BTech 450A Project Report : Online Survey Management System

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Abstract

The purpose of this project is to develop a Survey System for the University of Auckland that would let staff, departments and students create, manage and publish surveys online. This project will be developed by Aqxi Software in conjunction with students from the University of Auckland doing an internship in this company.

In the long term this project aims to be used widely throughout the University and possibly market research organizations to obtain online survey based data and be able to analyze them. The system will therefore be developed so that it provides a flexible architecture that would be easily integrated with existing packages. The system will also provide extensible statistics and report functionalities on the responses gathered with different surveys.

The system that I present in this document therefore aims to easily design and publish surveys in order to collect large and accurate data from the different respondents. By providing a flexible variety of types as well as template libraries for the different components of a survey, this system could therefore be used for marketing research methodologies.

This document describes the functional and non-functional requirements for such a survey system, The research supporting the decisions and analysis done for specifying the system functionality. I will describe the interaction between the roles of users of the system and the policies which govern the process of survey creation, survey moderation, survey response and extraction of relevant data.

1. Introduction

1.1. The Company:

Aqxi Creative Software was founded in 2004 with a vision to successfully invent and apply technology to support businesses with a thirst to not just succeed, but excel at what they do. [2].

1.2. Industry Links:

Confirming the viability of Aqxi's direction and vision, Aqxi has been accepted into the Icehouse, the leading NZ business incubator and key supporter of Spark, the University of Auckland Entrepreneurship Challenge. The Icehouse was developed by The University of Auckland Business School with its partners Bank of New Zealand, Telecom, The Boston Consulting Group, Chapman Tripp, HP, Deloitte and Microsoft.

1.3. The Project Team:

The team at Aqxi specializes in software requirement analysis, design, development and project management. They are also experts in creative graphics design, system architecture and networking. The Company currently supports five interns on the Survey System project [2] including a sub team from the Bachelor of Technology Project, and a sub team of Information System undergraduates. These include Mr. Nischint Java (BTech - UOA), Mr. Hitesh Patel (BTech - UOA), Mr. Phil Hu (IS - UOA), Ms. Michelle Wu (IS - UOA) and Mr. Sam Johnson (IS - UOA). This team is supported by project manager Mr. Sébastien Louis and Company Director Mr. Alex Dunayev.

1.4. The Project:

The purpose of this project is to design and develop additional modules for the online Survey Management System, currently in phase two of its project plan. The vision for the system demands an online, modular, world-class survey system for accurate, timely and simple collection of data from a large number of respondents.

The Survey Management System is expected to be commercialized and developed and supported during and after the completion of this project. At this time the academic and market research markets are targeted, although the flexible design of the system should allow it to be adopted across a wide range of industries.

A detailed design concept has been commissioned and created by a team of final year students as part of a special research project at the University over the summer

semester 2006. A prototype system allowing basic creation, management and publication of surveys, polls and questionnaires online has also been partially implemented to prove the viability of the software concept and develop experience in leading joint research projects together with the University. Through this prototype they are now able to share what went right and what didn't in the project so far and gain experience in the area of both the concept and the technology.

2. Project Outline

The section will give an idea of how projects are developed and structured at Aqxi, the motivation behind this project and how this project will solve these issues.

2.1. Background Information

The Survey System project is an experiment in software product development undertaken by Aqxi Limited. The company aims to use several best practices in engineering, development and project management to test the potential of development of a modular, multi layer system that can potentially compete with similar available systems.

The technology chosen for this project is an open-source Web Application Framework built on a Microsoft ASP.NET (VB.NET) platform. The framework is called DotNetNuke (DNN) [3] and is based on Microsoft Corporation's IBuySpy Portal Solution Kit (IBS), and is distributed as open-source software, licensed under a BSD agreement. In general, this license grants the general public permission to obtain the software free-of-charge. It also allows individuals to do whatever they wish with the application framework, both commercially and non-commercially, with the simple requirement of giving credit back to the DotNetNuke project community. The most recently released versions are 3.2 and 4.0.

Version 3.2 of DNN runs on ASP.NET 1.1 with SQL Server 2000. This version, although less current, is selected for extension to develop the online Survey Management System, due to availability of hosting solutions and support for ASP.NET 1.1 and a preference for SQL Server 2000 over SQL Server 2005 which is bundled with ASP.NET 2.0 and used for DNN version 4.0.

2.2. Motivation

This project offers opportunities for the company on several aspects. As a growing entrepreneurial company, it allows experimentation with project management techniques and best practices with relatively low risk, while creating Intellectual Property resources that can potentially be commercialized. The development of the online Survey system also allows the company an opportunity to capture new markets and extend into partnerships with Universities where internship programs can benefit both organizations.

The intern teams stand to benefit from the companies expertise in development of software, and learn the process of taking an idea from concept to commercialization.

2.3. Project Goals

The goal of this project is to develop a system that allows the users to conduct online surveys for accurate, timely and simple collection of data from a large number of respondents.

