INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - APRIL 2015

NOTES:
Section A - You are required to answer Questions 1 and 2.
Section B - You are required to answer any **three** out of Questions 3 to 6.
(If you provide answers to all of Questions 3 to 6, you must draw a clearly distinguishable line through the answer not to be marked. Otherwise, only the first three answers to hand for these four questions will be marked.)

TIME ALLOWED:
3 hours, plus 10 minutes to read the paper.

INSTRUCTIONS:
During the reading time you may write notes on the examination paper but you may not commence writing in your answer book. **Please read each Question carefully.**

Marks for each question are shown. The pass mark required is 50% in total over the whole paper.

Start your answer to each question on a new page.

You are reminded to pay particular attention to your communication skills and care must be taken regarding the format and literacy of your solutions. The marking system will take into account the content of your answers and the extent to which answers are supported with relevant legislation, case law or examples where appropriate.

List on the cover of each answer booklet, in the space provided, the number of each question attempted.

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - APRIL 2015

Time Allowed: 3 hours, plus 10 minutes to read the paper.

SECTION A

Answer **BOTH** Question 1 and Question 2 in this Section.

(Both Compulsory)

1. Torquay Ltd. is a for-profit provider of care services, including residential care, respite care and day care for individuals with a wide variety of support needs. It is a long-established organisation with 20 sites across Ireland and provides services to over 1,000 service users per annum. In recent years, the organisation has been growing, adding on average 2 new sites and 100 service users, in each of the past three years. Care services are highly regulated, and non-compliance with these regulations can result in immediate closure of facilities and significant penalties.

   The company's business model is that the relevant health board is charged a fee per service user on a monthly basis. For residential and respite care services, the fee is unique to each service user, dependent on his/her support needs. This is usually set at the beginning of service user's care, but can be amended by agreement over the course of the care. This means that every such service user is also a cost centre for staff costs, consumables and other costs. For day care services a fixed fee is levied, although following negotiations, the amount paid by some Health Boards is higher than that paid by others.

   The Health Boards demand that, as a means of monitoring the quality of services provided, personal care targets are set with residential and respite care service users or their representatives and progress towards these targets is assessed on a weekly basis. Each month, the relevant Health Board receives a summary of this information, as a condition of payment. Currently, this information is being maintained on a weekly basis by means of notes on the service users' charts: a folder of information specific to that service user and including medical records. On a monthly basis, one of the care professionals reviews these notes and writes a report for the relevant Health Board.

   As is normal in the sector, costs in Torquay Ltd are dominated by staff costs at around 55% of total spend, including the costs of employing care professionals and ancillary staff. In addition, there are also significant expenses on consumables, these include medical consumables, food etc., making up around 30% of total costs.

   At a recent senior management team meeting, Jack Avalon, Head of Compliance, made the case that given the increased demands for information on service users, and the potential risks in continuing with the current system, investment is needed in information systems. This was supported by Jane Lorne, Head of Finance, who suggested that 'if we are to achieve our strategic business objectives, we need to invest, urgently, in our Information Systems. However, we need to carefully consider the appropriate scale of such an investment, given that we know demand exists in the marketplace, and possible new sites have been identified'. Jack Avalon suggested that one possibly low-cost approach might be to consider cloud-based computing. David Campbell, Head of Operations, protested that: 'This is crazy! You're talking about the confidential patient information of vulnerable people here – that just cannot be entrusted to a third party!'

REQUIREMENT:

Based on a critical analysis of the case study on Page 1, candidates are asked to address the following:

(a) Evaluate Jane Lorne's statement that: 'if we are to achieve our strategic business objectives, we need to invest, urgently, in our Information Systems'. In your answer, you should consider what the strategic business objectives of Torquay Ltd. might be, and how Information Systems can assist in achieving these.

(9 marks)

(b) Which cloud-based services would you recommend to Torquay Ltd., discussing the possible benefits and challenges of each?

(10 marks)

(c) To what extent might David Campbell's concerns be eased by developing a detailed service level agreement with the providers of cloud-based services?

(6 marks)
[Total: 25 Marks]

2. Write briefing notes on any THREE of the following topics. In each case your note should include a summary of the main points relating to the topic.

    (a) Open source software for enterprise applications
    (b) Prototyping in the development of specific software applications for small teams
    (c) Expert systems in supporting complex production scheduling decisions
    (d) XBRL in analysing financial statements
    (e) Executive Support Systems in business expansion decisions   Each part carries 5 marks.

[Total: 15 Marks]

SECTION B
Answer **ANY THREE** of the four questions in this Section.

3. **(a)** Discuss the importance of organisational dimension of Information Systems when developing effective systems.

(6 marks)

    (b) Mobile digital platforms are increasingly used by organisations in preference to larger computers. Analyse this trend and the possible security implications arising. Illustrate your answer with examples.

