

# STG Customer Satisfaction Survey – Azure Cloud

## Questionnaire Sub-System with Azure Cloud Deployment

### Feasibility Study

I was tasked by Colin Law to create a prototype web-site using the latest C# dotnet Core language running on the Azure cloud platform. This prototype web-site to contain a 'Customer Satisfaction Survey' / 'Sales Lead Generator' sub-system; complete with a Questionnaire builder, a Metrics overview and details downloader. This is to help prepare the company to convert their numerous web-sites for hosting on the Azure Cloud app-services. The questionnaire builder is to have multiple uses for various parts of the business, so was to be made flexible enough in this respect.

The CSS-SLG to be delivered in two stages, a Proof-of-Concept presentation with a part-working first-stage web-site; followed by an un-styled fully working Prototype second-stage web-site, with supporting documentation. Allowing for co-operation and feedback from stakeholders during the development.

### Initial Proof of Concept Web-Site

The initial Proof of Concept web-site is implemented using C# ASP.net Core 3.0, MVC and Razor-Pages; with Azure DevOps and Portal. Azure DevOps is used as the Source-Code repository, based on Team-Server and Git. Azure Portal is used to create and control the Web-Site using App-Service. After management consultation, continued by adding EF Core 3.0 and the OAuth User Identity sub-system, using the Azure-SQL as the database. This was then presented to the stakeholders who agreed with the proposal and subsequent development.

### Prototype Proof of Concept Web-Site

The fully working Prototype Proof of Concept web-site builds upon the initial web-site, with full Administrator control of Users and Roles, as well as using Azure DevOps for the CI/CD processes. The questionnaire builder is to be modified to be more user friendly and automated. All styling is to be performed by the in-house specialists, to ensure the finished sub-system matches current web-site design rules.

The delivered prototype web-site and supporting documentation will allow the company's software-engineering department to appraise moving to the cloud and initiate the transition to Azure Cloud services. The prototype web-site can be accessed using the URL '[kbd2.azurewebsites.net](http://kbd2.azurewebsites.net)' no log-in required to take the survey; log-in as 'guest@guest.com' with password 'Guest99Guest', to view both the Customer Satisfaction Survey logs attempts and the Questionnaire Builder web-pages (limited functionality).

### Moving Considerations

The move from local servers to the cloud is ideal for customer facing web-sites, but it may not be the best solution for sensitive or company confidential uses. The Azure cloud is fundamentally secure but is open to foreign government rules and regulations, concerning the disclosure of data contained on the cloud-servers resident within their borders. As the performance of our web-sites does not require the fastest of servers, a lower performing tier can be used to save on running costs; both for web-sites and databases.

For York Place and the Property Search business, the use of the cloud is beneficial. Especially as the need for the out-workers to access their web-site is usually by hand-held devices, at odd hours of the day. Using the cloud helps to guarantee the availability and reduces the likelihood of malign influences whilst using public facilities and unprotected wi-fi connections as the Searchers do their work.

The use of Azure DevOps to automate CI linked to the code repository with manual CD when required, is a good paradigm to use and works well with current practice. The scope for differential deployment regarding the proposed API for smart-phone apps is a good fit for these future requirements.

## Modus Operandi Recommendations

### Main Path Development

For the vast majority of development work carried out at SDG, including minor changes and bug-fixes, the main-path repository can be utilised, combined with automatic CI and manual CD.

### Branch Path Development

For some development tasks, it may necessitate the use of a Branch-Test-Merge paradigm with the repository, combined with manual CI and local-only deployment for testing and Quality Control.

### Unit testing

The use of extensive unit testing to provide code quality control is to be used, but not as TDD as this tends to be counter-productive in a small team like SDG. User-Acceptance tests (**UAT**) are to be run once prior to deployment, and signifies the hand-over of the code to production. Regression unit tests (**RT**) are required to be run before every deployment to ensure that nothing has been broken due to code modifications. Data-Access-Layer regression tests (**DAL-RT**) or Behavioural Driven Design testing (**BDD**) are to be carried out after database changes or major code changes, prior to deployment.

