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Examiners' Report
Principal Examiner Feedback

Summer 2022

Pearson Edexcel International Advanced Level
In Information and Communication Technology
(WIT13) paper 01

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Introduction

This was the first, more or less normal, examination for **WIT13**. Previous papers in 2020 and 2021 were sat under Covid19 restrictions by very small numbers of candidates.

Even so, it must be acknowledged that many students did not have a normal educational experience in the year 2021 – 22 and some students were in lockdown or under other severe restrictions at the time of the examination.

Marks and grade boundaries are therefore not comparable to previous papers.

This report discusses each of the questions, illustrated with examples of actual responses where appropriate.

Details of individual question items.

Q1ai is about a transaction processing (TP) system for a chain of bookshops. It states:
When a customer purchases a book in a shop, their credit card information is entered into the TP system via an electronic point of sale (EPOS).

The question asks for **one other** *piece of information that* **must** *be entered via an EPOS to complete the transaction process.*

This was not well answered, with too many responses being about the price or title of the book, items that would be in the system, linked to each book's ID/barcode.

Q1aii was similar, but about online sales, asking for **additional** *information that* **must** *be entered by the customer to complete the online transaction process.*

Answers here were better than in 1ai, with many responses about delivery address, credit card verification details, and one time passcodes.

Q1b links the TP system to the retailer's customer relationship management (CRM) system.

Q1bi asks for **one** *benefit to the* **retailer** *of having purchase information in the CRM system.*

This was generally well answered. The example shows a two mark answer that links customer purchase records to offers of discounts that improve customer satisfaction/retention.

> can record the purchases made by a customer and offer discounts for those paticular items or show them related items to keep the customer interested.

Another common answer was to analyse the sales data to enable targetted marketing.

> When the retailer has the customers purchase information they can identify the regular products and services that the customer purchases, thereby they can provide personalised discount schemes to increase sales growth and increase customer satisfaction.

Q1bii asks for *two drawbacks to the customer of their purchase information being stored in the retailer's CRM system.*

Although **stating** two drawbacks should be simpler than **explaining** a benefit, the question was less well answered than 1bi. Many candidates could only come up with a single drawback, often about misuse of personal information.

This example has two good answers, information may be hacked / stolen, and unwanted marketing material.

> 1 The security of the CRM might be breached thus leaving the information vulnerable to hackers
> 2 Customer would be constantly sent unwanted promotions they may not be interested in.

The second example is more typical, having the 'information may be misused' mark but nothing worthwhile for the second response.

> 1 The information could be sold to unauthorized people via ransomware
> 2 Due to a bug or glitch the information could be deleted

Q1c. Looks at aspects of data governance for the chain of bookshops.

1ci asks for *two ways of maintaining data integrity*. Input validation is given as an example.
Candidates were generally able to get one mark, often for removing data duplication or for access controls. They found it quite hard to produce a second method. Many weaker candidates went for vague answers such as 'encryption' or 'check if data is up to date'. Others described types of validation such as 'no null fields'.

1cii asks about how data is archived. Candidates were usually able to get a mark for a simple response, usually about storing offline or in a different location, but had trouble expanding their description for the second mark.

The first example shows a one mark answer.
Stored off site gets mark point 2, stored in a different location.

A data archive is usually stored off off site in a data lake. All the data is stored together and not structured as it is not accessed regularly

The second example is just enough for two marks.
Stored for long term retention, is just enough for mark point 1, long term storage.
Magnetic tape gets mark point 4 as an example of a slow access medium.

This refers to infrequently accessed data being stored for long term retention. This can be such as in magnetic tape. or SSD The stored data will need to be protected through physical security.

1ciii asks about user policy for shop staff using the EPOS system.
This was not well answered. It seems that few candidates read the part about an EPOS system and answered a more general question about user policies. As a result a large number of responses were not relevant.

The first example shows an incorrect answer that would be suitable for a more general user policy but which would not apply to EPOS.

> responsibility ~~when~~ *if* customer's security/privacy is compromised

The second example is one of the more common correct responses, about user rights. This is not specific to EPOS but would apply to it as well as to more general policies.

> use Staff access rights and not sharing passowrds between the staff.

1civ includes a script that checks if new passwords meet the retailer's requirements. Candidates are asked to analyse the script and state the requirements that are being enforced by it.