(8 marks)

    (c) Suggest and explain two technologies or tools that can prevent unauthorised access to an organisation's proprietary information.

(6 marks)

[Total: 20 Marks]

4. **(a)** Suggest how internet technologies can assist in coordinating inter-organisational systems relating to key business processes.

(6 marks)

    (b) Supply Chain Management Software (SCM) has been significantly enhanced by internet technologies. Evaluate the importance of SCM given the increasingly global nature of supply chains.

(8 marks)

    (c) How might SCM systems support businesses in gaining or sustaining competitive advantage? (6 marks)

[Total: 20 Marks]

5. **(a)** Contrast relational Database Management Systems (DBMS), data warehouses and Hadoop as possible elements of an organisation's business intelligence infrastructure.

(8 marks)

(b) To what extent might business intelligence and business analytics be used differently by various levels of employees?

(6 marks)

(c) Explain the process by which you might consider the possible ethical implications of storing and analysing customer data, giving relevant examples.

(6 marks)

[Total: 20 Marks]

6. **(a)** Assess the impact of social media on organisations' interactions with their customers. In your answer you should discuss:

- Social commerce
- Social network marketing
(10 marks)

(b) Explain, giving examples, the meaning of the term '*Enterprise Social Networking Tools'*. (4 marks)

(c) Discuss two software-based collaboration platforms. (6 marks)

[Total: 20 Marks]

END OF PAPER

THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS IN IRELAND

INFORMATION SYSTEMS

FORMATION 2 EXAMINATION - APRIL 2015

SOLUTION 1

Purpose: To examine the candidates' understanding of: the role of Information Systems in helping organisations to achieve their strategic objectives; cloud computing services, in particular the appropriateness of certain services to Torquay; the risks of cloud-based services to the organisation; and the usefulness and content of service level agreements in cloud-based services.

Links: No major links to other topics or papers.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a)   Organisations are suggested to have six strategic business objectives: operational excellence; new products, services, and business models; customer and supplier intimacy; improved decision making; competitive advantage; and survival. The possible relevance of each to Torquay Ltd and how information systems may assist in achieving these is discussed below.

Operational excellence: organisations continuously seek to improve the efficiency and productivity of their operations in order to achieve higher profitability, and Torquay, as a for-profit company, will also seek to do this. For Torquay, a further aspect of operational excellence may be the quality of service provided to service users. Information systems can assist in this by providing Torquay Ltd with tools that allow them to operate more efficiently, examples might include the use of business to business e-commerce in procuring consumables; real-time inventory stock monitoring; and human resource systems that can assist in time management and work scheduling. In terms of service quality, information systems can assist in promoting better quality in service and productivity by making relevant, real-time information such as service users' care records available at the operational level to nurses and care staff: this is essential in a care environment for quality and for service user safety.

New products, services and business models: information systems and technologies are a major enabling tool for firms to create new products and services as well as entirely new business models. These changes are increasingly being seen even in organisations like Torquay, where their application may be less immediately obvious. Given that a major element of cost for service users relates to staff costs, one possible suggestion of new, information-systems enabled service might be through the use of videoconferencing or telepresence technology, an integrated audio and visual environment to allow care staff to 'check in' on service users requiring less intensive care. In addition, information systems can be used to track and provide detailed information on costs in the organisation that are essential for new product and service design, and for agreeing the fee per service user with the relevant health board.

Customer and supplier intimacy: when a business really knows its customers, and serves them well, the customer generally responds by returning and purchasing more. This is a slightly more complex relationship in Torquay Ltd, because although the service user benefits from the service, this is paid for by the health board. Health boards can be described as customers because they pay for the services provided, will monitor performance of the services (increasingly, as in the case, on the basis of the outcomes of care for the service user) and because they can (usually) take their business elsewhere, to other care providers, if dissatisfied. Information systems can assist in meeting these customers' needs by ensuring information related to service users is gathered, analysed and presented to such customers on a timely basis; through streamlined invoicing and payment procedures (and related queries) and useful tools might include good quality customer relationship management software. Feeding into this, for service users it will be important to store and track information relating to the service users health and progress towards the pre-set goals for their care. It will be important for such information to be kept securely,

yet easy to use for care professionals. Such information may be stored on a searchable relational database, possibly linked to sector-specific software (or in house developed software) for gathering and displaying such information. Such software might increasingly be cloud-based.

With suppliers, the more a business engages its suppliers, the better suppliers can provide vital inputs and this can lead to lower costs. For Torquay, it may be useful to engage with suppliers of consumables (particularly food supplies and medicines) through the use of web-enabled electronic data interchange or net marketplaces; or supply chain management software. This might be particularly beneficial given possible cost savings related to dealing with a limited number of suppliers (possibly versus switching costs); the need to ensure good stockholding procedures (supplies must not run out, but obsolescence will also occur).

