FACTFILE:
GCE DIGITAL TECHNOLOGY

AS1: APPROACHES TO SYSTEM DEVELOPMENT 2

Rewarding Learning

Design development testing

Learning Outcomes

Students should be able to:

- Describe the purpose of system design, development and testing
- Describe the use of storyboarding in developing the user interface
- Describe the use of prototyping in the design of the user interface and the data model
- Understand the importance of testing throughout the development of a system in ensuring system quality
- Distinguish between different types of testing: system, acceptance, alpha and beta
- Understand the purpose of a test plan
- Describe the main components of a test plan
- Distinguish between different types of test data

Content in Data Representation Fact file

- ✔ Purpose of Design, Development and Testing
- ✔ Use of storyboarding in developing the user interface
- ✔ Prototyping
- ✔ Types of Testing
- ✔ Test Plan and Test Data

Design, Development and Testing

Design

The purpose of the design stage is to design/ implement a Systems Specification. This document will include detail on a number of design components including:

- ✔ Data capture methods and forms for the system
- ✔ Data inputs and outputs for the system including screen designs, report specifications, query designs, storyboards, macros
- ✔ Data processing within the system
- ✔ Data structures such as : Database structure, Data Models, DFDs, normalisation.
- ✔ The user interface i.e. screen layouts, buttons, error messages
- ✔ The hardware to be used to run the new system
- ✔ Detailed design of user interface, switchboard, menus
- ✔ Test Plan
- ✔ Program Code listings
- ✔ Hardware and software configuration

Development

The purpose is to develop the software package

required for the information system. In order to do this appropriate programming code needs to be produced or the features of the software package need to be developed. Aspects such as data structures, data checking procedures and the user interface also need to be developed. As part of the development stage there also needs to be evidence of effective use of the hardware specification

Testing
The purpose of testing is to ensure that the system works as described in the system specification. Testing should be able to demonstrate that all parts or functions of the solution work as expected, irrespective of what data input is and at the same time ensure all functions agreed upon with the user are included and work correctly. As part of the testing stage, errors and limitations maybe identified and corrected. To ensure testing is structured a test plan is devised including a range of test data.

Use of storyboarding in developing the user interface
A Storyboard is a diagram that shows the planned sequence of screen displays in a user interface. Unlike the storyboard of a movie (which is linear) the storyboard may be a "branching" diagram showing the different paths available to the user.

Prototyping
This involves building a working model (also known as a "first cut") of a new system. The aim is to give the user a "look and feel" experience. The role of the user will be to evaluate the prototype and provide feedback to the systems analyst. Based on the feedback the analyst will make changes to the prototype, give it back to the user who will then evaluate the changes. This process will continue as refinements are made to the prototype. The result of these refinements may result into a fully working system which is known as Evolutionary Prototyping or produce a set of user requirement which is known as Throw-away prototyping. This system is then fully developed using an alternative approach such as Waterfall method. A prototype which is usually a practical implementation of the system is produced to help discover requirements

Testing
Testing is an important part of systems development. This is to ensure the system is of a high quality. Quality indicators are used during the testing stage, including:

Quality Indicator	Typical questions that are used to measure the system quality
Suitability	Does the system meet all its objectives? Is it 'fit for purpose'? Does the system provide the required functionality? Is it compatible with existing technology/hardware/software/ data? Is it robust/free of errors?
Usability	How fast can a user learn to use the user interface? Is the interface intuitive? Does the interface match the user's level of ICT competence? How well can a user transfer previous skills? What training may be required?
Effectiveness	Does the system perform its tasks efficiently? Has it been designed to facilitate maintenance?

System Testing
This is making sure the system works as described in the specification. This is done by following a test plan to test each individual system function. It will also test that each individual function works with extreme or invalid data. System testing will also ensure that the system produces the correct results for the data input.

Alpha Testing
This is also referred to as application testing and is carried out in-house by members of the ICT development team such as programmers. This type of testing Includes module, integration and system testing whereby the software is tested against the module and system specifications.

Beta Testing
This form of testing takes place after alpha testing. The Software is given to a number of potential users in the form of a pre-release version. These users agree to test the system in a realistic environment and provide feedback to the developer(s).

Acceptance Testing
This involves testing the software by the end user in the "live" environment with real volumes of data. The end user is testing the system to ensure it meets their user requirements. The end users will feedback to the developer any issues arising. The aim is to get agreement between the developer and the end user.

Test Plan
The test plan is normally produced at the design stage. It takes the form of a detailed document which will be used by a group of testers. The documentation will include a reference to the part of the system to be tested, test data to be entered and result expected from the test. The people testing the system will also record whether the test has been successful. A test plan may take the form of the table below

Test Number	Test Reference	Actual Test	Test Data	Expected Result	Actual Result
1	Member Form	Postcode – to check that letters cannot be entered where numbers should be	BT6A 7PF	Postcode Invaild	
2	Member Form	Age – to check that the member is over 18 on Jan 01	DOB<01/01/1996	Age is valid	

It would be important for the testing teams to follow the test plan and accurately record their outcomes. When the actual result is not as expected then the developing team can modify the system and further testing can take place. It should be also noted that testing every part of a system in detail is not possible and errors maybe discovered at a later stage such as maintenance.

Test Data
When selecting test data for a test plan, data that checks validation rules should be included. Test data can be categorised into one of three categories:
1. Normal Data – This included data that the program will accept.
2. Extreme Data – This includes data that is on the limits of acceptability.
3. Exceptional Data – This is data that when entered should be invalid and not accepted.

Test Number	Test Reference	Actual Test	Test Data	Expected Result	Actual Result
1	Exam Score	Enter an exam score within the range	70	Valid	
2	Exam Score	Enter an exam score at the lower boundary	0	Valid	
3	Exam Score	Enter an exam score at the higher boundary	100	Valid	
4	Exam Score	Enter an exam score outside the range	105	Invalid	

Questions

1 Identify four contents of a typical system specification

2 Describe the main features of prototyping

3 Distinguish between alpha and beta testing

4 Identify the main contents of a test plan

5 Compare the use of normal and extreme data in a test plan

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Bibliography

BCS Academy Glossary Working Party, 2013, *BCS Glossary of Computing and ICT*, 13th Edition, Swindon, BCS Learning and Development Ltd