### Azure DevOps

**Repository:** this is mainly for the source-code but can also be used for supporting documentation. This is based on the Team-Server and Git applications, and supports multi-path development with full review and quality control processes.

**Continuous Integration (CI):** run-compile on repository main-path push has been set-up. For branch-path repositories, compile on demand should be used, to prevent bogus compile errors during development.

**Continuous Deployment (CD):** has been set-up to be run manually, including run-once UAT and run-always Regression Tests; DAL regression tests will need to be applied when relevant, as will BDD testing.

### Database Changes

These are to be done on a local machine designated for this purpose, using Visual-Studio data migration tools from the 'Package Management' console (add-migration and update-database). It is possible to use the database comparison tools included in MSVS instead, but this requires the purchase of the full enterprise system, which is not cheap. Prior to deployment on the live system, from the local machine, point to the live database, check the connection and then run 'update-database' via the 'Package Management' console. Then run pre and post deployment unit tests for the DAL and BDD to ensure all is working as expected.

The OAuth User Identity sub-system installed in the database combined with the corresponding assemblies, covers most of the requirements for the EU GDPR rules.

## Design Considerations

### Inter-Page Data Retention

As we are using normal HTTP browser-based presentation, we need to retain some inter-page data. This ranges from user credentials and Survey Attempt identifiers to more mundane data such as sub-page markers. This is to use a combination of page header data, page hidden fields, URI routes, page query-strings, user cookies and session variables. These can be consolidated at a later date after due consideration, the session data is held 'in-memory' as the need for server-farms is not envisioned. The User-Identifier (UID) is pulled as and when required from the Identity sub-system.

### User Role Types

- |    |               |       |   |
|----|---------------|-------|---|
| 1. | Anonymous     | anon  | Uses 'null' UID, casual user.   |
| 2. | Guest         | guest | Uses singular UID (common and backup), casual user.   |
| 3. | Test          | test  | Uses own UID (cut-down Client), used for unit testing.  |
| 4. | Normal        | norm  | Uses own UID, logged-in user.   |
| 5. | [Customer     | norm  | Uses own UID. A customer is owned by a Client, via User-Claims 'Client-UID' and 'Client-Identifier'.] |
| 6. | [Client       | norm  | Uses own UID. Has client details via User-Claims.]  |
| 7. | Administrator | norm  | Uses own UID.   |

Both the Anonymous and Guest user types are considered as casual visitors to the web-site; whereas the Normal, logged-in visitor, is deemed to be from a more serious professional user. The Customer and Client user types are for future uses. The Test user type is for both Unit-Testing purposes and also prospective Clients to try-out the full but limited Questionnaire system. The guest user has very limited access to the Questionnaire and Management systems, for example use only.

### Home / Index Page – Customer Satisfaction Survey

#### First Entry (no state cookie)

If 'test' or 'norm', check for existing survey.

If Exists, select Start-New or Continue-Existing via JS-Confirm (continue) pop-up.

Else, Start-New.

Else, Start-New.

Show either 'Start-New' sub-page or 'Continue-Existing' sub-page.

#### Re-Entry (state cookie = 'Started')

Show 'Continue-Existing' sub-page.

#### Re-Entry (state cookie = 'Finished')

Show 'Start-New' sub-page.

### Sub-Pages

The layout of these sub-pages comprises 3 divisions. The first is for contact details, the second is for any comments, whilst the third contains the action buttons.

The first division is only visible for the user types 'anon' / 'guest'. This division is to allow these users to enter their contact details, should they so wish. For the 'start' sub-page these are editable, whereas for the 'continue' sub-page they are display only.

The second division is to allow all user types to enter any comments they may wish; this is editable for both 'start' and 'continue' sub-pages.

The third division is to house the user 'action' buttons. For the 'start' sub-page this is a single button titled 'Start New Survey', whereas for the 'continue sub-page this comprises two buttons; the first titled 'Continue Survey' and the second titles 'Finish Survey'.