Improved decision making: without detailed information, risks for Torquay Ltd include failure to achieve operational excellence; misallocation of resources; poor response times; and perhaps most importantly, lack of appropriate, accurate and timely information could threaten service user safety. Information systems are therefore important both at an operational level and at a management level. It may be particularly important for managers to have a dashboard of information on a range of metrics, including financial and performance information, but also on matters such as complaints and regulatory requirements (which are extensive in a care environment). With better information, service users are safe guarded and relationships with customers (health boards) protected – this is also essential for survival (see below). Information can then be used in a range of business decisions ranging from changing suppliers; customer profitability analysis; to broader growth or process change decisions.

Competitive advantage: an organisation achieving one or more of the above may already have achieved competitive advantage. For Torquay Ltd their competitive advantage may be in offering high quality services; safety and reliability; offering services for lower prices than their competitors; or real time response to customer needs. As discussed above, information systems can be used to help Torquay Ltd achieve these.

Survival: organisations invest in information systems because they are necessities of doing business. Care professionals need accurate, real-time information on service users' needs if these are to be met and service users safeguarded. Health boards need information on outcomes related to service users, and provision of this is required as a condition of payment for these services. In addition, such an organisation will have a legal duty to retain such records and keep them securely (under data protection legislation and given the requirements of the regulator). Additionally, from a business perspective, it is essential for the organisation to have strong transaction processing systems relating to the finances of the organisation in order to report externally and to provide accurate information on financial position internally.

3 marks for identifying possible strategic objectives, 6 marks for the relevant comments of the usefulness of Information Systems

(b)   Recommendations are given below across the three categories of cloud computing services.

Infrastructure as a Service (IaaS): customers use processing, storage, networking and other computing resources from cloud service providers to run their information systems. Torquay Ltd could use a third party provider to store the increased quantity of data being generated. Benefits of this would include saving a large initial investment in servers and committing to a variable cost based on usage (this also moving costs from fixed to variable) and an overall potential cost reduction. This also allows Torquay Ltd greater flexibility in capacity where data storing/processing peaks at certain times of the year or due to other events (if you were buying infrastructure it would have to cope with your maximum even if not required for 11 months of the year, where payment for cloud might more closely reflect usage). However concerns might relate to the security of data in transmission and storage; integration with existing technologies and systems; and the risk of potential outages/ connection issues relating to the provider and network. In addition, the costs of switching away from this provider in the future could be great, leaving Torquay Ltd to some extent at their mercy in setting prices in the future.

In addition, Torquay Ltd could consider outsourcing not only its data storage but also its computing resource management, including the provision of storage, machines, peripherals etc. Torquay Ltd's information systems are not a major source of competitive advantage, and from the detail in the case have not been sufficiently invested in in recent years, so there may be an opportunity to follow such an approach at this time. Depending on the contract entered into, this could be a lower cost (and variable cost) option for the firm, albeit that switching costs would be high. Possible concerns might exist in that control of IT infrastructure passes to another organisation and quality of service might be a concern.

Platform as a Service (PaaS): customers use infrastructure and programming tools supported by the cloud service provider to develop their own applications. In Torquay's case, if specific applications that allow them to track service user data were not available, or were felt to be unsuitable, they could use these platforms to develop an application that allows staff to easily input information on service users' targets, performance against targets, and to integrate this with their broader care record. Such information, protected by strong access controls, could then be available to relevant staff via a web browser on tablets or similar devices, giving ease of access to patient information and leading to better outcomes for the patient. The most significant concern would relate to potential outages/ connection issues relating to the provider and network (Safety issues if service user information was unavailable), in addition to security of data in transmission and storage and integration with existing technologies and systems.

Software as a Service (SaaS): customers use software hosted by the vendor on the vendor's cloud infrastructure and delivered over a network. Customers access the applications via a web browser with the data and software maintained on the providers' remote servers. In this case, if an application relating to tracking service user data was available; this might be appropriate (and would be subject to the same benefits and risks as discussed above). Additionally, Torquay Ltd could use customer relationship management software, delivered as SaaS, to manage data on its relationships with its 'customers': which, in Torquay's case would be the health boards that pay for the services (rather than the service users). Possible benefits include facilitating a better relationship with these customers, and doing so on a cloud basis minimises a range of costs including the costs of multiple licenses, installation and maintenance. Torquay Ltd may benefit from regular upgrades, patches and fixes by the software provider without the disruption of upgrading individual machines, while taking data and software offsite may be safer in event of a disaster – important customer information would still be easily accessible. Concerns might include: security of data in transmission and storage; integration with existing technologies and systems; and potential outages/ connection issues relating to the provider and network. A range of possible applications could be discussed as relevant here, including Enterprise Resource Planning systems; supply chain management and accounting software, subject to the same risks and benefits.