Candidates generally did well in this question. There were a lot of two mark answers and would have been more but for simple errors such as:
- missing the > sign and saying that the password length must be exactly 8 characters
- thinking that > meant < and having the password as less than 8 characters.

Q1d is about the use of a dual backup system in the retailer's disaster recovery plan. Candidates are told that there is a local backup and another one in an external data centre. They are then asked to explain why both are needed.

This was generally well answered, with a large number of two mark responses.

The first example demonstrates the most common correct answer, that a problem in one backup/location could be resolved by using the other backup/location.
The candidate has written the answer twice, but only gets the maximum of two marks.

> Incase of a data breach or disaster ~~at the locally~~ at the local buildings backup the external backup is still available. Incase of an emergenay, disaster or data breach at the external backup center the data is backed up locally.

(Total for Question 1 = 15 marks)

There were not many one mark answers as candidates who could explained about damage to one backup usually said that the other was available for the second mark.
Zero mark answers, as in the second example, tended to be about backup but too vague to get anything.

The dual backup process is ideal in cases of natural hazards (fires, floods) where the data is more likely to survive at the data centre than it is locally at the bookshop.

2a is a short, 6 mark, practical question where candidates are asked to analyse a scenario and create a Gannt chart.

Most candidates attempted the question and were able to score some marks. The practical questions have marking points covering grades A – E. Mark distribution was about as expected, although the average mark was a little lower.

Weaker candidates generally got the date-based marks, while stronger ones gave constraints and/or dependencies.

The first example is a 5 mark answer, getting mark points 1 and 2 for the dates and date ranges, mark point 3 for two dependencies, mark point 5 for two constraints, and mark point 7 for showing a possible overrun for task 8.

Task	Task details	July									Date									
	Constraints	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	*Review and test existing this site*				×	×	×	×	×	↲											
2	*Buy additional and storage space*			×	×	×	×	×	×	×	↓										
3	*Install hardware*				×	×	×	×	×	×	↲										
4	*Task 3 must be completed.*										×	×	×	↲							
5	*Task 1 must be completed*										×	×	×	×	×	×					
6	*Project management this*															×	↨				
7	*Must be completed on July 16*																×	↲			
8																	×	×	(×	↗)	

The second example is a 3 mark answer, getting mark points 1, 2 and 7. Dates and the two day extension.

The answer does not get any constraint marks as the candidate has effectively copied the Task Description column from the question into the Constraints column in their answer.
Dependencies are given, in written form. This is an acceptable way of showing them, but they are not correct.

Task details		July									Date										
Task	Constraints	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Review & Testing.					X	X	X	X	X											
2	Reserve Cloud storage.									X											
3	Hardware Installation.					X	X	X	X	X	X										
4	Software Installation											X	X	X								
5	Existing files moving											X	X	X	X	X	X					
6	Backups	X													X							
7	physical movement.																X					
8	Testing & familiarisation.																	X	X	.	.	

Dependencies
  └→ Finish to finish: 2 & 3, 5 & 6.
  └→ Start to start: 1 & 3
  └→ Finish to start: 1 & 2, 3 & 4, 5 & 7, 6 & 7, 7 & 8

Constraints
  └→ over run of ≤ 2 days in 8 after 18th.

2b is a short, 6 mark, practical question where candidates are asked to analyse some records and create a data dictionary.

Most candidates attempted the question and were able to score some marks. The practical questions have marking points covering grades A – E. Mark distribution and the average mark were about as expected.

The first example is a 4 mark answer. It gets:
- mark point 1, at least 8 correct data types. Purchase price is wrong, but the rest are correct.
- Mark points 4, 5, 6, for the validations.

The ToolID as a primary key, mark point 2, is correct but the mark is lost as a second primary key is given.
The text field lengths, mark point 3, are appropriate except for warranty number and make, the lengths given are far too long for the sample data provided.

Table name	Tbl_Warranty			
Attribute / field name	Data type	Primary key	Field size	Validation
warranty number	text		255	>LL 0000000
toolID	text	P	6	
tool	text		20	
make	text		30	
model	text		6	
supplierID	text	P	6	
supplier email	text		25	*@*.*
when purchased	Date		8	DD/mm/YYYY
purchase price	Num		15.6	

The second example is a five mark answer. It gets:
- mark point 1 for the data types
- mark point 2 for the primary key
- mark point 3 for appropriate lengths for their text fields.
- Mark points 5 and 6 for the warranty and date validations.

