

**THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 6 Professional Graduate Diploma in IT**

April 2008

EXAMINERS' REPORT

Management Information Systems

General Comments

Disappointingly, the overall pass rate, of around 57%, for this paper was similar to that for the October 2007 paper. Whilst some candidates produced answers of very high quality, (one of whom obtained 90%) there were a significant number of candidates who struggled to obtain sufficient marks to pass. The best candidates carefully considered the requirement of each question, planned the layout of their answer, provided diagrams where appropriate, avoided generalisations, justified points with example, and gave comprehensive and thoughtful answers.

The weaker candidates should follow the correct approach taken by the good candidates. Many weak candidates attempted to answer questions by simply restating points made in the question or by looking at the subject matter of other questions and including these in their answers. Candidates are advised that they will not gain any marks for such efforts. Other weak candidates wasted time by providing a commentary about the question, rather than giving a valid answer.

Candidates should also be aware that, with an hour available for each question, several pages of relevant information are expected. The all-important "pass" grade is unlikely if just half a page of bullet points is presented to an examiner. However, those who think they will gain high marks by writing several pages on the theory surrounding some of the key phrases within a question, without actually answering the question set, will be disappointed; only one or two marks at most can be given for such practice, where some applicability to the question can be determined.

It is important for candidates to be aware that it is extremely unlikely an examiner will present two questions covering identical topics in the same examination paper. If a candidate provides the same answer to a question as has already been given to a previously attempted question on the same paper, then the candidate should read again the questions and very carefully consider its content to ensure that its nature and requirements are truly understood. This year, many candidates provided identical, or very similar, answers to Questions 1 and 4, and to Parts (a) and (b) of Question 3, yet these questions were examining different aspects of the syllabus.

Regrettably, a significant number of candidates answered more than the required three questions. Because of time constraints, this meant that there were often four or five poor answers rather than three good answers. As credit will only be given for the three best answers, future candidates are advised to attempt only three questions and to concentrate their thoughts accordingly.

An indication is given below of the expected answer points. However, marks were given for alternative answers if relevant to the question.

Question 1

The Managing Director of a medium-sized UK furniture retailing company is considering the development of MIS applications to enhance existing business operations. Finance available for the systems is limited, and therefore any systems development activities by the IT Department must be focused on the most important MIS applications.

- a) Describe a process by which this company can ensure that they target their systems development activities towards the most important MIS applications. **(16 marks)**
- b) List and justify who would need to be involved in this process. **(9 marks)**

Answer Pointers

Question 1 was about MIS/IS/IT strategic planning, and the people that needed to be involved in such an activity.

Part (a) required candidates to provide an explanation of the principal MIS strategic planning tasks, which comprise the following:

- o Setting the terms of reference (what, who, etc.) for the study.
- o Performing an environmental assessment, including macro-environmental factors and micro-environmental factors (i.e., the furniture retailing “industry” for the given company) and find areas where MIS could be effectively applied.
- o Company assessment – includes analysing the corporate business objectives and identifying any MIS opportunities that would support these, and analysing the existing IS/IT/MIS in the organisation and highlighting where MIS could be included and/or extend existing systems.
- o From the assessments, identify the total set of MIS projects that need to be considered further, together with any IT infrastructure and management issues.
- o Prioritise the projects and plan for them, including a financial assessment. From this, the top MIS projects can be selected that lie within the financial boundaries set by the company.

Candidates may have discussed MIS strategic planning as a component of IS/IT strategic planning, which was appropriate. Techniques that could be applied within the environmental and company analyses included Porter’s Value Chain Analysis (VCA), Warren & McFarlan’s Strategic grid, SWOT analysis, Porter’s Five (Competitive) Forces Model, and CSF identification and analysis. Candidates may have provided descriptions of these and have shown how the techniques can lead to MIS being identified for subsequent implementation. For example, the use of SWOT analysis may have established that the company’s previous competitor analyses had been very poorly performed. This could have led to a definition of an EIS project which would provide more effective competitor monitoring and analysis. Porter’s Five (Competitive) Forces Model gives an organisation a way of analysing what it needs to do to ensure a healthy position in the industry, and the IT that needs to be in place. Some MIS development projects could emerge from applying this model. CSF

analysis enables the business objectives of the company and its SBUs to be considered for IS/IT/MIS opportunities.