## Operation of Survey Pages

First entry to the web-site index page, will normally show the start-new version of the page, the user enters any data requested and then clicks on the 'Start Survey' button. This will take them to the first section of the survey, with the constituent questions displayed. The user is able to page back and forth through the survey, with their responses saved to interim records in the database as they do so. When they are satisfied with their responses, they can return 'back' to the index page to modify their comments. They then click on the 'Finished' button, which copies their saved responses to a log file, ready for company inspection.


The user is able to pause their survey entry, and continue it later. For casual users 'anon' and 'guest', this must be in the same web-site session; but for 'test' and 'norm' users, this can be at a later date. Entering the web-site home page will pick-up this state and offer the user to continue the started survey or start a new one, or even just finish the existing survey. For casual users, any outstanding surveys will be auto-finished after 24 hours, otherwise they will be auto-finished after 4 weeks. All responses will be deleted after 12 months, except for those downloaded for company action where existing GDPR rules will apply.

## Other Questionnaires

These use the common Questionnaire Responses page as used by the Customer Satisfaction Survey, but with the constrains as defined by the Client, via the Questionnaire builder. As these questionnaires are not for casual users the landing page is simpler with just a comment box and action buttons. The ability to re-enter a specific questionnaire may be limited by the Client.

## Screen-Shots

### Home Page



The screenshot shows a web page for a Customer Satisfaction Survey. At the top left, there is a navigation menu with 'KBD2', 'Home', and 'About'. At the top right, there are links for 'Register' and 'Login'. The main heading is 'Welcome', followed by a sub-heading 'Visit main SDG web-site 'www.StanleyDavis.co.uk''. Below this is the title 'Customer Satisfaction Survey' and a section titled 'Contact Details'. There is a dropdown menu for 'e-Mail' with the value 'fred@derf.com' selected. Below that is a 'Comment' section with a text input field containing 'Casual User home page'. At the bottom left, there is a blue button labeled 'Start new Survey'.

Casual user view

## Survey Pages

### 2: Second Section

QS2

---

1      QS2 First question jimmy       No    Yes    No Understand

2      QS2 second question willy       Yes    No    Maybe

Dual column 50:50, single line radio-buttons

### 3: The last Section

QS3

---

1      Hello Boys

I'm back  
 Where am I  
 Who am I?  
 Other

Dual column 75:25 multi-line radio + 'other' text.

### 4: Special Test

QS4

---

	Select your satisfaction	Good	-	OK	-	Bad	n/a
1	My first Sats	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	Second Spats test	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3	Third Special Test	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

7 column special layout radio buttons

### 5: Checkboxes

QS5

---

1      Single Column Test    Yes    No    Maybe

2      Dual Line  
          Yes    No    No Understand

Single column, check-boxes both single and dual line layouts

## 6: Data Entry

1 Enter single line text

Text in here, fred

2 Enter multi-line text

Multi-line text,  
second line.

<<

<

Back

Save

>

>>

50:50 dual column data-entry boxes, both single-line and multi-line types.

## Survey / Questionnaire Builder

The questionnaires are based on a model approach with all the details held in the database questionnaire tables, and a set of simple display code-functoids to assemble the required questionnaire. See below for the data-diagram.

The questionnaire sections can use sequential navigation, bi-directional navigation, full page display or be inhibited; for the Customer Satisfaction Survey it is bi-directional, but other questionnaires can be set by the 'Quiz-Mode' field, as required. The sections can be laid out as a single column or dual column with varying ratios, to allow for varying styles linked to section purpose. The questionnaire item types can require different types of response; radio or check buttons, with or without extra text input, or direct textual input.

### Quiz Modes

	Quiz-mode
• Sequential section navigation.	1
• Bidirectional section navigation.	2
• All sections on a single page, no section navigation.	0
• Inhibited, to allow for temporary removal from user view.	-1

**Quiz Details Page:** this has a link to run the quiz directly.

### Section Modes

In dual column modes, the item question texts are in the first column with the user responses in the second column.