In order to develop the system, a series of sub goals need to be achieved. These are:

- Understanding the technology and its capabilities.
- Understanding Survey Systems and the process of surveying in general.
- Understanding the end user and their requirements.
- Analyzing what current systems are available, and what they offer.
- Creating a vision for the system and specifying what features are essential to build a good survey system.
- Detailing the features and scoping the requirements.
- Designing the system to accomplish the features.
- Implementing the system to accomplish a first release.
- Testing and evaluating the system with end user feedback.
- Adding features and fine tuning requirements.
- Reiterating design through testing to accomplish a better system.

2.4. Learning Opportunities

This project offers me the opportunity to gain experience in technology development in a commercial environment. Also it allows for exploring new techniques and apply software engineering skills and use technology standards and best practices, to create a product that is marketable as well as flexible so that it may be further developed.

3. Project Requirements

3.1. Research

The first goal to developing a survey system, after understanding the technology capabilities, was to collect information and establish an understanding of what a survey is, how it is used, by whom it is used, what it is composed of, and what sort of a workflow support was needed for.

3.2. Methodology

To facilitate research on surveys, firstly an analysis of available systems was done. Feature sets available in various systems were studied, and discussions on these features were held internal to the BTech Team. Possible approaches, solutions, data structures and system complexities were discussed, although not in depth. The cross tabulated results of 5 most feature rich systems is included in Appendix 1.

To extend understanding and deepen feature granularity of the system, Interviews were conducted with several organizations and expert users. These included people from the Department of Statistics, Science and Information Systems at the University of Auckland, as well as people involved in various aspects of surveying and survey conducting in over 40 different market research organizations. These interviews were conducted over the telephone, as well as in person. The feedback and requirements were documented for Aqxi Limited. A list of all possible features were compiled and graded in terms of priority, for a distribution between 4 iterations. This is compiled in summary in Appendix 2. The requirements and specifications for the system are based on these interviews, as well as the research and interviews collated in the previous iteration.

3.3. Analysis

Based on the research, the survey was identified as the central object that followed a specific workflow (Fig 1). The survey is created by the survey creator. When dealing with online surveys, this survey may be in various formats, and may even be un-digitized. After creation the survey questionnaire, the survey creator may be required to take approval from someone who acts as a moderator to ensure the survey is of sufficient quality, and is statistically valid.

This moderator may be a single person, or a group of people, or may even be the survey creator himself in cases where the survey creator believes he has sufficient knowledge to be sure that the survey produces statistically meaningful results.

The survey is sent to the moderator for approval, and the moderator may approve it, or provide feedback to the creator. This process may iterate several times, and in some organizations has specified formats and procedures.

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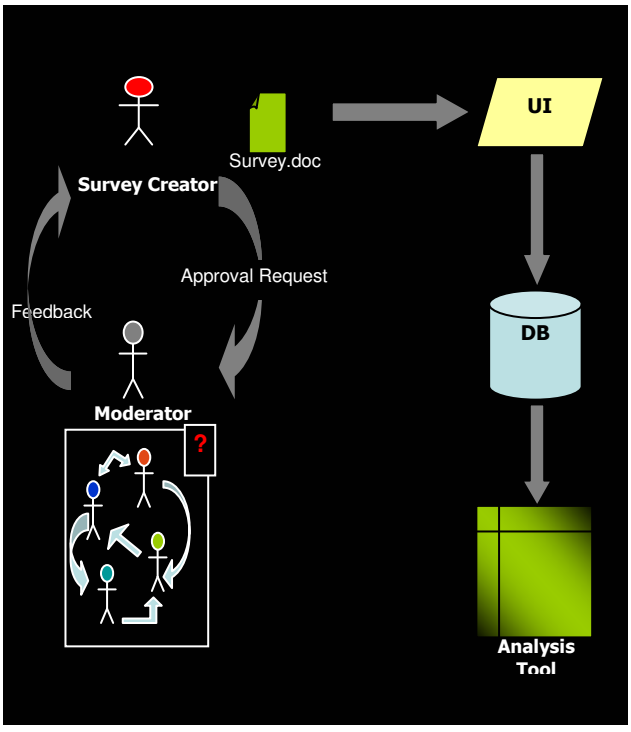

Fig 1. The Online Survey Process

If the moderator is more than one person, i.e. a committee of people, this group may have its own internal workflow. This internal process would vary from organization to organization and supporting the moderators' internal process is outside the scope of the system.

Once the survey is approved, the creator may either, both create and publish an online version of, the survey may have to be digitized programmatically by one or more employees of the organization, or in some cases the original survey may be a directly publishable digital format.

The User Interface (UI) is typically a web page accessible through a browser. Respondents are informed by any traditional means, of its existence and access URI. Respondents presumably access the website and log their responses, which are recorded into a database (DB). After sufficient responses are collected, the survey analyst (often the survey creator) accesses this raw data. This data is subject to analysis in a variety of ways, most often in statistical analysis and presentation packages like SPSS, SAS and MS Excel. Actual statistical analysis is beyond the scope of the system.