The email validation is incorrect and there is no size given for the date field.

Table name	Tbl_Warranty			
Attribute / field name	Data type	Primary key	Field size	Validation
warranty number	Text	~~Yes~~	9~~8~~	LL0000000
toolID	Number	Yes	5	
tool	Text		7	
make	Text		10	
model	Text		7	
supplierID	Text		6	
supplier email	Text	~~30~~~~25~~		*?@?*.?*
when purchased	Date / Time			dd/mm/yyyy
purchase price	~~Text~~ Number		8	

3a is a long, 9 mark, practical question where candidates are asked to analyse a scenario and complete a diagram to produce a high-level design for an IoT system.

Most candidates attempted the question and were able to score some marks. The practical questions have marking points covering grades A – E.

Mark distribution was about as expected over the 1 – 8 range. About 10% of candidates achieved full marks, more than those getting 7 or 8, perhaps showing some good preparation for this type of question.

The first example gets full marks.

There are 11 marking points, the only one missing is mark point 5, a light sensor linked to the light.

The lock sensor shown at bottom left is ignored as it is not mentioned in the scenario.

The door lock and exterior light labels are not as shown in the mark scheme. This is acceptable as any understandable arrangement that has the correct labels and connections is allowed.
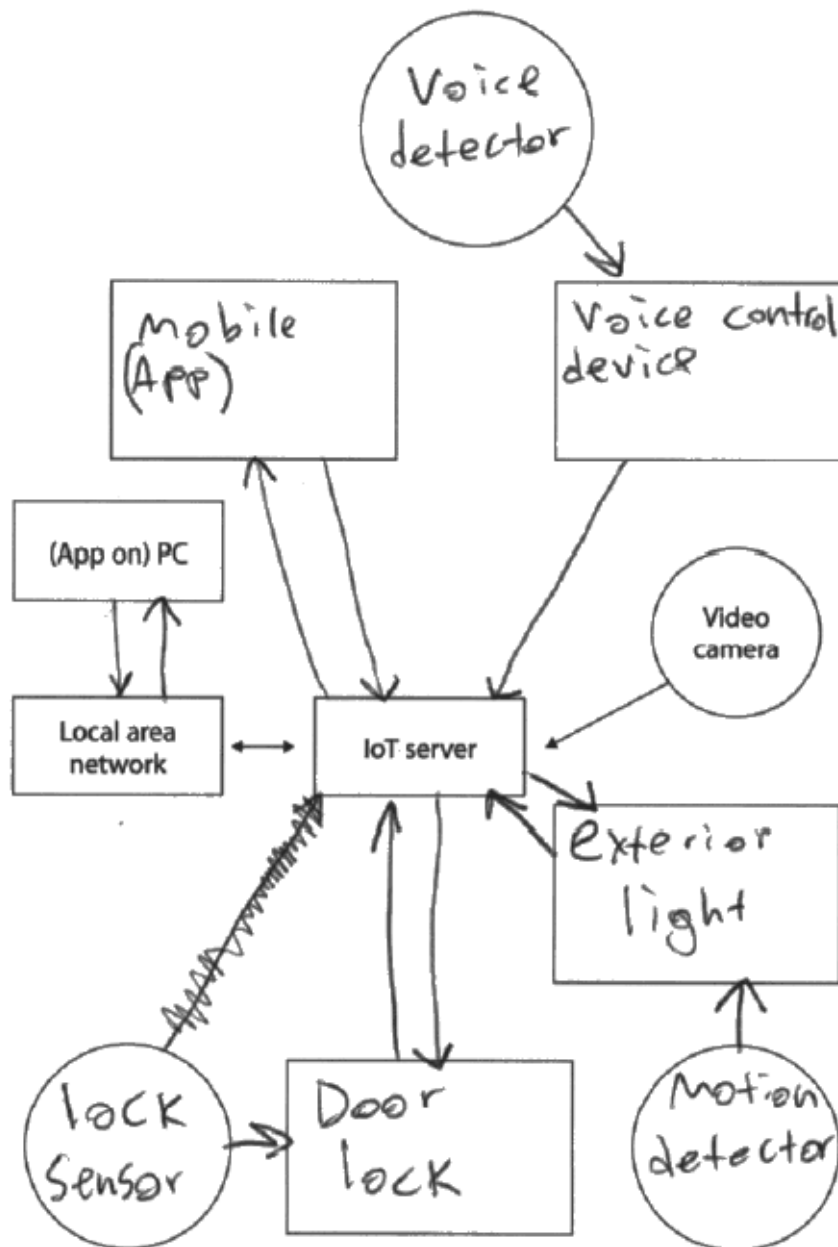
The second example is a mid-range answer, scoring 5 marks. It gets:
- Mark point 1 for the voice sensor. This is the bottom rectangle, voice capture / mic. The circle at bottom right would not get the mark as it is labelled both voice sensor and voice control. It is however acceptable as being the voice control unit for the purpose of linking to the voice capture / mic box.
- Mark point 4 for the motion sensor linked to the light, top right.
- Mark point 6 for the IoT server linked to the light.
- Mark point 8 for the mobile app linked to the IoT server.
- Mark point 9 for the app having a two way link to the IoT server.