A different tack to this question could have been taken, which involves implementing a corporate framework whereby any MIS/IS/IT projects that emerge are assessed (in a strategic way) on a regular basis. Although the question had more to do with one-off assessment (which the MIS strategic planning activity answer described above was more geared towards), an answer that considered an effective strategic assessment of projects on a regular basis would have also been acceptable.

(Marks: - for an appropriate process – 8 marks, plus 1 mark per example and/or additional commentary, to a maximum of 8 marks = 16 marks)

Part(b) asked candidates to consider the involvement of people within the process that they had proposed within their answer to Part (a). In the case of an answer to Part (a) that proposed a one-off MIS strategic planning activity, the IT department should not be driving this activity: rather, it should be driven from the top. The sponsorship of top management is vital to its success. Thus, the Managing Director and possibly his first line management should be involved throughout the study. They champion the study, enable the finances and other resources to be available, and motivate others to be involved by “example”. Also, end user representatives should be involved to ensure their input on issues, at key points throughout the planning activities, and to ensure that users feel that their views are valued and represented. IT Department and its management (represented by the IT Manager and possibly also one or two other key departmental members) should also be involved, as they are the IS/IT experts within the company. Sometimes, an external consultancy is brought in either to manage the study and/or as an “external expert” to scrutinise aspects of the MIS plans as they emerge, and to offer technical and/or procedural advice.

(Marks: 1 mark for appropriate party identified and/or for party justification, to a maximum 9 marks)

Examiners' comments

This question was attempted by about 60% of candidates, and the answers tended to be either extremely good (where the candidate recognised that this was an MIS strategic planning question and answered accordingly) or extremely poor (where the candidate did not recognise what the question was about), with the average mark for the question being a very disappointing 6.5 out of 25. Of those not recognising that the question was about MIS strategic planning question, the majority thought Part (a) to be another systems development question and repeated much of what they had put in their answer to Question 4. As such, there was little in their answer of relevance to the actual sub-question set, and therefore they could not obtain much in the way of marks.

Because Part (b) followed on from Part (a), those that gave the wrong answer to Part (a) tended to give the wrong membership also in Part (b): a few marks were obtained where some of the parties mentioned were also appropriate to involve within the MIS strategic planning process. Some of the candidates, that did answer Part (a) correctly, started Part (b) appropriately by mentioning several relevant personnel, but either did not justify or poorly justified their involvement.

Question 2

Quickparts Electrical is a company that specialises in providing spare parts for heating systems installed in buildings. Unlike its competitors, who only supply spares according to the heating system manufacturer's part number, Quickparts uses experienced and knowledgeable advisers to ensure the correct part is purchased. They also advise on an alternative part if the original is unavailable. This approach has proved most successful and Quickparts needs to recruit additional advisers if it is to meet rising demand.

The Board of Quickparts has met to discuss how to cope with the rising demand. Because advisers are expensive to recruit and train, a software supplier has suggested that products could be sold over the Internet using a knowledge-based system. The experienced advisers would be responsible for inputting the knowledge data and for answering, by email, those queries that are beyond the scope of the new knowledge-based system.

The Board broadly agrees with this approach but is concerned that the company's reputation could suffer if the knowledge-based system gave the wrong advice.

As an independent consultant brought in to advise the Board:

- a) Describe knowledge-based systems and explain how such systems could be implemented at Quickparts Electrical. **(12 marks)**

- b) Explain how the knowledge-based system should be tested. **(13 marks)**

Answer Pointer:

Answers are not prescribed for Parts a) and b) of this question, but the examiners were seeking an understanding of the issues and the points below should have been included.

- a) Knowledge-based systems

Answers should have included the following, although alternative definitions to those used below were acceptable if the meaning was the same:

- Knowledge-based systems (KBS) are computer systems programmed to imitate human problem-solving by means of artificial intelligence and reference to a database of knowledge on a particular subject.
- KBS use a knowledge base of human expertise for problem solving. Their success is based on the quality of the data and rules obtained from the human expert. In practice, expert systems perform both below and above that of a human.
- KBS derives its answers by running the knowledge base through an inference engine. This is software that interacts with the user and processes the results from the rules and data contained in the knowledge base.