3.4. System Specification

3.4.1. Problems

Problems identified from the current systems, over various organizations are:

- The Survey Creator may make a statistically irrelevant or ethically unsound survey or part thereof.
- The Survey Creator - Moderator communication is slow and may involve multiple formats and transitions.
- The Moderation Process is slow.
- Survey Moderators may "change their mind" or may be uncertain about decisions made by other Moderators, or even decisions made previously by them.
- The Survey Creator may have to edit the survey often.
- The Survey Creator may have to change the format of the survey in order to publish it.
- The Survey Creator may need to edit the survey once it is published.
- The Survey Respondents demand ease of use in order to respond to surveys.
- The collected data must be available in a suitable format for analysis; otherwise the analysis process involves re-entering data into an analysis tool.
- Basic statistics on surveys are required to monitor status.

Based on our understanding of the research material, the basic terminology was defined as follows:

3.4.2. Definitions

- **Survey**: A collection of questions and answers for a particular subject.
- **Answer**: An answer consists of answer text and is associated to a question.
- **Question**: A question consists of question text, and is associated to a set of answers.
- **Section**: A section consists of one or many questions and their associated answer sets.

The research material and competitive evaluation of various systems showed the need to ensure that the system provides a quality process-centric online survey management system which facilitates the development of creating, editing and publishing surveys. It needs to provide basic moderation capabilities for surveys created in the survey system. The system should also enable the survey administrators to manage the process of producing surveys as well as basic response analysis and extraction of data based on the results of surveys. Distribution of Surveys to respondents is also a valid issue. Thus the scope of the system was defined as:

3.4.3. System Scope

The system should:

- Present the ability to manage access controls for users of the system and basic administration of the survey management system.
- Present the ability to create and edit surveys and survey questions (including selection of types of questions and the viewing and editing of survey and question properties).
- Present basic survey moderation capabilities for surveys created in the survey system.
- Present basic survey respondent management capabilities to manage respondents of surveys published by the system (including invitations and additions to system).
- Present the ability to analyze responses of surveys in basic views, including tables and charts.
- Present basic survey data extraction capabilities in raw data formats for download.
- Present basic survey response capabilities to allow response to surveys.

3.4.4. Assumptions

This scope is subject certain limits and assumptions including:

- Only online surveys are considered in this system.
- Respondents only answer online.
- Unauthenticated users have access only to public surveys.
- Authenticated users have access to public and private surveys.
- Authenticated users are responsible for keeping their personal details up to date.
- The Survey Administrator is responsible for keeping the details of Respondents up to date.
- Respondents have the required skill to attempt surveys.
- The Survey Administrator will provide and manage the respondents suitable to a survey.
- The survey response data is independent of system data.
- The roles of Survey Administrators, Editors, Analysts, Moderators, and Respondents are assigned by the Survey Administrator, to users associated to his survey system.

Several Roles are also considered in the system. The basic scheme is to separate out users from roles, and have a user role management system for assigning various roles to a user. The roles considered in the system are detailed below.

3.4.5. System Roles

System Administrators:
This group of people will have access to every module in the system. They are also responsible for maintaining the survey system. This group of people will be able to assign survey administrators of the system.

Survey Administrators:
This group of users will have increased authority in the system with regards to managing and maintaining surveys. They can assign roles to Editors, Moderators, Analysts and Respondents. The Survey Administrator will have rights to add, invite, remove and remind respondent in the system. They are able to invite anonymous respondent and publish anonymous link as well. The Survey Administrator has the rights of Editors, Moderators, Analysts and Respondents.

Importing and exporting of user lists will be available in a CSV-based format. A sample of which is specified in Table 1.

```
FirstName,LastName,EmailAddress,AddressLine1,Ad
dressLine2,City,State,Zip,Country
Joe,Smith,js@test.com,1 Test
St,Testville,Auckland,AKL,1200,New Zealand
```

Table 1: Sample CSV Format for User List
*Subject to change during design phase.

First row of a CSV file contains describing headers. Each consecutive row will contain the values for the headers. The headers may be (Example):

- FirstName
- LastName
- EmailAddress
- AddressLine1
- AddressLine2
- City
- State
- Zip
- Country

The subject headers at this point are subject to changes or additions.

Editors:
This group of users will have access to create, edit, delete and publish surveys.

Moderators:
This group of users will be assigned by survey administrators; they have access to review surveys. Survey moderators also have authorities to write, edit and delete comments on surveys which they have been reviewed, as well as assign comment to surveys and questions.

Analysts:
This group of users will have permissions to generate reports, such as survey statistics and online analysis. The report is based on completed surveys. This group of users will also have access to extract raw data containing responses for each question for each respondent in CSV format (Table 2). An example of such a format is discussed below.