This candidate has labelled most of the boxes differently to those shown in the mark scheme. This is acceptable, although they have made things a bit more difficult for themselves by doing so.
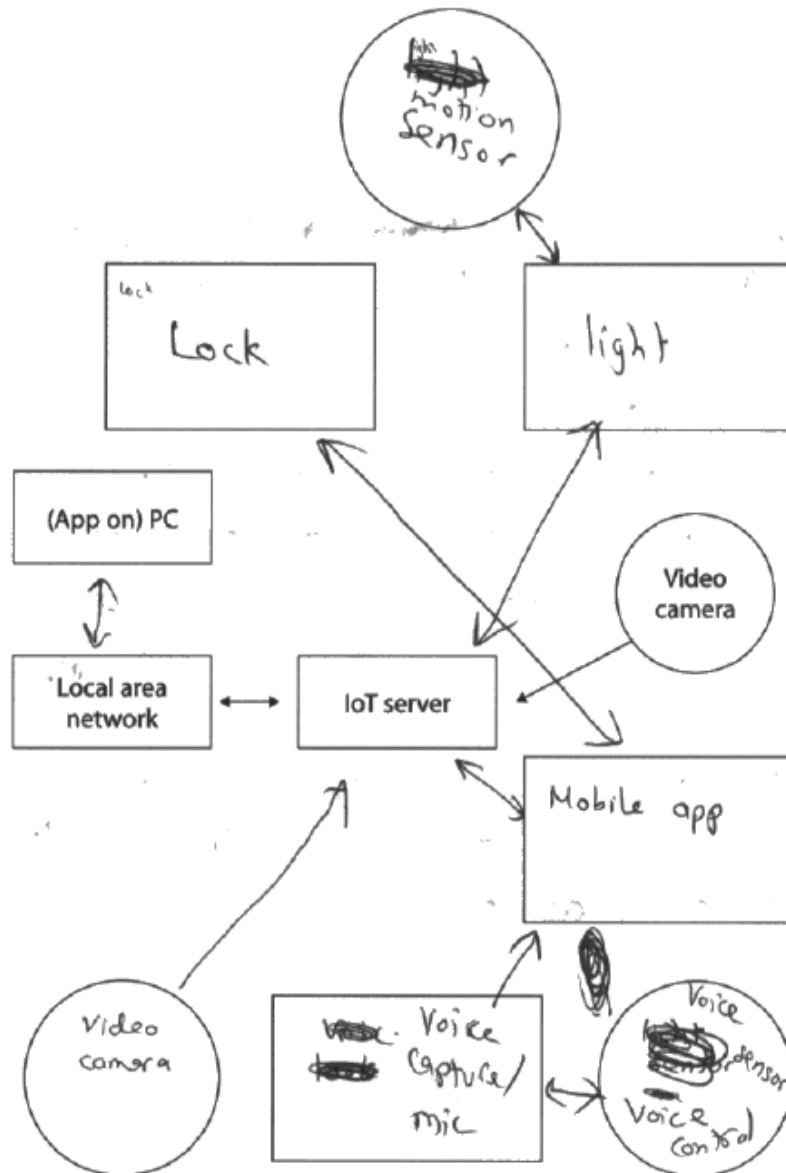
3b is a short, 6 mark, extended writing question where candidates are asked to discuss IoT security issues in the context of installing and configuring the IoT elements of the system described in 3a.