3 marks for identifying and explaining IaaS, PaaS and SaaS. Up to 4 marks for explaining relevant uses, plus 3 marks for advantages/disadvantages of each

(c) Service level agreements can be useful in creating a firm foundation in the form of a formal contract for the provision of cloud-based services, and will differ depending on the service being offered – for example a service level agreement relating to data hosting will be quite different to one dealing with CRM software. However, broadly speaking, a service level agreement should define the specific responsibilities of the service provider and the level of service expected by the customer. It should specify the nature and level of services provided, criteria for performance measurement, support options, provisions for security and disaster recovery, hardware and software ownership and upgrades, support, billing and conditions for terminating the agreement.

However, even with a well written, comprehensive service level agreement concerns may still remain. Regardless of the type of cloud-based service, access is lost when broadband fails or there is a slow connection – where this is patient data, for example information on medication or allergies the consequences of this could be particularly severe. Torquay Ltd might also be exposed if the provider organisation failed. Strong access controls (and perhaps anonymisation of data) will be required, and for this reason it is perhaps unlikely that a public cloud will be suitable in this case. It could be argued that Torquay's data – confidential, important information relating to vulnerable people could be argued to be unsuitable for cloud-based storage.

3 marks for explaining what a service level agreement might include; 3 marks for discussion of possible issues with a cloud base and whether such an approach might be suitable here.

SOLUTION 2

Purpose: Responses for each question are expected to include a summary of the main facts relating to the topic.
Links: No major links to other topics or papers.
Options: Candidates should answer three of the five parts/sub-questions
Essential components: Each sub-question has an aspect that allows the student to show what they know about a broad topic. Each also provides an opportunity for candidates to show they understand the relevance of the broad topic in a specific context. In general, 5 key points are expected on each sub-question for the 5 marks. 4 of these could be general points but must be relevant.

(a) Open source software is software produced by a community of several hundred thousand programmers around the world. It is free and can be modified by users. Works derived from the original code must also be free, and the software can be redistributed by the user without additional licensing. Open source software is by definition not restricted to any particular operating system or hardware technology, although most open source software is based on a Linux or Unix operating system. Examples of open source software include the Linux operating system, the Apache HTTP web server and the Mozilla Firefox web browser.

Enterprise applications are systems that can coordinate activities, decisions and knowledge across many different functions, levels, and business units in a firm. They include enterprise systems, supply chain management systems, and knowledge management systems. Such applications have been traditionally associated with very high purchase and implementation costs, partly due to vendor costs and to lengthy implementation periods. Open source enterprise application software, such as Compiere, Apache Open for Business and Openbravo may be advantageous for some companies as there are no software licensing charges although there may be usage-based fees. However, these will lack the functionality and support offered by traditional vendors.

(b) Prototyping consists of building an experimental system rapidly and inexpensively for end users to evaluate. It is often described as a four-step model:

1. Identify the users' basic requirements
2. Develop an initial prototype
3. Use the prototype
4. Revise and enhance the prototype (repeated until users are satisfied).

Prototyping is suggested as a more flexible approach to developing systems and software than the traditional systems development life cycle approach. Prototyping is an iterative process, with steps being repeated over and over again until users are satisfied, actively promoting system design changes. It is argued that this approach replaces unplanned rework with planned iterations, with each version more closely matching user requirements.

It may be particularly useful in developing applications for a small number of users because of the focus on user requirements: with prototyping encouraging intense end-user involvement throughout system development, it is more likely to fulfil user requirements. This may be particularly the case where there is uncertainty about requirements or design solutions. In addition, some of the common criticisms of prototyping would not apply in this context: such as the inability to cope with large quantities of data or a large number of users, or difficulty of engaging a range of users with the prototyping process. However care needs to be taken that prototyping is not rushed through, without consideration of important steps in the process or failure to appropriately engage with relevant end users.

(c) Expert systems are an intelligent technique for capturing tacit knowledge in a very specific and limited domain of human expertise. Expert systems model human knowledge as a set of rules that are collectively known as the knowledge base, potentially consisting of a few hundred to many thousands of these rules, depending on the complexity of the problem. These rules are interconnected and nested, and a strategy known as an inference engine is used to search through the knowledge base using either forward or backward chaining to move through the rules and frames.

Expert systems are used in discrete, highly-structured decision –making situations, decisions that could be taken by a professional in a few minutes or hours, such as deciding whether to grant credit for a loan. Similarly, such systems may be appropriate for complex production scheduling environments, where decision-making is based primarily on highly structured information (such as machine availability, production time, availability of staff to move products etc.), and where it is possible to use such systems to quickly and accurately identify the optimum (rather than merely the possible) production schedule over a period of time. However such systems do not make the decision, but provide advice to enable managers to make the appropriate decision.