- QE need to train their boiler engineers to become “subject matter experts” who will need to work with knowledge engineers to input their expertise into a KBS database. The knowledge engineers will agree with the boiler engineers how best to represent the knowledge to the customers. QE may also need to engage a key customer to assist with the developemnt of an appropriate user interface.

b) Testing knowledge-based systems

The difficulties in testing KBS should be acknowledged.

An overview and explanation of a standard testing process should be given, namely:

- Unit testing
- Integration testing
- Functional testing
- Acceptance testing
- User testing 1 - Alpha testing
- User testing 2 - Beta testing
- Regression testing

The issue of providing live test data for KBS should have been discussed and a possible solution proposed.

One solution could be simulation of a live operation. The boiler engineers record all customer queries and the responses given by the boiler engineers over a period of time. These responses could be re-input to ascertain if the response is as per the response given on the recording.

(8 marks for describing a testing process, 5 marks for explaining how the testing of a KBS differs from other types of development. Maximum 13 marks.)

Examiners' comments

An unpopular question, although most of the candidates who attempted this question gained reasonably high marks. Generally, candidates gained more marks for Part a) than for Part b). This was because many candidates omitted to describe a standard testing process and were unable to obtain marks as a result. Others mentioned the different stages of testing but failed to “explain” or provide a meaningful description and were thus unable to obtain marks.

Question 3

A financial services company wishes to implement a small Customer Relationships Management (CRM) system. However the company is unsure of whether they should implement an in-house database application or whether to purchase one of several “off-the-shelf” CRM software packages and then tailor it to meet their specific needs.

- (a) List and justify the factors that the company needs to consider when selecting whether to develop a CRM application system in-house or to procure one of the available “off the shelf” CRM packages.

(15 marks)

- (b) If the company opts for the “off-the-shelf” option, it has to decide between the several CRM packages available. Explain a suitable process by which the most appropriate package could be selected.

(10 marks)

Answer Pointers

This question was about MIS development options. Part (a) centred on the factors that should be considered when selecting between a packaged solution and an in-house development of the software. Factors that could have been included are:

- **Reputation of packaged software and originating company** – Are any of the available systems reputable in terms of both the originating company and in terms the quality of the software (where quality can be considered from many different angles; security, ease of use, reliability, etc.)?
- **Cost** - Costs are typically known in terms of package price (but possibly not in terms of tailoring costs), whereas in-house software development can be difficult to fix. Maintenance costs may be fixed and known for a packaged solution by contract, whereas in-house maintenance may be difficult to estimate and could actually end up being very high. Expensive upgrades to the packaged solution may occur, however, each time a new version is released. Other costs, such as for training and hiring any necessary specialist expertise, may also vary between the two approaches.
- **Functionality** – A packaged solution may have extra features that were not considered at the outset yet may prove to be of benefit to the organisation, whereas an in-house development would only develop that which the organisation specifies that it requires. However, a packaged solution may never possess the entire functionality required for a particular organisation, given its standardised nature, whereas an in-house development should result in a system that fulfils all specified requirements (but may not actually fulfil these for other reasons).
- **Hardware and software compatibility** – There may not be any suitable packaged solutions that run on the existing hardware platform. Any in-house software development would be built for use on the existing hardware platform and/or may be more efficient on that platform than any compatible packaged solution.

- **Staffing** - The company may or may not have sufficient staff with the necessary skills/domain knowledge to develop an in-house CRM. There may be problems retaining the staff who develop the system so that the company can maintain it effectively (CRM specialists may be headhunted for other jobs, for instance). The packaged solution comes with the expertise and staff of the originating company.
- **Control over the software development and/or maintenance** – In-house development means the company maintains total control over the software. Alternatively, a packaged solution means that the company is reliant on an external company – what happens if they go out of business during development and/or maintenance? What happens if their priorities change during maintenance activities, and therefore their response rate to problems is lengthened?