Only about 90% candidates attempted the question. The extended writing questions have marking points covering grades A – E. Mark distribution of those who got a mark was a little more towards the lower end of the range than expected.

Weaker candidates generally got marks for generic ideas about IoT, stronger candidates were able to relate their ideas to the scenario.

The first example is a level 3 answer, getting 5 marks. The candidate discusses several devices and has some idea of the effects that weak security could have on the IoT network and company LAN.
It does not get full marks as there is no linkage to specific requirements during installation and maintenance. This was generally a weak spot in most answers.

IoT devices ~~or Internet of thing~~ cAn sometimes be affected by weake security. There can be several security issues regarding the companys IoT system, while installing and configuring. The Local Area Network (LAN) can be compomised digitally or can be physically damaged. It can be hacked or corrupted. The app on the PC can be hacked and taken control of or can be corrupted by viruses and malware. The app can also be ~~edited~~ edited. The app on the mobile device can be hacked or get corrupted by viruses and malware. Botne the apps can be taken conlcol of and can show incorrect edited information. The voice control device can be taken incontol by recording and playing the required voice/voices. Anyone can input Instructions into it If there is no requirement of a specific person's voice. The entrance door's camera can be physically damaged and if the app is hacked and taken control, the lock on thedoor can be unlocked/blocked, or by whoever can get the app. The exterior light above the door can also be damaged or can be controlled if the app is hacked. The motion sensor can also be hacked or corrupted by viruses. The light can be turned by the app resulting in unnceisary electricity consumption. If the LAN, App on the PC or the app on the phone gets hacked/corrupted almost all components can be controlled resulting in no security.

The second example is a level 2 answer, getting 3 marks. The essay discusses unauthorised access and concentrates more on the connectivity of the devices than the first example. There is very limited mention of consequences of an attack on the system.

The system relies heavily on the IOT server and the to LAN network for the devices and sensors to work interchangibly. The whole network can be compromised if an unauthorise users connects to the IOT server or to LAN network can wreak havoc on the network. This is possible as the network would have low security once a connection is facilitated and the network wasn't design to only allow registered users. Another issue lies in the transmission medium to connect these sensors, if the company opt to use Wi-Fi or bluetooth to connect the sensor to the network, this allows external access for others as they merely have to connect to it, the only way to prevent this is to use directly wired connection or to a password tra on the wireless media method. Lastly a another issue which can occur is

4a is a long, 12 mark, extended writing question where candidates are asked to examine a photograph of a home workstation and evaluate ergonomic issues and their solutions.

Many candidates confused ergonomics with health and safety, writing about such things as the risk of spilling a drink, or of an object falling from the table. These candidates self-penalised by wasting time and answer space on answers which, although correct from a health and safety viewpoint, were irrelevant to ergonomics.

The first example is a good level 3 answer. It identifies several ergonomic issues, explains what problems they could cause and gives sensible methods of resolving them.

Sarah's workstation is not ideal to work on and for long hours as there are many ergonomic issues in it:

• The first issue is that she has three monitor screens on her desk which includes two desktop computers and a laptop. The desktop computer on the right and the laptop on the left are not placed in a straight angle to her eyes, which can cause her trouble reading on them.

• The middle desktop is too far and Sarah would not be able to reach the keyboard and the mouse/touchpad. Even if she tried to do so, the laptop would come in the way.

• The chair's height is low, which means that Sarah would not be able to view the desktop screen without tilting her head upwards, which can cause pain in the neck and headache.

• Sarah's chair does not have any arm rests, which means she would not be able to type for long hours as it can cause pain in the arms.

• There is no lamp on the desk, the only one is on top of the chair. The only source of light is the window, which means that Sarah would not be able to work at night, and if she did, it can cause strain in her eyes and cause her fatigue and headache.

In order to resolve these issues, Sarah should:

- Remove the additional two computers as one is more comfortable to work on. She can keep a desktop and eliminate the laptop and the other desktop if she needs a big screen. She should then keep that one screen in a straight angle to her eyes.

- Now that the laptop is out of the way, Sarah can move her desktop computer closer to her chair so she can easily reach the keyboard and the mouse/touchpad.

- Sarah should buy a chair with a height adjusting feature and armrests so her neck and arms are comfortable, and it should also have wheels so she can adjust the distance easily.

- Sarah should empty up the space on her table and place a table lamp aimed at her desktop computer so she can work in the dark without straining her eyes.