Benefits of expert systems relevant to production scheduling include improved decisions, reduced errors, reduced costs, reduced training time and higher levels of quality and services. However if these benefits are to be achieved organisations need to be mindful of the limitations of such systems. These include that only certain classes of problems can be solved in this way, and that these systems are less useful for dealing with the unstructured problems often encountered by managers. Developing and maintaining expert systems can be costly – such systems must work correctly and be based on regularly updated, relevant information, otherwise they could result in incorrect decisions based on outdated or incorrect information.

(d)   eXtensible Business Reporting Language (XBRL) is an XML-based markup language used to communicate financial and business data electronically. Software is used to 'tag' the data contained in financial statements with contextual information such as scale (€m, €000) date (as at 31.12.14) and nature (for example, non-current assets – freehold property). When such tagged data is read by XBRL-enabled software, it can be quickly and accurately sorted, classified and analysed.

XBRL can be useful in analysing financial statement data – for example, by investment advisors, regulators or tax authorities, because financial data tagged with XBRL saves time and cost by preventing re-keying by the analysing organisation. This also leads to improved accuracy and reliability of data and the analysis. Regardless of the native language, or systems used to produce the financial data, that data can be more easily and reliably analysed. As such, it allows greater focus on analysis (rather than data entry) potentially improving and speeding decision making by the analysing organisation.

(e)   Executive Support Systems are information systems at the organisation's strategic level, designed to address unstructured decision making through advanced graphics and communications. Their purpose is to provide executives with information to help them to make their decisions (not to provide executives with ready made decisions), because such decisions normally require judgement, evaluation and insight. Such an evaluation could be made of the decision to expand the organisation, which will require executives to combine the information provided with their own experience, expertise, risk preferences and understanding of the organisation and its business environment in making their decision.

Such systems are designed to be flexible, to cope with unstructured data from a range of sources, including internal and particularly external to the organisation. They may draw on information from internal management information systems and decision support systems. They are designed to be easy to use or manipulate, so that executives can see the information provided to them in a range of ways that are useful in their decision making. For example, it may be important to provide information at a summary level rather than risk information overload, yet also provide the capacity to drill down (possibly using business analytics tools) to more specific information to allow the optimal decision to be made. This may be done through a portal, which uses a web interface to present integrated, personalised business content. Another approach is provide a digital dashboard, which provides, at a glance, a real-time view of key performance indicators for the business. While traditionally these indicators might have focussed on financial or production related indicators, increasingly broader and more externally focussed indicators are used. For example, following the balanced scorecard approach, the organisation might monitor financial information alongside other indicators related to customers, internal business processes, and learning and growth. Executives using this type of information, provided the information provided is accurate, reliable and provided in real-time (or in a timely fashion), may be able to make more informed and better decisions on business expansion.

SOLUTION 3

Purpose: To examine the candidate's understanding of: the organisational, technical and management dimensions of information systems; the effect of mobile computing platforms on business processes; and tools or technologies relevant to securing proprietary information.

Links: No major links to other topics or papers.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a) Organisation: The key elements of an organisation are its people; structure; business processes; culture and politics. People in the organisation include senior management, making long range strategic decisions about the firm; middle management; operational management, monitoring the daily activities of the business; knowledge workers; data workers; and production/service workers. Information Systems provides information to each to allow them to carry out their function and to monitor others as appropriate. Authority and responsibility is organised as a hierarchy. Business functions include sales and marketing, manufacturing and production, finance and accounting and human resources, each with business processes that include formal written-down rules related to accomplishing relevant tasks, and informal work practices. Information systems can facilitate these processes and can be tools for improving and effecting change in these processes, while weaknesses in information systems will adversely affect these processes. Each organisation has a unique culture, a fundamental set of assumptions, values and ways of doing things that has been accepted by most of its members. Organisational politics may be a part of this, and is often based in conflicts as to how the company should be run and resources and rewards distributed. Information systems have a role to play in facilitating positive effects and mitigating negative effects of organisational culture and politics.

(b) Mobile digital platforms include the use of smartphones and tablets, rather than PCs and desktop machines. These devices are able to download hundreds of thousands of applications to support collaboration, location based services, communication with colleagues, and to provide information for decision making. Increasingly, business processes are moving to these platforms, being enabled by: grid computing (connecting geographically distant computers into a single network to create a computational grid that combines the computing power of all computers on the network); virtualisation (organises computing resources so that use id not restricted by physical configuration or geographic location) and cloud based services, which provide computing power and software as services over a network, rather than installing the hardware and software on their own computers.