First row of a CSV file contains describing headers. Each consecutive row will contain the values for the headers. The headers may be (Example):

- Email (of respondent)
- DateOfSurvey (taken by respondent)
- SurveyID

- SurveyName (describing the survey)
- SurveyQuestionx (where x is greater than one and an integer)
- SurveyAnswery (where y is greater than one and an integer)

The subject headers at this point are subject to changes or additions.

```
Email,DateOfSurvey,SurveyID,SurveyName,Surv
eyQuestion1,SurveyAnswer1,SurveyQuestion2,Su
rveyAnswer2
nischint@aqxi.com,23/05/2006 18:02,1,Curry,Do
you like curry?,TRUE,Is curry cool?,TRUE
bob@aqxi.com,23/05/2006 18:02,1,Curry,Do you
like curry?,FALSE,Is curry cool?,TRUE
sam@aqxi.com,23/05/2006 18:02,2,Peaches,Have
you tried peaches?,FALSE,How many peaches do
you eat?,4
```

Table 2: Sample CSV Format for Data
*Subject to change during design phase.

Respondents:
This group of users will be people who have been invited into the system to complete surveys.

The system features were compiled using evaluated software as benchmarks to define common functionality, as well as user interviews to prioritize and fine tune feature considerations. Features considered for this iteration of the Survey System are summarized in Appendix 3 and discussed below.

3.4.6. System Features

A generic survey system catering to roles discussed previously should include:

Authentication System:

Purpose of Feature:
The purpose of this feature is to provide authentication to track users interacting with the survey system.

Stimulus/Response Sequence:
User arrives using a URL entered to the web browser or by clicking on an encoded link. A username and password combination is supplied by the user from the login page. The system will verify the credentials supplied to authenticate a user.

Description
Process username and password of users.
Login option through encoded URI.
Public access available for respondents.
Password reminder to be sent via email.

Table 3: Associated Functional Requirements

Description
Public access is tracked via a cookie.
Username and password can be parsed from encoded URI.

Table 4: Associated Non-Functional Requirements

Personalized Profile Management

Purpose of Feature:
The User Profile Management allows an authenticated user to maintain their personal details.

Stimulus/Response Sequence:
After logging in, the user chooses a User Profile Management option to view or modify existing details.

Description
Shows current user personal details
Edit current user personal details like First Name, Last name, Contact details, etc..
Reset forgotten password by sending email notification.
Authenticated users cannot change other users' personal details
Survey respondents cannot modify their own profile.

Table 5: Associated Functional Requirements

User Management

Purpose of Feature:
This feature allows administrators and owners to create, delete and manage users in the system.

Stimulus/Response Sequence:
After logging in, the user selects the User and Role Management control which will provide an option to add a user, add a respondent to a survey, modify a user, delete a user, import a user, export a user, reset a user password or send an email to a user.

Description
Add a new user into the system by inputting new user details.
Add a respondent into the system by inputting new respondent details..
Modify a user's or respondent's details by selecting a user or respondent to edit.
Delete a user by selecting the user or respondent to delete.
Import users by uploading a CSV file as defined in table 1.
Export users by uploading a CSV file as defined in table 1.
Reset or modify user password by selecting a user with which to do so.
Send email to user via a hyperlink.
Create encoded automatic login URI to allow logins without keystrokes.

Table 6: Associated Functional Requirements

Description
A user name must be unique when the user selects a user name for their account.
E-mail address is compulsory.
A unique user name and password may be generated for a respondent.
A public user account will exist which shall be used by multiple anonymous users.
Import format will be a CSV file. Headers are subject to change.
Export format will be a CSV file. Headers are subject to change.
Only respondents can be imported and exported.

Table 7: Associated Non-Functional Requirements

Role Management

Purpose of Feature:
This feature allows Survey Administrators to add modify and delete users from roles in the system.

The following roles can be assigned by the Survey Administrator:
Moderator, Editor, Response Analyst, Reporting Analyst and Respondent.
Stimulus/Response Sequence:
After logging in, the user selects the Role Management control which will provide an option to assign a user to a role or un-assign them from a role.

Roles can then be assigned to users. Each of the roles has associated options; for example, an Editor role can be associated with specific surveys.

Description
Add users to a role by selecting the user to add and a role.
Modify the user assignment to a role by selecting a user.
Remove a user from a role by selecting a user.

Table 8: Associated Functional Requirements

Description
The number of users assigned to a role is unlimited.
The number of roles to which a user can be assigned is limited to the number of roles that exist within the system.
Role management is performed by Survey Administrators.

Table 9: Associated Non-Functional Requirements

Publish Survey

Purpose of Feature:
Allows publication of the survey for distribution to respondents.

Stimulus/Response Sequence:
As an authenticated Survey Editor, the user selects the surveys to publish and selects the publish survey option. A survey publishing page is then displayed.

Description
Generate URI's for public surveys by selecting the appropriate command.
Generate URI's for private surveys by by selecting the appropriate command.
Survey Editors and Survey Administrators can publish surveys by choosing to publish a public or private survey.
Option for survey preview provided after confirmation of publication method.
Publish Survey by clicking on the publish survey button.
Publishing is contingent upon a positive response from the survey moderator.
Public surveys are visible to all.
Private surveys are tracked using the identified user profile.
When publishing a survey a new page is created with the survey formatted in preview mode. All respondents have view permission for the page. No user has edit permissions on this page.