- She should remove the lamp on top of her chair as a lamp is not required there and it could hurt her head if she adjusts the chair's height higher.

In conclusion, Sarah needs to change her workstation to be able to work for long hours, deliver work of higher quality and stay healthy and safe.

The second example is a lower level 2 answer. It includes a mix of ergonomic and health and safety issues, with more health and safety than ergonomic.
The problems and solutions are appropriate but are far too brief.

• Identification of hazards
1) drinks on the workstation
2) direct sun light on the workstation
3) bad cable manogment
4) not much desk space

• the problems they could cause
1) spilling the drink and ruining the devices around it
2) the devices might over heat
3) could cause breyries when making any movement around the workstation
4) might cause device falling off the desk due to the small space

• recommendations for resolving them
1) move any liveid away from the workstation
2) install a cover on the window to minimize sun light
3) fix the cable management by wing tafe
4) a bigger desk to aviod small space

4b is a 3 mark question about SMART targets. Candidates are asked to read a short scenario and an objective and then complete a SMART targets table.

The question is quite open-ended and most candidates were able to score well.

The first example is worth 3 marks. It has sensible explanations of how the objective meets each of the criteria.

Measurable	It is measureable as she can measure the progress of her project over the fixed time. she has alloted
Achievable	It is acheivable as she has given enough time for The objective to be completed.
Relevant/realistic	It is realistic as a weekend is enough to shift her belonging as she lives in a small apartment

The second example shows how weaker candidates often tried rewriting the text from the scenario or objective instead of giving an explanation. It gets 1 mark.

Measurable	It is measurable as she has to move on the weekend and and by Saturday, 2 July. And that she is moving from a small apartment to a large apartment and then set up her home office
Achievable	It is achievable as she has taken the weekend off and arranged for a moving company to transfer her belongings. which leaves time for her to set up her office
Relevant/realistic	It is realistic as it will just take the two days to move her belongings with the help of a moving company.

Q5 is about the Agile methodology used in project management. The question is set in the context of a transport company creating new software as in-house project.

Agile seems to be a weak point for the majority of candidates, with relatively few being able to able to give the meanings of basic terms.

5a asks *what is meant by an agile iterative approach*. Most candidates failed to get a mark. Those who did usually got one mark for describing an iteration, with no extension.

The first example shows a 1 mark answer that describes iterations.

> Agile approach involves the company coming up with a PO. Prototype and the take feedback and improvements to fix issues to develop. Another Prototype before final Product is Produced.

The second example expands the answer to include the idea that each cycle contains the same elements. These are not the ones shown in the mark scheme but they convey the principle that each cycle/iteration contains the same set of processes.

> An approach wherein the development follows a continous cycle of requirements, planning, design and installation until fully satisfied/ reaches the goal.

5bi asks what is *meant by an agile scrum*. The term is included in the specification, but again, few candidates seemed to know what it meant.

The example shows a correct answer. Common incorrect ones were about a scrum being a meeting, or were describing the role of a scrum master.

> It's a framework that used to ~~organise~~ organize the plan.

5bii asks for *characteristics of a sprint.* The term is included in the specification, but again, few candidates seemed to know what it meant.

The example shows a rare, 2 mark answer, getting mark points 1 and 3.

1. Has Specifically defined objectives

2. Time bound.

5c is a short, 6 mark, extended writing question where candidates are asked to discuss what needs to be done by the project team in the requirement and planning phases of this project.

Less than 90% of the candidates attempted the question. Mark distribution of those who got a mark was a little more towards the lower end of the range than expected.

Weaker candidates generally got marks for generic ideas about planning projects, which could be applied to waterfall or agile methodology. They rarely referred to the scenario. Stronger candidates were able to relate their ideas to the scenario but still wrote in fairly general terms.

The first example is a good, level 3 answer. It has specific reference to the context of a transport company and fleet management.

It is important for the project team to carry out the first 2 phases: requirement and planning because firstly, they can prepare a requirement list that identify the items that need to be purchased. Hence easier to calculate cost. Therefore allowing them to operate within the given budget. The requirement list may even have the time when the items will be needed. Therefore, allowing the team to order the items such GPS trackers for the fleet on time to complete project within deadline. The requirement phase unables the team to clearly see the objectives of the owners that the software should fullfill. Planning phases

Planning phases it ever important. Because Here they can careful plan when to install trackers on the fleet so that all fleets are not called from work at the same time. Moreover, they can time with the delivery of trackers and enegine chips so both can be installed at once to avoid ineffriency. Planning also allows the team to document each process and phase of the fleet management software so have clear projection of the budget and deadline.