	Section-Mode
• Single column.	0
• Dual column 25:75.	1
• Dual column 50:50.	2
• Dual column 75:25.	3
• 7 columns 'satisfied' special, comprising 50% item text followed by 'Good/ish/OK/ish/Bad/ignore' 8% each. Item number zero contains column titles in six options, to override defaults.	7

**Section Details Page:** shows a part functional WYSIWYG section display, with all the items and options.

### Item Modes

On the editing sub-page this mode is set using two drop-down controls, one for the control type (radio, check, data or special) and the other for the display layout (single, dual, multiple and with data) style.

#### Exhaustive list of combinations

	control type	display lines	Item-Mode
Radio buttons, single line.	1	1	5
Radio buttons, dual line.	1	2	6
Radio buttons, multiple lines.	1	3	7
Radio buttons, multiple lines, with 'other' text-box entry.	1	0	4
Check boxes, single line.	2	1	9
Check boxes, dual line.	2	2	10
Check boxes, multiple lines.	2	3	11
Check boxes, multiple lines, with 'extra' text-box entry.	2	0	8
Data entry only, dual line (text).	3	0	12
Data entry only, dual line (number only).	3	1	13
Data entry only, dual line (date only).	3	2	14
Data entry only, multi-line entry (text).	3	3	15
Special Radio buttons (7 column)	0	1/2/3	1/2/3
initial mode when created, same as radio-buttons, single line	0	0	0

Item Mode field value = 'control-type' x 4 + 'display-lines'.

## Section / Item / Option Numbering

**Inhibit:** negative numbered entries are not displayed nor renumbered; good for temporary changes.

**Auto-number:** on create; renumbered and then use  $[n + 1]$ .

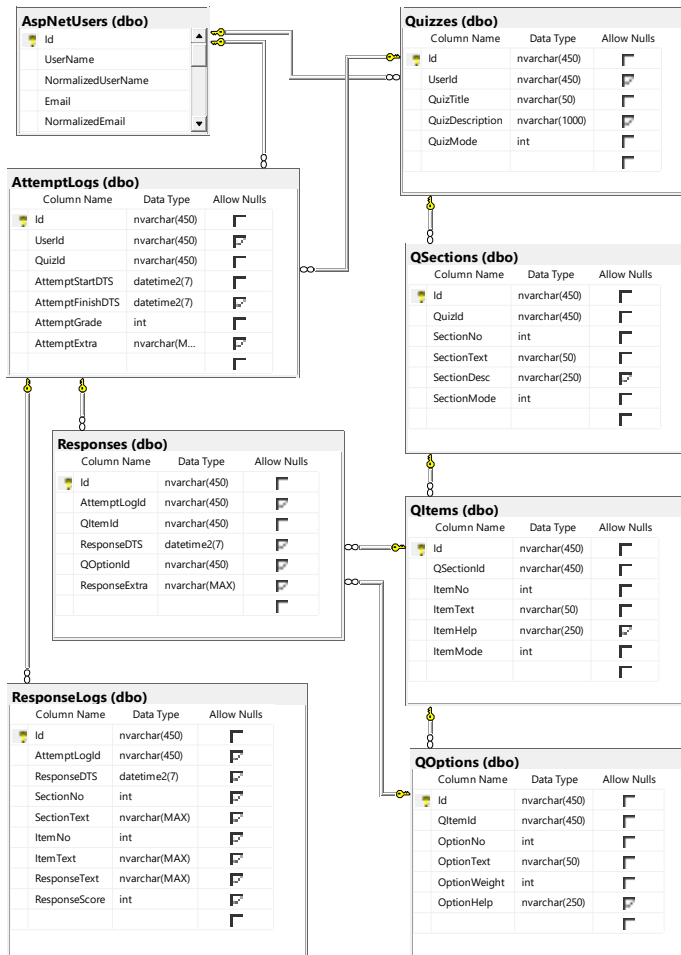
**Swap buttons:** move entry up or down in display order, by swapping adjacent entries.

