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INFORMATION TECHNOLOGY IN A GLOBAL SOCIETY

Higher Level and Standard Level

Paper 2

12 pages

Using assessment criteria for external assessment

For external assessment, a number of assessment criteria have been identified. Each assessment criterion has level descriptors describing specific levels of achievement, together with an appropriate range of marks. The level descriptors concentrate on positive achievement, although for the lower levels failure to achieve may be included in the description.

Examiners must judge the externally assessed work at SL and at HL against the four criteria (A–D) using the level descriptors.

- The same assessment criteria are provided for SL and HL.

- The aim is to find, for each criterion, the descriptor that conveys most accurately the level attained by the candidate, using the best-fit model. A best-fit approach means that compensation should be made when a piece of work matches different aspects of a criterion at different levels. The mark awarded should be one that most fairly reflects the balance of achievement against the criterion. It is not necessary for every single aspect of a level descriptor to be met for that mark to be awarded.

- When assessing a candidate's work, examiners should read the level descriptors for each criterion until they reach a descriptor that most appropriately describes the level of the work being assessed. If a piece of work seems to fall between two descriptors, both descriptors should be read again and the one that more appropriately describes the candidate's work should be chosen.

- Where there are two or more marks available within a level, examiners should award the upper marks if the candidate's work demonstrates the qualities described to a great extent. Examiners should award the lower marks if the candidate's work demonstrates the qualities described to a lesser extent.

- Only whole numbers should be recorded; partial marks, that is fractions and decimals, are not acceptable.

- Examiners should not think in terms of a pass or fail boundary, but should concentrate on identifying the appropriate descriptor for each assessment criterion.

- The highest level descriptors do not imply faultless performance but should be achievable by a candidate. Examiners should not hesitate to use the extremes if they are appropriate descriptions of the work being assessed.

- A candidate who attains a high level of achievement in relation to one criterion will not necessarily attain high levels of achievement in relation to the other criteria. Similarly, a candidate who attains a low level of achievement for one criterion will not necessarily attain low achievement levels for the other criteria. Examiners should not assume that the overall assessment of the candidates will produce any particular distribution of marks.

- The assessment criteria must be made available to candidates prior to sitting the examination.

Theme: Home and leisure

Criterion A — The issue and stakeholder(s) ***[4 marks]***

1. (a) Describe *one* social/ethical concern related to the IT system in the article.

Social/ethical concerns may include the following:

- loss of privacy due to revealing location using geotagged information or from the content of photo(s)
- loss of anonymity due to identifying the identity of the person through the geotagged information and the content of the photo(s)
- surveillance resulting from observing the patterns of behaviour determined from geotagged photos (*e.g.* always attending certain events at specific times)
- crimes resulting from cellphone users uploading geotagged photos to social networking sites. Examples include:
  - stalking or other criminal activity related to persons: GPS-enabled cellphones allow date, time and geotagging to locate people
  - theft: geotagged photos may contain the location of valuable items
- security concern such as knowing that certain SNS accounts (this could be famous or wealthy people) will contain geotagged photos of people and locations to build a picture of their movements.

(b) Describe the relationship of *one* primary stakeholder to the IT system in the article.

Primary stakeholders may include the following:

- cellphone user(s) who upload geotagged photos to a social networking site
- criminals (*i.e.* stalkers, cyberbullies, thieves) who commit crimes using information obtained from cellphone users' geotagged photos that are uploaded to social networking sites
- law enforcement officers who need to catch persons who use information from geotagged photos to commit crimes
- persons who work for social networking sites and are responsible for the IT systems that allow photos to be uploaded (*i.e.* security, display of geotagged information, policies)
- persons responsible for developing cellphone features which enable the taking of geotagged photos and the uploading of geotagged photos to social networking sites.

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is identified.
2	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is described **or** both are identified.
3	Either an appropriate social/ethical concern **or** the relationship of **one** primary stakeholder to the IT system in the article is described; the other is identified.
4	Both an appropriate social/ethical concern **and** the relationship of **one** primary stakeholder to the IT system in the article are described.

Criterion B — The IT concepts and processes ***[6 marks]***

2. (a) Describe, step by step how the IT system works.
IT system: using cell/mobile phones, geotagging and social networking sites.