(Marks: for each relevant factor explained/justified – to a maximum of 3 marks, to a maximum total of 15 marks)

Part (b) was about the process by which the best package could be selected from the several that are available in the market, given that a packaged solution was the chosen overall approach. Candidates could have adopted a criteria/weighted score technique to the selection, where each software is evaluated against a set of criteria (which themselves are weighted according to importance). The total weighted score for each package is then worked out, and the one that scores the maximum total is the one to select.

Candidates may have added to this process the fact that there may be mandatory and desirable criteria, and therefore that a subset of the packages could be eliminated at this first “screening” phase of the process. They could have also suggested what the criteria, on which to evaluate each package, could be – purchase cost, reliability, security, features, maintenance costs, maintenance quality, originating company reputation, etc. They may have also suggested the selection of two or three packages via weighted score and then seek demo/trial copies of these packages to aid the final selection. Reviews and other on-line sources of information may have also been mentioned to gather information about the products.

(Marks: for each relevant point concerning the product selection process – 1 mark, to a total of 10 marks)

Examiners' comments

This was the most popular question on the paper, with 95% of students attempting it. Whilst some of the answers were excellent, with some obtaining full marks there were many that did not approach the question in the correct manner.

Part (a) asked for a list of **factors**, with associated justifications, that the company should consider when deciding between in-house CRM software development and “off-the-shelf CRM software package with tailoring” options. The question **did not ask for a list of the advantages and disadvantages of each software option**. Whilst some of the better advantages/disadvantages discussions implicitly identified some factors that are appropriate to use in deciding between the aforementioned software options, they were not discussed in the correct manner for this question (e.g., some candidates stated that “the need for user training” was a disadvantage of the “off-the-shelf with tailoring” option, yet training has a role within in-house software

development as well (but it might be a smaller and/or easier task as the users may already be somewhat familiar with the software)). Essentially, by taking the advantages/disadvantages approach to the question, candidates lost the opportunity to discuss the differences between the options with respect to a given factor, which provides the justification for that factor being useful to the decision making process. As a consequence, candidates limited their ability to gain high marks for this sub-question.

The candidates with the best answers to part (a) were those who thoroughly discussed five or six appropriate factors. Other answers contained lists of relevant factors, with very brief associated commentary that painted a very simplistic picture of the issues surrounding the evaluation of a factor for each of the software options. For example, several candidates indicated, quite rightly, that cost could be a factor, and then justified this by simply saying that the cost of the “off-the-shelf with tailoring” approach is less than the cost of the in-house development approach: the cost of what? Is this always true? Does this apply to some costs and not others? And so on.

Part (b) was about the selection between packages, when an “off-the-shelf with tailoring” approach had already been decided. Many candidates saw this as an opportunity to repeat their answer to Part (a), whereas the examiner was looking for a proper method whereby the packages could be evaluated and the best selected. Very few provided a detailed and appropriate process from start to finish.

Question 4

- a) Critically evaluate both the traditional and the Rapid Application Development (RAD) approaches to the development of Management Information Systems. **(15 marks)**
- b) Discuss and justify which of the two development approaches, traditional or RAD, you would recommend for each of the following situations.
- i) An insurance company which requires an accounting system to process and record the collection of premiums obtained from customers' bank accounts.
- ii) A supermarket chain which requires a system to gather data from each of its retail outlets in order to analyse and summarise the sale of each product.
- (2 x 5 marks)**

Answer Pointers

- a) Traditional versus RAD

This part of the question required a description of traditional methods (5 marks), a description of RAD (5 marks) and an evaluation of each (5 marks).

Traditional

Description of traditional/structured methodologies and the stages:

Practically all early systems developments and many current projects use structured methodologies. They generally consist of easily defined stages, each of which requires formal completion before the next one can commence. Generally, there are no tangible deliverables until the last stage has been completed and then the whole system is provided.

Structured methodologies are suitable where:

- changes have to be implemented at one particular date; for example, regulatory purposes.
- the requirements are well understood and are unlikely to change during the development period; again, a regulatory requirement is an example.
- it is impossible to break the task down into smaller component projects.
- provision of the system is contractual and to a fixed price.
- the technology used is inherently inflexible and it is therefore necessary to determine the requirements precisely at the outset of the development.
- the required system is safety-critical (human-life depends upon reliable operation).