Table 10: Associated Functional Requirements

Survey Creation & Editing

Purpose of Feature:
Each Survey Editor is able to create and edit surveys using this module. The user with a Survey Editor Role is able to create a blank survey ready for addition of questions. The user is able to add questions and answers of different types. The Survey Editor can also change the name, expiry date and descriptions associated with each survey. These properties may be changed or added to in the design phase.

Stimulus/Response Sequence:
Each Survey Editor creates a blank survey or selects a previous survey for editing. The Editor can then change the basic properties outlined above and proceed to add questions and answers to the survey.

Description
Edit survey name by editing the survey properties.
Edit expiry date by editing the survey properties.
Edit survey description (single field) by editing the survey properties.
Delete survey, including questions and collected data. A warning and confirmation is required to complete this action.
Preview survey by selecting an option on the page. The preview button toggles visibility of editing functionality on or off.
Edit maximum number of questions per page by editing the survey properties.
Terms and conditions can be recorded in the survey properties, should one be needed. The respondent will see a page with the terms and conditions upon following a link after entering the survey system to respond.

Table 11:Associated Functional Requirements

Question Management

Purpose of Feature:
Manages the questions and associated answers of a selected survey.

Stimulus/Response Sequence:
After selecting a survey the Survey Editor is then taken to the Question Management module. A toolbox of question types is displayed as well as a list of questions already added to the survey. The user can then click a question type and set associated properties to be added to the survey. Questions can be reordered after creation.

Description
A selection panel for question type selection will be displayed.
A display panel will be displayed to show a representation of questions and answers added to a survey.
A Properties panel is displayed on question creation. This region will display the properties of the question selected.
Add single selection question type from question selection panel.
Add multiple selection question type from question selection panel.
Add free-text input question type from question selection panel.
Add Likert question type from question selection panel.
Add Likert matrix question type from question selection panel.
Add answer to question from question selection panel.
Delete an answer from a question. An answer is deleted from within the properties panel.
Edit the text of the answer. The text of an answer is edited within the properties panel.
Edit the properties of a question. The properties of a question are edited within the properties panel.

Delete question (and any associated answers) by selecting the appropriate question from the display panel.
A question can be moved in the upward and downward direction (restricted within a section should a question be contained within one).
A background save and resume capability is implemented. Each time a change is made to the survey, a post-back will be sent to the database to save the current survey in case of unexpected browser errors.
When the properties of a question or an answer are edited within the properties the change is reflected within the display panel.
When a question type is selected from the selection panel its default properties are set and the result is displayed in the display panel. The question is then selected for editing within the properties panel.
Add terms and conditions to the survey by selecting the terms and conditions option from the selection panel.
Question number as displayed is generated based upon the display position of the question.

Table 12:Associated Functional Requirements

Description
A Likert matrix consists of a group of Likert questions.
Each question is associated with one or more answers. Each answer is associated with only one question.
Properties of the questions depend on the question type.

Table 13:Associated Non-Functional Requirements

Section Management

Purpose of Feature:
Manages the sections of questions and their associated answers contained within a survey.

Stimulus/Response Sequence:
In the toolbox of question types whilst managing questions a section control is available for addition to the survey. After clicking this, section properties can be set and the section is added to the survey.

Description
Add Section (name, display title, existence transparent to Respondent and range of questions spanned) from the selection panel.
Edit Section properties (name, display title, existence transparent to Respondent and range of questions spanned) from the properties panel.
Delete Section. When a section is deleted, an option is given to the user, whether or not to delete all Questions within the section from the properties panel.
A Section can demarcate a group of questions.
A Section can be moved in an upward direction, downward direction, top or bottom of a survey.
A question can be added to a section only if it is adjacent to the section.
A background save and resume capability is implemented. Each time a change is made to the survey, a post-back will be sent to the database to save the current survey in case of unexpected browser errors.

Table 14:Associated Functional Requirements

Description
Questions are associated with one section. Each section can be associated with more than one question.

Table 15:Associated Non-Functional Requirements

Template Management

Purpose of Feature:
Manages the addition and usage of templates for surveys.

Stimulus/Response Sequence:
A user can either opt to convert an existing question to a template or survey to a template when viewing the appropriate entity.

Description
Support for templates is designed in the database during this iteration of the system.
Save survey as template.
Load survey template; appends the loaded template to the current survey. Only templates of surveys can be appended.
Delete template from system.
Only Survey Editors can delete templates from the system.

Table 16:Associated Functional Requirements

Skin Management

Purpose of Feature:
Manages the look and feel of a survey.

Stimulus/Response Sequence:
As an authenticated survey administrator one can click on the Skin Management module and set the appropriate properties.

Description
A CSS file can be specified and used for skinning in DotNetNuke.