The second example is a level 2 response. It has no reference to the context of a transport company and includes only generic project planning ideas that could apply to almost any methodology.

In the requirement phase, the team has to list down various things that is needed throughout the development of the project. This could be a the type of hardware, type of software used, overall cost, needed, techniques and process of testing and b in each phase, the time that would be needed for the project and the type of staff needed. In the planning phase, the teams needs to organise and assign roles for to the staff so that in a way that is most effective and finishes the project within the time limit. The All set up of hardware software and things requirements for project is set up in order for staff to start coding in the next phase according to the plan. Each team will be assigned specific objectives to be completed within a deadline so the next team can start their job. The roles of scrum and sprint team is assigned so there is no delay in releasing the project.

Q6 is a long, 12 mark, extended writing question where candidates are asked to write about data analytics in the context of electronic health records.

The question includes a short scenario, explaining what electronic health records are, plus some discussion points that could be included.

Only about 85% of candidates attempted the question, but this is not unexpected as it is the final question and some candidates will have failed to complete the paper in the time allowed.

The extended writing questions have marking points covering grades A – E. Mark distribution of those who got a mark was a little more towards the lower end of the range than expected.

Discussion of types of data analytics was generally reasonable, but not many candidates understood the use of tools such as such as natural language search or text analysis. This restricted the access to level 3 marks.

The first example is a mid level 3 answer. It has a reasonable discussion of types of analytics and includes something on tools. There is also a sensible conclusion.

Big data can be very useful for healthcare providers. Using big data analytics, trends in a virus can be spotted before it becomes a large issue. Data compiled from previous outbreaks can be analysed to predict future outbreaks. This can also track when seasonal flues are at its peak. This data can be used by hospitals to stockpile certain medicines depending on what is needed.

Since an EHR tracks family medical history, this can be used to predict likely problems a patient may face and offer preventative care or diagnose a problem that would otherwise go unnoticed such as prescription glasses.

Using natural language processing, in the future their may be an ai that could diagnose a patient based on what the patients symptoms are. This is commonly used in retail websites. Data taken from patients records, doctors diagnosises and the patients description can be used to create a bot that correlates a patients response to a diagnosis. However this may be risky since a bot can be tricked or give a false diagnosis.

Big data can also be used to create cures for known diagnoses. This can be done by collecting datapoints such as age, sex, blood type, family medical history. This is also useful for medical schools and students for doing case studies. The student can compare their diagnosis to that of a doctor.

The government can also benefit from big data to maximise resource allocation and funding. For example, for every monsoon flu season, an estimate in medical supplies need can be taken on funding for this can be given to hospitals.

In conclusion data analytics is very useful for both patients

doctors, hospitals and the government allowing for better resource allocation, preventative and predictive care that can optimise and increase the number of patients taken care of. However to process complicated data big data such as EHRs, professional data analysis analysists will be needed.

The second example is a mid level 2 answer. It has some discussion of three types of analytics but has nothing on the tools and lacks a conclusion.

Data analytics can help analyze the data about EHR.

Descriptive analytics can be used to obtain all EHRs to give a brief discription about what has happend in the past. The countyies common illnesses common illnesses can he Identified. And all the medical issues can he Indentified.

Prescriptive data analysis can he done with EHRs. All the common illness identified, can be in general reduced by having information about them more, Allocating more doctors and making them aware. Allocating more of the welfare budget for those illnesses. Predictive analysis can he used to predict any forthcoming illnesses or abnormalities. So that they can react to them beforehand.

Meeting with doctors can he recorded and done natural language processing for analysis. And prescription can also he analysed.

Summary

Based on their performance on this paper, learners should:

- read the scenarios/question introductions carefully, looking for specific mentions of context and concerns of the people involved
- avoid the pre-planning of answers based on the sample assessment material or previous examinations. Although many of the practical questions will be similar, the contexts will be different
- try to address any should/could include items given in the extended writing questions
- avoid writing answers that are just a rephrasing of the question
- attempt all the questions, especially the extended writing. Essays questions have E, C and A marks, so there are lower end marks available even on questions towards the end of the paper.