A diagram showing the stages used in a traditional development should ideally have been included.

RAD

RAD emerged following the development of evolutionary systems and the arrival in the late eighties of software tools and high-performance computing capacity. These facilitated the prototyping, program code generation and reiterative processes required by RAD.

Prototyping overcomes many of the problems associated with systems development, where users may experience difficulties in understanding hypothetical situations and where systems designers could easily fail to communicate their proposed solutions.

Prior to RAD, prototyping of systems was possible only at the expense of the wasted time and effort necessary to design and mimic screen layouts and reports. Changing the prototype was difficult and, when the design was agreed, the prototype had to be thrown away and the operational system developed.

The introduction of graphical user interfaces (GUI) simplified the process of prototyping and RAD software tools enabled the completed prototype to form the basis of the system. For the first time, every percentage of effort resulted in the same percentage of the completed system.

Current RAD methods and tools enable all stages of systems development to occur more or less in parallel. By prototyping a series of incremental system improvements, over a period of time each can evolve into a completed system.

The provision of CASE tools also facilitated RAD developments.

A suitable diagram showing the stages used in a RAD development could have been included.

Evaluation of traditional versus RAD

The following points should be used in the evaluation:

Traditional	RAD
Can use lower grade staff/known by many	Needs specialist skills
Sequential approach limits progress	Parallel approach speeds development
Each stage generates user documentation	Less formal user documentation
Suitable for precise user requirements	Suitable for imprecise user requirements
Ideal for large corporate projects	More suited to small developments
System abstract until completion	Early visibility (prototypes)
Suitable for outsourcing	Not really suitable for contracted work

b) Recommended approaches:

There was no set answer to this part of the question. The candidate's understanding of the issues and applicability of appropriate methodologies to given situations was important and marks were awarded accordingly.

Insurance company:

- This suggested a traditional method - the requirements are unlikely to change (insurance is a contract).
- Payment and accounting systems suggested that a long term, precise approach is called for, with documentation and formal structured agreements.
- It would be a business critical system and so prototyping does not seem relevant.
- Because of all of the above, insurance company IT staff are likely to have traditional skills.

Supermarket

- Suggests RAD as the requirement is transient and non-specific
- Not business critical
- Does not store or generate standing data
- Application may evolve, so RAD suitable

Examiners' comments:

A popular question which was attempted by practically all candidates and there were some excellent answers. In Part a) many candidates adequately described the two methodologies, but failed to provide an evaluation (note the question asked for a "critical evaluation"). Although most candidates provided reasoned answers for Part b), a number gave short answers and provided no explanation as to why a particular methodology was being recommended. As mentioned in the general comments, an hour is available for each question and several pages of reasoned argument or explanation is expected for each question. Candidates should not be afraid of stating what might appear to be obvious, as otherwise marks may not be gained.

Question 5

For each of the following software systems, describe their principal features and explain clearly how they can be used in the provision of a company's MIS capability.

- a) Enterprise Resource Planning (ERP) software. **(9 marks)**
- b) Content Management System. **(8 marks)**
- c) Business Intelligence (BI) tool. **(8 marks)**

Answer Pointers

This is a standard type of question on this paper, where candidates were required to demonstrate their awareness of the features of some systems/technologies and how these apply to MIS. Possible answers pointers for each part of this question are detailed below in turn.

- (a) Enterprise Resource Planning (ERP) software.

ERP software is really an integrated suite of software modules which is developed to support the whole range of company functions (e.g., human resources, production, marketing & sales). It helps a manufacturer (typically) or other business manage the important parts of its supply chain, including product planning, parts purchasing, maintaining inventories, interacting with suppliers, providing customer service and tracking orders, and also includes application modules for the supportive aspects of the business such as finance and human resources. ERP modules can be used alone or in combination. An ERP system typically uses a relational database system as its data store and integrating mechanism. Deploying a comprehensive ERP system involves considerable business process analysis, and possibly substantial changes in employee work practices and associated training. Leading ERP products are provided by companies such as SAP.