Table 17:Associated Functional Requirements

Description
All user interface elements follow a consistent CSS design.

Table 18:Associated Non-Functional Requirements

Commenting

Purpose of Feature:
Surveys need to be reviewed when surveys have been created by survey Editors. Comments on surveys allow moderators to write comments on each survey. This feature enables survey Editors to receive feedback from Moderators and to refine surveys accordingly.

Stimulus/Response Sequence:
Each moderator will be assigned by Survey Administrators to a particular survey. After logging into the system, Moderators choose the part they are required to moderate and write comments for it, in a survey that they select.

Description
Add a comment to a survey in a comment box displayed on the survey page.
View survey comments, displayed on the survey page.
Survey Moderators only have preview access to surveys.
A history of comments will be displayed and can be sorted by date or author on the survey page.
Comments may be added up to the point of the survey being published.
Multiple comments may be added to the survey.
Comments will be displayed on the same page as the currently previewed survey. Comments will be displayed on all pages of the survey.

Table 19:Associated Functional Requirements

Response Collection

Purpose of Feature:
This feature allows the system to collect survey responses so that analysis can be performed.

Stimulus/Response Sequence:
The respondent reaches the survey by a URI. All questions are displayed and the respondent will choose their responses. The respondent continues until all sections are complete. The survey is then submitted and will be shown a thank you notification. The respondent may also save the survey to return to continue later.

Description
Retrieve and display surveys by selecting the survey.
Retrieve and display questions in a section.
Validation of user response after form input.
Record Responses after user input.
User redirection (thank you page specified by the creator) after survey completion.
After authentication the user is directed to the survey as specified by the URI.
A progress indicator may be displayed whilst response collection takes place.
Terms and Conditions can be displayed on request via a link at the beginning of the survey should the Survey Editor opt to include it when setting the survey properties.

Table 20:Associated Functional Requirements

Description
The user interface will be designed with usability principles in mind. We will use the Microsoft User Interface Design Guidelines.
Three respondents can respond to the survey simultaneously.

Table 21:Associated Non-Functional Requirements

Basic Analysis

Purpose of Feature:
The Survey Editor is able to view basic statistics gleaned from the Survey Results.

Stimulus/Response Sequence:
The user is given a choice of available Questions from a Survey to choose from. The user then chooses from a selection of charts.

Description
Online viewing of charts within a web browser.
A range of graph types is to be provided using a charting component.
Result tables to be displayed for questions.
Result tables to consist of basic statistics including an average and total.
Data may be exported in CSV format: specified in Table 2.
Reports are to be generated dynamically upon request.

Table 22:Associated Functional Requirements

Description
Result tables will be displayed using HTML tables within the web browser.

Table 23:Associated Non-Functional Requirements

User Interfaces
The User Interface should be based on the standards and guidelines for web-based applications that would be intuitive for users familiar with the web. The user interface will make it easy for users to interact with the system.

Software Interfaces
The Survey System should be designed to run on a Windows-based operating system running Microsoft SQL Server 2000, Internet Information Services 5.0 or above, ASP.NET and DotNetNuke. The supported clients browsers will be Internet Explorer 5 and Mozilla Firefox 1.x compliant and above.

Communication Interfaces
No communication interface would be presented by the system but it would be designed so that interacting can be done for Data Extraction using a CSV file, which can be opened in Microsoft Excel and other tools with generic CSV importing facilities. The CSV will be in a format suitable for importing into the SPSS analysis package.

Performance Requirements:

Constraints
The system should use DotNetNuke. The system should be using a minimum resolution of 1024x768, to ensure that what users create, is seen in the preview or by respondent to be the same. To avoid potential conflicts with data, each customer would have a separate DotNetNuke installation. At least ten simultaneous users can access the system at any one time.

Other Requirements
The system should present different options to the user depending on the level of access the particular user has.

4. Design Decisions

4.1. Technology

As discussed previously, the technology selected is an ASP.NET 1.1 based Framework called DotNetNuke. This is a 4-tiered architecture consisting of a User Interface, Business Logic Layer (BLL), Data Access Layer (DLL) and Database (DB). A schema of this architecture is shown in Fig 2.

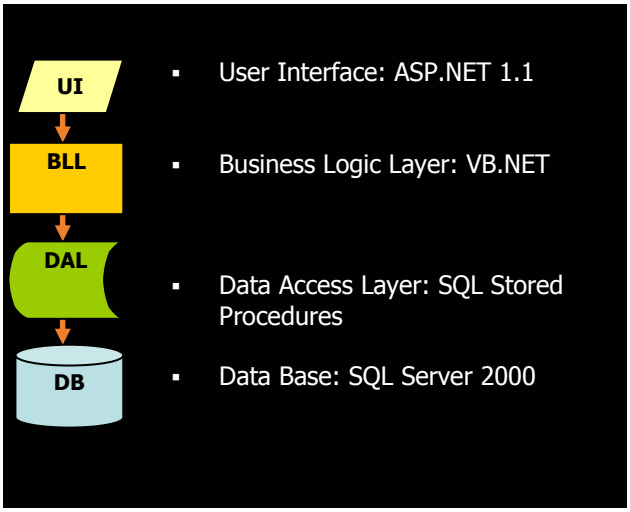

Fig 2. The DNN Framework

For DNN 3.2.2 The UI is designed using ASP.NET 1.1 ascx controls linked to code-behind files. The codes behind files, as well as the BLL are implemented in VB.NET. The Data Access Layer is implemented using SQL Stored Procedures. The Database is implemented in SQL Server 2000. A detailed ERD for this version is available at website reference [4]. A description of the DAL is provided in website reference [5].