Advantages of such platforms include: increasing the availability and flexibility of relevant business information, allowing faster and more accurate decision making; the increased computing power that can be made available to each device which may speed the process; possibly lower hardware and software costs; greater work flexibility to facilitate teleworking; development of business processes to include collaboration capabilities.

However, in considering their usefulness in business processes, concerns around security of such a platform need to be considered. Like laptops and desktops they need to be secured against malware, theft, accidental loss, unauthorised access and hacking attempts. Mobile devices accessing corporate systems and data could create increased risks of data corruption, data loss and security breaches, and accordingly require special protection. The company security policy should include mobile devices, and guidelines should stipulate approved mobile platforms, applications, software and procedures. Mobile device management tools should be used to: authorise all mobile devices in use; maintain accurate inventory levels on all mobile devices, users and applications; to control updates to applications; and to lock down or erase lost or stolen devices so that they cannot be compromised. Companies should encrypt communications whenever possible, and all devices should be password protected.

4 marks for discussing this trend and 4 marks for security implications

(c) Students could explain any two of the following:

- Identity management and authentication
- Firewalls
- Intrusion detection systems
- Antivirus software
- Encryption

SOLUTION 4

Purpose: To examine the candidate's understanding of: possible uses of internet technologies in coordinating inter-organisational business process; and the role of supply chain management software in global supply chains and in securing competitive advantage.

Links: No major links to other topics or papers.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below. Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a)   Inter-organisational systems are information systems that automate the flow of information across organisational boundaries and link organisations to their customers, distributors or suppliers. Examples include the use of supply chain management systems: systems that help suppliers, purchasing firms, distributors and logistics companies share information about orders, production, inventory levels and delivery of products so that they can source, produce and deliver goods and services efficiently. Another example is customer relationship management systems: providing information to coordinate all of the business processes that deal with customers in sales, marketing and service, and which may (in some cases) facilitate automated sharing of information with customers.

Inter-organisational systems can be facilitated through electronic data interchange (EDI): the direct computer-to-computer exchange between two organisations of standard business transactions such as orders, shipment instructions or payments. Transactions are automatically transmitted from one information system to another through a network, eliminating the printing and handling of paper copies at one end and the inputting of data at the other. Major industries usually have EDI standards that define the structure and information fields of electronic documents for that industry. In addition, EDI can be used as a system for continuous replenishment, giving suppliers online access to selected parts of the purchasing firm's production and delivery schedules to automatically ship materials and goods. EDI can be mediated through a private network, however web-enabled EDI is becoming much more common as an increasingly low-cost and flexible alternative.

Internet technology can be used to create extranets (private intranets extended to authorised users outside the organisation) or electronic marketplaces for linking to other businesses for purchase transactions. These could include the use of private industrial networks or private exchanges, where a large firm uses a secure website to link to key suppliers and other partners. The site is controlled by the purchasing firm and allows for the secure sharing of detailed information on product design and development, marketing, production scheduling, inventory management and unstructured communication. An example is VW group supply.

(b)   Supply chain management software is classified as either software to help businesses plan their supply chains (supply chain planning) or software to help them execute their supply chain steps (supply chain execution).

Supply chain planning systems enable the business to model its existing supply chain, generate demand forecasts for products, and develop optimal sourcing and manufacturing plans. Such systems can help companies make better decisions such as determining how much of a specific product to manufacture in a given period; establishing inventory levels for raw materials, intermediate products and finished goods; determining where to store finished goods; and identifying the transportation mode to use for product delivery.

Supply chain execution systems manage the flow of products through distribution centres and warehouse to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations and financial information involving all parties.

Both types of systems may assist organisations facing increasingly global supply chains. While global supply changes may have significant advantages – including lower cost production and an increased range of materials, components or finished goods, difficulties also arise. These include spanning greater geographic distances and time differences, giving rise to additional logistical considerations. Performance standards may vary from region to region or nation to nation. Cultural differences and different regulatory environments may impact.

Internet technologies can help in managing many aspects of global supply chains, including sourcing, transportation, communications and international finance. By using web interfaces, or electronic data interchange, difficulties in sharing information with external supply chain partners arising from their use of incompatible technology platforms and standards can be overcome. Information can flow more smoothly between the disparate internal supply chain systems of these and other organisations. Examples include managers using web interfaces to access suppliers' systems to determine whether inventory and production capabilities match

demand for the firm's products. Business partners use web-based supply chain management tools to collaborate online on forecasts. Sales representative access suppliers' productions schedules and logistics to monitor customers' order status.

2 marks for explaining SCM systems, 3 marks for discussion of global supply chain, 3 marks for discussion of use of internet technologies.

(c) Competitive advantage refers to the suggestion that some businesses are stand-out firms, that do things better than most others in their industry. Some achieve this competitive advantage by aiming for low-cost leadership; some by differentiating their product from competitors' offerings; some by focussing on a market niche; and others by building supplier and customer intimacy. Supply chain management systems may particularly assist in helping an organisation achieve low cost leadership or in building supplier intimacy.