Benefits:

- The integration of ERP data enables external MIS applications to draw off a consistent and integrated pool of data rather than data “silos”. (You could say that the ERP database is essentially acting as an “operational-level data warehouse” although a data warehouse would need its own data store due to the different emphases between that and the ERP database – management support vs. operational efficiency). Examples of MRS reporting and DSS drawing upon ERP data stores, etc., could be provided to support the above narrative.
- There are also some management functions available from within ERP software modules to “pick up and use”, such as that found with functionally-oriented modules such those supporting marketing and sales activities, and also in dedicated management modules such as a Data Warehousing ERP Module. These can directly benefit, with or without tailoring, management activities within a business.

(Marks: up to 5 marks for an overview of ERP and up to 5 marks for benefits of ERP, to a total maximum of 9 marks)

(b) Content Management System (CMS)

As its name implies, a Content Management System (CMS) is a software system for the management of content. They can be used across several contributors, each of which provides content. The content managed includes computer files, image media, audio files, electronic documents and web content. Nowadays, the CMS term is frequently used to refer to system that aids the development of web-based systems, by enabling the web page content to be created and updated (and employing versioning to manage such updates) more easily than without such a facility.

A CMS may include support for the following features:

- Importing and creating of documents and multimedia material
- Identifying the key users and their roles with regard to content management
- The capability to allocate roles and responsibilities to different content types.
- The capability to track and manage several versions of a single content aspect.
- The ability to copy the content to a repository which enables effective access to that content. Increasingly, the provision of a central repository is becoming an inherent part of a CMS.
- Some CMS allow the textual aspect of content to be somewhat independent of its formatting.

Benefits:

- Much easier management of the information within a web-based application system. Having the information, of many different forms, integrated within a central repository and the easier access to that information as a consequence, facilitates management decision making.
- The typical result of employing the CMS is that a company has a web-based system that enables effective management support of content - candidates may expand on what they means here, such as more effective management of data currency, data access, etc.,

(Marks: up to 6 marks for an overview of CMS and up to 6 marks for benefits of CMS, to a maximum total of 8 marks)

(c) Business Intelligence (BI) tool.

A Business Intelligence (BI) tool is an “umbrella” term for all software systems that facilitate decision making via enabling data analysis. BI tools typically run on top of a data warehouse (consolidated and consistent pool of management-oriented data drawn from several data sources within a business). Each BI tool may take its own copy of the DW data it needs and in the format it requires for it to function effectively (i.e., it possesses its own Data Mart). BI tools include OLAP tools, DSS, tools for Data Mining, and even EIS.

Benefits:

- BI tools enable the exploration, either driven by user or by tool, of the data for any patterns or trends that could have implications for the company.
- BI tools enable companies to find out aspects about the company and its environment so that it can take actions to strengthen the company's position in the marketplace.
- Human data exploration tasks that used to take days can now be a matter of seconds/minutes. BI tools can make tedious tasks less tedious and/or impossible data exploration tasks possible (there must be a suitable data repository base, though, for maximum effectiveness).

(Marks: 4 marks for overview of BI tool features + 4 marks for benefits = total 8 marks)

Examiners' comments

This was the least popular question on the examination paper, with 28% of students attempting it. Again, it was clear when a candidate knew about each software system; his/her answer was specific (rather than full of vague statements) and accurate to the system being described. Several candidates knew only about 2 of the 3 systems, but were still able to gain good marks on the strength of the two very good descriptions (i.e., 15 or 16 marks out of 25). With respect to Part (a), some candidates thought that ERP was planning software (similar to project management software), which it is not.

Part (b) was particularly poorly answered, where many did not attempt it or thought that it was another name for a Customer Relationships Management (CRM) system, which it is not.

With respect to Part (c), several candidates thought that BI meant the same as AI or that a BI tool is another name for an expert system, neither of which are correct.

Some candidates, whilst being able to describe a software system, were not able to explain the benefits of that system to an organisation's MIS capability, beyond "it helps decision making". At professional graduate diploma level more specific and focused answer are required to gain maximum marks.