Modularity of components and multi tier architecture allows for extensibility and modification of the system. One future consideration is to extend the Business Logic of the system and expose its functionality through Web Services. The survey object could then potentially be injected into a website with content through a client side frame, or AJAX control, and respondents could be targeted based on content, interests, external system profiles, or system information external to the survey management system itself. This could potentially target larger, more specific audiences and increase rates of response, or sample representation, although there is currently no research available to suggest or discredit this approach.

To implement the current specified system, this framework will be extended on each level to implement functionality. Each module will be associated with its own set of User Control, Code Behind File, Data Reader, Stored Procedures and Database Tables.

5. The Next Step

The next steps in the project involve designing User interface, Data Schemas and Object Dependencies. Implementing system components, Prototyping it feature by feature and testing the system for release at the end of the year.

Currently an understanding of what is involved has been established, and some design decisions and assumptions have been discussed. Completing the design involves documenting these decisions and assumptions using industry standards.

6. Conclusion

In conclusion, the project so far has evaluated and determined the scope and requirements of the system and technology. I have familiarized myself with the technology and the various aspects involved in its implementation. Sample implementation of small modules was undertaken in order to learn the necessary skills and techniques.

The project has remained largely on schedule with deliverables met in required time, and minor fluctuations have not seriously affected the progress of the project.

The design and implementation of the project is expected to be completed by early October. The system scope and requirements may be varied or adjusted slightly to accommodate user requirements or implementation capabilities.

7. References

[1] IEEE Standard 830-1993: Software Requirements Specification Standard.
[2] Website: http://studwww.cs.auckland.ac.nz/~njav001/btech450/index.html

[3] Website: http://dotnetnuke.com/

[4] Website:
http://dotnetnuke.com/Portals/25/Documents/DNN_ERD_3.2.2.pdf
{S. Willhite, http://dotnetnuke.com/, DNN 3.2.2 ERD, 3/6/2006}

[5] Website:
http://dotnetnuke.com/Portals/25/DotNetNuke%20Data%20Access.doc {S. Walker, http://dotnetnuke.com/, DotNetNuke Data Access Whitepaper, 06/02/2006}

8. Confidentiality Statement

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Appendix 1: Comparison of Available Online Survey Management Systems.

	Prezza Technologies (http://www.prezzatech.com)	**Qualitric Labs** (http://www.qualtrics.com/)	**Web Surveyor** (http://www.websurveyor.com)	**Perseus SurveySolutions** (http://www.perseus.com)	**Net Reflector** (http://www.instantsurvey.com)
Dynamic branching	☑	☑	☑	☑	☑
Survey completion reward schemes.	☒	☒	☒	☒	☒
Validations	?	?	☑	☑	?
Access control for respondents (Embedded Identifier link)	☑	☑	☑	☑	?
Single survey response per user.	☑	☑	☑	☑	☑
Survey Preview	☑	☑	☑	☑	?
Survey statistics page	☑	☑	☑	☑	?
Question limits (sample limiting)	☑	☑	☑	☒	☒
Quota reached messages	☒	☑	☑	☒	☒
Email Invitations	☑	☑	☑	☑	☑
Survey Response URL	☑	☑	☑	☒	☑
question type	☑	☑	☑	☑	☑
Number of questions per page.	☑	☑ Limited	☑	☑	☑
Branched / Skip	☑	☑	☑	☑	☑

patterns for questions.					
Directional flow control	☑	☑	☒	☒	?
Email reminders	☑	☑	☑	☑	☒
Email Survey?	☑	☒	☒	☒	☑ Limited
Question and Answer Randomization	☑	☑	☒	☑	☑
Weighted responses	☒	☑	☒	☒	?
Weighted respondents	☒	☒	☒	☒	?
Media (Audio/Video) based questions	☒	☑	☒ ?	☑	☑
Streamline load speed.	?	?	?	?	?
Editable live surveys	☒	☑ Limited	☑	☒	☒
Trigger notification for particulars surveys. (early warning system)	☒	☑	☒	☒	☒
Printable surveys	☒	☒	☒	☑	☒
Manual management of email reminders	☑	☑	☑	☑	☑