Low-cost leadership: securing competitive advantage by keeping costs low. SCM can assist in a range of ways, including: minimising stock-holding by enabling better forecasting and replenishment; more reliable systems to avoid stock-outs; providing real-time, accurate information that facilitates monitoring and control of replenishment processes; and reducing procurement transaction processing times with increasing automation. Other relevant suggestions and examples are acceptable.

Strengthening supplier intimacy: securing competitive advantage by developing relationships and loyalty with suppliers. SCM can assist by: facilitating information sharing between the organisation and its customers and suppliers (for example, allowing suppliers access to production schedules and stock levels); reducing transaction processing times for both the organisations and its suppliers through increasing automation; developing relationships based on repeat business that can lead to volume and other discounts. Other relevant suggestions and examples are acceptable.

2 marks for explaining competitive advantage, 4 marks for discussing SCM as a means to competitive advantage.

SOLUTION 5

Purpose: To examine the candidate's understanding of: data storage mechanisms and their suitability for business intelligence; the use of business intelligence and business analytics by different levels of employees; and ethical considerations relating to data storage and analysis.

Links: No major links to other topics or papers.

Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.

Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a) A Database Management System (DBMS) is software that permits an organisation to centralise data, mange them efficiently, and provide access to the stored data by application programs. It acts as an interface between application programs and physical data files. Relational databases represent data as two-dimensional tables (called relations), with each table containing data on an entity and its attributes. Data is organised and accessed according to the relationships between data. Relationships are expressed by means of relationship tables – used to store data without reference to any other physical orientation and relationship. Every table is listed in order of a unique identifier relevant to that table –the primary key. Within the table are numbers that are the primary key in another table – foreign keys. And further characteristics of the primary key – non-key. A DBMS includes tools for organising, managing and accessing information in the database.

A data warehouse is a database that stores current and historical data, originating from core operational transaction processing systems, and extracted from those systems into the data warehouse, this data is then combined with data from external sources, and transformed by correcting inaccurate or incomplete data and restructuring data for management reporting before being loaded into the data warehouse. It make the data available for anyone to access as needed, but it cannot be altered. A data warehouse system also provides a range of ad hoc and standardised query tools, analytical tools and graphical reporting facilities.

Relational DBMS and data warehouses are not well suited for organising and analysing big data (datasets with volumes so huge they are beyond the ability of typical relational DBMS to capture store and analyse, often comprised of unstructured and semi-structured data), or data that do not fit into the columns and rows used in their data models. Hadoop, on the other hand, can handle structured, semi-structured and unstructured data in large quantities. It is an open source framework managed by the Apache Software Foundation that enables parallel processing of huge amounts of data across inexpensive computers. It does this by splitting a big data problem into sub-problems, distributes them around thousands of inexpensive computer processing nodes, and then combines the result into a smaller data set that is easier to analyse. It can process a range of data including structured transactional data, loosely structure data such as Facebook and Twitter feeds, complex data such as web server log files and unstructured video and audio data. It runs on a cluster of inexpensive servers, with processors added or removed as needed.it may be used for analysing large volumes of data before loading that into a data warehouse.

The use of each of these may depend therefore on the type of data which is to be analysed as business intelligence, and the quantity of data. For example, if a business is keen to use business intelligence to investigate unstructured or semi-structured data gleaned from external sources, and the quantity is likely to be large, a Hadoop cluster may be appropriate. If alternatively, the business is more interested in structured data of the type generated by internal transaction processing systems, then depending on the amount of data a relational DBMS or data warehouse may be sufficient.

2 marks for explaining each, 2 marks for clear contrast between each.

(b) Business intelligence and business analytics promise to deliver correct, nearly real-time information to decision makes through six analytic functionalities:

1. Production reports: These are pre-defined reports which are specific to the industry and to a functional area of the business, and are most commonly used by casual users and operational staff (such as those engaged with the particular functional area to which they relate – sales, purchases).
2. Parameterized Reports: users enter several parameters as in a pivot table to filter data and isolate impacts of parameters, often used by middle managers and analysts to immerse themselves in the data.
3. Dashboards/Scorecards: visual tools for presenting performance data defined by users, particularly senior managers, as an overview of the most important metrics for the business.
4. Ad hoc query/search/report creation: functions that allow users to create their own reports based on queries and searches, i.e. not just to run the reports predefined by the vendor or at the time of installation. These would normally be run by managers or business analysts in response to their specific queries such as, for example, investigating sales in a subsection of a region to inform future marketing strategy.
5. Drill down: the ability to move from a high-level summary to a more detailed view may be most appropriate to executives and some managers.
6. Forecasts, scenarios, models: these include the ability to perform linear forecasting, what-if scenario analysis, and analyse data using standard statistical tools, primarily used by analysts and managers.