**Re-number:** from 1 to  $n$ ; for items ignore item 0, as used by 'specials'.

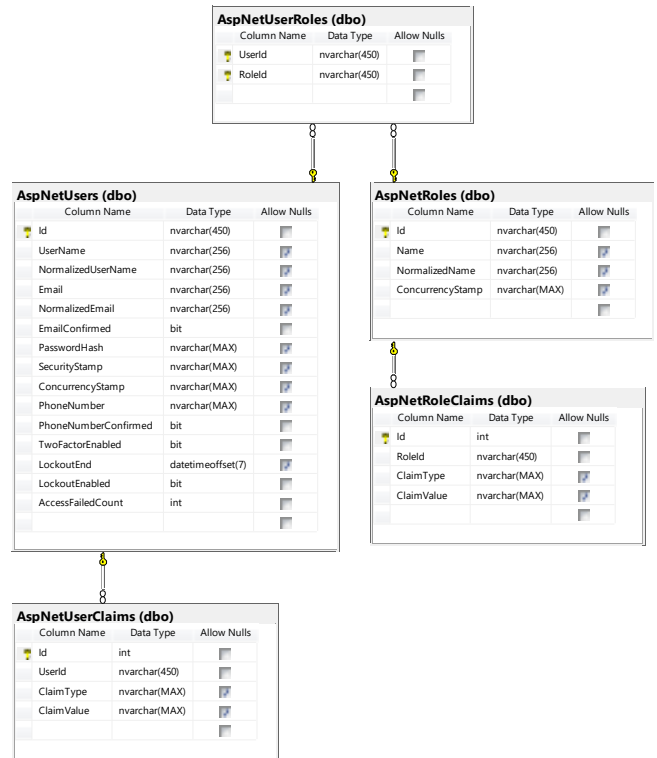
**Move:** edit number to 0 or 99 and re-number, to move to top or bottom respectively.

## Database Diagrams

### Questionnaire Tables



### User Tables



## New Table – Enum-Look-Up

Name = 'EnumLookUp'

Col	Name	Type	Key	Description
1	ELU_Name	a80	primary	(combined primary key)
2	ELU_Field	a32	primary	if not used leave blank or null
3	ELU_Text	a32	primary	Enum text
4	ELU_Value	n4		Enum value
5	ELU_Order	n4		Display order





## Questionnaire Builder Screen-Shots

### Quiz

Quiz Owner	Questionnaire Title	Questionnaire Description	Sections			
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	Customer Satisfaction Survey test	6	Edit	Details	Delete
ken.birch@kenbirchdesign.com	Forth Title	This my 4th one	1	Edit	Details	Delete
ken.birch@kenbirchdesign.com	Second Try	This is my second try	0	Edit	Details	Delete
ken.birch@kenbirchdesign.com	Third Try Updated	This is my 3rd try	3	Edit	Details	Delete
ken-birch@blueyonder.co.uk	First Try dash	My first try with a dash	0	Edit	Details	Delete

'Quiz-Owner' only shown for 'Administrator' user.

For 'Guest' user, dedicated example questionnaire is used, 'Create New' and 'Delete' are not shown.

### Section

Section No	Section Text	Section Description	SectionMode	Items			
1	First Section	QS1	1	2	Edit	Details	Delete
2	Second Section	QS2	2	2	Edit	Details	Delete
3	The last Section	QS3	3	1	Edit	Details	Delete
4	Special Test	QS4	7	4	Edit	Details	Delete
5	Checkboxes	QS5	0	2	Edit	Details	Delete
6	Data Entry		2	2	Edit	Details	Delete

'Quiz-Owner-Name' only shown for Administrator user. 'Create New' and 'Delete' not shown for 'Guest' user.