Answers provided in the article include the following:

- cellphone user takes a photo with their cellphone with geotagging enabled
- cellphone connects with the social networking site, *e.g. Twitter*
- user goes to the photo and clicks upload the photo to the user's social networking account, *i.e. Twitter*, *Flickr*, *Craigslist*
- criminal downloads the geotagged photo and extracts the date, time and geotagged data (latitude and longitude) using either special software or browser plug-in
- geotag data is attached invisibly to photos
- criminal uses mapping software to locate where the photo was taken and the location of the user

Answers with additional information to that in the article may include the following:

- user inputs user name and password or allows continuous login from the cellphone
- user logs out of the *Twitter* account if they do not wish to keep an automatic login
- some cellphones prompt if the user wants to use GPS information when taking a photo
- GPS can be disabled on some cellphones
- how GPS data is collected and attached to the photos – satellites, triangulation
- some cellphones have apps/services that allow an automatic connection/upload
- some social networking sites prompt the user if they would like to include GPS information when they post a photo, *e.g. Facebook*
- cellphone user can add message with the photo in the social networking site
- criminals can search for patterns in the activities of the cellphone user through the geotagged photos that are posted (*i.e.* times that they do specific activities each day or week or month), places that they visit regularly
- criminals can use code to extract additional information from geotagged photos and make relationships (*e.g.* being away from home or in a particular location or with particular persons)
- can extract information using metadata extraction tool (jpeg geographical info is embedded in the metadata) or using a metadata removal tool to delete data before publishing them (internet)
- user has WiFi or 3G or 4G Internet connection to automatically upload or manually upload images to social media
- some websites display the location of the photo based on the geotag data
- photos are stored on the SNS servers

(b) Explain the relationship between the IT system and the social/ethical concern described in *Criterion A*.

Candidates are expected to explain the connection between the concern in Criterion A and the relevant part and use of the IT system. Candidates are expected to make reference to relevant stakeholders, information technologies, data and processes. Candidates will be expected to refer to "how the IT system works" using appropriate IT terminology.

Answers may include the following:
Cellphone users are not aware that other persons can use the information that they are posting with geotagged photos:

- unaware that they are sending invisible information when they send photos from their cellphones (*i.e.* geotagging, date, time, content information which can be combined with the name of their account and any associated messages)
- unaware of the technologies that they are using *i.e.* features of their cellphones, features on the social networking site that they are using
- unaware of the range of crimes that can result from analysing online information contained in photos (*i.e.* cyberbullying, stalking, theft).

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	There is little or no understanding of the step-by-step process of how the IT system works and does not go beyond the information in the article. The major components of the IT system are identified using minimal technical IT terminology.
3–4	There is a description of the step-by-step process of how the IT system works that goes beyond the information in the article. Most of the major components of the IT system are identified using some technical IT terminology. The relationship between the IT system referred to in the article and the concern presented in criterion A is identified, with the some use of ITGS terminology.
5–6	There is a detailed description of the step-by-step process that shows a clear understanding of how the IT system works that goes beyond the information in the article. The major components of the IT system are identified using appropriate technical IT terminology. The relationship between the IT system referred to in the article and the concern presented in criterion A is explained using appropriate ITGS terminology.

Criterion C — The impact of the social/ethical issue(s) on stakeholders ***[8 marks]***

3. Evaluate the impact of the social/ethical issues on the relevant stakeholders.

A range of impacts needs to be provided. The results of the impacts on stakeholders need to be described, refer to a range of stakeholders and include positive and negative impacts. The impacts need to be analysed and evaluated and may include the following:

Cellphone users are not aware of the features that are included in their cellphones and how they are used (i.e. could be helpful in some situations):

- cellphones are pre-set with GPS turned on (*i.e.* to determine location of the cellphone in case of an emergency) and users may not know it
- user may not know how to use the GPS related programs on their phone in emergency situations or that they even exist
- user may not know that invisible data is attached to photos (*i.e.* date, time and geotagging) which could be helpful (*e.g.* emergency situations, identifying the location and date of a family photo)
- users need to opt-out of GPS and/or geotagging

Cellphone users are not careful when taking and posting geotagged photos and include content information that can lead to crimes:

- famous sites or information that locates the user's location or the location of family members or friends
- ownership of valuable possessions that could lead to theft
- adding messages to posted photos that provide additional information about the location of the photo or being away from home
- the content of the photo could contain additional information about the location (*i.e.* entrances to homes, security systems used in the home)

Cellphone users may take photos that indicate that the cellphone user is not at home, but others in the house could be at risk during a break-in or theft.

Criminals can easily extract date, time, and geotagging information from photos:

- create a planned list of valuable items that they want to steal from a range of locations in the house taken from various photos
- formulate an overview of the routine activities of a person for the purpose of stalking or other crime targeted against the person
- gain information about a person for the purpose of cyberbullying
- gain information about a person for stalking and other criminal purposes

Social networking site administrators have an ethical responsibility to:

- inform cellphone users when they are uploading photos with geotagging
- not allow messages that can be commonly searched for (*i.e.* on vacation, on holiday, be back)
- provide an opt-in feature for including geotags when uploading photos

Cellphone manufacturers have a responsibility for:
- informing cellphone users when GPS systems are being used
- providing an opt-in for using geotagging feature
- providing information how to turn-off geotagging

Impact for various situations:
Positive impacts - some are included above.

