

# THE BRITISH COMPUTER SOCIETY

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

### SYSTEMS DESIGN METHODS

28<sup>th</sup> April 2008, 10.00 a.m.-1.00 p.m.

Answer THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

Calculators are <b>NOT</b> allowed in this examination.
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**Questions 1,2,3,4 and 5 refer to a case study method briefly described in the Appendix at the end of this paper.**

1.

- a) Explain with the aid of diagrams the differences between the waterfall and incremental approaches to systems development.

Which approach to systems development would you suggest for the projects characterized by:

- i) precise requirements which can not be clearly prioritised,
- ii) precise requirements which can be easily divided into different priority categories?

**(10 marks)**

- b) Consider the following life cycle models: waterfall, evolutionary prototyping, throw away prototyping, incremental and spiral. How would you classify the *Rapid* method process? (See **Appendix** at end of paper). Justify your answer.

**(6 marks)**

- c) Explain the difference between validation and verification (V&V) in software projects.

The *Rapid* method process (see **Appendix**) includes five phases: Feasibility Study, Business Analysis, Build usability and functional prototype, Refine prototype and Deliver prototype. Suggest various V&V activities/techniques suitable for different stages of *Rapid* method. Your answer should include a brief justification of your 'allocation' of V&V activities/techniques to the *Rapid* stages.

**(9 marks)**

**Turn over]**

2.

- a) Geographic information systems are a relatively new type of information system that allow map based data to be input, stored, manipulated and queried. Such systems can contain a variety of table based data that is geo-coded (each item of data is associated with a given geographic location). Such systems can be queried to allow for example: identification of the number of houses within a given distance from a certain point, or a certain feature such as a river; or identification of all areas at a given height above sea level, or areas with a population density in a certain range.

Outline which systems design techniques you feel would be suitable for designing geographic information systems, justifying your answer.

**(15 marks)**

- b) The *Rapid* method (see **Appendix**) specifies the development process, but it does not force a method 'user' (i.e. developer) to use a prescribed set of systems modeling techniques. Assuming that you are required to use the *Rapid* method process in your project decide which the Unified Modeling Language (UML) techniques you would use in different stages of the process. Briefly justify your decisions.

**(10 marks)**

3.

- a) Many organizations do not follow a complete systems design method but instead use just some of the techniques from a systems design method or a collection of techniques from different systems design methods.

Explain why this happens.

**(15 marks)**

- b) The *Rapid* method (see **Appendix**) is suitable for projects and applications/systems which have certain characteristics related to users, functional and non-functional requirements, complexity and time constraints.

Suggest five or more such characteristics and justify your suggestions.

**(10 marks)**

4.

a) You are an IT manager in a UK university computing department. You have recently recruited four computing graduates to work in the computing department and are considering their training needs in systems design methods. Your training budget is limited, but the graduates should be fully trained in systems design methods as soon as possible. The options you have identified for training the graduates include:

- Attendance on an external professional short course.
- Undertaking a year long module in systems design methods at the university.
- Undertaking a continuing professional development course at the university in the evenings over a twelve week period.
- Self study using text books.
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Any courses run by the university will be free for university staff.

Discuss how you would choose to train the graduates in systems design methods.

**(12 marks)**

b) Every organization that wants to introduce a RAD/Agile method has an existing culture and accepted working practices. Therefore the introduction of the new method (e.g. *Rapid* method – see **Appendix**) must be carefully planned and managed to achieve a successful outcome.

Suggest a plan of action for introducing *Rapid method*. Your plan should include at least 6 'actions'.

**(13 marks)**

5.

- a) Give two (or more) reasons for comparing and evaluating systems design methods.

**(4 marks)**

- b) NIMSAD (Normative Information Model-based Systems Analysis and Design) is a well known framework for comparing and evaluating systems design methods. NIMSAD suggests that evaluation of a method involves evaluation of the Method Context (the problem situation), the Method User (the intended problem solver) and the Method itself (the problem solving process). Why is the evaluation of all three aspects necessary? Give three criteria that may be used to evaluate the Method Context and three to evaluate the Method User.

**(9 marks)**

- c) Avison and Fitzgerald provide a number of 'ideal-type' criteria that might be considered in assessing systems design methods. Some of these criteria are: relevance of application, life cycle coverage, effective communication, separation of analysis and design, visibility of product, designing for change. Use these criteria to assess/evaluate *Rapid* method (see **Appendix**).

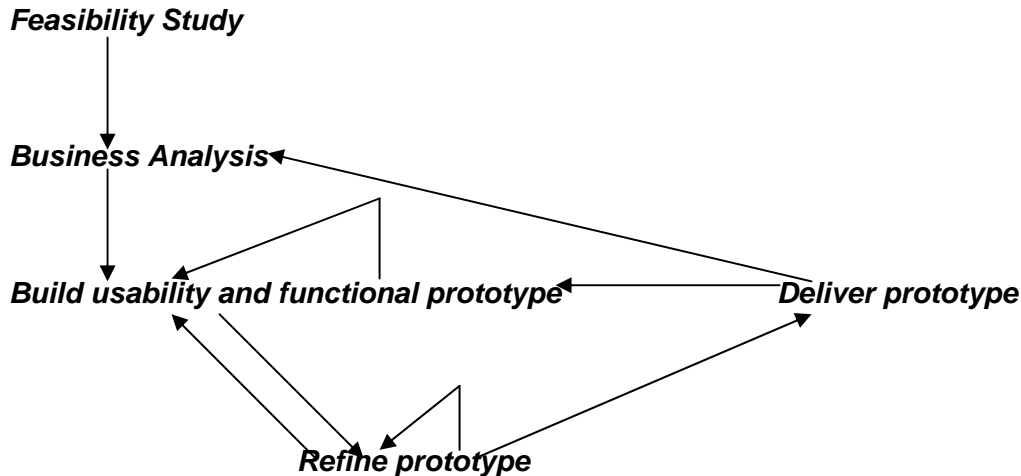
**(12 marks)**

## APPENDIX (for use in Questions 1b, 1c, 2b, 3b, 4b, 5c)

*Rapid* is a RAD/Agile method.

The method includes the following stages: Feasibility study, Business analysis, Build usability and functional prototype, Refine prototype, Deliver prototype.

The development process is as follows (see Figure below).



The stages are briefly described below.

**Feasibility Study.** Scope the development in terms of proposed solutions and produce both a business case and first-cut project plan. Find out who/what the system will interact with. Examine the suitability of the method for your project.

**Business Analysis.** Examine the business processes to be automated, their information needs, the user groups involved and their respective needs and wishes. Prioritize requirements and plan prototypes to deliver.

**Build usability and functional prototype.** Develop the usability and functional prototypes as well as system models. The developed prototypes are reviewed by different user groups.

**Refine prototype.** Engineer the prototype to a sufficiently high standard. The prototype should meet various non-functional requirements (e.g. efficiency, maintainability, etc).

**Deliver prototype.** The prototype is installed in the live environment and (if applicable) integrated with previously developed prototypes. If the system is not completed then go back to Build usability and functional prototype (or in some situations to Business Analysis).

**\*\* END OF PAPER \*\***