## Quiz Section Details

**Quiz**

**Questionnaire Title** First Try dash  
**Questionnaire Description** My first try with a dash

### Q-Section

---

**Section No** 1  
**Section Text** Non-Admin test  
**Section Description** Non-Administrator Section test entry  
**SectionMode** 1  
**Items** 3

List Edit Delete

### Section WYSIWYG

1	Test Item	<input checked="" type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Maybe
2	Test Item 2	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Weekend <input type="checkbox"/> .extra
3	Starting month	<input style="width: 100%;" type="text" value="Text data entry, single line."/>

Section Details page, showing WYSIWYG of section items with 25:75 dual columns.

Item

KBD2 Home | Edit Quizzes Attempt Log | Users Roles User-Roles Hello ken.birch@kenbirchdesign.com! Logout

## Q-Item Index

Create New Parent Details Parent List

**Questionnaire Title** Customer Satisfaction Survey  
**Section No** 4  
**Section Text** Special Test  
**Section Description** QS4  
**SectionMode** 7

ItemNo	ItemText	ItemHelp	ItemMode	Options
0	Select your satisfaction		1	<span style="background-color: #007bff; color: white; padding: 2px 5px; border-radius: 3px;">6</span> <span style="background-color: #ffc107; padding: 2px 5px; border-radius: 3px;">Edit</span> <span style="background-color: #17a2b8; color: white; padding: 2px 5px; border-radius: 3px;">Details</span> <span style="background-color: #dc3545; color: white; padding: 2px 5px; border-radius: 3px;">Delete</span>
1	My first Sats		1	<span style="background-color: #007bff; color: white; padding: 2px 5px; border-radius: 3px;">6</span> <span style="background-color: #ffc107; padding: 2px 5px; border-radius: 3px;">Edit</span> <span style="background-color: #17a2b8; color: white; padding: 2px 5px; border-radius: 3px;">Details</span> <span style="background-color: #dc3545; color: white; padding: 2px 5px; border-radius: 3px;">Delete</span>
2	Second Spats test		1	<span style="background-color: #007bff; color: white; padding: 2px 5px; border-radius: 3px;">6</span> <span style="background-color: #ffc107; padding: 2px 5px; border-radius: 3px;">Edit</span> <span style="background-color: #17a2b8; color: white; padding: 2px 5px; border-radius: 3px;">Details</span> <span style="background-color: #dc3545; color: white; padding: 2px 5px; border-radius: 3px;">Delete</span>
3	Third Special Test		3	<span style="background-color: #007bff; color: white; padding: 2px 5px; border-radius: 3px;">6</span> <span style="background-color: #ffc107; padding: 2px 5px; border-radius: 3px;">Edit</span> <span style="background-color: #17a2b8; color: white; padding: 2px 5px; border-radius: 3px;">Details</span> <span style="background-color: #dc3545; color: white; padding: 2px 5px; border-radius: 3px;">Delete</span>

# Q-Option Index

[Create New](#) [Parent Details](#) [Parent List](#)

**Questionnaire Title** Customer Satisfaction Survey  
**Section No** 2  
**Section Text** Second Section  
**ItemNo** 2  
**ItemText** QS2 second question willy  
**ItemHelp** QS2-QI2  
**ItemMode** 5

OptionNo	OptionText	OptionWeight	OptionHelp	
1	Yes	2	ding-dong	<a href="#">Edit</a> <a href="#">Details</a> <a href="#">Delete</a>
2	No	-1	none	<a href="#">Edit</a> <a href="#">Details</a> <a href="#">Delete</a>
3	Maybe	0	whoops	<a href="#">Edit</a> <a href="#">Details</a> <a href="#">Delete</a>

Attempt Log Viewer

KBD2 Home | Edit Quizzes Attempt Log | Users Roles User-Roles Hello ken.birch@kenbirchdesign.com! Logout

## Index

Quiz Owner	Questionnaire Title	Start Date/Time	Finish Date/Time	Grade	
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	10/02/2020 19:10:48	10/02/2020 19:11:45	0	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	07/02/2020 20:50:32	10/02/2020 18:01:52	20	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	04/02/2020 14:25:21	06/02/2020 17:22:58	11	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	30/01/2020 20:17:08	04/02/2020 18:21:12	3	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	30/01/2020 20:10:13	06/02/2020 17:17:00	11	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	30/01/2020 19:44:58	04/02/2020 18:05:43	26	<a href="#">Details</a> <a href="#">Delete</a>
ken.birch@kenbirchdesign.com	Customer Satisfaction Survey	30/01/2020 19:42:16	07/02/2020 20:37:47	19	<a href="#">Details</a> <a href="#">Delete</a>

Administrator view or Quiz Owner.