and messages.					
Virtual Address for survey responses.	☑	☒	☑	☒	?
Respondent qualifying.	☒	☑	☒	☑	☒
How-to section	☑	☑	☒	☒	☑
Best practice documents	☒	☒	☒	☒	?
Survey templates	☑	☑	☑	☑	☑
Sample questions; question library	☑	☑	☑	☑	?
Progress Bar	☑	☒	☒	☒	☒
Save and Continue	☑	☑	☑	☑	☒
Wizard based survey creation	?	☑	☑	☑	☒
View and click through tracking.	?	☒	☑	☒	☒
Tracking save and continue.	☒	☒	☑	☒	☒
Personalized costing	☒	☑	☒	☒	☒
Personalized reporting	☑	☑	☑	☑	☑
Authentication	☑	☑	☑	☑	☑
Password protected survey, for respondents.	☑	☑	☑	☑	?
HTTPS	☑	☑	☑	☑	☒

Appendix 2: Identified functionality for Survey System (Long Term).

Process	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Access Control	• Authentication • HTTPS		• Virtual Addresses for Survey Responses • Email Invites	• Question Limits • Personalized costing • Reward Schemes

Survey Creation / Editing/ deleting	• Ease of Use (UI)
	• Progress Indicator
	• Defining no of Questions per page
	• Dynamic Branching Foundation
	• Foundation for Live Editable surveys
	• Foundation for Survey Templates
	• Survey Preview
	• Simple Question Types
	  ○ Check Box
	  ○ Radio Button
	  ○ Combo Select
	  ○ Text Area
	• Complex Question Type
	  ○ Likert
	  ○ Matrix
		• Directional Flow control
		• Company Customizable look and feel.
			• Survey Templates
			• Wizard Based Survey Creation
			• Dynamic Branching
			• Dynamic Branch / Skip Declaration (UI)
				• Sample questions(Question Library)
				• Editable Live Surveys
				•

Moderation		○ Comments on Surveys	○ Survey Approval ○ Survey Disapproval	
Respondent Management	• Survey Response URL • Password protected Surveys • Access Control for respondents		• Manual management of reminders and messages • Email reminders • Respondent Qualifying	• Weighted respondants • OCR • Printable Surveys • Streamlined load speed • Media based questions (Audio / Video)
Response Collection	• Quota Reached Messages • Single Survey response per user	• Save and Continue	• Question Randomization • Answer randomization	• Email Survey? • Weighted Responses
Response Analysis	• Survey statistics	• Online Analysis	• Personalized Reporting	• Tracking Save and Continue • Trigger Notification for particular surveys • View and click through tracking
Data Extraction	• CSV	• SPSS	• Excel	• SAS • Data Transformation • Recoding Ability.

Appendix 3: Identified Features And Roles Required For The Current Iteration Of The Survey System.

Page:	Roles Affected:	Features of Role:
Access Control Page.	• Survey Owner. • Survey Admin.	• Survey Admin: o Assign Survey Creators. o Assign Survey Moderators. o Assign Survey Respondent Managers. o Assign Survey Response Analysts. o Assign Survey Reporting Analysts. o Assign Survey Respondents. o "Unassign" all of the above. • Survey Owner: o Assign Survey Admins. o Assign Survey Creators. o Assign Survey Moderators. o Assign Survey Respondent Managers. o Assign Survey Response Analysts. o Assign Survey Reporting Analysts. o Assign Survey Respondents. o "Unassign" all of the above.
Survey Creation/ Editing.	• Survey Editor.	• Survey Creator: o Create Category. o Create Survey. o Create Question ▪ Choose question type. ▪ Choose answer type (related to question type). o Edit Survey. o Delete Survey.
Survey Moderation.	• Survey Moderator.	• Survey Moderator: o Create Comment. o Edit Comment. o Delete Comment. o Assign comment to Survey. o Assign comment to Question.
Respondent Management.	• Survey Admin.	• Respondent Manager: o Add Respondent (new). o Invite Respondent (existing). o Remove Respondent. o Remind Respondent. o Invite Anonymous Respondent. o Publish Anonymous Link.

		• Respondent Types:
		  ○ In-System:
		  ▪ Known (has Uname and Upassword, and we can say who filled out what)
		  ▪ Anonymous (has Uname and Upassword, but cannot track who filled what)
		  ○ Out-System:
		  ▪ Known (Like from a mailing list.)
		  ▪ Anonymous (All the rest of Respondents from the net.)

Response Analysis	• Survey Admin.	• Response Analyst
		  ○ View basic tables.
		  ○ View basic graphs:
		  ▪ Bar (useful for Volume)
		  ▪ Pie (useful for proportions)
		  ▪ Line (useful for trends)
		  ○ All of the above Views are formulated on a per question basis.

Extraction	• Survey Admin.	• Reporting Analyst
		  ○ Extract raw data in formats:
		  ▪ C.S.V.
		  ▪ Microsoft Excel
		  ○ Assumes end user has access to Office applications.

Response	• Survey Respondent	• Survey respondent: • Answer (View access) Surveys. • Save and Continue (if applicable). • Log In/Out of Survey. • Reset Password to access Survey.