3 marks for discussing business intelligence and analytics and 3 marks for clearly identifying interests of executives as distinct from managers, as distinct from analysts, and operational staff

(c) These might be analysed by following a five-step process:

1. Identify and describe the facts clearly: in this case, intention to store and analyse data A particular concern exists in applying analysis which brings together data from a range of sources to provide highly detailed information on an individual, their interests and past misdemeanours (for example non-obvious relationship awareness (NORA) data analysis).
2. Define the conflict or the dilemma and identify the higher-order values involved: These might include legal concerns (to what extent is the storage and analysis of the data legal with reference to data protection legislation? If not, should it be reported?); privacy concerns (to what extent is the storage and analysis of the data a breach of the individual's right to privacy, could harm be caused to that individual by storing that data?); or security concerns (are proper procedures in place to secure the data, and ensure it is accurate and up to date?).
3. Identify the stakeholders: individuals involved, the organisation, relevant data protection regulators and other regulatory bodies, the justice system
4. Identify the options that can reasonably be taken: a range of options from no storage and analysis to storage of information for which permission has not been given and analysis which could cause harm to the individual
5. Identify the potential consequences of your options: harm to the individual, penalties for the organisation and persons responsible, reputational effects.

SOLUTION 6

Purpose: To examine the candidate's understanding of: the impact of social media on organisations' interactions with their customers; enterprise social networking tools and software-based collaboration platforms.
Links: No major links to other topics or papers.
Options: Candidates must answer all parts of the question. Answers should not vary significantly from those given below.
Essential components: Candidates must be able to show a depth of understanding of the areas identified above (under Purpose).

(a)   Social commerce involves the use of social networking platforms, including Facebook, Twitter, and internal corporate social tools, to engage with employees, customers and suppliers. Common features of social commerce include:

Social sign-on: refers to websites allowing users to sign into their sites through social network sites, such as Facebook. This allows organisations to receive valuable social profile information which can then be data mined and used to target marketing, make product recommendations, or to build a relationship with the customer.

Network notification creates an environment where customers can share their approval or disapproval of a product, services or a brand. Examples include the Facebook like button on Google's +1. By encouraging customers to follow the brand, brand identity can be developed, relationships built and useful content generated (where text mining is used on feedback from followers on twitter, social networks and related sites).

Collaborative shopping involves creating an environment where customers can share their shopping experiences with one another by viewing products, chatting, or texting. Similarly, social search (recommendations) enables an environment where customers can ask their friends for advice on the purchase of products and services. Social recommender tools can use a customer's social profile to recommend products.

Social marketing is the use of social media to interact with customers and derive customer insights. It can include activities designed to shape perceptions of the brand, solidify customer relationships, promote particular products or offers, and can be augmented by a range of tools to assess the usefulness of such marketing. Examples might include promoting its Facebook page through advertising, paying for promoted Tweets or promoted trends on Twitter, meaning that these are displayed more prominently. Online advertisements on other sites could also be used to promote the brand's Facebook page or Twitter account – usually with users clicking on the advertisement and being taken to the relevant page. Customers can then interact with the organisation through these applications, for example to enter competitions, comment on a product, complain, or share information with friends.

In addition to building relationships through these mechanisms, linking with customers and others in this way can be a powerful means of generating information on these customers' preferences, buying habits that can informal future business decisions, such as the development of new products and decisions about promotions. However, given the unstructured nature of the data gathered (for example, from Facebook pages or Twitter feeds) if an organisation wishes to turn the big data generated from these relationships into useful information, it will need to invest in business intelligence infrastructure and analytics.

<div align="right">

4 marks for exploring social commerce
3 marks for social marketing
3 marks for relevant points of the effect on businesses.

</div>

(b)   Enterprise Social Networking Tools create business value by connecting the members of an organisation through profiles, updates and notifications, similar to Facebook features but tailored to internal corporate uses. Typical features include individual profiles (personal information, experience, skills); content sharing (including documents, presentations and images); feeds and notifications (real-time information streams, status updates and announcements); group and team workplaces (establishing private and public groups to share information and collaborate); tagging and social bookmarking (similar to the 'like' button, indicating preference for certain types of content); permissions and privacy (need to establish who has permission to see what information). Examples include Microsoft's Yammer, Jive and IBM connections. These create a 'virtual water-cooler' environment where people are able to talk about what's going on in an informal way, in addition to having easy access to formal documentation to keep track of best practices.

(c)   Students might discuss any two of the following:

- Virtual meeting systems (or telepresence)
- Google Apps/Google Sites
- Microsoft SharePoint
- Lotus Notes

(Note: discussion of e-mail/instant messaging/wikis would not be acceptable)