Attempt Log Details

## Details

### AttemptLog

<b>UserName</b>	ken.birch@kenbirchdesign.com		
<b>Questionnaire Title</b>	Customer Satisfaction Survey		
<b>Start Date/Time</b>	11/02/2020 12:35:44		
<b>Finish Date/Time</b>	11/02/2020 12:49:01		
<b>Grade</b>	24		
<b>Extra Info</b>	Test for doco.		

Section	Item	Response Date-Time	Response Text
1 : First Section	1 : QS1 first question	11/02/2020 12:48:53	Yes
1 : First Section	2 : QS1 Second Question	11/02/2020 12:48:53	Yes
2 : Second Section	1 : QS2 First question jimmy	11/02/2020 12:40:59	Yes
2 : Second Section	2 : QS2 second question willy	11/02/2020 12:40:59	Maybe
3 : The last Section	1 : Hello Boys	11/02/2020 12:39:49	Other: Text in here, 2
4 : Special Test	1 : My first Sats	11/02/2020 12:42:48	Opt-1
4 : Special Test	2 : Second Spats test	11/02/2020 12:42:48	option-3
4 : Special Test	3 : Third Special Test	11/02/2020 12:42:48	option-5
5 : Checkboxes	1 : Single Column Test	11/02/2020 12:44:32	Maybe
5 : Checkboxes	1 : Single Column Test	11/02/2020 12:44:32	Yes
5 : Checkboxes	2 : Dual Line	11/02/2020 12:44:32	No Understand
5 : Checkboxes	2 : Dual Line	11/02/2020 12:44:32	Yes
6 : Data Entry	1 : Enter single line text	11/02/2020 12:48:26	Text in here
6 : Data Entry	2 : Enter multi-line text	11/02/2020 12:48:26	Multiple-line text, can be put here.

[Back to List](#) [Delete](#)

Administrator view.

## Implementation Progress – Proof of Concept web-site

Friday 10 Jan 2020 – Presentation to Stakeholders

### Points Raised

Quiz-Builder improvements to User-Interface.

done

User-Admin improvement to automation for User-Role maintenance.

done

Questionnaire Display, complete Section and Item mode implementations

done

Questionnaire Display, 'other' and 'extra' options (Item 100).

done

Redirect Questionnaire 'back' to different landing pages.

done

Guest User, cut-down Quiz-Builder pages functionality.

done

Friday 7 Feb 2020 – Manager Meeting

### Points Raised

Questionnaire Display, fix bootstrap layout problem.

done

Questionnaire Display, Quiz mode finish implementation.

not started

Questionnaire Display, 'Inhibit' modes implementation to do.

done

Quiz-Builder, quiz landing page.

done

Quiz-Builder, Section WYSIWYG sub-page.

done

Response-Attempt, viewer re-write.

done

Response-Attempt, maintenance re-write.

done

Date-Time Display Template.

done

Friday 14 Feb 2020 – Delivery of Prototype Presentation

### Points Raised

**None.** Start Customer Acceptance trial.

Quiz-Builder: fix operational bug with Guest account editing.

done

Quiz-Builder: add Quiz-Edit helpers for Section and Item mode fields.

done

Quiz-Builder: fix bug Guest editing of quiz user-name field.

done

Quiz-Builder: Section, Item and Option; auto-numbering and re-numbering.

not started

Friday 28 Feb 2020 – Final Delivery and Payment

## Outstanding Tasks

### Management Metrics

All – on hold.

### Response Downloads

All – on hold

### Auto-Completion Regime

All – on hold