- easy to find photos in your collection, just find a place on the map and applications like iPhoto, Picasa will show you all the pictures taken there
- hence easy to organise photos for times and place
- easy to find when and where a photo was taken
- friends can find out exactly where to go if need or want to
- police and other investigators can use geotags as evidence of location and time
- helpful in emergency situations, identifying the location and date of a family photo
- if you do want friends and relatives to see where you are at any one time, e.g. if on a holiday and uploading your holiday photos
- parents (if befriended on SNS) can see the location of their children through the posted photos
- to help track down missing persons – can reveal where last seen
- could be used to prove that you were in a certain location and time e.g. police enquiries
- geotagging and date/time on photos can help keep information about photos available for the future e.g. looking back at old family albums – no more arguments about where or when as it is in the file information
- help validate photos taken for the news

Negative impacts for Privacy
Citizens may lose their privacy, because citizens are taking photos and are not aware that the geo data is being saved with the photo. This impacts the person taking the photo in a negative way-

- their own location when and where the photo was being taken is revealed to anyone on the social networking site and this could be misused
- e.g. stalkers, 'friends' on the SNS can build a picture of your personal life of where you went and with who
- information in the background may be used, to reveal, who you were with, or some valuables where you are
- if you are someone where you should not be or when you should be, this could be shared e.g. taking a sick day at work and being posted in a coffee shop
- subject of cyberbulling (mentioned in article)
- could put your other family members at risk

If the evaluation does not provide any additional information to that in the article, the candidate will be awarded a maximum of ***[2 marks]****.*

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	The impact of the social/ethical issues on stakeholders is described but not evaluated. Material is either copied directly from the article or implicit references are made to it.
3–5	The impact of the social/ethical issues on stakeholders is partially analysed, with some evaluative comment. Explicit references to the information in the article are partially developed in the response. There is some use of appropriate ITGS terminology.
6–8	The impact of the social/ethical issues on stakeholders is fully analysed and evaluated. Explicit, well-developed references to information in the article are made appropriately throughout the response. There is use of appropriate ITGS terminology.

Criterion D — A solution to a problem arising from the article ***[8 marks]***

4. Evaluate *one* possible solution that addresses at least *one* problem identified in *Criterion C*.

Answers may include the following. A multi-part solution is allowed if it enfolds interlinked parts of a single problem, e.g. various ways of ensuring security, or education of users:

Solutions to the problem of cellphone users sending geotagged photos from a cellphone:

- cellphone users can turn off the GPS capability on their cellphones so that it is not sent with the photo to the social networking site (*i.e.* check the cellphone manual on how to do this, use a search engine to find forums that provide this information, go back to the store where the cellphone was purchased for instructions)
- cellphone users can turn the GPS capability on when they wish to take photos that will be not uploaded to social networking sites
- cellphones need to send an opt-in alert whenever the GPS system is turned on and the user has selected to use the camera
- cellphone uses turn off the geotagging feature of the camera (but can leave GPS running)

Solutions to the problem of displaying and accessing geotagging information on a social networking site:

- social networking administrators need to inform cellphone users in their policies about the risks of uploading geotagged photos
- cellphone users need to be provided with an opt-in option whenever they upload a geotagged photo
- social networking administrators need to be able to monitor when someone is running scripts on their site (*i.e.* searching for geotagged photos with specific text associated with the photos)
- privacy settings in SNS don't specifically impact on geotagging, but can restrict who can access the geotagged photos
- SNS sites allows editing or deleting meta data
- possible future solution: encrypt geotag data before inserting into photo and use special program to decrypt with password access - does not seem to be available yet, and how it is decrypted needs to be explained

Solutions to making cellphone users aware of the risks of sending photos to a social networking site from a cellphone:

- cellphone manufacturers need to include warnings with cellphones that include GPS technology and cameras
- parents and teachers (*i.e.* school parent associations) need to inform students about the risks of taking / posting geotagged photos on social networking sites (*i.e.* if they share a geotagged photo with friends, it could be posted even if they do not post it themselves, kinds of criminal activity, placing family and friends at risk)
- law enforcement agencies need to make cellphone users aware of the risks involved in posting geotagged photos to social media sites (*i.e.* special television programs, radio broadcasts news articles in local newspapers)

*If the evaluation does not provide any additional information to that in the article, the candidate will be awarded a maximum of **[2 marks]**.*

Marks	Level descriptor
0	The response does not reach a standard described by the descriptors below.
1–2	**One** feasible solution to at least **one** problem is proposed and described. No evaluative comment is offered. Material is either copied directly from the article or implicit references are made to it.
3–5	**One** appropriate solution to at least **one** problem is proposed and partially evaluated. The response contains explicit references to information in the article that are partially developed. There is some use of appropriate ITGS terminology.
6–8	**One** appropriate solution to at least **one** problem is proposed and fully evaluated, addressing both its strengths and potential weaknesses. Areas for future development may also be identified. Explicit, fully developed references to the information in the article are made appropriately throughout the response. There is use of appropriate ITGS terminology.