provide me with any responses and only wait for what I said and delivered. I think they only learned knowledge from me but did not store their own considerations in their mind. I ensure they did not learn well at least on the topic of Environment Concerns.

I ever learned COMP2310 but did not obtain enough understanding. I tried to consult other classmates to figure out the meaning of the code and concept of concurrent, which is not a good idea and disturb other’s learning. Moreover, before this semester, I thought that the ability of understanding on the conceptual and abstract lectures and contents is similar for everyone. And learning them early and then delivering to colleagues are meaningless, which resulted in that I lost the interests on the facilitations for a time.

However, LS is a good method to correct my mind. For instance, in the cyber security aspect, relying on the antivirus software is not the optimal way to avoid terrible loss. If people could understand the intermedia, classifications and way to prevent of viruses, Trojans, phishing and malwares, the security rate of their property and social media accounts will be promoted widely. Personally, since I have learned the cyber security, I would notice and avoid some loophole during the design process based on my knowledge. And in the Environment Concerns part, because my teammate and I did many searches and readings, we have gained some sustainable measures before the lecture, such as utilising the remote sensing and location technology to replan the transportation route for vehicles of the express companies to reduce the usage of fossil fuels. And both of us felt easy to understand and resonate with what the lecturer taught. Lastly, the greatest benefit is avoiding mistakes caused by subjective senses. I would know the concept adequately before I leave any comments on it. I think I would decrease the possibility of making subjective mistakes like what I thought of the relationship between engineering and commercial areas.

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